THE BURGESS HILL ACADEMY

HOME LEARNING PACK

YEAR 9

Believe in your best

CONTENTS

HOW TO USE THIS BOOKLET

In this booklet you will find a menu of tasks related to the subjects and topics that you study. There are opportunities for you to revise material you have previously studied, practice skills that you have learned in class and sometimes learn something new.

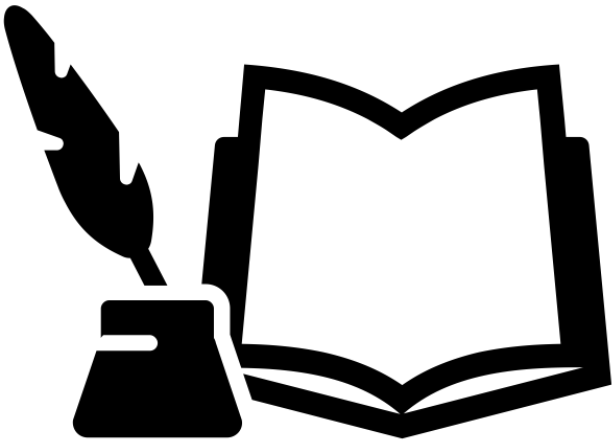
As a minimum you will a pen and some paper to complete these tasks. If you need these, please collect from the reception desk at the academy. For some of the mind-mapping tasks you might wish to use coloured pens or pencils but they are not essential. Some tasks may ask you to create packs of flashcards. You can use any kind of paper or card for this but don't worry if you don't have enough, just choose another task.

While you are not in school **you should follow your normal school timetable** and complete an hour of work for each hour you would normally be studying that subject. You may find that, without the support of your teacher you complete tasks more slowly than you would do in a lesson.

If you get really stuck on something, move on to the next task and/or seek help from the internet or by e-mailing your teacher if possible.

ENGLISH LITERATURE

Work your way through the reading and comprehension questions on the following pages



For your English work you will be reading and completing activities on 'An Inspector Calls'.

Act One, Part 1: Celebrating the engagement (pp. 1–7)

QUICK TEST

1 Which of these are **TRUE** statements about this scene, and which are **FALSE**? Write **'T'** or **'F'** in the boxes:

a) The stage directions indicate that the Birling family are warm hearted and loving. ☐

b) We are told that Mr Birling is of a higher social class than his wife. ☐

c) Mr Birling is pleased that Gerald is to become part of the family. ☐

d) Sheila reminds Gerald that he neglected her last summer. ☐

e) Eric is slightly drunk at the dinner party. ☐

f) Mrs Birling is disappointed with Sheila's engagement ring. ☐

g) Mr Birling is concerned that there will soon be trouble with the workforce. ☐

THINKING MORE DEEPLY

2 Write **one** or **two sentences** in response to each of these questions:

a) What do you learn about the social position of the Birling family?

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b) What impression do we get of Sheila and Gerald's relationship?

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c) What do we learn about Eric from his behaviour at the dinner party?

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Read back through Mr Birling's speech in Act 1:

Birling: I'm delighted about this engagement and I hope it won't be too long before you're married. And I want to say this. There's a good deal of silly talk about these days – but – and I speak as a hard-headed business man, who has to take risks and know what he's about – I say, you can ignore all this silly pessimistic talk. When you marry, you'll be marrying at a very good time. Yes, a very good time – and soon it'll be an even better time. Last month, just because the miners came out on strike, there's a lot of wild talk about possible labour trouble in the near future. Don't worry. We've passed the worst of it. We employers at last are coming together to see that our interests – and the interests of capital – are properly protected. And we're in for a time of steadily increasing prosperity.

Gerald: I believe you're right, sir.

Eric: What about war?

Birling: Glad you mentioned it, Eric. I'm coming to that. Just because the kaiser makes a speech or two, or a few german officers have too much to drink and begin taking nonsense, you'll hear some people say that war's inevitable. And to that I say – fiddlesticks! The germans don't want war. Nobody wants war, except some half-civilized folks in the Balkans. And why? There's too much at stake these days. Everything to lose and nothing to gain by war.

Eric: Yes, I know – but still -

Birling: Just let me finish, Eric. You've a lot to learn yet. And I'm taking as a hard headed, practical man of business. And I say there isn't a chance of war. The world's developing so fast that it'll make war impossible. Look at the progress we're making. In a year or two we'll have aeroplanes that will be able to go anywhere. And look at the way the auto-mobile's making headway – bigger and faster all the time. And then ships. Why, a friend of mine went over this new liner last week – the titanic – she sails next week – forty-six thousand eight hundred tons – new york in five days – and every luxury – and unsinkable, absolutely unsinkable. That's what you've got to keep your eye on, facts like that, progress like that – and not a few german officers taking nonsense and a few scaremongers here making a fuss about nothing. Now you three young people, just listen to this – and remember what I'm telling you now. In twenty or thirty year's time – let's say, in 1940 – you may be giving a little party like this – your son or daughter might be getting engaged – and I tell you, by that time you'll be living in a world that'll have forgotten all these capital versus labour agitations and all these silly little war scares. There'll be peace and prosperity and rapid progress everywhere – except of course in russia, which will always be behindhand naturally.

Mrs Birling: Arthur!

// *has Mrs Birling shows signs of interrupting.*//

Birling: Yes, my dear, I know – I'm talking too much. But you youngsters just remember what I Said. We can't let these Bernard Shaws and H.G.Wellses do all the talking. We hard-headed practical business men must say something sometime. And we don't guess – we've had experience - and we know.

Mrs Birling. (*rising. The others rise*) Yes, of course, dear. Well don't keep Gerald in here too long. Eric – I want you a minute.

// *she and* Sheila *and* Eric *go out*. Birling *and* Gerald *sit down again.*//

EXAM PREPARATION: WRITING ABOUT ATTITUDES AO3

Reread Mr Birling's monologues (speeches) (pp. 6–7) from *'There's a good deal of silly talk'* to *'which will always be behindhand naturally.'*

Question: How do Mr Birling's comments help you to understand attitudes among many of the wealthy before the First World War?

Think about:

- How he regards himself and those in his position
- What he thinks the future will hold

❸ Complete this table:

Point/detail	Evidence	Effect or explanation
1: *Mr Birling believes the powerful and wealthy should protect their position.*	*'We employers at last are coming together to see that our interests … are properly protected.'*	*His comments imply that he disregards the workforce he employs.*
2: *He likes to speak at length and expects to be listened to.*		
3: *He is confident that future technology will bring prosperity.*		

❹ Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

⑤ Now, choose **one** of your **other points** and write it out as another **paragraph** here:

PROGRESS LOG [tick the correct box] Needs more work ☐ Getting there ☐ Under control ☐

Read through the next section of the play:

Birling: Cigar?

Gerald: No, thanks. Can't really enjoy them.

Birling: (*taking one himself*) Ah, you don't know what you're missing. I like a good cigar. (*indicating decanter*.) help yourself.

Gerald: Thank you.

// Birling lights his cigar and Gerald, who had lit a cigarette, helps himself to port, then pushes the decanter to Birling.//

Birling: Thanks. (*confidentially*.) by the way, there's something I'd like to mention – in strict confidence – while we're by ourselves. I have an idea that your mother – lady croft – while she doesn't object to my girl – feels you might have done better for yourself socially -

// Gerald, *rather embarrassed, begins to murmur some dissent, but* Birling *checks him*.//

no, Gerald, that's all right. Don't blame her. She comes from an old country family – landed people and so forth – and so it's only natural. But what I wanted to say is – there's a fair chance that I might find my way into the next honours list. Just a knighthood, of course.

Gerald: Oh – I say – congratulations!

Birling: Thanks, but it's a bit too early for that. So don't say anything. But I've had a hint or two. You see, I was lord mayor here two years ago when royalty visited us. And I've always been regarded as a sound useful party man. So – well – I gather there's a very good chance of a knighthood – so long as we behave ourselfs, don't get into the police court or start a scandal – eh? (*laughs complacently*.)

Gerald: (*laughs*) You seem to be a nice well-behaved family -

Birling: We think we are -

Gerald: So if that's the only obstacle, sir , I think you might as well accept my congratulations now.

Birling: No, no, I couldn't do that. And don't say anything yet.

Gerald: Not even to my mother? I know she'd be delighted.

Birling: Well, when she comes back, you might drop a hint to her. And you can promise her that we'll try to keep out of trouble during the next few months.

//*they both laugh.* Eric *enters*//

Eric: What's the joke? Started telling stories?

Birling: No. want another glass of port?

Eric: (*sitting down*) Yes, please. (*takes decanter and helps himself*.) mother says we mustn't stay too long. But I don't think it matters. I left'em talking about clothes again. You'd think a girl had never any clothes before she gets married. Women are potty about 'em.

Birling: Yes, but you've got to remember, my boy, that clothes mean something quite different to a woman. Not just something to wear – and not only something to make 'em look prettier – but – well, a sort of sign or token of their self-respect.

Gerald: That's true.

Eric: (*eagerly*) Yes, I remember – (*but he checks himself*.)

Birling: Well, what do you remember?

Eric: (*confused*) Nothing.

Birling: Nothing?

Gerald: (*amused*) Sounds a bit fishy to me.

Birling: (*taking it in the same manner*) Yes, you don't know what some of these boys get up to nowadays. More money to spend and time to spare than I had when I was Eric's age. They worked us hard in those days and kept us short of cash. Thought even then – we broke out and had a bit of fun sometimes.

Gerald: I'll bet you did.

Birling: (*solemnly*) But this is the point. I don't want to lecture you two young fellows again. But what so many of you don't seem to understand now, when things are so much easier, is that a man has to make his own way – has to look after himself – and his family too, of course, when he has one – and so long as he does that he won't come to much harm. But the way some of these cranks talk and write now, you'd think everybody has to look after everybody else, as if we were all mixed up together like bees in a hive – community and all that nonsense. But take my word for it, you youngsters – and I've learnt in the good hard school of experience – that a man has to mind his own business and look after himself and his own – and -

// *we hear the sharp ring of a door bell. Birling stops to listen*.//

QUICK TEST

❶ Choose the correct answer to **finish the statement** and tick the box:

a) Mr Birling held the position of: Chief Constable ☐ Lord Mayor ☐ Member of Parliament ☐

b) Mr Birling expects to receive a: knighthood ☐ royal visit ☐ visit from Lady Croft ☐

c) Gerald and Mr Birling joke about a: possible death ☐ possible scandal ☐ visit from the Inspector ☐

d) Mrs Birling and Sheila are discussing: Lady Croft ☐ clothes ☐ Eric ☐

e) Eric arouses curiosity when he: refuses to join the men for port ☐ claims not to remember something ☐ leaves by the back door ☐

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) How do we know that Mr Birling feels inferior to Gerald's family?

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b) How does Gerald behave with Mr Birling in this scene?

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c) How can we tell there is something wrong with Eric before the Inspector arrives?

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Reread Mr Birling's speech (p. 8) from *'I was Lord Mayor here'* to *'chance of a knighthood'* and his speech (pp. 9–10) from *'I don't want to lecture'* to *'and look after himself and his own'.*

Question: What do Mr Birling's comments reveal about his character?

Think about:

- What he says about himself and what he expects
- What he says about the community

❸ Complete this table:

Point/detail	Evidence	Effect or explanation
1: *He believes he will be knighted (for contributions to the community).*	*'I've always been regarded as a sound useful party man.'*	*His comments suggest that a knighthood will depend on his support for the right people and political party.*
2: *He believes in self-reliance.*		
3: *He has no respect for the community.*		

❹ Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

❺ Now, choose **one** of your **other points** and write it out as another **paragraph** here:

Read the next part of the play:

Edna: Please, sir, an inspector's called.

Birling: An inspector? What kind of inspector?

Edna: A police inspector. He says his name's inspector Goole.

Birling: Don't know him. Does he want to see me?

Edna: Yes, sir. He says it's important.

Birling: All right, Edna. Show him in here. Give us some more light.

// Edna *does, then goes out*.//

I'm still on the bench. It may be something about a warrant.

Gerald: (*lightly*) Sure to be. Unless Eric's been up to something. (*nodding confidentially to Birling*.) and that would be awkward, wouldn't it?

Birling: (*humorously*) Very.

Eric: (*who is uneasy, sharply*) Here, what do you mean?

Gerald: (*lightly*) Only something we were talking about when you were out. A joke really.

Eric: (*still uneasy*) Well, I don't think it's very funny.

Birling: (*sharply, staring at him*) what's the matter with you?

Eric: (*defiantly*) Nothing.

Edna: (*opening door, and announcing*) Inspector Goole.

// the inspector *enters, and* Edna *goes, closing door after her. The* inspector *need not be a big man but he creates at once an impression of massiveness, solidity and purposefulness. He is a man in his fifties, dressed in a plain darkish suit of the period. He speaks carefully, weightily, and has a disconcerting habit of looking hard at the person he addresses before actually speaking.//*

Inspector: Mr Birling?

Birling: Yes. Sit down inspector.

Inspector: (*sitting*) Thank you, sir.

Birling: Have a glass of port – or a little whisky?

Inspector: No, thank you, Mr Birling. I'm on duty.

Birling: You're new, aren't you?

Inspector: Yes, sir. Only recently transferred.

Birling: I thought you must be. I was an alderman for years – and lord mayor two years ago – and I'm still on the bench – so I know the brumley police offices pretty well – and I thought I'd never seen you before.

Inspector: Quite so.

Birling: Well, what can I do for you? Some trouble about a warrant?

Inspector: No, Mr Birling.

Birling: (*after a pause, with a touch of impatience*) Well, what is it then?

Inspector: I'd like some information, if you don't mind, Mr Birling. Two hours ago a young woman died on the infirmary. She'd been taken there this afternoon because she'd swallowed a lot of strong disinfectant. Burnt her inside out, of course.

Eric: (*involuntarily*) My god!

Inspector: Yes, she was in great agony. They did everything they could for her at the infirmary, but she died. Suicide, of course.

Birling: (*rather impatiently*) Yes, yes. Horrid business. But I don't understand why you should come here, inspector –

inspector: (*cutting through, massively*) I've been round to the room she had, and she'd left a letter there and a sort of diary. Like a lot of these young women who get into various kinds of trouble, she'd used more than one name. But her original name – her real name – was Eva Smith.

Birling: (*thoughtfully*) Eva Smith?

Inspector: Do you remember her, Mr Birling?

Birling: (*slowly*) No – I seem to remember hearing that name – Eva Smith – somewhere. But it doesn't convey anything to me. And I don't see where I come into this.

Inspector: She was employed in your works at one time.

Birling: Oh – that's it, is it? Well, we've several hundred young women there, y'know, and they keep changing.

Inspector: This young woman, Eva Smith, was out of the ordinary. I found a photograph of her in her lodgings. Perhaps you'd remember her from that.

// *inspector takes a photograph, about postcard size, out of his pocket and goes to* Birling. *Both* Gerald *and* Eric *rise to have a look at the photograph, but the inspector interposes himself between them and the photograph. They are surprised and rather annoyed.* Birling *stares hard, and with recognition, at the photograph, which the* inspector *then replaces in his pocket.*//

Gerald: (*showing annoyance*) Any particular reason why I shouldn't see this girl's photograph, inspector?

Inspector: (*coolly, looking hard at him*) There might be.

Eric: And the same applies to me, I suppose?

Inspector: Yes.

Gerald: I can't imagine what it could be.

Eric: Neither can I.

Birling: And I must say, I agree with them, inspector.

Inspector: It's the way I like to go to work. One person and one line of inquiry at a time. Otherwise, there's a muddle.

Birling: I see. Sensible really. (*moves restlessly, then turns.*) you've had enough of that port, Eric.

// *the inspector is watching* Birling *and now* Birling *notices him*.//

Inspector: I think you remember Eva Smith now don't you. Mr Birling?

Birling: Yes, I do. She was one of my employees and then I discharged her.

Eric: Is that why she committed suicide? When was this, father?

Birling: Just keep quiet, Eric, and don't get excited. This girl left us nearly two years ago. Let me see – it must have been in the early autumn of nineteen-ten.

Inspector: Yes. End of September, nineteen-ten.

Birling: That's right.

Gerald: Look here, sir. Wouldn't you rather I was out of this?

Birling: I don't mind your being here, Gerald. And I'm sure you've no objection, have you, inspector? Perhaps I ought to explain first that this is Mr Gerald croft – the son of sir George croft – you know, crofts limited.

Inspector: Mr Gerald croft, eh?

Birling: Yes. Incidentally we've been modestly celebrating his engagement to my daughter, Sheila.

Inspector: I see. Mr croft is going to marry miss Sheila Birling?

Gerald: (*smiling*) I hope so.

Inspector: (*gravely*) Then I'd prefer you to stay.

Gerald: (*surprised*) Oh – all right.

Birling: (*somewhat impatiently*) Look – there's nothing mysterious – or scandalous – about this business – at least not so far as I'm concerned. It's perfectly straightforward case, and as it happened more than eighteen months ago – nearly two years ago – obviously it has nothing whatever to do with the wretched girl's suicide. Eh, inspector?

Inspector: No, sir. I can't agree with you there.

Birling: Why not?

Inspector: Because what happened to her then may have determined what happened to her afterwards, and what happened to her afterwards may have driven her to suicide. A chain of events.

Birling: Oh well – put like that, there's something in what you say. Still, I can't accept any responsibility. If we were all responsible for everything that happened to everybody we'd had anything to do with, it would be very awkward, wouldn't it?

Inspector: Very awkward.

Birling: We'd all be in an impossible position, wouldn't we?

Eric: By jove, yes. And as you were saying, dad, a man has to look after himself-

Birling: Yes, well, we needn't go into all that.

Inspector: Go into what?

Birling: Oh – just before you came – I'd been giving these young men a little good advice. Now – about this girl, Eva Smith. I remember her quite well now. She was a lively good-looking girl – country-bred, I fancy – and she'd been working in one of our machine shops for over a year. A good worker too. In fact, the foreman there told me he was ready to promote her into what we call a leading operator – head of a small group of girls. But after they came back from their holidays that august, they were all rather restless, and they suddenly decided to ask for more money. They were averaging about twenty-two and six, which was neither more nor less than is paid generally in our industry. They wanted the rates raised so that they could average about twenty-five shillings a week. I refused, of course.

Inspector: Why?

Birling: (*surprised*) Did you say 'why?'?

Inspector: Yes. Why did you refuse?

Birling: Well, inspector, I don't see that it's any concern of yours how I choose to run my business. Is it now?

Inspector: It might be, you know.

Birling: I don't like that tone.

Inspector: I'm sorry. But you asked me a question.

Birling: And you asked me a question before that, a quite unnecessary question too.

Inspector: It's my duty to ask questions.

Birling: Well it's my duty to keep labour costs down. And if I'd agreed to this demand for a new rate we'd have added about twelve per cent to our labour costs. Does that satisfy you? So I refused. Said I couldn't consider it. We were paying the usual rates and if they didn't like those rates, they could go and work somewhere else. It's a free country, I told them.

Eric: It isn't if you can't go and work somewhere else.

Inspector: Quite so.

Birling: (*to Eric*) Look – just you keep out of this. You hadn't even started in the works when this happened. So they went on strike. That didn't last long, of course.

Gerald: Not if it was just after the holidays. They'd be all broke – if I know them.

Birling: Right, Gerald. They mostly were. And so was the strike, after a week or two. Pitiful affair. Well, we let them all come back – at the old rates – except the four or five ring-leaders, who'd started the trouble. I went down myself and told them to clear out. And this girl. Eva Smith, was one of them, she'd had a lot to say – far too much – so she had to go.

Gerald: You couldn't have done anything else.

Eric: He could. He could have kept her on instead of throwing her out. I call it tough luck.

Birling: Rubbish! If you don't come down sharply on some of these people, they'd soon be asking for the earth.

Gerald: I should say so!

Inspector: They might. But after all it's better to ask for the earth than to take it.

Birling: (*staring at the inspector*) What did you say your name was, inspector?

Inspector: google. G. double O-L-E.

Birling: How do you get on with our chief constable, colonel Roberts?

Inspector: I don't see much of him.

Birling: Perhaps I ought to warn you that he's an old friend of mine, and that I see him fairly frequently. We play golf together sometimes up at the west brumley.

Inspector: (*dryly*) I don't play golf.

Birling: I didn't suppose you did.

Eric: (*bursting out*) Well, I think it's a dam' shame.

Inspector: No, I've never wanted to play.

Eric: No, I mean about this girl – Eva Smith. Why shouldn't they try for higher wages? We try for the highest possible prices. And I don't see why she should have been sacked just because she'd a bit more spirit than the others. You said yourself she was a good worker. I'd have let her stay.

Birling: (*rather angrily*) Unless you brighten your ideas, you'll never be in a position to let anybody stay or to tell anybody to go. It's about time you learnt to face a few responsibilities. That's something this public-school-and-varsity life you've had doesn't seem to teach you.

Eric: (*sulkily*) Well, we don't need to tell the inspector all about that, do we?

Birling: I don't see we need to tell the inspector anything more. In fact, there's nothing I can tell him. I told the girl to clear out, and she went. That's the last I heard of her. Have you any idea what happened to her after that? Get into trouble? Go on the streets?

Inspector: (*rather slowly*) No, she didn't exactly go on the streets.

Act One, Part 3: An inspector interrupts (pp. 11–16)

QUICK TEST

❶ Complete this **gap-fill** paragraph about the scene, adding the **correct or suitable information**:

We first meet Inspector ..... when Edna, the maid, announces him. Although not a ..... man, he is an imposing figure. Mr Birling tries to impress the Inspector by pointing out that he was an alderman and also Lord Mayor and still sits on the ..... , meaning he is a magistrate. The Inspector explains that a girl died in the Infirmary after swallowing strong ..... . A letter and a diary were found in her room. She had more than one name, but her original name was ..... and she worked at Mr Birling's ..... . The Inspector shows Mr Birling a ..... of the girl. Eventually Mr Birling remembers that he sacked her because of her part in a ..... for higher wages.

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) Why do you think Mr Birling wanted to impress the Inspector?

.....

.....

b) What does Gerald think about Eva Smith's sacking?

c) What does the Inspector mean by 'a chain of events' (p. 14)?

EXAM PREPARATION: WRITING ABOUT DIFFERENT POINTS OF VIEW AO1

Reread the dialogue (p. 15) from '***Inspector:*** *It's my duty to ask questions*' to '***Inspector:*** *... to ask for the earth than to take it.*'

Question: What different points of view do Mr Birling and Eric hold about Eva Smith's sacking?

Think about:

- What each character says
- What each character cares about

3 Complete this table:

Point/detail	Evidence	Effect or explanation
1: *Mr Birling cares about the profit his company makes.*	*'it's my duty to keep labour costs down'.*	*His comments tell us that he values the profit he makes more than a good wage for his workers.*
2: *Eric is sympathetic to the hardship Eva Smith faced.*		
3: *We can further compare Mr Birling and Eric's points of view about taking responsibility for the workers.*		

4 Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

5 Now, choose **one** of your **other** points and write it out as another **paragraph** here:

Read the next part of the play:

//Sheila *has now entered*//

Sheila: (*gaily*) What's this about streets? (*noticing the inspector*.) Oh – sorry. I didn't know. Mummy sent me in to ask you why you didn't come along to the drawing-room.

Birling: We shall be along in a minute now. Just finishing.

Inspector: I'm afraid not.

Birling: (*abruptly*) There's nothing else, y'know. I've just told you that.

Sheila: What's all this about?

Birling: Nothing to do with you, Sheila. Run along.

Inspector: No, wait a minute, Miss Birling.

Birling: (*angrily*) Look here, inspector, I consider this uncalled-for and officious. I've half a mind to report you. I've told you all I know – and it doesn't seem to me very important – and now there isn't the slightest reason why my daughter should be dragged into this unpleasant business.

Sheila: (*coming father in*) What business? What's happening?

Inspector: (*impressively*) I'm a police inspector, miss Birling. This afternoon a young woman drank some disinfectant, and died, after several hours of agony, tonight in the infirmary.

Sheila: Oh – how horrible! Was it an accident?

Inspector: No. she wanted to end her life. She felt she couldn't go on any longer.

Birling: Well, don't tell me that's because I discharged her from my employment nearly two years ago.

Eric: That might have started it.

Sheila: Did you, dad?

Birling: Yes. The girl had been causing trouble in the works. I was quite justified.

Gerald: Yes, I think you were. I know we'd have done the same thing. Don't look like that Sheila.

Sheila: (*rather distressed*) Sorry! It's just that I can't help thinking about this girl – destroying herself so horribly – and I've been so happy tonight. Oh I wish you hadn't told me. What was she like? Quite young?

Inspector: Yes. Twenty-four.

Sheila: Pretty?

Inspector: She wasn't pretty when I saw her today, but she had been pretty – very pretty.

Birling: That's enough of that.

Gerald: And I don't really see that this inquiry gets you anywhere, inspector. It's what happened to her since she left Mr Birling's works that is important.

Birling: Obviously. I suggested that some time ago.

Gerald: And we can't help you there because we don't know.

Inspector: (*slowly*) Are you sure you don't know.

// *He looks at* Gerald, *then at* Eric, *then at* Sheila.//

Birling: And are you suggesting now that one of them knows something about this girl?

Inspector: Yes.

Birling: You didn't come here just to see me, then?

Inspector: No.

// *the other four exchange bewildered and perturbed glances*.//

Birling: (*with marked change of tone*) Well, of course, if I'd known that earlier, I wouldn't has called you officious and talked about reporting you. You understand that, don't you, inspector? I thought that – for some reason best known to yourself – you were making the most of this tiny bit of information I could give you. I'm sorry. This makes a difference. You sure of your facts?

Inspector: Some of them – yes.

Birling: I can't think they can be of any great consequence.

Inspector: The girl's dead though.

Sheila: What do you mean by saying that? You talk as if we were responsible--

Birling: (*cutting in*) Just a minute, Sheila. Now , inspector, perhaps you and I had better go and talk this over quietly in a corner--

Sheila: (*cutting in*) Why should you? He's finished with you. He says it's one of us now.

Birling: Yes, and I'm trying to settle it sensibly for you.

Gerald: Well, there's nothing to settle as far as I'm concerned. I've never known an Eva Smith.

Eric: Neither have I.

Sheila: Was that her name? Eva Smith?

Gerald: Yes.

Sheila: Never heard it before.

Gerald: So were are you now inspector?

Inspector: Where I was before, Mr croft. I told you – that like a lot of these young women, she'd used more than one name. She was still Eva Smith when Mr Birling sacked her – for wanting twenty-five shillings a week instead of twenty-two and six. But after that she stopped being Eva Smith. Perhaps she'd had enough of it.

Eric: Can't blame her.

Sheila: (*to* Birling) I think it was a mean thing to do. Perhaps that spoilt everything for her.

Birling: Rubbish! (*to* inspector.) Do you know what happened to this girl after she left my works?

Inspector: Yes. She was out of work for the next two months. Both her parents were dead, so that she'd no home to go back to. And she hadn't been able to save much out of what Birling and company had paid her. So that after two months, with no work, no money coming in, and living in lodgings, with no relatives to help her, few friends, lonely, half-starved, she was feeling desperate.

Sheila: (*warmly*) I should think so. It's a rotten shame.

Inspector: There are a lot of young women living that sort of existence in every city and big town in this country, miss Birling. If there weren't, the factories and warehouses wouldn't know where to look for cheap labour. Ask your father.

Sheila: But these girls aren't cheap labour – they're people.

Inspector: (*dryly*) I've had that notion myself from time to time. In fact, I've thought that it would do us all a bit of good if sometimes we tried to put ourselves in the place of these young women counting their pennies, in their dingy little back bedrooms.

Sheila: Yes, I expect it would. But what happened to her then?

Inspector: She had what seemed to her a wonderful stroke of luck. She was taken on in a shop – and a good shop too – Milwards.

Sheila: Milwards! We go there – in fact, I was there this afternoon – (*archly to* Gerald) for your benefit.

Gerald: (*smiling*) Good!

Sheila: Yes, she was a lucky to get taken on at Milwards.

Inspector: That's what she thought. And it happened that at the beginning of December that year – nineteen-ten – there was a good deal of influenza about and Milwards suddenly found themselves short handed. So that gave her a chance. It seems she liked working there. It was nice

change from a factory. She enjoyed being among pretty clothes, I've no doubt. And now she felt she was making a good fresh start. You can imagine how she felt.

Sheila: Yes, of course.

Birling: And then she got herself into trouble there, I suppose?

Inspector: After about a couple of months, just when she felt she was settling down nicely, they told her she'd have to go.

Birling: Not doing her work properly?

Inspector: there was nothing wrong with the way she was doing her work. They admitted that.

Birling: There must have been something wrong.

Inspector: All she knew was – that a customer complained about her – and so she had to go.

Sheila: (*staring at him, agitated*) When was this?

Inspector: (*impressively*) At the end of January – last year.

Sheila: What – what did this girl look like?

Inspector: If you'll come over here, I'll show you.

// He moves nearer a light – perhaps standard lamp – and she crosses to him. He produces the photograph. She looks at it closely, recognizes it with a little cry, gives a half-stifled sob, and then runs out. The inspector puts the photograph back in his pocket and stares speculatively after her. The other three stare in amazement for a moment.//

Birling: What's the matter with her?

Eric: She recognized her from the photograph, didn't she?

Inspector: Yes.

Birling: (*angrily*) Why the devil do you want to go upsetting the child like that?

Inspector: I didn't do it. She's upsetting herself.

Birling: Well – why – why?

Inspector: I don't know – yet. That's something I have to find out.

Birling: (*still angrily*) Well – if you don't mind – I'll find out first.

Gerald: Shall I go after her.

Birling: (*moving*) No, leave this to me. I must also have a word with my wife – tell her what's happening. (*turns at the door, staring at the* inspector *angrily*.) We were having a nice family celebration tonight. And a nasty mess you've made of it now, haven't you?

// *Enter* Sheila, *who looks as if she's been crying.*//

Inspector: Well, Miss Birling?

Sheila: (*coming in, closing the door*) You knew it was me all the time, didn't you?

Inspector: I had an idea it might be – from something the girl herself wrote.

Sheila: I've told my father – he didn't seem to think it amounted to much – but I felt rotten about it at the time and now I feel a lot worse. Did it make much difference to her?

Inspector: Yes, I'm afraid it did. It was the last real steady job she had. When she lost it – for no reason that she could discover – she decided she might as well try another kind of life.

Sheila: (*miserably*) So I'm really responsible?

Inspector: No, not entirely. A good deal happened to her after that. But you're partly to blame. Just as your father is.

Eric: But what did Sheila do?

Sheila: (*distressed*) I went to the manager at Milwards and I told him that if they didn't get rid of that girl, I'd never go near the place again and I'd persuade mother to close our account with them.

Inspector: And why did you do that?

Sheila: Because I was in a furious temper.

Inspector: And what had this girl done to make you lose your temper.

Sheila: When I was looking at myself in the mirror I caught sight of her smiling at the assistant, and I was furious with her. I'd been in a bad temper anyhow.

Inspector: And was it the girls fault?

Sheila: No, not really. It was my own fault. (*suddenly, to* Gerald) All right, Gerald, you needn't look at me like that. At least, I'm trying to tell the truth. I expect you've done things you're ashamed of too.

Gerald: (*surprised*) Well, I never said I hadn't. I don't see why –

inspector:(*cutting in*) Never mind about that. You can settle that between you afterwards. (*to* Sheila.) What happened?

Sheila: I'd gone in to try something on. It was an idea of my own – mother had been against it, and so had the assistant – but I insisted. As soon as I tried it on, I knew they'd been right. It just didn't suit me at all. I looked silly in the thing. Well, this girl had brought the dress up from the workroom, and when the assistant – miss Francis – had asked her something about it, this girl, to show us what she meant, had held the dress up, as if she was wearing it. And it just suited her. She was the right type for it, just as I was the wrong type. She was very pretty too – with big dark eyes – and that didn't make it any better. Well, when I tried the thing on and looked at myself and knew that it was all wrong, I caught sight of this girl smiling at miss Francis – as if to say: 'doesn't she look awful' – and I was absolutely furious. I was very rude to both of them, and then I went to the manager and told him that this girl had been very impertinent – and – and – (*she almost breaks down, but just controls herself*.) How could I know what would happen afterwards? If she'd been some miserable plain little creature, I don't suppose I'd have done it. But she was very pretty and looked as if she could take care of herself. I couldn't be sorry for her.

Inspector: In fact, in a kind of way, you might be said to have been jealous of her.

Sheila: Yes, I suppose so.

Inspector: And so you used the power you had, as a daughter of a good customer and also of a man well known in the town, to punish the girl just because she made you feel like that?

Sheila: Yes, but it didn't seem to be anything very terrible at the time. Don't you understand? And if I could help her now, I would---

Inspector:(*harshly*) Yes, but you can't. It's too late. She's dead.

Eric: My god, it's a bit thick, when you come to think of it----

Sheila: (*stormily*) Oh shut up, Eric. I know I know.

It's the only time I've ever done anything like that, and I'll never, never do it again to anybody. I've noticed them giving me a sort of look sometimes at Milwards – I noticed it even this afternoon – and I suppose some of them remember. I feel now I can never go there again. Oh – why had this to happen?

Inspector: (*sternly*) That's what I asked myself tonight when I was looking at that dead girl. And then I said to myself: 'well, we'll try to understand why it had to happen?' and that's why I'm here, and why I'm, not going until I know all that happened. Eva Smith lost her job with Birling and

company because the strike failed and they were determined not to have another one. At last she found another job – under what name I don't know – in a big shop, and had to leave there because you were annoyed with yourself and passed the annoyance on to her. Now she had to try something else. So first she changed her name to Daisy Renton-

Gerald: (*startled*) What?

Inspector: (*steadily*) I said she changed her name to Daisy Renton.

Gerald: (*pulling himself together*) D'you mind if I give myself a drink, Sheila?

// Sheila *merely nods, still staring at him, and he goes across to the tantalus on the sideboard for a whisky.*//

Inspector: Where is your father, Miss Birling?

Sheila: He went into the drawing room, to tell mother what was happening here. Eric, take the inspector along to the drawing-room.

// *As* Eric *moves, the inspector looks from* Sheila *to* Gerald, *then goes out with Eric.*//

Well, Gerald?

Gerald: (*trying to smile*) Well what, Sheila?

Sheila: How did you come to know this girl – Eva Smith?

Gerald: I didn't.

Sheila: Daisy renton then – it's the same thing.

Gerald: Why should I have to known her?

Sheila: Oh don't be stupid. We haven't much time. You gave yourself away as soon as he mentioned her other name.

Gerald: All right. I knew her. Let's leave it at that.

Sheila: We can't leave it at that.

Gerald: (*approaching her*) Now listen, darling--

Sheila: no, that's no use. You not only knew her but you knew her very well. Otherwise, you wouldn't look so guilty about it. When did you first get to know her?

// *he does not reply*//

Was it after she left milwards? When she changed her name, as he said, and began to lead a different sort of life? Were you seeing her last spring and summer, during that time you hardly came near me and said you were so busy? Were you?

// *he does not reply but looks at her*.//

Yes, of course you were.

Gerald: I'm sorry, Sheila. But it was all over and done with, last summer. I hadn't set eyes on the girl for at least six months. I don't come into this suicide business.

Sheila: I thought I didn't half an hour ago.

Gerald: You don't. Neither of us does. So – for god's sake – don't say anything to the inspector.

Sheila: About you and this girl?

Gerald: Yes. We can keep it from him.

Sheila: (*laughs rather hysterically*) why – you fool – he knows. Of course he knows. And I hate to think how much he knows that we don't know yet. You'll see. You'll see.

// she looks at him almost in triumph. He looks crushed. The doors slowly opens and the inspector *appears, looking steadily and searchingly at them.//*

Inspector: Well?

END OF ACT ONE

Act One, Part 4: Sheila's link in the chain (pp. 16–21)

QUICK TEST

❶ Who is each character talking **about**? Write a **name** (or names) from the list below next to each quotation:

Sheila **Eva Smith** **the Inspector** **Eric** **Gerald** **factory workers**

a) '**Birling:** … I've half a mind to report you. I've told you all I know –' (p. 17) .....

b) '**Sheila:** (*rather distressed*) Sorry! It's just that I can't help thinking about this girl –' (p. 17) .....

c) '**Gerald:** … It's what happened to her since she left Mr Birling's works that is important.' (p. 18) .....

d) '**Birling:** And are you suggesting now that one of them knows something about this girl?' (p. 18) .....

e) '**Sheila:** But these girls aren't cheap labour – they're *people*.' (p. 19) .....

f) '**Eric:** She recognized her from the photograph, didn't she?' (p. 21) .....

g) '**Birling:** (*angrily*) Why the devil do you want to go upsetting the child like that?' (p. 21) .....

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) In what way does the Inspector drive home the awfulness of Eva Smith's death?

b) How does Mr Birling's mood change when he realises that all the family might be involved with Eva Smith?

c) Why does the Inspector show the photograph to one character at a time?

EXAM PREPARATION: WRITING ABOUT SHEILA'S INVOLVEMENT AO1

Reread (pp. 19–21) from ***'Inspector:** Where I was before, Mr Croft'* to the stage directions *'The other three stare in amazement for a moment.'*

Question: In what way is Sheila involved with Eva Smith and how does she react to the knowledge?

Think about:

- What Sheila says and feels

❸ Complete this table:

Point/detail	Evidence	Effect or explanation
1: *Sheila scolds her father for sacking Eva Smith.*	*'I think it was a mean thing to do. Perhaps that spoilt everything for her.'*	*She not only feels sympathy for Eva Smith but also recognises the possible consequences of her father's actions.*
2: *Sheila begins to realise that Eva is the girl she had sacked from Milwards.*		
3: *Sheila recognises the girl in the photograph the Inspector shows her.*		

❹ Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

❺ Now, choose **one** of your **other points** and write it out as another **paragraph** here:

Act One, Part 5: Sheila's confession (pp. 21–6)

QUICK TEST

❶ Which of these are **TRUE** statements about this scene, and which are **FALSE**? Write **'T'** or **'F'** in the boxes:

a) Mr Birling exits to tell his wife what is happening. ☐

b) Gerald doesn't want to look at the photograph and refuses to do so. ☐

c) The Inspector suggests that Eric had better stay in the room. ☐

d) Sheila refuses to accept that she is partly to blame for Eva Smith's downfall. ☐

e) Sheila insists that Eva Smith made unpleasant comments in Milwards. ☐

f) The Inspector is trying to understand why Eva Smith died. ☐

g) Sheila immediately recognises that Gerald knew Daisy Renton. ☐

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) Why did Sheila have Eva Smith dismissed?

b) How can we tell in this scene that Sheila regrets what happened at Milwards?

c) What is dramatic about the ending to Act One?

EXAM PREPARATION: WRITING ABOUT THE INSPECTOR'S POWER AO2

Reread (pp. 21–3) from the stage directions *'BIRLING looks as if about to make some retort'* to *'**Inspector:** … Just as your father is.'*

Question: How is the Inspector gaining control and power over the situation?

Think about:

- What the character says and the tone he uses
- How he manages the other characters

3 Complete this table:

Point/detail	Evidence	Effect or explanation
1: *The Inspector deliberately refuses Gerald's request.*	*'Gerald: I'd like to have a look at that photograph now, Inspector.* *'Inspector: All in good time.'*	*The Inspector's tone is calm and he is increasingly in control of the situation.*
2: *He states his opinion regardless of whom he is speaking to.*		
3: *He states the consequences of Eva Smith's dismissal from Milwards.*		

4 Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

5 Now, choose **one** of your **other points** and write it out as **another paragraph** here:

Read the beginning of Act 2:

Act two

// A*t rise, scene and situation are exactly as they were at end of act one. The* Inspector *remains at the door for a few moments looking at* Sheila *and* Gerald*. Then he comes forward, leaving door open behind him.//*

Inspector: (*To Gerald*) Well?

Sheila: (*with hysterical laugh, to Gerald*) You see? What did I tell you?

Inspector What did you tell him?

Gerald (with an effort) inspector, I think miss birling ought to be excused any more of this questioning. She'd nothing more to tell you. She's had a long exciting and tiring day – we were celebrating our engagement, you know – and now she's obviously had about as much as she can stand. You heard her.

Sheila: He means that I'm getting hysterical now.

Inspector: And are you?

Sheila: probably.

Inspector: well, I don't want to keep you here. I've no more questions to ask you.

Sheila: no, but you haven't finished asking questions – have you?

Inspector: No.

Sheila: (to gerald) You see? (to inspector.) then I'm staying.

Gerald: Why should you? It's bound to be unpleasant and disturbing.

Inspector: and you think young women ought to be protected against unpleasant and disturbing things?

Gerald: if possible – yes.

Inspector: well, we know one young woman who wasn't, don't we?

Gerald: I suppose I asked for that.

Sheila : be careful you don't ask for more, gerald.

Gerald: I only ment to say to you – why stay when you'll hate it?

Sheila: It can't be any worse for me than it has been. And it might be better.

Gerald: (*bitterly*) I see.

Sheila: what do you see?

Gerald: You've been through it – and now you want to see somebody else put through it.

Sheila: (*bitterly*) so that's what you think I'm like. I'm glad I realized it in time, Gerald.

Gerald: no, no, I didn't mean -

Sheila: (*cutting in*) Yes, you did. And if you'd really loved me, you couldn't have said that. You listened to that nice story about me. I got that girl sacked from Milwards. And now you've made up your mind I must obviously be a selfish, vindictive creature.

Gerald: I neither said that nor even suggested it.

Sheila: Then why say I want to see somebody else put through it? That's not what I mean at all.

Gerald: All right then, I'm sorry.

Sheila: Yes, but you don't believe me. And this is just the wrong time not to believe me.

Inspector: (*massively taking charge*) allow me, miss Birling. (to Gerald.) I can tell you why miss Birling wants to stay on and why she says it might be better for her if she did. A girl died tonight. A pretty, lively sort of girl, who never did anybody any harm. But she died in misery and agony – hating life –

Sheila: (*Distressed*) don't please – I know, I know – and I can't stop thinking about it –

Inspector: (*Ignoring this*) now miss Birling has just been made to understand what she did to this girl. She feels responsible. And if she leaves us now, and doesn't hear any more, then she'll feel she's entirely to blame, she'll be alone with her responsibility, the rest of tonight, all tomorrow, all the next night--

Sheila: (*eagerly*) Yes, that's it. And I know I'm to blame – and I'm desperately sorry – but I can't believe – I won't believe – it's simply my fault that in that in the end she – she committed suicide. That would be too horrible –

Inspector: (*sternly to them both*) You see, we have to share something. If there's nothing else, we'll have to share our guilt.

Sheila: (staring at him) yes. That's true. You know. (she goes close to him, wonderingly.) I don't understand about you.

Inspector: (*calmly*) there's no reason why you should.

// he regards her calmly while she stares at him wonderingly and dubiously. Now Mrs Birling. Enters, briskly and self-confidently, quite out of key with the little scene that has just passed. Sheila feels this at once.//

Mrs Birling: (*smiling social*) Good evening inspector.

Inspector: good evening, madam.

Mrs Birling: (*same easy tone*) I'm Mrs Birling, y'know. My husband has just explained why you're here, and while we'll be glad to tell you anything you want to know, I don't think we can help you much.

Sheila: No. mother – please!

Mrs Birling: (*affecting great surprise*) what's the matter, Sheila?

Sheila:(*hesitantly*) I know it sounds silly--

Mrs Birling: what does?

Sheila: you see, I feel you're beginning all wrong. And I'm afraid you'll say or do something that you'll be sorry for afterwards.

Mrs Birling: I don't know what you're talking about, sheila.

Sheila: we all started like that – so confident, so pleased with ourselves until he began asking us questions.

// *Mrs Birling looks from sheila to the inspector*.//

Mrs Birling: you seem to have made a great impression on this child, inspector.

Inspector: (*coolly*) we often do on the young ones. They're more impressionable.

//*He and Mrs Birling look at each other for a moment. Then Mrs Birling turns to sheila again*//

Mrs Birling: you're looking tired, dear. I think you ought to go to bed – and forget about this absurd business. You'll feel better in the morning.

Sheila: mother, I couldn't possibly go. Nothing could be worse for me. We've settled all that. I'm staying here until I know why that girl killed herself.

Mrs Birling: nothing but morbid curiosity.

Sheila: no it isn't.

Mrs Birling: please don't contradict me like that. And in any case I don't suppose for a moment that we can understand why the girl committed suicide. Girls of that class--

Sheila:(*urgently, cutting in*) mother, don't – please don't. For your own sake, as well as ours, you mustn't--

Mrs Birling: (*annoyed*) mustn't – what? Really, sheila!

Sheila: (*slowly, carefully now*) you mustn't try to build up a kind of wall between us and that girl. If you do, then the inspector will just break it down. And it'll be all the worse when he does.

Mrs Birling: I don't understand you. (*to inspector.*) Do you?

Inspector: yes. And she'd right.

Mrs Birling: (*haughtily*) I beg your pardon!

Inspector: (*very plainly*) I said yes – I do understand her. And she's right.

Mrs Birling: that – I consider – is a trifle impertinent, inspector.

// *sheila gives short hysterical laugh*//

now, what is it, sheila?

Sheila: I don't know. Perhaps it's because impertinent is such a silly word.

Mrs Birling: in any case....

Sheila: but, mother, do stop before it's too late.

Mrs Birling: if you mean that the inspector will take offence-

inspector: (*cutting in, clamly*) no, no. I never take offence.

Mrs Birling: i'm glad to hear it. Though I must add that it seems to me that we have more reason for taking offence.

Inspector: let's leave offence out of it, shall we?

Gerald: I think we'd better.

Sheila: so do I.

Mrs Birling: (*rebulking them*) I'm talking to the inspector now, if you don't mind. (*to inspector, rather grandly*.) I realize that you may have to conduct some sort of inquiry, but I must say that so far you seem to be conducting in a rather peculiar and offensive manner. You know of course that my husband was lord mayor only two years ago and that he's still a magistrate--

Gerald: (*cutting, rather impatiently*) Mrs Birling, the inspector knows all that. And I don't think it's a very good idea to remind him--

Sheila: (*cutting in*) It's crazy. Stop it, please, mother.

Inspector: (*imperturbable*) Yes. Now what about Mr Birling?

Mrs Birling: He's coming back in a moment. He's just talking to my son, Eric, who seems to be in an excitable silly mood.

Inspector: What's the matter with him?

Mrs Birling: Eric? Oh – I'm afraid he may have had rather too much to drink tonight. We were having a little celebration here--

inspector: (*cutting in*) isn't he used to drinking?

Mrs Birling: No, of course not. He's only a boy.

Inspector: No, he's a young man. And some young men drink far too much.

Sheila: And Eric's one of them.

Mrs Birling: (*very sharply*) Sheila!

Sheila:(*urgently*) I don't want to get poor Eric into trouble. He's probably in enough trouble already. But we really must stop these silly pretences. This isn't the time to pretend that Eric isn't used to drink. He's been steadily drinking too much for the last two years.

Mrs Birling: (*staggered*) it isn't true. You know him, Gerald -and you're a man – you must know it isn't true.

Inspector:(*as Gerald hesitates*) Well, Mr Croft?

Gerald: (*apologetically, to* Mrs Birling) I'm afraid it is, y'know. Actually I've never seen much of him outside this house – but- well, I have gathered that he does drink pretty hard.

Mrs Birling: (*bitterly*) And this is the time you choose to tell me.

Sheila: yes, of course it is. That's what I meant when I talked about building up a wall that's sure to be knocked flat. It makes it all harder to bear.

Mrs Birling: But it's you – and not the inspector here – who's doing it--

Sheila: yes, but don't you see? He hasn't started on you yet.

Mrs Birling: (*after a pause, recovering herself*) if necessary I shall be glad to answer any questions the inspector wishes to ask me. Though naturally I don't know anything about this girl.

Inspector: (*gravely*) we'll see, Mrs Birling.

//*enter birling, who closes door behind him*//

Birling: (*rather hot, bothered*) I've been trying to persuade Eric to go to bed, but he won't. Now he says you told him to stay up. Did you?

Inspector: Y es, I did.

Birling: why?

Inspector: because I shall want to talk to him, Mr Birling.

Birling: I can't see why you should, but if you must, then I suggest you do it now. Have him in and get it over, then let the lad go.

Inspector: no, I can't do that yet. I'm sorry, but he'll have to wait.

Birling: now look here, inspector--

inspector: (*cutting in, with authority*) he must wait his turn.

Sheila: (*to* Mrs Birling) you see?

Mrs Birling: no, I don't. And please be quiet, Sheila.

Birling: (*angrily*) inspector, I've told you before, I don't like the tone nor the way you're handling this inquiry. And I don't propose to give you much rope.

Inspector: you needn't give me any rope.

Sheila: (*rather wildly, with laugh*) No, he's giving us the rope – so that we'll hang ourselves.

Birling: (*to* Mrs Birling) What's the matter with that child?

Mrs Birling: over-excited. And she refuses to go. (*with sudden anger, to* inspector.) well, come along – what is it you want to know?

Inspector: (*coolly*) at the end of january, last year, this girl Eva Smith had to leave Milwards, because Miss Birling compelled them to discharge her, and then she stopped being Eva Smith, looking for a job, and became Daisy Renton, with other ideas. (*sharply turning on him*.) Mr croft, when did you first get to know her?

// *An exclamation of surprise from birling and Mrs Birling*. //

Gerald: where did you get the idea that I did know her?

Sheila: it's no use, Gerald. You're wasting time.

Inspector: as soon as I mentioned the name daisy renton, it was obvious you'd known her. You gave yourself away at once.

Sheila: (*bitterly*) of course he did.

Inspector: and anyhow I knew already. When and where did you first meet her?

Gerald: all right, if you must have it. I met her first, sometime in march last year, in the stalls bar at the palace. I mean the palace music hall here in brumley-

Sheila: well, we didn't think you meant buckingham palace.

Gerald: (*to* Sheila) thanks. You're going to be a great help, I can see. You've said your piece, and you're obviously going to hate this, so why on earth don't you leave us to it?

Sheila: nothing would induce me. I want to understand exactly what happens when a man says he's so busy at the works that he can hardly ever find time to come and see the girl he's supposed to be in love with. I wouldn't miss it for worlds--

Inspector: (*with authority*) yes, Mr Croft – in the stalls bar at the palace variety theatre . . .

Gerald: I happened to look in, one night, after a long dull day, and as the show wasn't very bright, I went down into the bar for a drink. It's a favourite haunt of women of the town--

Mrs Birling: women of the town?

Birling: yes, yes. But I see no point in mentioning the subject – especially -(*indicating* sheila.)

Mrs Birling: it would be much better if sheila didn't listen to this story at all.

Sheila: but you're forgetting I'm supposed to be engaged to the hero of it. Go on, Gerald. You went down into the bar, which is a favourite haunt of the women of the town.

Gerald: I'm glad I amuse you-

inspector: (*sharply*) come along, mr croft. What happened?

Gerald: I didn't propose to stay long down there. I hate those hard-eyed dough-faced women. But then I noticed a girl who looked quite different. She was very pretty – soft brown hair and big dark eyes- (*breaks off*.) My god!

Inspector: what's the matter?

Gerald: (*distressed*) sorry – I – well, I've suddenly realized – taken it in properly – that's she's dead--

Inspector: (*harshly*) yes, she's dead.

Sheila: and probably between us we killed her.

Mrs Birling: (*sharply*) sheila, don't talk nonsense.

Sheila: you wait, mother.

Inspector: (*to* gerald) go on.

Gerald: she looked young and fresh and charming and altogether out of place down here. And obviously she wasn't enjoying herself. Old joe meggarty, half-drunk and goggle-eyed, had wedged her into a corner with that obscene fat carcass of his--

Mrs Birling: (*cutting in*) there's no need to be disgusting. And surely you don't mean Alderman Meggarty?

Gerald: of course I do. He's a notorious womanizer as well as being one of the worst sots and rogues in Brumley--

Inspector: Quite right.

Mrs Birling: (*staggered*) well, really! Aldermand Meggarty! I must say, we are learning something tonight.

Sheila: (*coolly*) of course we are. But everybody knows about that horrible old Meggarty. A girl I know had to see him at the town hall one afternoon and she only escaped with a torn blouse--

Birling: (*sharply, shocked*) sheila!

Inspector: (*to* gerald) go on, please.

Gerald: the girl saw me looking at her and then gave me a glance that was nothing less than a cry for help. So I went across and told Joe Meggarty some nonsense – that the manager had a message for him or something like that – got him out of the way – and then told the girl that if she didn't want any more of that sort of thing, she'd better let me take her out of there. She agreed at once.

Inspector: where did you go?

Gerald: we went along to the county hotel, which I knew would be quiet at that time of night, and we had a drink or two and talked.

Inspector: did she drink much at the time?

Gerald: no. she only had a port and lemonade – or some such concoction. All she wanted was to talk – a little friendliness – and I gathered that joe meggarty's advances had left her rather shaken – as well they might--

Inspector: she talked about herself?

Gerald: yes. I asked her questions about herself. She told me her name was Daisy Renton, that she'd lost both parents, that she came originally from somewhere outside Brumley. She also told me she'd had a job in one of the works here and had had to leave after a strike. She said something about the shop too, but wouldn't say which it was, and she was deliberately vague about what happened. I couldn't get any exact details from her about herself – just because she felt I was interested and friendly – but at the same time she wanted to be daisy renton – and not eva smith.

In fact, I heard that name for the first time tonight. What she did let slip – though she didn't mean to – was that she was desperately hard up and at that moment was actually hungry. I made the people at the county find some food for her.

Inspector: and then you decided to keep her – as your mistress?

Mrs Birling: what?

Sheila: of course, mother. It was obvious from the start. Go on,

gerald. Don't mind mother.

Gerald: (*steadily*) I discovered, not that night but two nights later, when we met again – not accidentally this time of course - that in fact she hadn't a penny and was going to be turned out of the miserable back room she had. It happened that a friend of mine, Charlie Brunswick, had gone off to canada for six months and had let me have the key of a nice little set of rooms he had – in morgan terrace – and had asked me to keep an eye on them for him and use them if I wanted to. So I insisted on Daisy moving into those rooms and I made her take some money to keep her going there. (*carefully, to the inspector*.) I want you to understand that I didn't install her there so that I could make love to her. I made her go to morgan Terrace because I was sorry for her, and didn't like the idea of her going back to the palace bar. I didn't ask for anything in return.

Inspector: I see.

Sheila: yes, but why are you saying that to him? You ought to be saying it to me,

Gerald: I suppose I ought really. I'm sorry, sheila. Somehow i--

Sheila: (*cutting in, as he hesitates*) I know. Somehow he makes you.

Inspector: but she became your mistress?

Gerald: yes. I suppose it was inevitable. She was young and pretty and warm hearted – and intensely grateful. I became at once the most important person in her life – you understand?

Inspector: yes. She was a woman. She was lonely. Were you in love with her?

Sheila: just what I was going to ask!

Birling: (*angrily*) I really must protest--

Inspector: (*turning on him sharply*) why should you do any protesting? It was you who turned the girl out in the first place.

Birling: (*rather taken aback*) well, I only did what any employer might have done. And what I was in which my daughter, a young unmarried girl, is being dragged into this--

inspector: (*sharply*) your daughter isn't living on the moon. She's here in brumley too.

Sheila: yes, and it was I who had the girl turned out of her job at Milwards. And I'm supposed to be engaged to gerald. And I'm not a child, don't forget. I've a right to know. Were you in love with her, gerlad?

Gerald: (*hesitatingly*) it's hard to say. I didn't feel about her as she felt about me.

Sheila: (*with sharp sarcasm*) of course not. You were the wonderful fairy prince. You must have adored it, gerald.

Gerald: all right – I did for a time. Nearly any man would have done.

Sheila: that's probably about the best thing you've said tonight. At least it's honest. Did you go and see her every night?

Gerald: no. I wasn't telling you a complete lie when I said i'd been very busy at the works all that time. We were very busy. But of course I did see a good deal of her.

Mrs Birling: I don't think we want any further details of this disgusting affair--

Sheila: (*cutting in*) I do. And anyhow, we haven't had any details yet.

Gerald: and you're not going to have any. (*to* Mrs Birling.)

you know, it wasn't disgusting.

Mrs Birling: it's disgusting to me.

Sheila: yes, but after all, you didn't come into this, did you, mother?

Gerald: is there anything else you want to know – that you ought to know?

Inspector: yes. When did this affair end?

Gerald: I can tell you exactly. In the first week of september. I had to go away for several weeks then – on business – and by that time daisy knew it was coming to an end. So I broke it off definitely before I went.

Inspector: how did she take it?

Gerald: better than I'd hoped. She was – very gallant – about it.

Sheila: (*with irony*) that was nice for you.

Gerald: No, it wasn't. (*he waits a moment, then in a low, troubled tone*.) she told me she'd been happier than she'd ever been before – but that she knew it couldn't last – hadn't expected it to last. She didn't blame me at all. I wish to God she had now. Perhaps I'd feel better about it.

Inspector: she had to move out of those rooms?

Gerald: Yes, we'd agreed about that. She'd saved a little money during the summer – she'd lived very economically on what I'd allowed her – and didn't want to take more from me, but I insisted on a parting gift of enough money – though it wasn't so very much – to see her through to the end of the year.

Inspector: did she tell you what she proposed to do after you'd left her?

Gerald: No. she refused to talk about that. I got the idea, once or twice from what she said, that she thought of leaving brumley. Whether she did or not – I don't know. Did she?

Inspector: Yes. She went away for about two months. To some seaside place.

Gerald: By herself?

Inspector: Yes. I think she went away – to be alone, to be quiet, to remember all that had happened between you.

Gerald: how do you know that?

Inspector: she kept a rough sort of diary. And she said there that she had to go away and be quiet and remember ' just to make it last longer'. She felt there'd never be anything as good again for her – so she had to make it last longer.

Gerald: (*gravely*) I see. Well, I never saw her again, and that's all I can tell you.

Inspector: It's all I want to know from you.

Gerald: in that case – as I'm rather more – upset – by this business than I probably appear to be – and – well, i'd like to be alone for a while – I'd be glad if you'd let me go.

Inspector: Go were? Home?

Gerald: No. I'll just go out – walk about – for a while, if you don't mind. I'll come back.

Inspector: all right, mr croft.

Sheila: but just in case you forget – or decide not to come back, Gerald, I think you'd better take this with you. (s*he hands him the ring*.)

Gerald: I see. Well, I was expecting this.

Sheila: I don't dislike you as I did half an hour ago, gerald. In fact, in some odd way, I rather respect you more than I've ever done before. I knew anyhow you were lying about those months last year when you hardly came near me. I knew there was something fishy about that time. And now at least you've been honest. And I believe what you told us about the way you helped her at first. Just out of pity. And it was my fault really that she was so desperate when you first met her. But this has made a diffence. You and I aren't the same people who sat down to dinner here. We'd have to start all over again, getting to know each other--

Birling: Now, sheila, I'm not defending him. But you must understand that a lot of young men-

Sheila: don't interfere, please, father. Gerald knows what I mean, and you apparently don't.

Gerald: Yes, I know what you mean. But I'm coming back – if I may.

Sheila: all right.

Mrs Birling: Well, really, I don't know. I think we've just about come to an end of this wretched business--

Gerald: I don't think so. Excuse me.

// *he goes out. They watch him go in silence. We hear the front door slam.*//

Act Two, Part 1: Guilty feelings (pp. 27–9)

QUICK TEST

❶ Choose the correct answer to **finish the statement** and tick the box:

a) Act Two opens: in the garden ☐ in the hall ☐ where Act One finished ☐

b) At the beginning of Act Two the Inspector is: in the doorway ☐ sitting down ☐ leaving the stage ☐

c) Initially, Sheila: frowns ☐ laughs hysterically ☐ wipes her tears ☐

d) Sheila and Gerald: quarrel ☐ do not speak to each other ☐ leave the room together ☐

e) The Inspector: interrupts Gerald and Sheila ☐ arrests Gerald ☐ goes out ☐

f) Mrs Birling enters: with the maid ☐ unaware of the situation ☐ with Eric ☐

g) At first, Mrs Birling approaches the Inspector: politely ☐ rudely ☐ fearfully ☐

h) Mrs Birling: does not understand Sheila ☐ thinks Sheila is ill ☐ sees Sheila crying ☐

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) What is Gerald afraid of?

b) What does Mrs Birling attempt to do when she enters?

c) How does Sheila react to her mother, and what is she afraid of?

EXAM PREPARATION: WRITING ABOUT SHEILA'S CHANGING ATTITUDES AO1

Reread (pp. 27–9) from *'**Inspector:** Well, I don't want to keep you here'* to *'**Sheila:** … I don't understand about you.'*

Question: In this scene, how does Sheila come to regard her own part in Eva Smith's death?

Think about:

- What she says and how she feels
- What she needs to discover about herself and the other characters

❸ Complete this table:

Point/detail	Evidence	Effect or explanation
1: *Sheila suspects that Gerald is also implicated in Eva Smith/ Daisy Renton's death.*	*She says to the Inspector: 'you haven't finished asking questions – have you? …Then I'm staying.'*	*She wants to hear the truth, even if it is unpleasant.*
2: *But she still feels she is to blame.*		
3: *Sheila responds to the Inspector's discussion of shared responsibility.*		

❹ Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

❺ Now, choose **one** of your **other points** and write it out as **another paragraph** here:

Act Two, Part 2: Enter Mrs Birling (pp. 29–32)

QUICK TEST

❶ Complete this **gap-fill** paragraph about the scene, with the **correct or suitable information**:

Mrs Birling enters in a ..... manner, which is very different from the mood of the others in the room. When Mrs Birling comments that the Inspector has made an impression on her ....., he replies that this often happens with the young. Sheila is determined to stay, despite her mother's comment that Sheila has a morbid curiosity about the girl's ..... . As the scene develops, Mrs Birling's self-importance increases and she accuses the Inspector of being ..... . She reminds him that ..... was once Lord Mayor. However, she is shocked to learn of the seriousness of ..... drinking habit.

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) In what way does the word 'offence' have a double meaning?

b) Why does the Inspector question Mrs Birling about Eric's drinking?

c) How does Gerald respond to Mrs Birling's question about Eric's drinking?

EXAM PREPARATION: WRITING ABOUT SHEILA'S FOREWARNING AO2

Reread the dialogue (pp. 30–1) from *'**Sheila:** (urgently cutting in) Mother, don't – please don't.'* to *'**Mrs Birling:** … Inspector will take offence – '.*

Question: Why does Sheila use the image of a 'wall' to address her mother and how does her mother respond?

Think about:

- How Sheila uses the image
- How her mother responds

❸ Complete this table:

Point/detail	Evidence	Effect or explanation
1: *Sheila is aware that Mrs Birling does not accept that the family may have played a part in Eva Smith's death.*	*'You mustn't try to build up a kind of wall between us and that girl.'*	*The 'wall' is a metaphor referring to the way in which Mrs Birling separates herself (and her family and Gerald) from possible guilt.*
2: *Sheila is warning her mother what will happen if she fails to answer the Inspector's questions.*		
3: *Mrs Birling fails to understand.*		

❹ Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

❺ Now, choose **one** of your **other points** and write it out as another **paragraph** here:

Act Two, Part 3: Gerald's revelations (pp. 32–40)

QUICK TEST

❶ From the list of names, identify which **character** is being **referred to**. Sometimes it might be more than one person.

Sheila **Gerald** **Daisy Renton/Eva Smith** **Eric** **Alderman Meggarty**

a) **'Birling:** I've been trying to persuade ..... to go to bed, but he won't.' (p. 32) .....

b) **'Birling:** What's the matter with that child?' (p. 33) .....

c) **'Inspector:** ... Mr Croft, when did you first get to know her?' (p. 33) .....

d) **'Sheila:** Well, we didn't think you meant Buckingham Palace.' (p. 34) .....

e) **'Gerald:** He's a notorious womanizer [and] one of the worst sots and rogues in Brumley –' (p. 35) .....

f) **'Inspector:** Yes. She was a woman. She was lonely. Were you in love with her?' (p. 37) .....

g) **'Sheila:** ... You were the wonderful Fairy Prince.' (p. 38) .....

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) How does Gerald's confession affect the audience?

.....

.....

.....

.....

b) How does Sheila help create the idea that the Inspector is all-knowing?

.....

.....

.....

.....

c) How does Sheila react to Gerald at the end of the scene?

.....

.....

.....

.....

EXAM PREPARATION: WRITING ABOUT THE INSPECTOR'S KNOWLEDGE AO2

Reread the dialogue (p. 39) from *'**Gerald:** Yes, we'd agreed about that.'* to *'**Inspector:** Go where? Home?'*

Question: How does the Inspector appear to know so much about people and events? How is Gerald affected by the Inspector's knowledge?

Think about:

- The Inspector's methods, e.g. use of the diary
- How Gerald responds

❸ Complete this table:

Point/detail	Evidence	Effect or explanation
1: *The Inspector asks simple questions.*	*He asks questions of Gerald such as: 'When did this affair end?'; 'How did she take it?'; 'She had to move out of those rooms?'*	*These questions, which often build on what the characters say, encourage the characters to reveal further events and actions.*
2: *Gerald is curious about the Inspector's knowledge.*		
3: *Gerald reacts to the information about Daisy Renton.*		

❹ Write up **point 1** into a **paragraph** below, in your own words. Remember to include what you infer from the evidence, or the writer's effects.

❺ Now, choose **one** of your **other points** and write it out as another **paragraph** here:

Now read the final part of Act 2:

Sheila: (*to* inspector) you know, you never showed him that photograph of her.

Inspector: No. it wasn't necessary. And I thought it better not to.

Mrs Birling: you have a photograph of this girl?

Inspector: Yes. I think you'd better look at it.

Mrs Birling: I don't see any particular reason why I should-

Inspector: probably not. But you'd better look at it.

Mrs Birling: very well. (*he produces the photograph and she looks hard at it*.)

inspector: (*taking back the photograph*) you recognize her?

Mrs Birling: No. why should I?

Inspector: of course she might have changed lately, but I can't believe she could have changed so much.

Mrs Birling: I don't understand you, Inspector.

Inspector: you mean you don't choose to do, Mrs Birling.

Mrs Birling: (*angrily*) I meant what I said.

Inspector: you're not telling me the truth.

Mrs Birling: I beg your pardon!

Birling: (*angrily, to* Inspector) Look here, I'm not going to have this, Inspector. You'll apologize at once.

Inspector: Apologize for what – doing my duty?

Birling: No, for being so offensive about it. I'm a public man-

Inspector: (*massively*) Public men, Mr Birling, have responsibilities as well as privileges.

Birling: Possibly. But you weren't asked to come here to talk to me about my reponsibilities.

Sheila: Let's hope not. Though I'm beginning to wonder.

Mrs Birling: Does that mean anything, sheila?

Sheila: it means that we've no excuse now for putting on airs and that if we've any sense we won't try. Father threw this girl out because she asked for decent wages. I went and pushed her farther out, right into the street, just because I was angry and she was pretty. Gerald set her up as his mistress and then dropped her when it suited him. And now you're pretending you don't recognize her from that photograph. I admit I don't know why you should, but I know jolly well you did in fact recognize her, from the way you looked. And if you're not telling the truth, why should the Inspector apologize? And can't you see, both of you, you're making it worse?

// she turns away. We hear the front door slam again.//

Birling: that was the door again.

Mrs Birling: gerald must have come back.

Inspector: unless your son has just gone out.

Birling: I'll see.

// *he goes out quickly.* Inspector *turns to* Mrs Birling.//

Inspector: Mrs Birling, you're a member – a prominent member – of the Brumley Women's Charity Organization, aren't you?

// Mrs Birling *does not reply*.//

Sheila: Go on, mother. You might as well admit it. (*to* Inspector.) Yes, she id. Why?

Inspector: (*calmly*) It's an organization to which women in distress can appeal for help in various forms. Isn't that so?

Mrs Birling: (*with dignity*) Yes. We've done a great deal of useful work in helping deserving cases.

Inspector: there was a meeting of the interviewing committee two weeks ago?

Mrs Birling: I dare say there was.

Inspector: you know very well there was, Mrs Birling. You were in the chair.

Mrs Birling: and if I was, what business is it of yours?

Inspector: (*severely*) do you want me to tell you – in plain words?

// *enter birling, looking rather agitated.*//

Birling: that must have been Eric.

Mrs Birling: (*alarmed*) Have you been up to his room?

Birling: yes. And I called out on both landings. It must have been eric we heard go out then.

Mrs Birling: silly boy! Where can he have gone to?

Birling: I can't imagine. But he was in one of his excitable queer moods, and even though we don't need him here--

Inspector: (*cutting in, sharply*) We do need him here. And if he's not back soon, I shall have to go and find him.

// B*irling and Mrs Birling exchange bewildered and rather frightened glances*.//

Sheila: He's probably just gone to cool off. He'll be back soon.

Inspector: (*severely*) I hope so.

Mrs Birling: And why should you hope so?

Inspector: I'll explain why when you've answered my questions, Mrs Birling.

Birling: Is there any reason why my wife should answer questions from you, Inspector?

Inspector: yes, a very good readon. You'll remember that Mr Croft told us – quite truthfully, I believe – that he hadn't spoken to or seen eva smith since last september. But Mrs Birling spoke to and saw her only two weeks ago.

Sheila: (*astonished*) mother!

Birling: Is this true?

Mrs Birling: (*after a pause*) yes, quite true.

Inspector: she appealed to your organization for help?

Mrs Birling: yes.

Inspector: not as Eva smith?

Mrs Birling: No, nor as daisy renton.

Inspector: as what then?

Mrs Birling: first, she called herself Mrs Birling--

Birling: (*astounded*) Mrs Birling!

Mrs Birling: Yes, I think it was simply a piece of gross impertinence – quite deliberate – and naturally that was one of the things that prejudiced me against her case.

Birling: And I should think so! Damned impudence!

Inspector: you admit being prejudiced against her case?

Mrs Birling: Yes.

Sheila: mother, she's just died a horrible death – don't forget.

Mrs Birling: i'm very sorry. But I think she had only herself to blame.

Inspector: was it owing to your influence, as the most prominent member of the committee, that help was refused the girl?

Mrs Birling: possibly.

Inspector: was it or was it not your influence?

Mrs Birling: (*stung*) Yes, it was. I didn't like her manner. She'd impertinently made use of our name, though she pretended afterwards it just happened to be the first she though of. She had to

admit, after I began questioning her, that she had no claim to the name, that she wasn't married, and that the story she told at first – about a husband who'd deserted her – was quite false. It didn't take me long to get the truth – or some of the truth – out of her.

Inspector: why did she want help?

Mrs Birling: you know very well why she wanted help.

Inspector: No, I don't. I know why she needed help. But as I wasn't there, I don't know what she asked from your committee.

Mrs Birling: I don't think we need discuss it.

Inspector: you have no hope of not discussing it, Mrs Birling.

Mrs Birling: if you think you can bring any pressure to bear upon me, Inspector, you're quite mistaken. Unlike the other three, I did nothing I'm ashamed of or that won't bear investigation. The girl asked for assistance. We were asked to look carefully into the claims made upon us. I wasn't satisfied with the girl's claim – she seemed to me not a good case – and so I used my influence to have it refused. And in spite of what's happened to the girl since, I consider I did my duty. So if I prefer not to discuss it any further, you have no power to make me change my mind.

Inspector: Yes I have.

Mrs Birling: No you haven't. Simply because I've done nothing wrong – and you know it.

Inspector: (*very deliberately*) I think you did something terribly wrong – and that you're going to spend the rest of your life regretting it. I wish you'd been with me tonight in the infirmary. You'd have seen-

Sheila: (*bursting in*) No, no, please! Not that again. I've imagined it enough already.

Inspector: (*very deliberately*) then the next time you imagine it, just remember that this girl was going to have a child.

Sheila: (*horrified*) No! Oh – horrible – horrible! How could she have wanted to kill herself?

Inspector: because she'd been turned out and turned down too many times. This was the end.

Sheila: mother, you must have known.

Inspector: it was because she was going to have a child that she went for assistance to your mother's committee.

Birling: Look here, this wasn't gerald croft-

Inspector: (*cutting in, sharply*) No, no. nothing to do with him.

Sheila: thank goodness for that! Though I don't know why I should care now.

Inspector: (*to* Mrs Birling) and you've nothing further to tell me, eh?

Mrs Birling: I'll tell you what I told her. Go and look for the father of the child. It's his responsibility.

Inspector: That doesn't make it any the less yours. She came to you for help, at a time when no woman could have needed it more. And you not only refused it yourself but saw to it that the others refused it too. She was here alone, friendless, almost penniless, desperate. She needed not only money but advice, sympathy, friendliness. You've had children. You must have known what she was feeling. And you slammed the door in her face.

Sheila: (*with feeling*) mother, I think it was cruel and vile.

Birling: (*dubiously*) I must say, sybil, that when this comes out at the inquest, it isn't going to do us much good. The press might easily take it up--

Mrs Birling: (*agitated now*) Oh, stop it, both of you. And please remember before you start accusing me of anything again that it wasn't I who had her turned out of her employment – which probably began it all.

(*turning to Inspector*.) In the circumstances I think I was justified. The girl had begun by telling us a pack of lies. Afterwards, when I got at the truth, I discovered that she knew who the father was, she was quite certain about that, and so I told her it was her business to make him responsible. If he refused to marry her – and in my opinion he ought to be compelled to – then he must at least support her.

Inspector: and what did she reply to that?

Mrs Birling: Oh – a lot of silly nonsense!

Inspector: what was it?

Mrs Birling: whatever it was, I know it made me finally lose all patience with her. She was giving herself ridiculous airs. She was claiming elaborate fine feelings and scruples that were simply absurd in a girl in her position.

Inspector: (*very sternly*) Her position now is that she lies with a burnt-out inside on a slab. (*As* Birling *tries to protest, turns on him*.) Don't stammer and yammer at me again, man. I'm losing all patience with you people. What did she say?

Mrs Birling: (*rather cowed*) she said that the father was only a youngster – silly and wild and drinking too much. There couldn't be any question of marrying him – it would be wrong for them both. He had given her money but she didn't want to take any more money from him.

Inspector: why didn't she want to take and more money from him?

Mrs Birling: all a lot of nonsense – I didn't believe a word of it.

Inspector: I'm not asking you if you believed it. I want to know what she said. Why didn't she want to take any more money from this boy?

Mrs Birling: Oh – she had some fancy reason. As if a girl of that sort would ever refuse money!

Inspector: (*sternly*) I warn you, you're making in worse for yourself. What reason did she give for not taking any more money?

Mrs Birling: her story was – that he'd said something one night, when he was drunk, that gave her the idea that it wasn't his money.

Inspector: where had he got it from then?

Mrs Birling: he'd stolen it.

Inspector: so she'd come to you for assistance because she didn't want to take stolen money?

Mrs Birling: that's the story she finally told, after i'd refused to believe her original story – that she was a married woman who'd been deserted by her husband. I didn't see any reason to believe that one story should be any truer than the other. Therefore, you're quite wrong to suppose I shall regret what I did.

Inspector: but if her story was true, if this boy had been giving her stolen money, then she came to you for help because she wanted to keep this youngster out of any more trouble – isn't that so?

Mrs Birling: possibly. But it sounded ridiculous to me. So I was perfectly justified in advising my committee not to allow her claim for assistance.

Inspector: you're not even sorry now, when you know what happened to the girl?

Mrs Birling: I'm sorry she should have come to such a horrible end. But I accept no blame for it at all.

Inspector: who is to blame then?

Mrs Birling: first, the girl herself.

Sheila: (*bitterly*) for letting father and me have her chucked out of her jobs!

Mrs Birling: secondly, I blame the young man who was the father of the child she was going to have. If, as she said, he didn't belong to her class, and was some drunken young idler, then that's all the more reason why he shouldn't escape. He should be made an example of. If the girl's death is due to anybody, then it's due to him.

Inspector: and if her story id true – that he was stealing money-

Mrs Birling: (*rather agitated now*) there's no point in assuming that-

Inspector: but suppose we do, what then?

Mrs Birling: then he'd be entirely responsible – because the girl wouldn't have come to us, and have been refused assistance, if it hadn't been for him-

Inspector: so he's the chief culprit anyhow.

Mrs Birling: certainly. And he ought to be dealt with very severely-

Sheila: (*with sudden alarm*) mother – stop – stop!

Birling: Be quiet, sheila!

Sheila: but don't you see-

Mrs Birling: (*severely*) you're behaving like an hysterical child tonight.

// Sheila *begins crying quietly.* Mrs Birling *turns to the* Inspector. //

and if you'd take some steps to find this young man and then make sure that he's compelled to confess in public his responsibility – instead of staying here asking quite unnecessary questions – then you really would be doing your duty.

Inspector: (*grimly*) Don't worry Mrs Birling. I shall do my duty. (*He looks at his watch*.)

Mrs Birling: (*triumphantly*) I'm glad to hear it.

Inspector: No hushing up, eh? Make an example of the young man, eh? Public confession of responsibility – um?

Mrs Birling: Certainly. I consider it your duty. And now no doubt you'd like to say good night.

Inspector: not yet. I'm waiting.

Mrs Birling: Waiting for what?

Inspector: To do my duty.

Sheila: (*distressed*) Now, mother – don't you see?

Mrs Birling: (*understanding now*) But surely …. I mean … it's ridiculous . . .

// *she stops, and exchanges a frightened glance with her husband*.//

Birling: (*terrified now*) Look Inspector, you're not trying to tell us that – that my boy – is mixed up in this - ?

Inspector: (*sternly*) If he is, then we know what to do, don't we? Mrs Birling has just told us.

Birling: (*thunderstruck*) my God! But – look here -

Mrs Birling: (*agitated*) I don't believe it. I won't believe it . . .

Sheila: Mother – I begged you and begged you to stop-

// Inspector holds up a hand. We hear the front door. They wait, looking towards door. Eric enters, looking extremely pale and distressed. He meets their inquiring stares.

Curtain falls quickly. //

END OF ACT TWO

Act Two, Part 4: Sheila opposes her mother (pp. 40–2)

QUICK TEST

❶ Which of these are **TRUE** statements about this scene, and which are **FALSE**? Write **'T'** or **'F'** in the boxes:

a) Mr Birling tries to defend Eric to Sheila. ☐
b) Sheila points out that the Inspector did not show Gerald the photograph. ☐
c) Mrs Birling does not wish to look at the photograph. ☐
d) Sheila defends her mother against the Inspector. ☐
e) Eric returns with Gerald to speak to Mr Birling. ☐
f) Mrs Birling chairs the Charity for Homeless Animals. ☐
g) Mr and Mrs Birling are concerned that Eric has gone out. ☐

THINKING MORE DEEPLY

❷ Write **one** or **two sentences** in response to each of these questions:

a) How does Gerald react to parting from Sheila?

.....

.....

.....

.....

.....

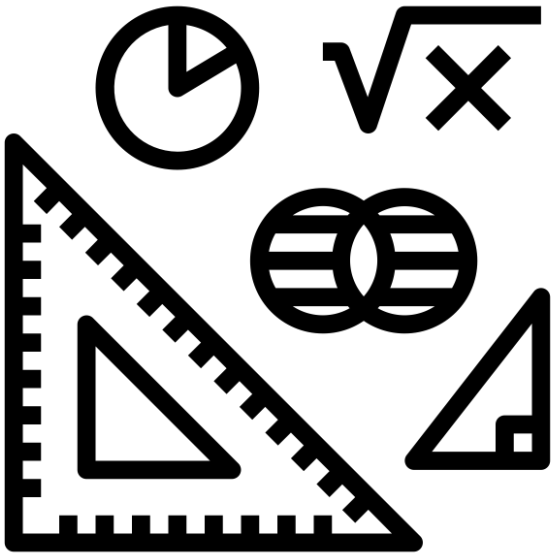
.....

b) How is the photograph used in this scene?

c) In what way does the Inspector's authority increase in this scene?

MATHS – FOUNDATION

On the following pages you will find a series of maths activities. Please start with the ones that are appropriate for your tier or set although of course you are welcome to try other activities if you wish. You can mark your own work by using the answers at the back of the section.



Place value

Grade 1

1. Write the number ninety thousand, one hundred and twenty-four using digits.

..... **[I got ___ / 1 mark]**

Grade 2

2. Write down the value represented by the digit 2 in each of these numbers.

a) 4269

..... **[___ / 1 mark]**

b) 723 000

..... **[___ / 1 mark]**

c) 5.201

..... **[___ / 1 mark]**

Grade 2

3. Put one of the symbols <, > or = in each box to make a correct statement.

a) 0.36 ☐ 0.306 **[___ / 1 mark]**

b) 0.450 ☐ 0.45 **[___ / 1 mark]**

c) 1.9003 ☐ 1.903 **[___ / 1 mark]**

Grade 2

4. Put these numbers in order of size, starting with the smallest.

7.504 7.45 7.405 7.054

..... **[___ / 2 marks]**

Grade 2

5. Work out

a) 67.9 × 1000

Hint
Think about how many places the digits move and in what direction.

..... **[___ / 1 mark]**

b) 0.9 ÷ 100

..... **[___ / 1 mark]**

Grade 2

6. 10 packets of sweets cost £8.50. How much does one packet cost?

.....p **[___ / 2 marks]**

Grade 3

7. Given that 4.5 × 192 = 864, write down the answer to each of these calculations.

a) 4.5 × 19.2

..... **[___ / 1 mark]**

b) 450 × 0.0192

..... **[___ / 1 mark]**

c) 8.64 ÷ 0.45

..... **[___ / 1 mark]**

Order of operations

Grade 2

1. Work out

a) $2 + 3 \times 9$

..... **[I got ___ / 1 mark]**

b) $24 \div (6 - 2) \times 5$

..... **[___ / 1 mark]**

c) $10 - 3^2$

..... **[___ / 1 mark]**

Grade 3

2. Work out

a) $(12 - 4 \times 2)^3$

..... **[___ / 1 mark]**

b) $\dfrac{4 \times 5^2}{4 \times 5 \div 2}$

..... **[___ / 1 mark]**

c) $5 \times \sqrt{50 - 1} + 6 \times 3$

..... **[___ / 1 mark]**

Grade 3

3. Use your calculator to evaluate these expressions.

a) $\dfrac{2 \times 36 + 18}{20 - 12}$

..... **[___ / 1 mark]**

b) $\left(\dfrac{3}{5}\right)^3 + 9 \div 3$

..... **[___ / 1 mark]**

c) $\sqrt{7.29} \times 1000$

..... **[___ / 1 mark]**

Grade 3

4. Bavan says that $2 \times 3^2 = 36$ but Eva says $2 \times 3^2 = 18$
Who is correct? Explain your reasoning.

Hint
Explain your answer using accurate calculations.

.....

..... **[___ / 1 mark]**

Grade 3

5. Rewrite these statements using brackets to make them true.

a) $22 - 10 - 7 = 19$

..... **[___ / 1 mark]**

b) $20 - 5 - 2 + 6 = 11$

..... **[___ / 1 mark]**

Rounding and truncating

Grade 2

1. Round 258.3 to

a) the nearest integer

..... **[I got ___ / 1 mark]**

b) the nearest 10

..... **[___ / 1 mark]**

c) the nearest 100

..... **[___ / 1 mark]**

Grade 2

2. Round 19.902 to

a) the nearest integer

..... **[___ / 1 mark]**

b) 1 decimal place

..... **[___ / 1 mark]**

c) 2 decimal places.

..... **[___ / 1 mark]**

Grade 2

3. Truncate 8.2694 to

a) an integer

Hint
Remind yourself of the difference between truncation and rounding.

..... **[___ / 1 mark]**

b) a tenth

..... **[___ / 1 mark]**

c) a hundredth.

..... **[___ / 1 mark]**

Grade 2

4. One bag of grass seed covers an area of 3.66 m^2. What size of lawn will nine bags of seed cover?
Give your answer to the nearest integer.

..... m^2 **[___ / 2 marks]**

Grade 2

5. A jug contains 3000 ml of juice. A glass holds 310 ml. How many glasses can be filled from the jug?

..... **[___ / 2 marks]**

Grade 3

6. Mark is paid £18.93 an hour and works 7.5 hours a day.
Kwamé is paid £22.17 an hour and works 6.5 hours a day.
What is the difference between their daily pay?

Hint
Money is often rounded to 2 dp.

£..... **[___ / 3 marks]**

Significant figures

Grade 3

1. Round 20 193 to

a) 4 significant figures

..... **[I got ___ / 1 mark]**

b) 3 significant figures

..... **[___ / 1 mark]**

c) 2 significant figures

..... **[___ / 1 mark]**

d) 1 significant figure.

..... **[___ / 1 mark]**

Grade 3

2. Round 0.006 802 to

a) 1 significant figure

..... **[___ / 1 mark]**

b) 2 significant figures

..... **[___ / 1 mark]**

c) 3 significant figures.

..... **[___ / 1 mark]**

Grade 3

3. The area of a square is 40 cm^2. What is the length of the side of the square?
Give your answer to 3 significant figures.

Hint
You square the side length to get the area of a square.

40 cm^2

..... cm **[___ / 2 marks]**

Grade 3

4. a) Evaluate this expression using your calculator.

$$\frac{4.56 \times 2.89}{12.1 - 0.56}$$

Write your answer as a decimal, giving all the digits on your calculator display.

..... **[___ / 1 mark]**

b) Write your answer to part **a** to 2 significant figures.

..... **[___ / 1 mark]**

Grade 4

5. Shirley rounds 0.065 29 to 2 significant figures and gives the answer 0.07
Shirley is wrong. Explain why.

Hint
Think about the difference between significant figures and decimal places.

.....

..... **[___ / 1 mark]**

Estimation

Grade 4

1. Estimate the value of 2.84×19.3. Show your working.

Hint
You usually round numbers to 1 sf to estimate.

..... **[I got ___ / 1 mark]**

Grade 4

2. Estimate the value of $\frac{317 + 48.6}{9.683}$. Show your working.

..... **[___ / 2 marks]**

Grade 4

3. Estimate the value of $\frac{2.67 \times 1.36}{0.11 + 0.42}$. Show your working.

..... **[___ / 2 marks]**

Grade 4

4. A biologist visits a lake at the start of January and works out that the number of fish in the lake is approximately 1000. She thinks that the population is growing at a rate of 17 fish per day. Estimate how many fish there will be in the lake five months later.

..... **[___ / 3 marks]**

Grade 5

5. In one week, an Italian restaurant sells 96 portions of lasagne. The restaurant sells a portion of lasagne for £8.95 and each portion costs £3.20 to make. Estimate the profit the restaurant makes from lasagne in the week.

£..... **[___ / 3 marks]**

Grade 5

6. James is driving to visit his Gran who lives 405 km away. He leaves at 8.30 am and drives at an average speed of 77 km/h, stopping for a 25-minute lunch break on the way. Estimate the time he arrives at his Gran's.

..... **[___ / 3 marks]**

Error intervals

Grade 5

1. A number is given as 5.3 rounded to 1 decimal place.
What is the smallest number this could be?

..... **[I got ___ / 1 mark]**

Grade 5

2. The length, L cm, of a rectangle is 14 cm to the nearest centimetre.
Complete the statement to show the range of possible values of L.

$\leq L <$ ..... **[___ / 2 marks]**

Grade 5

3. The length, p m, of a football pitch is given as 110 m.
Write the error interval for p if this value is rounded to

a) the nearest 10 metres

$\leq p <$ ..... **[___ / 2 marks]**

b) the nearest 5 metres

$\leq p <$ ..... **[___ / 2 marks]**

c) the nearest metre.

$\leq p <$ ..... **[___ / 2 marks]**

Grade 5

4. A number, x, is given rounded to a particular degree of accuracy.
Write the error interval for x in each case.

a) $x = 4.67$ to 2 decimal places

$\leq x <$ ..... **[___ / 2 marks]**

b) $x = 5000$ to 1 significant figure

$\leq x <$ ..... **[___ / 2 marks]**

Grade 5

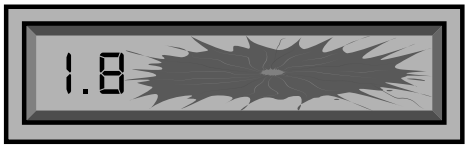
5. The average length, l seconds, of a chart song is 250 seconds to 2 significant figures.
Give the error interval for l.

Hint
Remember to use the correct inequality symbols: minimum ≤ x < maximum.

..... **[___ / 2 marks]**

Grade 5

6. Sienna uses her calculator to answer a question. The display breaks and she can only see 1.8 at the start of her answer. Let x be the unknown number on the display and write the range of possible values for x as an error interval.



..... **[___ / 2 marks]**

Calculating with negative numbers

Grade 1

1. The table shows the minimum temperature (in °C) across five months of the year.

Month	December	January	February	March	April
Minimum temperature (°C)	−1	−5	0	3	8

a) In which month is the lowest temperature recorded?

..... **[I got ___ / 1 mark]**

b) What is the difference in minimum temperature between December and January?

..... **[___ / 1 mark]**

c) What is the difference in minimum temperature between April and January?

..... **[___ / 1 mark]**

Grade 2

2. Evaluate

a) $2 + (-5)$

..... **[___ / 1 mark]**

b) $(-48) \div (-6)$

..... **[___ / 1 mark]**

c) $(-3)^2$

..... **[___ / 1 mark]**

Grade 3

3. Evaluate

Hint
Remember the order of operations.

a) $5 + (-3) \times 4$

..... **[___ / 2 marks]**

b) $(8 - 10) \times 4 - (-10)$

..... **[___ / 2 marks]**

c) $\dfrac{(-2) \times (-6)}{-10 + 7}$

..... **[___ / 2 marks]**

Grade 3

4. Thomas's bank balance is £241. He goes shopping and uses his bank card to spend £154 in the supermarket, £95 in the computer shop and £8.50 in a café. How much does Thomas need to pay into his bank account to bring the balance up to £100?

£..... **[___ / 3 marks]**

Calculating with decimals

Grade 2

1. Evaluate

a) 2.906 + 8.31

..... **[I got ___ / 2 marks]**

b) 25.043 – 17.82

..... **[___ / 2 marks]**

Grade 3

2. Evaluate

a) 7.4 × 0.26

Hint
*For part **b**, it's easier to divide by a whole number. How can you change the calculation to do this?*

..... **[___ / 2 marks]**

b) 17.12 ÷ 0.8

..... **[___ / 2 marks]**

c) $\frac{1.9 + 7.62}{9 - 8.3}$

..... **[___ / 3 marks]**

Grade 3

3. Seven identical toys cost a total of £55.65. How much does one toy cost?

£..... **[___ / 2 marks]**

Grade 3

4. Alex works out the answer to 14.5 × 2.6. Alex says the answer is 3.77

Explain, without working out the answer, how you can be sure Alex has made a mistake.

.....

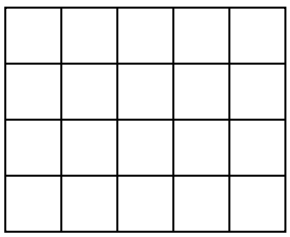
..... **[___ / 1 mark]**

Introduction to fractions

Grade 2

1. Which is the larger fraction, $\frac{1}{5}$ or $\frac{1}{4}$? Explain your answer.

You may use the diagram to help.



..... **[I got ___ / 1 mark]**

Grade 2

2. Write these fractions in order of size, starting with the smallest.

$\frac{3}{4}$ $\frac{2}{3}$ $\frac{5}{8}$ $\frac{7}{12}$

Hint
Find equivalent fractions with a common denominator.

..... **[___ / 2 marks]**

Grade 2

3. a) Write each mixed number as an improper fraction, giving your answer in its simplest form.

i) $1\frac{2}{5}$

..... **[___ / 1 mark]**

ii) $3\frac{3}{4}$

..... **[___ / 2 marks]**

b) Write each improper fraction as a mixed number, giving your answer in its simplest form.

i) $\frac{17}{9}$

..... **[___ / 1 mark]**

ii) $\frac{92}{40}$

..... **[___ / 2 marks]**

Grade 3

4. After a party, Dave has $2\frac{1}{3}$ bottles of cola left and Lizzie has $\frac{19}{8}$ bottles left. Who has the most cola? Show your working.

Hint
Here, you need to compare fractions that are presented differently. Convert both fractions to the same form.

..... **[___ / 3 marks]**

Proportions of amounts

Grade 2

1. Work out

a) $\frac{1}{5}$ of 45

..... **[I got ___ / 2 marks]**

b) 30% of 180

..... **[___ / 2 marks]**

c) $\frac{5}{7}$ of 14

..... **[___ / 2 marks]**

d) 62% of 50

..... **[___ / 2 marks]**

Grade 2

2. Every month, Faizal receives a bonus of 15% of his earnings in that month. In April, Faizal earnt £2460. How much was his bonus in April?

£..... **[___ / 2 marks]**

Grade 3

3. Which is bigger, 110% of 90 or $\frac{8}{7}$ of 84? Show all your working.

Hint
A diagram such as a bar model can help with these kinds of questions.

..... **[___ / 3 marks]**

Grade 3

4. Every year, a school raises money to donate to charity. One year, it chooses to donate $\frac{3}{8}$ of the money raised to a hospital. If the school raises £7200 that year, how much does it give to the hospital?

£..... **[___ / 2 marks]**

Grade 4

5. 48 children go on an outdoor activities day and must choose a morning activity.

25% of the children choose rock climbing.

$\frac{5}{12}$ of the children choose raft building.

The rest choose kayaking.

Work out how many children choose kayaking.

Hint
Calculate how many children choose rock climbing and how many choose raft building.

..... **[___ / 3 marks]**

Calculating with fractions 1

Grade 2

1. What is the reciprocal of 0.25?

..... **[I got ___ / 1 mark]**

Grade 3

2. Work out and simplify where possible

a) $\frac{1}{3} \times \frac{2}{5}$ ..... **[___ / 1 mark]**

b) $\frac{3}{7} \times \frac{14}{9}$ ..... **[___ / 2 marks]**

Grade 3

3. Evaluate and simplify where possible

a) $\frac{3}{4} \div \frac{1}{11}$ ..... **[___ / 2 marks]**

b) $\frac{6}{5} \div \frac{7}{10}$ ..... **[___ / 2 marks]**

Grade 3

4. A café uses up $\frac{2}{3}$ of a box of coffee beans every day. How many days will it take for the café to use up 16 boxes of coffee beans?

..... days **[___ / 2 marks]**

Grade 3

5. In a model village, everything is built at a size $\frac{1}{9}$ of the original size. If a street is 30 m long in real life, work out how long it is in the model village. Give your answer in its simplest form.

..... m **[___ / 2 marks]**

Grade 4

6. Rafael reserves $\frac{3}{10}$ of his monthly wage to pay his bills. $\frac{1}{4}$ of this amount is spent on his electricity bill. What fraction of his monthly wage does Rafael spend on his electricity bill?

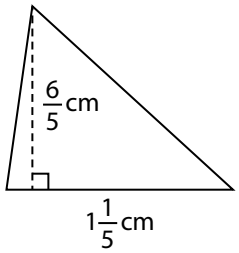
Hint
What calculation does the word 'of' represent?

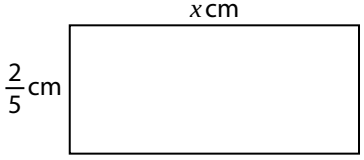
..... **[___ / 2 marks]**

Grade 5

7. A triangle has base $1\frac{1}{5}$ cm and perpendicular height $\frac{6}{5}$ cm.
A rectangle has the same area as the triangle. If the width of the rectangle is $\frac{2}{5}$ cm, what is its length, x cm? Give your answer in its simplest form.

Hint
This question combines fractions and geometry. Find the area of the triangle. What is the same about both shapes?





..... cm **[___ / 3 marks]**

Calculating with fractions 2

Grade 3

1. Work out and simplify where possible

a) $\frac{1}{3}+\frac{1}{5}$

..... **[I got ___ / 2 marks]**

b) $\frac{2}{9}+\frac{5}{6}$

..... **[___ / 2 marks]**

c) $1\frac{7}{8}+2\frac{3}{4}$

..... **[___ / 3 marks]**

Grade 3

2. Evaluate and simplify where possible

a) $\frac{7}{9}-\frac{1}{2}$

..... **[___ / 2 marks]**

b) $3\frac{1}{6}-2\frac{3}{4}$

..... **[___ / 3 marks]**

Grade 3

3. Janet says that $\frac{2}{5}+\frac{4}{5}=\frac{6}{10}$. Is Janet correct? Explain your reasoning carefully.

.....

..... **[___ / 1 mark]**

Grade 4

4. $\frac{1}{8}$ of the students in a class drive to school. $\frac{2}{3}$ of the students walk to school. The rest take the bus. What fraction of the students take the bus?

Hint
The whole class is represented by the number 1

..... **[___ / 3 marks]**

Grade 4

5. Daisy is building a model train track. Her track is $2\frac{4}{5}$ m long. She then takes out a piece of track which is $\frac{7}{8}$ m long and replaces it with a piece which is $1\frac{1}{20}$ m long. Work out the length of her track now.

..... m **[___ / 3 marks]**

Grade 4

6. Maxwell is reading a book on his e-reader. When he picks it up one day, it tells him he is $\frac{1}{3}$ of the way through the book. He reads some and when he puts it down he is $\frac{3}{4}$ of the way through the book. What fraction of the book did he read?

..... **[___ / 2 marks]**

Fractions, decimals, percentages

Grade 2

1. a) Write 0.4 as a fraction in its simplest form.

..... **[I got ___ / 1 mark]**

b) Write 6% as a decimal.

..... **[___ / 1 mark]**

c) Write $\frac{1}{8}$ as a percentage.

..... **[___ / 1 mark]**

Grade 2

2. a) Convert $\frac{6}{5}$ to a percentage.

..... **[___ / 1 mark]**

b) Convert 0.035 to a fraction in its simplest form.

..... **[___ / 1 mark]**

c) Convert 3.6% to a decimal.

..... **[___ / 1 mark]**

Grade 3

3. Write these numbers in order of size, starting with the smallest.

34% 0.3 $\frac{1}{3}$ $\frac{16}{50}$

..... **[___ / 3 marks]**

Grade 3

4. An online music streaming service, Dittify, does some research and finds that $\frac{7}{20}$ of its users listen to its daily mix playlist in the morning, $\frac{1}{5}$ of users listen to their own mix playlist and the rest choose an album.

What percentage of users choose an album?

Hint
Convert the fractions to percentages first.

..... **[___ / 3 marks]**

Grade 4

5. In Lin's class, 6 out of 25 students read fantasy books. In Jay's class, 8 out of 32 students read fantasy books. Lin says the proportion of students who read fantasy books is greater in her class than in Jay's. Is Lin correct? Explain your answer.

.....

..... **[___ / 2 marks]**

Powers and roots

Grade 2

1. Write down the value of

a) 4^2

..... **[I got ___ / 1 mark]**

b) 2^3

..... **[___ / 1 mark]**

c) $\sqrt{49}$

..... **[___ / 1 mark]**

d) $\sqrt[3]{27}$

..... **[___ / 1 mark]**

Grade 3

2. Evaluate

a) $2 \times \sqrt{9 + 16} + 6^2$

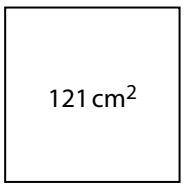
..... **[___ / 3 marks]**

b) $3^4 - 6 \times \sqrt[3]{8} + 50 \div 5^2$

..... **[___ / 3 marks]**

Grade 3

3. The area of a square is 121 cm^2. What is its perimeter?



Hint
Think how the side length of a square relates to its area and to its perimeter.

..... cm **[___ / 2 marks]**

Grade 4

4. a) Using your calculator, work out the value of $\dfrac{\sqrt[3]{3.6^2 + 91 \times 3.7}}{\sqrt{6.25} + 1.8^3}$

Write down all the figures on your calculator display.

Hint
Remind yourself how to round to 3 sf.

..... **[___ / 1 mark]**

b) Write your answer to part **a** to 3 significant figures.

..... **[___ / 1 mark]**

Grade 4

5. A cube-shaped box of side length 8 cm is made of solid metal. Work out how many smaller cubes of side length 2 cm will fill the box completely.

Hint
Consider the volume of the box and the volume of the smaller cubes.

..... **[___ / 3 marks]**

Calculating with indices

Grade 4

1. Simplify

Hint
Remind yourself of the rules of indices.

a) $7^2 \times 7^5$

..... **[I got ___ / 1 mark]**

b) $9^{10} \div 9^4$

..... **[___ / 1 mark]**

c) $2^5 \times 2^{-3}$

..... **[___ / 1 mark]**

d) $7^{-2} \div 7^{-6}$

..... **[___ / 1 mark]**

e) $(3^4)^4$

..... **[___ / 1 mark]**

Grade 4

2. Simplify

a) $(8^2)^{-5}$

..... **[___ / 1 mark]**

b) $\dfrac{9^3}{9^2 \times 9^4}$

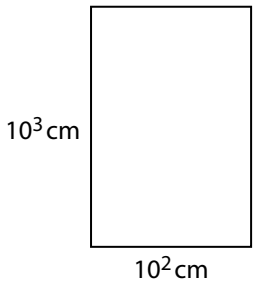
..... **[___ / 2 marks]**

c) $(2^7 \times 2^4)^{-1}$

..... **[___ / 2 marks]**

Grade 4

3. Work out the area of the rectangle, leaving your answer in simplified index form.



..... cm^2 **[___ / 2 marks]**

Grade 4

4. Peter says that $2^3 \times 5^2$ simplifies to 10^5. Peter is wrong. Explain why.

..... **[___ / 1 mark]**

Grade 5

5. Work out

a) 13^0

..... **[___ / 1 mark]**

b) 8^{-1}

..... **[___ / 1 mark]**

c) $\left(\dfrac{2}{5}\right)^3$

..... **[___ / 1 mark]**

d) $\left(\dfrac{1}{4}\right)^{-2}$

..... **[___ / 2 marks]**

Factors and multiples

Grade 2

1. Here is a list of numbers.

3 6 8 10 18 24 30 36

From the list, select

a) a factor of 12

..... **[I got ___ / 1 mark]**

b) a multiple of 9

..... **[___ / 1 mark]**

c) a number which is both a multiple of 12 and a multiple of 4

..... **[___ / 1 mark]**

d) a number which is both a factor of 24 and a factor of 16

..... **[___ / 1 mark]**

e) two numbers with a common factor of 5

..... **[___ / 1 mark]**

f) two numbers with a common multiple of 60

..... **[___ / 1 mark]**

Grade 3

2. What is the lowest common multiple of 9 and 12?

..... **[___ / 2 marks]**

Grade 3

3. What is the highest common factor of 18 and 12?

..... **[___ / 2 marks]**

Grade 4

4. Three alarms beep at the same time. The first alarm then beeps every 6 minutes, the second then beeps every 5 minutes and the third beeps every 15 minutes. Work out how long it is before all three alarms beep at the same time.

Hint
Is this an HCF or an LCM question?

..... minutes **[___ / 2 marks]**

Grade 4

5. Two 2-digit numbers have a highest common factor of 4 and a lowest common multiple of 60. What are the two numbers?

Hint
Remind yourself how to use prime factors to find the HCF and LCM.

..... **[___ / 2 marks]**

Prime factor decomposition

Grade 4

1. Write 110 as a product of its prime factors.

.....

[I got ___ / 2 marks]

Grade 4

2. a) Write 540 as a product of powers of its prime factors.

.....

[___ / 2 marks]

b) By looking at its prime factors, explain why 540 is divisible by 15

Hint
What are the prime factors of 15?

.....

[___ / 1 mark]

Grade 4

3. a) Write 750 as a product of its prime factors. Give your answer in index notation.

.....

[___ / 2 marks]

b) By looking at its prime factors, explain why 750 is not divisible by 4

.....

[___ / 1 mark]

Grade 5

4. The prime factor decomposition of a number, x, is $2 \times 3^2 \times 7 \times 13$

a) Is x even or odd? Explain your reasoning.

.....

[___ / 1 mark]

b) What is the prime factor decomposition of a number twice as big as x?

.....

[___ / 1 mark]

Grade 5

5. A number is a multiple of 4, 5 and 6. Write the prime factor decomposition of the smallest number it could be.

.....

[___ / 2 marks]

Finding HCF and LCM

Grade 4

1. a) Write 160 as a product of prime factors.

..... **[I got ___ / 2 marks]**

b) Find the highest common factor of 160 and 280

..... **[___ / 2 marks]**

c) Find the lowest common multiple of 160 and 280

..... **[___ / 2 marks]**

Grade 5

2. Two numbers have prime factor decompositions $2^3 \times 5 \times 11$ and $2 \times 3^2 \times 5$

Find

a) the highest common factor of the two numbers

Hint
You may wish to use a Venn diagram to help with this question.

..... **[___ / 2 marks]**

b) the lowest common multiple of the two numbers.

..... **[___ / 1 mark]**

Grade 5

3. Fran is sorting her books into piles. She has 225 yellow books and 324 orange books. She does not want to mix the colours and wants every pile to contain the same number of books. Work out the biggest number of books she can put in each pile.

..... **[___ / 3 marks]**

Standard form

Grade 3

1. Write these as ordinary numbers.

a) 1.56×10^8

..... **[I got ___ / 1 mark]**

b) 8.02×10^{-3}

..... **[___ / 1 mark]**

Grade 3

2. Write these numbers in standard form.

a) 48 000 000 000

..... **[___ / 1 mark]**

b) 0.000 0703

..... **[___ / 1 mark]**

c) 95×10^6

..... **[___ / 1 mark]**

d) 0.68×10^{-4}

..... **[___ / 1 mark]**

Grade 3

3. The distance from the Sun to Earth is approximately 150 000 000 km.
Write this number in standard form.

..... km **[___ / 1 mark]**

Grade 4

4. Put these numbers in order of size, starting with the biggest.

2.1×10^4 2.3×10^5 0.21×10^4 2200

Hint
Write all the numbers in the same form.

..... **[___ / 3 marks]**

Grade 4

5. The size of a bacteria cell is 4×10^{-7} m and the size of a virus is 0.000 000 05 m.
Which is smaller, the bacteria cell or the virus?

..... **[___ / 2 marks]**

Calculating with standard form

Grade 5

1. Work out the value of each expression, giving your answers in standard form.

a) $2 \times (3 \times 10^2)$

..... **[I got ___ / 1 mark]**

b) $(4 \times 10^{-4}) \div 2$

..... **[___ / 1 mark]**

c) $(3 \times 10^{-2}) + (5 \times 10^{-2})$

..... **[___ / 1 mark]**

d) $(9 \times 10^7) - (3 \times 10^7)$

..... **[___ / 1 mark]**

Grade 5

2. Everly says that $6 \times (3 \times 10^6)$ is written as 18×10^6 in standard form.

Is Everly correct? Explain your reasoning.

..... **[___ / 1 mark]**

Grade 5

3. Work out the value of $7 \times 10^{-2} \times 30\,000$. Give your answer in standard form.

..... **[___ / 2 marks]**

Grade 5

4. Work out the value of each expression, giving your answers in standard form.

a) $(5 \times 10^4) + (6 \times 10^5)$

..... **[___ / 2 marks]**

b) $(9 \times 10^{-3}) - (3 \times 10^{-4})$

..... **[___ / 2 marks]**

c) $(2.1 \times 10^8) \times (3 \times 10^{-5})$

..... **[___ / 2 marks]**

d) $(8.2 \times 10^3) \div (4.1 \times 10^7)$

..... **[___ / 2 marks]**

Guided answers

A correct final answer automatically scores all the marks, unless specified otherwise.

Page 1, Place value

1. 90 124
1 mark *for correct answer.*

2. a 200 **b** 20 000 **c** $\frac{2}{10}$ or 0.2
1 mark *for each correct answer.*

3. a > **b** = **c** <
1 mark *for each correct answer.*

4. 7.054, 7.405, 7.45, 7.504
2 marks *for correct order;* ***1 mark*** *for any three in correct order.*

5. a $67.9 \times 1000 = 67\,900$ **b** $0.9 \div 100 = 0.009$
1 mark *for each correct answer.*

6. £8.50 ÷ 10 = £0.85, so 1 packet costs 85p.
1 mark *for division;* ***1 mark*** *for 85p.*

7. a $4.5 \times 19.2 = 4.5 \times 192 \div \mathbf{10} = 864 \div \mathbf{10} = 86.4$
You could also estimate: $4.5 \times 19.2 \approx 5 \times 20 \approx 100$, which is close to 86.4

b $450 \times 0.0192 = 4.5 \times \mathbf{100} \times 192 \div \mathbf{10\,000}$
$= 864 \times \mathbf{100} \div \mathbf{10\,000} = 8.64$
You could also estimate: $450 \times 0.0192 \approx 500 \times 0.02 \approx 10$, which is close to 8.64

c You know that $864 \div 4.5 = 192$,
so $8.64 \div 0.45 = \frac{864 \div \mathbf{100}}{4.5 \div \mathbf{10}} = 192 \div \mathbf{10} = 19.2$
You could also estimate: $8.64 \div 0.45 \approx 10 \div 0.5 \approx 20$, which is close to 19.2

1 mark *for each correct answer.*

Page 2, Order of operations

1. a $2 + 3 \times 9 = 2 + 27 = 29$

b $24 \div (6 - 2) \times 5 = 24 \div 4 \times 5 = 30$

c $10 - 3^2 = 10 - 9 = 1$

1 mark *for each correct answer.*

2. a $(12 - 4 \times 2)^3 = (12 - 8)^3 = 4^3 = 64$

b $\frac{4 \times 5^2}{4 \times 5 \div 2} = \frac{4 \times 25}{10} = \frac{100}{10} = 10$

c $5 \times \sqrt{50 - 1} + 6 \times 3 = 5 \times \sqrt{49} + 6 \times 3$
$= 5 \times 7 + 6 \times 3$
$= 35 + 18 = 53$

1 mark *for each correct answer.*

3. a $\frac{2 \times 36 + 18}{20 - 12} = \frac{90}{8} = \frac{45}{4}$ or 11.25

b $\left(\frac{3}{5}\right)^3 + 9 \div 3 = \frac{27}{125} + 3 = \frac{402}{125}$ or 3.216

c $\sqrt{7.29} \times 1000 = 2.7 \times 1000 = 2700$

1 mark *for each correct answer.*

4. There are a number of ways to explain this. Two examples of correct explanations would be:
Eva is correct because you calculate 3^2, which is 9, then multiply by 2, so $2 \times 9 = 18$
Eva is correct. Bavan made the mistake of multiplying before squaring, whereas Eva squared before multiplying.
1 mark *for a correct, detailed explanation.*

5. a $22 - (10 - 7) = 19$ **b** $20 - (5 - 2 + 6) = 11$
1 mark *for each correct answer.*

Page 3, Rounding and truncating

1. a 258 **b** 260 **c** 300
1 mark *for each correct answer.*

2. a 20 **b** 19.9 **c** 19.90
1 mark *for each correct answer.*

3. a 8 **b** 8.2 **c** 8.26
1 mark *for each correct answer.*

4. $3.66 \times 9 = 32.94 \approx 33\ m^2$
1 mark *for correct multiplication;* ***1 mark*** *for rounding.*

5. $3000 \div 310 = 9.677$, so the jug will fill 9 whole glasses.
1 mark *for correct division;* ***1 mark*** *for truncating to an integer.*

6. $18.93 \times 7.5 = 141.975$, so Mark earns £141.98 a day.
$22.17 \times 6.5 = 144.105$, so Kwamé earns £144.11 a day.
The difference in their pay is £144.11 – £141.98 = £2.13 a day.
1 mark *for Mark's pay;* ***1 mark*** *for Kwamé's pay;* ***1 mark*** *for the difference. Total 3 marks.*

Page 4, Significant figures

1. a 20 190 **b** 20 200
c 20 000 **d** 20 000
1 mark *for each correct answer.*

2. a 0.007 **b** 0.0068 **c** 0.006 80
1 mark *for each correct answer.*

3. Side length = $\sqrt{40} = 6.32455532 = 6.32$ cm to 3 sf
1 mark *for square rooting;* ***1 mark*** *for 6.32*

4. a $\frac{4.56 \times 2.89}{12.1 - 0.56} = 1.141\,975\,737$

b 1.141 975 737 = 1.1 to 2 sf

1 mark *for each correct answer.*

5. Shirley has rounded 0.065 29 to 2 dp instead of 2 sf.
The correct answer is 0.065
1 mark *for a correct explanation.*

Page 5, Estimation

1. $2.84 \times 19.3 \approx 3 \times 20 \approx 60$
1 mark *for correct answer.*

2. $\frac{317 + 48.6}{9.683} \approx \frac{300 + 50}{10} \approx \frac{350}{10} \approx 35$
1 mark *for rounding to 1 sf;* ***1 mark*** *for correct answer.*

3. $\frac{2.67 \times 1.36}{0.11 + 0.42} \approx \frac{3 \times 1}{0.1 + 0.4} \approx \frac{3}{0.5} \approx 6$
1 mark *for rounding to 1 sf;* ***1 mark*** *for correct answer.*

4. Number of fish at start of January ≈ 1000
Increase ≈ 20 fish per day
Five months ≈ 5 × 30 ≈ 150 days
Number of fish after five months ≈ 150 × 20 + 1000 ≈ 4000
1 mark *for rounding rate of increase to 1 sf;* ***1 mark*** *for correct calculation for the number of fish after five months;* ***1 mark*** *for correct answer. Total 3 marks.*

5. Number of portions sold ≈ 100
Sale price per portion ≈ £9.00
Cost per portion ≈ £3.00
Profit per portion ≈ £9.00 – £3.00 ≈ £6.00
Total profit ≈ £6.00 × 100 ≈ £600

1 mark *for rounding portions, sale price and cost to 1 sf;* ***1 mark*** *for a profit calculation;* ***1 mark*** *for correct answer. Total 3 marks.*

Note that you could also find the total estimated sale price (£900) and subtract the total estimated cost (£300) to get the total estimated profit.

6. Distance driven ≈ 400 km
Average speed ≈ 80 km/h
Time driving ≈ $\frac{400}{80}$ ≈ 5 hours
Time for whole journey ≈ 5 hours 30 minutes (including the break)
Time of arrival is roughly 2 pm (8.30 am + $5\frac{1}{2}$ hours).
1 mark *for rounding distance and speed to 1 sf;*
1 mark *for finding the time taken;* ***1 mark*** *for correct answer. Total 3 marks.*

Page 6, Error intervals

1. The smallest number this could be is 5.25, since 5.25 is the smallest number that rounds to 5.3 to 1 dp.
1 mark *for correct answer of 5.25*

2. $13.5 \leq L < 14.5$
1 mark *for 13.5;* ***1 mark*** *for 14.5*

3. a $105 \leq p < 115$ **b** $107.5 \leq p < 112.5$
c $109.5 \leq p < 110.5$
1 mark *for each correct minimum;* ***1 mark*** *for each correct maximum.*

4. a $4.665 \leq x < 4.675$ **b** $4500 \leq x < 5500$
1 mark *for each correct minimum;* ***1 mark*** *for each correct maximum.*

5. $245 \leq l < 255$
1 mark *for correct minimum and maximum;* ***1 mark*** *for correct interval notation.*

6. Sienna can see a truncation to 1 dp, so the error interval is $1.8 \leq x < 1.9$
1 mark *for correct minimum and maximum;* ***1 mark*** *for correct interval notation.*

Page 7, Calculating with negative numbers

1. a January **b** $-1 - (-5) = 4$ °C
c $8 - (-5) = 13$ °C
1 mark *for each correct answer.*

2. a $2 + (-5) = -3$ **b** $(-48) \div (-6) = 8$
c $(-3)^2 = (-3) \times (-3) = 9$
1 mark *for each correct answer.*

3. a $5 + (-3) \times 4 = 5 + (-12) = -7$
1 mark *for –12;* ***1 mark*** *for correct answer.*
b $(8 - 10) \times 4 - (-10) = (-2) \times 4 - (-10) = -8 - (-10) = 2$
1 mark *for –8;* ***1 mark*** *for correct answer.*
c $\frac{(-2) \times (-6)}{-10 + 7} = \frac{12}{-3} = -4$
1 mark *for either 12 in the numerator or –3 in the denominator;* ***1 mark*** *for correct answer.*

4. Total spend = £257.50
Bank balance = £241 − £257.50 = −£16.50
Thomas must pay in £100 + £16.50 = £116.50 to get the balance up to £100
1 mark *for subtracting the spend from £241;* ***1 mark*** *for –£16.50 or £16.50 overdrawn;* ***1 mark*** *for final answer of £116.50. Total 3 marks.*

Page 8, Calculating with decimals

1. a
$$\begin{array}{r} 2.906 \\ +\ 8.310 \\ \hline 11.216 \\ {\scriptstyle 1} \end{array}$$
1 mark *for lining up the digits correctly in a column;*
1 mark *for correct answer.*

b
$$\begin{array}{r} {\scriptstyle 1}{\scriptstyle 14}{\scriptstyle 15}{\scriptstyle 1} \\ 25.043 \\ -17.820 \\ \hline 7.223 \end{array}$$
1 mark *for lining up the digits correctly in a column;*
1 mark *for correct answer.*

2. a
$$\begin{array}{r} 74 \\ \times\ 26 \\ \hline 444 \\ +1480 \\ \hline 1924 \\ {\scriptstyle 1}\ {\scriptstyle 2} \end{array}$$
Since 74 × 26 = 1924,
7.4 × 0.26 = 1924 ÷ 10 ÷ 100 = 1.924
1 mark *for multiplying 74 × 26 to get 1924;* ***1 mark*** *for correct answer.*

b 17.12 ÷ 0.8 = 171.2 ÷ 8
$$8\overline{)171.2}$$
$$\begin{array}{r} 21.4 \\ 8\overline{)171.2} \\ {\scriptstyle 1}\ {\scriptstyle 3}\ {\scriptstyle 2} \end{array}$$
171.2 ÷ 8 = 21.4
1 mark *for dividing 171.2 ÷ 8;* ***1 mark*** *for correct answer.*

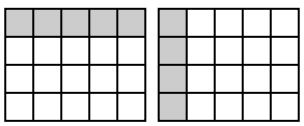
c $\frac{1.9 + 7.62}{9 - 8.3} = \frac{9.52}{0.7} = \frac{95.2}{7}$
$$\begin{array}{r} 13.6 \\ 7\overline{)95.42} \\ {\scriptstyle 2}\ {\scriptstyle 4} \end{array}$$
$\frac{95.2}{7} = 13.6$
1 mark *for getting correct numerator and denominator;*
1 mark *for dividing 95.2 ÷ 7;* ***1 mark*** *for correct answer. Total 3 marks.*

3. £55.65 ÷ 7 = £7.95
$$\begin{array}{r} 7.95 \\ 7\overline{)55.663}5 \\ {\scriptstyle 6}\ {\scriptstyle 3} \end{array}$$
1 mark *for attempting to divide;* ***1 mark*** *for correct answer.*

4. By estimating, 14.5 × 2.6 ≈ 15 × 3 ≈ 45. Alex's answer is not even close.
1 mark *for a correct explanation.*

Page 9, Introduction to fractions

1. $\frac{1}{4} > \frac{1}{5}$
Giving them a common denominator, $\frac{1}{4} = \frac{5}{20}$ and $\frac{1}{5} = \frac{4}{20}$
You can see $\frac{1}{4}$ is bigger.
Alternatively, you can say that $\frac{1}{4}$ must be bigger as one whole is split into four parts. Each part will be bigger than if the whole was split into five parts.
You can also show this by shading $\frac{1}{4}$ (horizontally) and $\frac{1}{5}$ (vertically) on the diagram:



1 mark *for a correct explanation.*

2. Giving each fraction a common denominator of 24,
$\frac{3}{4} = \frac{18}{24}$, $\frac{2}{3} = \frac{16}{24}$, $\frac{5}{8} = \frac{15}{24}$ and $\frac{7}{12} = \frac{14}{24}$
You can now put them in order by comparing the numerators and you have $\frac{7}{12}$, $\frac{5}{8}$, $\frac{2}{3}$, $\frac{3}{4}$
2 marks *for all correct,* ***1 mark*** *for three out of four correct.*

3. a i $1\frac{2}{5} = \frac{7}{5}$
1 mark *for correct answer.*

ii $3\frac{2}{4} = 3\frac{1}{2} = \frac{7}{2}$. Alternatively, $3\frac{2}{4} = \frac{14}{4} = \frac{7}{2}$
1 mark *for simplifying* $\frac{2}{4}$ *or* $\frac{14}{4}$*;* ***1 mark*** *for correct answer.*

b. i $\frac{17}{9} = 1\frac{8}{9}$
1 mark *for correct answer.*

ii $\frac{92}{40} = \frac{23}{10} = 2\frac{3}{10}$. Alternatively, $\frac{92}{40} = 2\frac{12}{40} = 2\frac{3}{10}$
1 mark *for simplifying* $\frac{92}{40}$ *or* $\frac{12}{40}$*;* ***1 mark*** *for correct answer.*

4. Dave has $2\frac{1}{3} = \frac{7}{3} = \frac{56}{24}$ bottles left.
Lizzie has $\frac{19}{8} = \frac{57}{24}$ bottles left.
$\frac{57}{24} > \frac{56}{24}$, so Lizzie has more.
Alternatively, Lizzie has $\frac{19}{8} = 2\frac{3}{8} = 2\frac{9}{24}$ bottles left.
Dave has $2\frac{1}{3} = 2\frac{8}{24}$ bottles left.
$2\frac{9}{24} > 2\frac{8}{24}$, so Lizzie has more.
1 mark *for converting* $2\frac{1}{3}$ *to an improper fraction (or for converting* $\frac{19}{8}$ *to a mixed number);* ***1 mark*** *for writing both fractions with a common denominator (such as 24);* ***1 mark*** *for a correct comparison and conclusion. Total 3 marks.*

Page 10, Proportions of amounts

1. a $\frac{1}{5}$ of $45 = 45 \div 5 = 9$

b 30% of $180 = 180 \div 10 \times 3 = 54$

c $\frac{5}{7}$ of $14 = 14 \div 7 \times 5 = 10$

d 10% of 50 = 5
So, 60% of $50 = 5 \times 6 = 30$
1% of 50 = 0.5
So, 2% of $50 = 2 \times 0.5 = 1$
62% of $50 = 30 + 1 = 31$
1 mark *for each correct calculation;* ***1 mark*** *for each correct answer.*

2. 10% of £2460 = £246
So, 5% of £2460 = £123
15% of £2460 = £246 + £123 = £369
1 mark *for correct calculation;* ***1 mark*** *for correct answer.*

3. 10% of 90 = 9
So, 110% of 90 = 90 + 9 = 99
$\frac{8}{7}$ of $84 = 84 \div 7 \times 8 = 96$
Since 99 > 96, 110% of 90 is bigger than $\frac{8}{7}$ of 84
1 mark *for finding 110% of 90;* ***1 mark*** *for finding* $\frac{8}{7}$ *of 84;*
1 mark *for a correct conclusion. Total 3 marks.*

4. $\frac{3}{8}$ of £7200 = £7200 ÷ 8 × 3 = £2700
1 mark *for correct calculation;* ***1 mark*** *for correct answer.*

5. Rock climbing: 25% of 48 = 48 ÷ 4 = 12
Raft building: $\frac{5}{12}$ of $48 = 48 \div 12 \times 5 = 20$
Kayaking: 48 − 12 − 20 = 16 children
1 mark *for the number who choose rock climbing;*
1 mark *for the number who choose raft building;* ***1 mark*** *for the number who choose kayaking. Total 3 marks.*

Page 11, Calculating with fractions 1

1. 4
1 mark *for correct answer.*

2. a $\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$
1 mark *for correct answer.*

b $\frac{3}{7} \times \frac{14}{9} = \frac{\cancel{3}^{1} \times \cancel{14}^{2}}{\cancel{7}_{1} \times \cancel{9}_{3}} = \frac{1 \times 2}{1 \times 3} = \frac{2}{3}$
1 mark *for multiplying;* ***1 mark*** *for the simplified answer.*

3. a $\frac{3}{4} \div \frac{1}{11} = \frac{3}{4} \times \frac{11}{1} = \frac{33}{4} = 8\frac{1}{4}$
1 mark *for turning into multiplication;* ***1 mark*** *for correct answer in improper fraction or mixed number form.*

b $\frac{6}{5} \div \frac{7}{10} = \frac{6}{5} \times \frac{10}{7} = \frac{6 \times \cancel{10}^{2}}{\cancel{5}_{1} \times 7} = \frac{6 \times 2}{1 \times 7} = \frac{12}{7} = 1\frac{5}{7}$
1 mark *for writing a correct multiplication;* ***1 mark*** *for correct, simplified answer in improper fraction or mixed number form.*

4. $16 \div \frac{2}{3} = \frac{16}{1} \times \frac{3}{2} = \frac{\cancel{16}^{8} \times 3}{1 \times \cancel{2}_{1}} = \frac{8 \times 3}{1 \times 1} = \frac{24}{1} = 24$ days
1 mark *for writing a division and turning into a correct multiplication;* ***1 mark*** *for correct answer.*

5. $\frac{1}{9}$ of $30 = \frac{1}{9} \times 30 = \frac{30}{9} = \frac{10}{3}$ m or $3\frac{1}{3}$ m
1 mark *for multiplying;* ***1 mark*** *for correct simplified answer (improper fraction or mixed number).*

6. $\frac{1}{4}$ of $\frac{3}{10} = \frac{1}{4} \times \frac{3}{10} = \frac{3}{40}$
1 mark *for multiplying;* ***1 mark*** *for correct answer.*

7. Area of triangle $= \frac{1}{2} \times 1\frac{1}{5} \times \frac{6}{5} = \frac{1}{2} \times \frac{6}{5} \times \frac{6}{5} = \frac{18}{25}$ cm^2
This is the area of the rectangle.
Length of rectangle $= \frac{18}{25} \div \frac{2}{5} = \frac{18}{25} \times \frac{5}{2} = \frac{\cancel{18}^{9} \times \cancel{5}^{1}}{\cancel{25}_{5} \times \cancel{2}_{1}} = \frac{9 \times 1}{5 \times 1}$
$= \frac{9}{5}$ cm or $1\frac{4}{5}$ cm
1 mark *for writing a correct multiplication;* ***1 mark*** *for writing a division and turning into a correct multiplication;*
1 mark *for correct, simplified answer (improper fraction or mixed number). Total 3 marks.*

Page 12, Calculating with fractions 2

1. a $\frac{1}{3} + \frac{1}{5} = \frac{5+3}{15} = \frac{8}{15}$
1 mark *for finding a common denominator;* ***1 mark*** *for correct answer.*

b $\frac{2}{9} + \frac{5}{6} = \frac{4}{18} + \frac{15}{18} = \frac{19}{18}$ or $1\frac{1}{18}$
1 mark *for finding a common denominator;* ***1 mark*** *for correct answer.*

c $1\frac{7}{8} + 2\frac{3}{4} = \frac{15}{8} + \frac{11}{4} = \frac{15}{8} + \frac{22}{8} = \frac{37}{8}$ or $4\frac{5}{8}$
1 mark *for converting mixed numbers to improper fractions;* ***1 mark*** *for finding a common denominator;*
1 mark *for correct answer. Total 3 marks.*

2. a $\frac{7}{9} - \frac{1}{2} = \frac{14-9}{18} = \frac{5}{18}$
1 mark *for finding a common denominator;* ***1 mark*** *for correct answer.*

b $3\frac{1}{6} - 2\frac{3}{4} = \frac{19}{6} - \frac{11}{4} = \frac{38}{12} - \frac{33}{12} = \frac{5}{12}$
1 mark *for converting mixed numbers to improper fractions;* ***1 mark*** *for finding a common denominator;*
1 mark *for correct answer. Total 3 marks.*

3. Janet is not correct. She has added the numerators and the denominators. She should have found a common denominator and then added the numerators only.
1 mark *for a correct explanation.*

4. $\frac{1}{8}+\frac{2}{3}=\frac{3+16}{24}=\frac{19}{24}$
$1-\frac{19}{24}=\frac{24}{24}-\frac{19}{24}=\frac{5}{24}$
1 mark *for finding a common denominator of 24;* ***1 mark*** *for adding to get* $\frac{19}{24}$*;* ***1 mark*** *for correct answer. Total 3 marks.*

5. $2\frac{4}{5}-\frac{7}{8}+1\frac{1}{20}=\frac{14}{5}-\frac{7}{8}+\frac{21}{20}=\frac{112}{40}-\frac{35}{40}+\frac{42}{40}=\frac{119}{40}$ m or $2\frac{39}{40}$ m
1 mark *for converting mixed numbers to improper fractions;* ***1 mark*** *for finding a common denominator;* ***1 mark*** *for correct answer. Total 3 marks.*

6. $\frac{3}{4}-\frac{1}{3}=\frac{9-4}{12}=\frac{5}{12}$
1 mark *for finding a common denominator;* ***1 mark*** *for correct answer.*

Page 13, Fractions, decimals, percentages

1. a $0.4=\frac{4}{10}=\frac{2}{5}$ **b** $6\%=0.06$ **c** $\frac{1}{8}=12.5\%$
1 mark *for each correct answer.*

2. a $\frac{6}{5}=1\frac{1}{5}=120\%$ **b** $0.035=\frac{35}{1000}=\frac{7}{200}$ **c** $3.6\%=0.036$
1 mark *for each correct answer.*

3. Convert everything to a percentage.
$0.3=30\%$, $\frac{1}{3}=33.\dot{3}\%$, $\frac{16}{50}=\frac{32}{100}=32\%$
The order is 0.3, $\frac{16}{50}$, $\frac{1}{3}$, 34%.
1 mark *for converting everything to a percentage (or everything to a decimal, or everything to a fraction with a common denominator), condone one mistake;* ***2 marks*** *for correct order (****1 mark*** *for three out of four correct). Total 3 marks.*

4. $\frac{7}{20}=\frac{35}{100}=35\%$, $\frac{1}{5}=20\%$
$35\%+20\%=55\%$
$100\%-55\%=45\%$ play an album.
1 mark *for converting both fractions to a percentage;* ***1 mark*** *for subtracting from 100%;* ***1 mark*** *for correct answer. Total 3 marks.*

5. Lin's class: $\frac{6}{25}=\frac{24}{100}=24\%$
Jay's class: $\frac{8}{32}=\frac{1}{4}=\frac{25}{100}=25\%$
Lin is not correct. Jay's class has a (slightly) higher proportion of students who read fantasy books.
1 mark *for finding either 24% or 25% or for giving both fractions with a common denominator;* ***1 mark*** *for a complete, correct explanation.*

Page 14, Powers and roots

1. a $4^2=16$ **b** $2^3=8$
c $\sqrt{49}=7$ **d** $\sqrt[3]{27}=3$
1 mark *for each correct answer.*

2. a $2\times\sqrt{9+16}+6^2=2\times\sqrt{25}+36=2\times5+36$
$=10+36=46$
1 mark *for* $\sqrt{25}=5$ *and* $6^2=36$ *first;* ***1 mark*** *for multiplying before adding;* ***1 mark*** *for correct answer. Total 3 marks.*

b $3^4-6\times\sqrt[3]{8}+50\div5^2=81-6\times2+50\div25$
$=81-12+2=71$
1 mark *for* $3^4=81$, $\sqrt[3]{8}=2$ *and* $5^2=25$ *first;* ***1 mark*** *for multiplying and dividing before adding and subtracting;* ***1 mark*** *for correct answer. Total 3 marks.*

3. Side length: $\sqrt{121}=11$ cm
Perimeter: $4\times11=44$ cm
1 mark *for side length of 11 cm;* ***1 mark*** *for correct perimeter.*

4. a $\frac{\sqrt[3]{3.6^2+91\times3.7}}{\sqrt{6.25}+1.8^3}=0.845\,537\,207$
b 0.845 537 207 = 0.846 to 3 sf
1 mark *for each correct answer.*

5. Volume of box $=8^3=512\,\text{cm}^3$
Volume of small cubes $=2^3=8\,\text{cm}^3$
$512\div8=64$ cubes will fit in the box.
Alternatively, $8\div2=4$, so 4 cubes fit along each side of the box and the total number of cubes that fit is $4^3=64$ cubes.
1 mark *for volume of box (or for finding that 4 cubes fit along each side);* ***1 mark*** *for volume of small cubes (or for* 4^3*);* ***1 mark*** *for correct answer. Total 3 marks.*

Page 15, Calculating with indices

1. a $7^2\times7^5=7^{2+5}=7^7$ **b** $9^{10}\div9^4=9^{10-4}=9^6$
c $2^5\times2^{-3}=2^{5+(-3)}=2^2$ **d** $7^{-2}\div7^{-6}=7^{-2-(-6)}=7^4$
e $(3^4)^4=3^{4\times4}=3^{16}$
1 mark *for each correct answer.*

2. a $(8^2)^{-5}=8^{2\times(-5)}=8^{-10}$
1 mark *for correct answer.*
b $\frac{9^3}{9^2\times9^4}=\frac{9^3}{9^6}=9^{3-6}=9^{-3}$
1 mark *for* 9^6 *in the denominator;* ***1 mark*** *for correct answer.*
c $(2^7\times2^4)^{-1}=(2^{7+4})^{-1}=(2^{11})^{-1}=2^{11\times(-1)}=2^{-11}$
1 mark *for* 2^{11} *in the bracket;* ***1 mark*** *for correct answer.*

3. Area $=10^3\times10^2=10^5\,\text{cm}^2$
1 mark *for multiplying the two lengths;* ***1 mark*** *for correct answer.*

4. Peter has multiplied the bases. Since the bases are different this cannot be simplified as a simple power of 10
1 mark *for a correct explanation.*

5. a $13^0=1$
1 mark *for correct answer.*
b $8^{-1}=\frac{1}{8}$
1 mark *for correct answer.*
c $\left(\frac{2}{5}\right)^3=\frac{2^3}{5^3}=\frac{8}{125}$
1 mark *for correct answer.*
d $\left(\frac{1}{4}\right)^{-2}=4^2=16$
1 mark *for 4;* ***1 mark*** *for correct answer.*

Page 16, Factors and multiples

1. a 3 or 6 **b** 18 or 36 **c** 24 or 36
d 8 **e** 10 and 30 **f** Any two of 3, 6, 10 and 30
1 mark *for each correct answer. Just one correct answer needed to get each mark.*

2. Multiples of 9: 9, 18, 27, (36), 45, …
Multiples of 12: 12, 24, (36), 48, …
LCM(9, 12) = 36
1 mark *for any correct common multiple;* ***1 mark*** *for correct answer.*

3. Factors of 18: 1, 2, 3, (6), 9, 18
Factors of 12: 1, 2, 3, 4, (6), 12
HCF(18, 12) = 6
1 mark *for any correct common factor;* ***1 mark*** *for correct answer.*

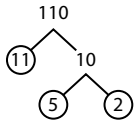
4. Multiples of 6: 6, 12, 18, 24, (30), 36, …
Multiples of 5: 5, 10, 15, 20, 25, (30), 35, …
Multiples of 15: 15, (30), 45, …
LCM(6, 5 and 15) = 30
The alarms next beep together after 30 minutes.
1 mark *for any correct common multiple;* ***1 mark*** *for correct answer.*

5. Multiples of 4: 4, 8, (12), 16, (20), …
Factors of 60: 1, 2, 3, 4, 5, 6, 10, (12), 15, (20), 30, 60
HCF(12, 20) = 4 and LCM(12, 20) = 60
The two numbers are 12 and 20
1 mark *for writing two numbers with a HCF of 4 or two numbers with a LCM of 60;* ***1 mark*** *for correct answer.*

Page 17, Prime factor decomposition

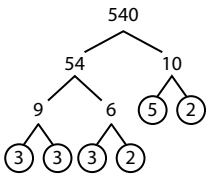
You might use a factor tree in your working with the same start and end as shown here but with different middle branches.

1.



$110 = 2 \times 5 \times 11$
1 mark *for finding or listing the prime factors;* ***1 mark*** *for correct answer.*

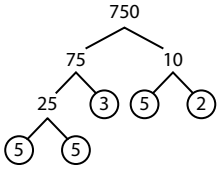
2. a



$540 = 2^2 \times 3^3 \times 5$
1 mark *for finding or listing the prime factors;*
1 mark *for correct answer.*

b Since $15 = 3 \times 5$ and both 3 and 5 are prime factors of 540, 540 must be divisible by 15
1 mark *for a correct explanation.*

3. a



$750 = 2 \times 3 \times 5^3$
1 mark *for finding or listing the prime factors;*
1 mark *for correct answer.*

b Since $4 = 2 \times 2$, but 750 only contains the factor of 2 once, 750 is not divisible by 4
1 mark *for a correct explanation.*

4. a $2 \times 3^2 \times 7 \times 13$ is even since 2 is a prime factor.
1 mark *for correct answer.*

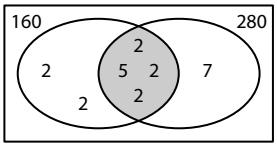
b To double a number, you multiply by 2, so the prime factor decomposition of a number twice as big will have another factor of 2. This is $2^2 \times 3^2 \times 7 \times 13$
1 mark *for correct answer.*

5. The prime factors of each number are:
$4 = 2 \times 2$; $5 = 5$; $6 = 2 \times 3$
Any number divisible by 4, 5 and 6 must have at least two 2s, one 5 and a 3, so the smallest such number is $2^2 \times 3 \times 5$
1 mark *for listing the prime factors of 4 and 6;* ***1 mark*** *for correct answer.*

Page 18, Finding HCF and LCM

1. a $160 = 2^5 \times 5$
1 mark *for finding or listing the prime factors;*
1 mark *for correct answer.*

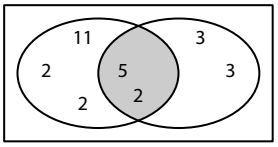
b $280 = 2^3 \times 5 \times 7$
A Venn diagram showing the prime factors looks like this:



HCF(160, 280) = $2^3 \times 5 = 40$
1 mark *for multiplying the common factors;* ***1 mark*** *for correct answer.*

c From the Venn diagram,
LCM(160, 280) = $2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 7 = 1120$
1 mark *for multiplying all the appropriate factors;*
1 mark *for correct answer.*

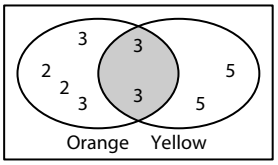
2.



a HCF = $2 \times 5 = 10$

b LCM = $2 \times 2 \times 11 \times 2 \times 5 \times 3 \times 3 = 3960$
1 mark *for correct Venn diagram or alternative method;*
1 mark *for HCF;* ***1 mark*** *for LCM. Total 3 marks.*

3. $225 = 3^2 \times 5^2$
$324 = 2^2 \times 3^4$
A Venn diagram would look like this:



The HCF of the two numbers is 9, so Fran can sort her books into piles of a maximum of 9 if they are to be the same size.
1 mark *for the prime factors of 225;* ***1 mark*** *for the prime factors of 324;* ***1 mark*** *for correct answer. Total 3 marks.*

Page 19, Standard form

1. a $1.56 \times 10^8 = 156\,000\,000$ **b** $8.02 \times 10^{-3} = 0.008\,02$
1 mark *for each correct answer.*

2. a $48\,000\,000\,000 = 4.8 \times 10^{10}$ **b** $0.000\,0703 = 7.03 \times 10^{-5}$
c $95 \times 10^6 = 9.5 \times 10^7$ **d** $0.68 \times 10^{-4} = 6.8 \times 10^{-5}$
1 mark *for each correct answer.*

3. 150 000 000 km = 1.5×10^8 km
1 mark *for correct answer.*

4. Putting all the numbers in either standard or ordinary form:
$2.1 \times 10^4 = 21\,000$, $2.3 \times 10^5 = 230\,000$,
$0.21 \times 10^4 = 2.1 \times 10^3 = 2100$, $2200 = 2.2 \times 10^3$
The order, starting with the biggest, is 2.3×10^5, 2.1×10^4, 2200, 0.21×10^4
1 mark *for converting at least two of the numbers correctly to an alternative form;* ***1 mark*** *for any three in the correct order;* ***1 mark*** *for all in the correct order. Total 3 marks.*

5. Virus: $0.000\,000\,05 = 5 \times 10^{-8}$ m
Bacteria cell: $4 \times 10^{-7} = 0.000\,0004$ m
The virus is smaller.
1 mark *for getting both numbers in the same form;*
1 mark *for correct conclusion.*

Page 20, Calculating with standard form

1. a 6×10^2 **b** 2×10^{-4}
c 8×10^{-2} **d** 6×10^7
1 mark *for each correct answer.*

2. Everly is not correct. 18 is not between 1 and 10 so it is not in standard form. The correct answer is 1.8×10^7
1 mark *for 'No' and correct explanation.*

3. $30\,000 = 3 \times 10^4$
$(7 \times 10^{-2}) \times (3 \times 10^4) = 21 \times 10^{(-2)+4} = 21 \times 10^2 = 2.1 \times 10^3$
1 mark *for 21×10^2;* ***1 mark*** *for correct answer.*

4. a $(5 \times 10^4) + (6 \times 10^5) = 50\,000 + 600\,000 = 650\,000$
$= 6.5 \times 10^5$
1 mark *for converting to ordinary numbers or the same power of 10;* ***1 mark*** *for correct answer.*

b $(9 \times 10^{-3}) - (3 \times 10^{-4}) = 0.009 - 0.0003 = 0.0087$
$= 8.7 \times 10^{-3}$
1 mark *for converting to ordinary numbers or the same power of 10;* ***1 mark*** *for correct answer.*

c $(2.1 \times 10^8) \times (3 \times 10^{-5}) = 6.3 \times 10^{8+(-5)} = 6.3 \times 10^3$
1 mark *for 10^3;* ***1 mark*** *for correct answer.*

d $(8.2 \times 10^3) \div (4.1 \times 10^7) = 2 \times 10^{3-7} = 2 \times 10^{-4}$
1 mark *for 10^{-4};* ***1 mark*** *for correct answer.*

Page 21, Terms and expressions

1. a $n - 2$ **b** $n - 2 + 11 = n + 9$
1 mark *for each correct answer.*

2. $3g$
1 mark *for correct answer.*

3. $2x + 3y$
1 mark *for 2x or 3y;* ***1 mark*** *for correct answer.*

4. $7 + 4p + 3q$
1 mark *for correct answer (the three terms can be written in any order).*

5. a $2a + 3b = 2 \times 5 + 3 \times 2 = 10 + 6 = 16$
b $10 - c = 10 - (-4) = 14$
c $\frac{8a}{c} = \frac{8 \times 5}{-4} = \frac{40}{-4} = -10$
d $ac + b = 5 \times (-4) + 2 = -20 + 2 = -18$
For each part, ***1 mark*** *for substituting the numbers in the correct place;* ***1 mark*** *for correct answer.*

Page 22, Simplifying expressions

1. a $2x + 3x - x = 4x$
1 mark *for correct answer.*

b $3p - 5q + 7q - 2q + 4p = 7p$
1 mark *for 7p or 0q;* ***1 mark*** *for correct answer.*

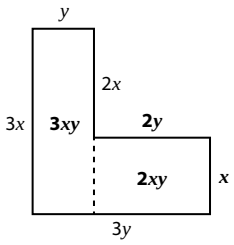
c $7 + 5t - 2 - 9t = 5 - 4t$
1 mark *for 5 or −4t;* ***1 mark*** *for correct answer.*

2. a $x^2 + 4x + 3x^2 - 6x + 1 = 4x^2 - 2x + 1$
1 mark *for $4x^2$ or −2x;* ***1 mark*** *for correct answer.*

b $9mn - 2m^2 + 7nm + 11m^2 = 16mn + 9m^2$
1 mark *for 16mn or $9m^2$;* ***1 mark*** *for correct answer (terms can be written in any order).*

3. $2x + 3x + x + 2 + x - 1 = 7x + 1$
1 mark *for adding all the sides together;* ***1 mark*** *for correct answer.*

4.



$3xy + 2xy = 5xy$
1 mark *for 3xy;* ***1 mark*** *for 2xy;* ***1 mark*** *for correct answer. Total 3 marks.*
Note that there are alternative methods.

5. Nikita: x, Gabriella: $2x$, Paulo: $x + 2x + 3 = 3x + 3$
Total number of figures: $x + 2x + 3x + 3 = 6x + 3$
1 mark *for 2x;* ***1 mark*** *for 3x + 3;* ***1 mark*** *for correct answer. Total 3 marks.*

Page 23, Formulae

1. a Cost = $80 + 5 \times 15 = 80 + 75 = £155$
1 mark *for substituting in;* ***1 mark*** *for correct answer.*

b $\frac{275 - 80}{15} = 13$ hours
1 mark *for 195 or subtracting 80 first;* ***1 mark*** *for correct answer.*

2. a $d = \frac{4+5}{2} = \frac{9}{2} = 4.5$
1 mark *for substituting in;* ***1 mark*** *for correct answer.*

b $d = 4^2 - 3 \times 4 = 16 - 12 = 4$
1 mark *for substituting in;* ***1 mark*** *for correct answer.*

c $4 = 2d - 12$
$2d = 4 + 12 = 16$
$d = \frac{16}{2} = 8$
1 mark *for substituting in;* ***1 mark*** *for rearranging;*
1 mark *for correct answer. Total 3 marks.*

3. $a = \frac{24 - 0}{8} = \frac{24}{8} = 3\ \text{m/s}^2$
1 mark *for substituting in;* ***1 mark*** *for correct answer.*

4. $C = 100 + 40t$ or $C = 40t + 100$
1 mark *for 40t + 100;* ***1 mark*** *for correct answer.*

5. Number of tablets = $\frac{17.5}{3.5} = 5$
1 mark *for substituting in;* ***1 mark*** *for correct answer.*

Page 24, Equations and identities

1.

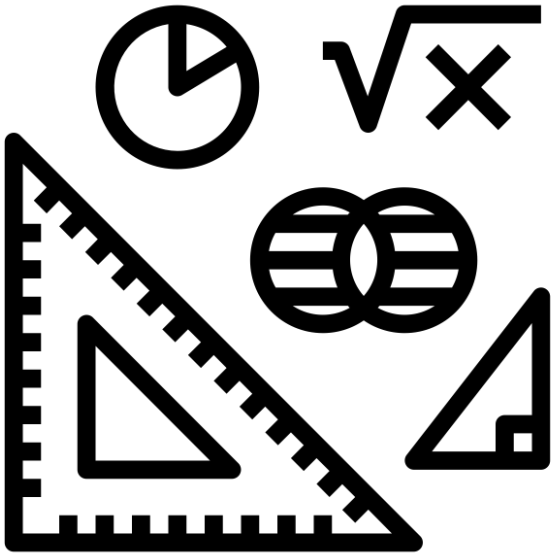
Expression	Formula	Equation	Identity
e, g	b, f	(a), c	d, h

1 mark *for each correct answer. Total 7 marks.*

2. A, **D**, **E**
1 mark *for each correct answer. Total 3 marks.*

MATHS – HIGHER

On the following pages you will find a series of maths activities. Please start with the ones that are appropriate for your tier or set although of course you are welcome to try other activities if you wish. You can mark your own work by using the answers at the back of the section.



Calculations

Grade 3

1. Work out

a) 25.043 – 17.82

..... **[I got ___ / 2 marks]**

b) 7.4 × 0.26

..... **[___ / 2 marks]**

c) 17.12 ÷ 0.8

..... **[___ / 2 marks]**

Grade 4

2. Work out

a) $(12 - 4 \times 2)^3$

..... **[___ / 1 mark]**

b) $\dfrac{4 \times 5^2}{4 \times 5 \div 2}$

..... **[___ / 1 mark]**

c) $5\sqrt{50 - 1} + 6 \times 3$

..... **[___ / 1 mark]**

d) $5 + (-3.2) \times 4$

..... **[___ / 1 mark]**

e) $(1 - 0.1) \times 4 - (-10)$

..... **[___ / 2 marks]**

f) $\dfrac{(-0.2) \times (-6)}{-1 + 0.7}$

..... **[___ / 2 marks]**

Grade 4

3. Supermarket A sells a pack of six vegan burgers for £4.65

Supermarket B sells a pack of eight for £6.59

Which supermarket is better value? Show your working.

..... **[___ / 3 marks]**

Grade 4

4. Marina's fence measures 1.4 m by 10.5 m. It costs £0.60 to paint the fence per square metre. How much does it cost to paint the fence in total?

£..... **[___ / 3 marks]**

Rounding & truncation

Grade 3

1. Round 20 193 to

a) 4 significant figures

..... **[I got ___ / 1 mark]**

b) 3 significant figures

..... **[___ / 1 mark]**

c) 2 significant figures

..... **[___ / 1 mark]**

d) 1 significant figure.

..... **[___ / 1 mark]**

Grade 3

2. Round 0.006 802 to

Hint
Where do significant figures start?

a) 1 significant figure

..... **[___ / 1 mark]**

b) 2 significant figures

..... **[___ / 1 mark]**

c) 3 significant figures.

..... **[___ / 1 mark]**

Grade 3

3. a) Calculate $\frac{1}{3}(0.02 \times 11.9)^2$. Write all the figures on your calculator display.

..... **[___ / 1 mark]**

b) Write your answer to part **a**

i) truncated to 2 decimal places

..... **[___ / 1 mark]**

ii) rounded to 2 significant figures.

..... **[___ / 1 mark]**

Grade 3

4. One bag of grass seed covers an area of 3.66 m^2 and costs £4.99. Fabio needs grass seed for a lawn of 32 m^2. How much will the grass seed cost Fabio? Give your answer to the nearest pound.

£..... **[___ / 3 marks]**

Grade 4

5. Shirley rounds 0.065 29 to 2 significant figures and gives the answer 0.07. Shirley is wrong. Explain why.

Hint
Think about the difference between significant figures and decimal places.

..... **[___ / 1 mark]**

Estimation

Grade 4

1. Estimate the value of $\frac{317 + 48.6}{9.683}$. Show your working.

Hint
Always round numbers before calculating.

..... **[I got ___ / 2 marks]**

Grade 4

2. Estimate the value of $\frac{2.67 \times 1.36}{0.11 + 0.42}$. Show your working.

..... **[___ / 2 marks]**

Grade 4

3. A biologist visits a lake at the start of January and works out that the number of fish in the lake is approximately 1000. She thinks that the population is growing at a rate of 17 fish per day. Estimate how many fish there will be in the lake five months later.

..... **[___ / 3 marks]**

Grade 5

4. In one week, an Italian restaurant sells 96 portions of lasagne. The restaurant sells a portion of lasagne for £8.95 and each portion costs £3.20 to make. Estimate the profit the restaurant makes from lasagne in the week.

£..... **[___ / 3 marks]**

Grade 5

5. James is driving to visit his Gran who lives 405 km away. He leaves at 8.30 am and drives at an average speed of 77 km/h, stopping for a 25-minute lunch break on the way. Estimate the time he arrives at his Gran's.

..... **[___ / 3 marks]**

Grade 6

6. Giving your answers to 1 decimal place, estimate the value of

a) $\sqrt{47}$

..... **[___ / 1 mark]**

b) $\sqrt{200}$

..... **[___ / 1 mark]**

Error intervals & bounds

Grade 5

1. The length, p m, of a football pitch is given as 110 m.
Write the error interval for p if this value is rounded to

a) the nearest 10 metres

$\leq p <$ ..... **[I got ___ / 2 marks]**

b) the nearest 5 metres.

$\leq p <$ ..... **[___ / 2 marks]**

Grade 5

2. A number, x, is given rounded to a particular degree of accuracy.
Write the error interval for x in each case.

a) $x = 4.67$ to 2 decimal places

$\leq x <$ ..... **[___ / 2 marks]**

b) $x = 5000$ to 1 significant figure.

$\leq x <$ ..... **[___ / 2 marks]**

Grade 5

3. A number, y, is given truncated. Write the error interval for y.

a) $y = 9$ truncated to an integer

$\leq y <$ ..... **[___ / 2 marks]**

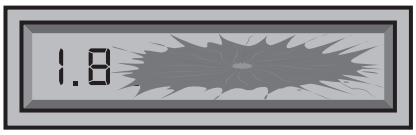
b) $y = 2.5$ truncated to 1 decimal place

$\leq y <$ ..... **[___ / 2 marks]**

Grade 5

4. Sienna uses her calculator to answer a question. The display breaks and she can only see 1.8 at the start of her answer. Let x be the unknown number on the display and write the range of possible values for x as an error interval.

Hint
Remember your inequalities.



..... **[___ / 2 marks]**

Grade 7

5. The side length of a square is given as 15 cm to the nearest centimetre. Work out the error interval for the area, x cm^2, of the square.

..... **[___ / 3 marks]**

Grade 7

6. A car travels on the motorway at a speed of 110 km/h to 3 significant figures, for a distance of 45 km, correct to the nearest kilometre. By considering bounds, work out the time taken in hours to travel this distance to an appropriate degree of accuracy. Give a reason for your answer.

..... **[___ / 5 marks]**

Adding & subtracting fractions

Grade 3

1. Work out and simplify where possible

a) $\frac{2}{9}+\frac{5}{6}$

..... **[I got ___ / 2 marks]**

b) $3\frac{1}{6}-2\frac{3}{4}$

..... **[___ / 3 marks]**

Grade 4

2. $\frac{1}{8}$ of the students in a class drive to school. $\frac{2}{3}$ of the students walk to school. The rest take the bus. What fraction of the students take the bus?

Hint
The whole class is represented by the number 1

..... **[___ / 3 marks]**

Grade 4

3. Daisy is building a model train track. Her track is $2\frac{4}{5}$ m long. She then takes out a piece of track which is $\frac{7}{8}$ m long and replaces it with a piece which is $1\frac{1}{20}$ m long. Work out the length of her track now.

.....m **[___ / 3 marks]**

Grade 4

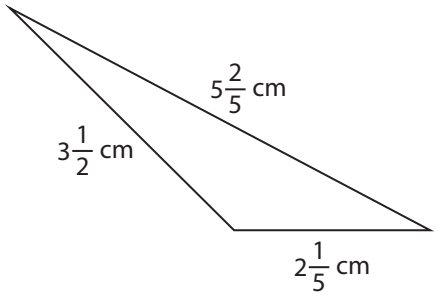
4. Maxwell is reading a book on his e-reader. When he picks it up one day, it tells him he is $\frac{1}{3}$ of the way through the book. He reads some and when he puts it down he is $\frac{3}{4}$ of the way through. What fraction of the book did he read?

..... **[___ / 2 marks]**

Grade 5

5. Work out the perimeter of the shape shown.

Hint
Add together the whole number parts and then add together the fraction parts.



.....cm **[___ / 3 marks]**

Multiplying & dividing fractions

Grade 3

1. A café uses up $\frac{2}{3}$ of a box of coffee beans every day. How many days will it take for it to use up 16 boxes of coffee beans?

..... **[I got ___ / 2 marks]**

Grade 4

2. Work out and simplify where possible.

a) $1\frac{1}{2} \times 3\frac{5}{6}$

..... **[I got ___ / 3 marks]**

b) $4\frac{4}{9} \div 2\frac{2}{3}$

..... **[___ / 3 marks]**

Grade 4

3. Rafael reserves $\frac{3}{10}$ of his monthly wage to pay his bills. $\frac{1}{4}$ of this amount is spent on his electricity bill.

What fraction of his monthly wage does Rafael spend on his electricity bill?

Hint
What calculation does the word 'of' represent?

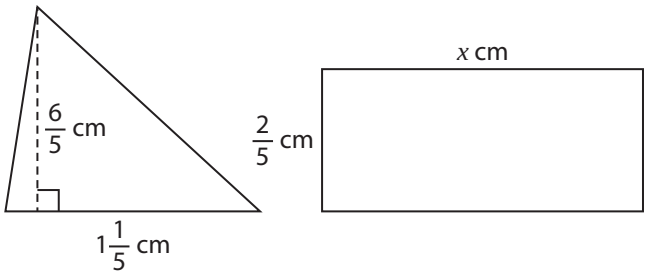
..... **[___ / 2 marks]**

Grade 5

4. A triangle has base $1\frac{1}{5}$ cm and height $\frac{6}{5}$ cm. A rectangle has the same area as the triangle. If the width of the rectangle is $\frac{2}{5}$ cm, what is its length, x cm?

Give your answer in its simplest form.

Hint
This question combines fractions and geometry. Find the area of the triangle. What is the same about both shapes?



..... cm **[___ / 3 marks]**

Grade 5

5. Vasiliki has a piece of material $3\frac{3}{4}$ m long.

She is cutting it into smaller pieces of length $\frac{5}{6}$ m.

How many smaller pieces can she get, and what fraction of a metre will be left over?

Number of small pieces = ... Fraction left = ... m

Hint
You need to divide fractions here.

[___ / 3 marks]

Fractions, decimals & percentages

Grade 4

1. In Lin's class, 6 out of 25 children read fantasy books. In Jay's class, 8 out of 32 children read fantasy books. Lin says the proportion of children who read fantasy books is greater in her class than in Jay's. Is Lin correct? Explain your answer.

.....

.....

[___ / 2 marks]

Grade 5

2. Sally says that multiplying by 0.01 is the same as dividing by 100. Is Sally correct? Explain your reasoning.

.....

[___ / 1 mark]

Grade 6

3. Explain, using prime factors, why $\frac{11}{28}$ is a recurring decimal.

.....

.....

[___ / 2 marks]

Grade 6

4. Jonathan ran some park races last year. 15% of his races were 5 km runs, $\frac{7}{10}$ of his races were 10 km runs and the rest were half marathons. If he ran 20 races in total, how many were half marathons?

.....

[___ / 3 marks]

Grade 6

5. In a city, 5.5 out of every 22 square metres are used for housing and services. If housing takes up $\frac{5}{8}$ of this space, what percentage of the total area is used for services?

.....

[___ / 3 marks]

Recurring decimals

Grade 6

1. Express these fractions as decimals.

a) $\frac{1}{18}$

..... **[I got ___ / 2 marks]**

b) $\frac{20}{33}$

..... **[___ / 2 marks]**

c) $\frac{3}{7}$

..... **[___ / 2 marks]**

Grade 7

2. Prove algebraically that $0.\dot{5} = \frac{5}{9}$

Hint
Let $x = 0.\dot{5}$ and find $10x$

[___ / 2 marks]

Grade 7

3. Write $0.\dot{8}\dot{4}$ as a fraction in its simplest form.

..... **[___ / 3 marks]**

Grade 8

4. Prove algebraically that $0.0\dot{5}\dot{6} = \frac{28}{495}$

[___ / 3 marks]

Surds

Grade 7

1. Write these expressions in the form $a\sqrt{2}$, where a is an integer.

a) $\sqrt{18} - \sqrt{8}$

..... **[I got ___ / 2 marks]**

b) $\sqrt{200} + \sqrt{72} - \sqrt{98}$

..... **[___ / 2 marks]**

c) $3\sqrt{2} + 7\sqrt{32}$

..... **[___ / 2 marks]**

d) $\frac{14}{\sqrt{2}}$

..... **[___ / 2 marks]**

Grade 8

2. Write these expressions in the form $a + b\sqrt{3}$, where a and b are integers.

a) $(1 + \sqrt{3})^2$

..... **[___ / 2 marks]**

b) $\frac{8}{2 - \sqrt{3}}$

Hint
Multiply numerator and denominator by the denominator with a changed sign.

..... **[___ / 3 marks]**

c) $\frac{\sqrt{3} - 1}{\sqrt{3} + 1}$

..... **[___ / 3 marks]**

Grade 8

3. Show that $(\sqrt{11} - \sqrt{8})(\sqrt{11} + \sqrt{8}) = 3$

..... **[___ / 3 marks]**

Index notation

Grade 4

1. Peter says that $2^3 \times 5^2$ simplifies to 10^5. Peter is wrong. Explain why.

..... **[I got ___ / 1 mark]**

Grade 5

2. Simplify $\frac{(2^7 \times 2^4)^{-1}}{2}$ fully and leave your answer in index form.

Hint
A power of -1 gives the reciprocal and a power of $\frac{1}{n}$ gives the nth root.

..... **[___ / 2 marks]**

Grade 6

3. Write in simplified index form

a) $\left(3^{\frac{1}{4}}\right)^{\frac{1}{4}}$ ..... **[___ / 1 mark]**

b) $\sqrt[3]{5^2}$ ..... **[___ / 2 marks]**

Grade 7

4. Work out

a) $\left(\frac{2}{5}\right)^3$ ..... **[___ / 1 mark]**

b) $25^{\frac{1}{2}}$ ..... **[___ / 1 mark]**

c) $8^{\frac{2}{3}}$ ..... **[___ / 2 marks]**

d) $\left(\frac{16}{9}\right)^{-\frac{3}{2}}$ ..... **[___ / 3 marks]**

Grade 8

5. $3 \times \sqrt{27} = 3^n$

Find the value of n

..... **[___ / 3 marks]**

Grade 9

6. $2^x \times 2^y = 64$ and $2^x \div 2^y = 4$

Find the values of x and y

Hint
Start by finding two simultaneous equations.

$x =$ ..... $y =$ ..... **[___ / 4 marks]**

Prime factor decomposition

Grade 4

1. Write 110 as a product of its prime factors.

..... **[I got ___ / 2 marks]**

Grade 4

2. a) Write 540 as a product of powers of its prime factors.

..... **[___ / 2 marks]**

b) By looking at its prime factors, explain why 540 is divisible by 15

Hint
What are the prime factors of 15?

..... **[___ / 1 mark]**

Grade 4

3. a) Write 750 as a product of its prime factors. Give your answer in index notation.

..... **[___ / 2 marks]**

b) By looking at its prime factors, explain why 750 is not divisible by 4

..... **[___ / 1 mark]**

Grade 5

4. The prime factor decomposition of a number, x, is $2 \times 3^2 \times 7 \times 13$

a) Is x even or odd? Explain your reasoning.

..... **[___ / 1 mark]**

b) What is the prime factor decomposition of a number twice as big as x?

..... **[___ / 1 mark]**

Grade 5

5. A number is a multiple of 4, 5 and 6. Write the prime factor decomposition of the smallest number it could be.

..... **[___ / 2 marks]**

Finding HCF and LCM

Grade 4

1. a) Write 160 as a product of prime factors.

..... **[I got ___ / 2 marks]**

b) Find the highest common factor of 160 and 280

..... **[___ / 2 marks]**

c) Find the lowest common multiple of 160 and 280

..... **[___ / 2 marks]**

Grade 5

2. Two numbers have prime factor decompositions $2^3 \times 5 \times 11$ and $2 \times 3^2 \times 5$

Find

a) the highest common factor of the two numbers

..... **[___ / 2 marks]**

b) the lowest common multiple of the two numbers.

..... **[___ / 1 mark]**

Grade 5

3. Fran is sorting her books into piles. She has 225 yellow books and 324 orange books. She does not want to mix the colours and wants every pile to contain the same number of books. Work out the biggest number of books she can put in each pile.

..... **[___ / 3 marks]**

Grade 6

4. Two numbers, A and B, have prime factor decompositions $A = 2 \times 3 \times 7 \times x$ and $B = 2^2 \times 5^2$

The highest common factor of the two numbers is 4

a) Work out the value of x.

Hint
How does the HCF relate to the prime factor decomposition?

..... **[___ / 1 mark]**

b) Work out the value of the number A.

..... **[___ / 1 mark]**

Standard form

Grade 3

1. Write these as ordinary numbers.

a) 1.56×10^8

..... **[I got ___ / 1 mark]**

b) 8.02×10^{-3}

..... **[___ / 1 mark]**

Grade 3

2. Write these numbers in standard form.

a) 48 000 000 000

..... **[___ / 1 mark]**

b) 0.000 0703

..... **[___ / 1 mark]**

c) 95×10^6

..... **[___ / 1 mark]**

d) 0.68×10^{-4}

..... **[___ / 1 mark]**

Grade 3

3. The distance from the Sun to Earth is approximately 150 000 000 km. Write this number in standard form.

.....km **[___ / 1 mark]**

Grade 4

4. Put these numbers in order of size, starting with the biggest.

2.1×10^4 2.3×10^5 0.21×10^4 2200

Hint
Write all the numbers in the same form.

..... **[___ / 3 marks]**

Grade 4

5. The size of a bacteria cell is 4×10^{-7} m and the size of a virus is 0.000 000 05 m. Which is smaller, the bacteria cell or the virus? Show your working.

..... **[___ / 2 marks]**

Grade 4

6. Here are the populations of four countries.

Angola: 31.8×10^6 Uzbekistan: 3.29×10^7 Malaysia: 31.9 million Mongolia: 3.2×10^6

Which country has the largest population? Show your working.

..... **[___ / 2 marks]**

Calculating with standard form

Grade 5

1. Work out the value of each expression, giving your answers in standard form.

a) $(5 \times 10^4) + (6 \times 10^5)$

..... **[I got ___ / 2 marks]**

b) $(9 \times 10^{-3}) - (3 \times 10^{-4})$

..... **[___ / 2 marks]**

c) $(2.1 \times 10^8) \times (3 \times 10^{-5})$

..... **[___ / 2 marks]**

d) $(8.2 \times 10^3) \div (4.1 \times 10^7)$

..... **[___ / 2 marks]**

Grade 6

2. The MiG 25 fighter jet can fly at 4×10^3 km/h. How long would it take to travel a distance of 3000 km? Give your answer in minutes.

Hint
Remember that $\text{speed} = \frac{\text{distance}}{\text{time}}$

..... minutes **[___ / 3 marks]**

Grade 6

3. A region on a map forms the shape of a rectangle with width 1.2×10^2 km and length 7×10^3 km. Work out the area of this region in standard form.

..... km^2 **[___ / 3 marks]**

Grade 7

4. The circumference of Earth is 4.0075×10^9 cm. The circumference of another planet is 0.2 times the circumference of Earth.

Hint
Start by rounding the circumference of Earth.

a) Work out an estimate for the circumference of this planet. Give your answer in standard form.

..... cm **[___ / 3 marks]**

b) Is your answer in part **a** an underestimate or an overestimate? Explain your answer.

..... **[___ / 1 mark]**

Guided answers

Page 1, Calculations

1. a
$$\begin{array}{r} {\scriptstyle 1\ 14\ 1}\\ 2\not{5}.043\\ -\ 17.820\\ \hline 7.223 \end{array}$$

1 mark *for lining up the digits correctly in columns;*
1 mark *for the correct answer.*

b
$$\begin{array}{r} 74\\ \times\ 26\\ \hline 444\\ {\scriptstyle 2}\\ +1480\\ \hline 1924\\ {\scriptstyle 1} \end{array}$$

Since $74 \times 26 = 1924$,
$7.4 \times 0.26 = 1924 \div 10 \div 100 = 1.924$

1 mark *for multiplying 74 × 26 to get 1924;* ***1 mark*** *for the correct answer.*

c $17.12 \div 0.8 = 171.2 \div 8$

$$8\overline{)17^{1}1.^{3}2}\quad 21.4$$

$171.2 \div 8 = 21.4$

1 mark *for dividing 171.2 by 8;* ***1 mark*** *for the correct answer.*

2. a $(12 - 4 \times 2)^3 = (12 - 8)^3 = 4^3 = 64$

1 mark *for correct answer.*

b $\frac{4 \times 5^2}{4 \times 5 \div 2} = \frac{4 \times 25}{10} = \frac{100}{10} = 10$

1 mark *for correct answer.*

c $5\sqrt{50 - 1} + 6 \times 3 = 5 \times \sqrt{49} + 6 \times 3 = 5 \times 7 + 6 \times 3$
$= 35 + 18 = 53$

1 mark *for correct answer.*

d $5 + (-3.2) \times 4 = 5 + (-12.8) = -7.8$

1 mark *for correct answer.*

e $(1 - 0.1) \times 4 - (-10) = 0.9 \times 4 - (-10) = 3.6 - (-10)$
$= 13.6$

1 mark *for 3.6;* ***1 mark*** *for the correct answer.*

f $\frac{(-0.2) \times (-6)}{-1 + 0.7} = \frac{1.2}{-0.3} = -4$

1 mark *for either 1.2 in the numerator or –0.3 in the denominator;* ***1 mark*** *for the correct answer.*

3. Supermarket A: £4.65 ÷ 6 = £0.775 per burger
Supermarket B: £6.59 ÷ 8 = £0.82375 per burger
0.775 < 0.82375
Therefore, Supermarket A is better value.

1 mark *for 0.775;* ***1 mark*** *for 0.82375;* ***1 mark*** *for correct conclusion with full justification. Total 3 marks.*

4. Area of fence = $1.4 \times 10.5 = 14.7\,m^2$
Cost = $14.7 \times 0.6 = £8.82$

1 mark *for multiplying lengths;* ***1 mark*** *for multiplying by cost per square metre;* ***1 mark*** *for correct answer. Total 3 marks.*

Page 2, Rounding & truncation

1. a 20 190 **b** 20 200
c 20 000 **d** 20 000

1 mark *for each correct answer.*

2. a 0.007 **b** 0.0068 **c** 0.006 80

1 mark *for each correct answer.*

3. a 21.56 8361…
b i 22 **ii** 21.5

1 mark *for each correct answer.*

3. a 0.018 8813…
b i 0.01 **ii** 0.019

1 mark *for each correct answer.*

4. $32 \div 3.66 = 8.743\ldots$
He can only buy whole bags, so round up to the next integer: 9 bags.
Total cost = $9 \times 4.99 = £44.91$
= £45 to the nearest pound

1 mark *for correct division;* ***1 mark*** *for rounding up and multiplying by £4.99;* ***1 mark*** *for correct answer. Total 3 marks.*

5. Shirley has rounded 0.065 29 to 2 dp instead of 2 sf. The correct answer is 0.065

1 mark *for a correct explanation.*

Page 3, Estimation

1. $\frac{317 + 48.6}{9.683} \approx \frac{300 + 50}{10} \approx \frac{350}{10} \approx 35$

1 mark *for rounding to 1 sf;* ***1 mark*** *for correct answer.*

2. $\frac{2.67 \times 1.36}{0.11 + 0.42} \approx \frac{3 \times 1}{0.1 + 0.4} \approx \frac{3}{0.5} \approx 6$

1 mark *for rounding to 1 sf;* ***1 mark*** *for correct answer.*

3. Number of fish at start of January ≈ 1000
Increase ≈ 20 fish per day
Five months ≈ $5 \times 30 \approx 150$ days
Number of fish after five months ≈ $150 \times 20 + 1000 \approx 4000$

1 mark *for rounding rate of increase to 1 sf;* ***1 mark*** *for correct calculation for the number of fish after five months;* ***1 mark*** *for correct answer. Total 3 marks.*

4. Number of portions sold ≈ 100
Sale price per portion ≈ £9.00
Cost per portion ≈ £3.00
Profit per portion ≈ £9.00 – £3.00 ≈ £6.00
Total profit ≈ £6.00 × 100 ≈ £600

1 mark *for rounding portions, sale price and cost to 1 sf;* ***1 mark*** *for a profit calculation;* ***1 mark*** *for correct answer. Total 3 marks.*
Note that there are alternative methods.

5. Distance driven ≈ 400 km
Average speed ≈ 80 km/h
Time driving ≈ $\frac{400}{80} \approx 5$ hours
Time for whole journey ≈ 5 hours 30 minutes (including the break)
Time of arrival is roughly 2 pm (8.30 am + $5\frac{1}{2}$ hours).

1 mark *for rounding distance and speed to 1 sf;* ***1 mark*** *for finding the time taken;* ***1 mark*** *for correct answer. Total 3 marks.*

6. a $\sqrt{36} < \sqrt{47} < \sqrt{49}$, so $6 < \sqrt{47} < 7$
$\sqrt{47} = 6.9$ to 1 dp

1 mark *for an answer of 6.8 or 6.9*

b $\sqrt{196} < \sqrt{200} < \sqrt{225}$, so $14 < \sqrt{200} < 15$
$\sqrt{200} = 14.1$ to 1 dp

1 mark *for an answer of 14.1 or 14.2*

Page 4, Error intervals & bounds

1. a $105 \leq p < 115$ **b** $107.5 \leq p < 112.5$
1 mark *for each correct minimum;* ***1 mark*** *for each correct maximum.*

2. a $4.665 \leq x < 4.675$ **b** $4500 \leq x < 5500$
1 mark *for each correct minimum;* ***1 mark*** *for each correct maximum.*

3. a $9 \leq y < 10$ **b** $2.5 \leq y < 2.6$
1 mark *for each correct minimum;* ***1 mark*** *for each correct maximum.*

4. Sienna can see a truncation to 1 dp so the error interval is $1.8 \leq x < 1.9$
1 mark *for correct minimum and maximum;* ***1 mark*** *for correct interval notation.*

5. Lower bound for the length is 14.5 cm, so lower bound for the area is $14.5^2 = 210.25\text{ cm}^2$.
Upper bound for the length is 15.5 cm, so upper bound for the area is $15.5^2 = 240.25\text{ cm}^2$.
Error interval for the area, $x\text{ cm}^2$, is $210.25 \leq x < 240.25$
1 mark *for* 14.5^2*;* ***1 mark*** *for* 15.5^2*;* ***1 mark*** *for correct error interval. Total 3 marks.*

6. The error interval for the speed, s km/h, is $109.5 \leq s < 110.5$
The error interval for the distance, d km, is $44.5 \leq d < 45.5$
The lower bound for the time taken is $\frac{44.5}{110.5} = 0.4027\ldots$ hours
The upper bound for the time taken is $\frac{45.5}{109.5} = 0.4155\ldots$ hours
Both of these answers round to 0.4 hours to 1 dp, so this is an appropriate degree of accuracy.
1 mark *for upper and lower bounds for speed;*
1 mark *for upper and lower bounds for distance;*
1 mark *for lower bound for time;* ***1 mark*** *for upper bound for time;* ***1 mark*** *for correct answer. Total 5 marks.*

Page 5, Adding & subtracting fractions

1. a $\frac{2}{9} + \frac{5}{6} = \frac{4}{18} + \frac{15}{18} = \frac{19}{18}$ or $1\frac{1}{18}$
1 mark *for finding a common denominator;* ***1 mark*** *for correct answer.*
b $3\frac{1}{6} - 2\frac{3}{4} = \frac{19}{6} - \frac{11}{4} = \frac{38}{12} - \frac{33}{12} = \frac{5}{12}$
1 mark *for converting mixed numbers to improper fractions;* ***1 mark*** *for finding a common denominator;* ***1 mark*** *for correct answer. Total 3 marks.*

2. $\frac{1}{8} + \frac{2}{3} = \frac{3+16}{24} = \frac{19}{24}$
$1 - \frac{19}{24} = \frac{24}{24} - \frac{19}{24} = \frac{5}{24}$
1 mark *for finding a common denominator of 24;* ***1 mark*** *for adding to get* $\frac{19}{24}$*;* ***1 mark*** *for correct answer. Total 3 marks.*

3. $2\frac{4}{5} - \frac{7}{8} + 1\frac{1}{20} = \frac{14}{5} - \frac{7}{8} + \frac{21}{20} = \frac{112}{40} - \frac{35}{40} + \frac{42}{40} = \frac{119}{40}$ m or $2\frac{39}{40}$ m
1 mark *for converting mixed numbers to improper fractions;* ***1 mark*** *for finding a common denominator;* ***1 mark*** *for correct answer. Total 3 marks.*

4. $\frac{3}{4} - \frac{1}{3} = \frac{9-4}{12} = \frac{5}{12}$
1 mark *for finding a common denominator;* ***1 mark*** *for correct answer.*

5. Perimeter $= 3\frac{1}{2} + 5\frac{2}{5} + 2\frac{1}{5}$
$= 3 + 5 + 2 + \frac{1}{2} + \frac{2}{5} + \frac{1}{5}$
$= 10 + \frac{5}{10} + \frac{4}{10} + \frac{2}{10}$
$= 10 + \frac{11}{10}$
$= 10 + 1\frac{1}{10} = 11\frac{1}{10}$ cm
1 mark *for summing the lengths;* ***1 mark*** *for finding common denominator;* ***1 mark*** *for correct answer or equivalent. Total 3 marks.*

Page 6, Multiplying & dividing fractions

1. $16 \div \frac{2}{3} = \frac{16}{1} \times \frac{3}{2} = \frac{\overset{8}{\cancel{16}} \times 3}{1 \times \underset{1}{\cancel{2}}} = \frac{8 \times 3}{1 \times 1} = \frac{24}{1} = 24$ days
1 mark *for writing a division and turning it into a correct multiplication;* ***1 mark*** *for correct answer.*

2. a $1\frac{1}{2} \times 3\frac{5}{6} = \frac{3}{2} \times \frac{23}{6} = \frac{\overset{1}{\cancel{3}} \times 23}{2 \times \underset{2}{\cancel{6}}} = \frac{1 \times 23}{2 \times 2} = \frac{23}{4} = 5\frac{3}{4}$
1 mark *for converting to improper fractions;* ***1 mark*** *for multiplying;* ***1 mark*** *for correct answer. Accept correct improper fraction or mixed number. Total 3 marks.*
b $4\frac{4}{9} \div 2\frac{2}{3} = \frac{40}{9} \div \frac{8}{3} = \frac{40}{9} \times \frac{3}{8} = \frac{\overset{5}{\cancel{40}} \times \overset{1}{\cancel{3}}}{\underset{3}{\cancel{9}} \times \underset{1}{\cancel{8}}} = \frac{5 \times 1}{3 \times 1} = \frac{5}{3} = 1\frac{2}{3}$
1 mark *for converting to improper fractions;* ***1 mark*** *for writing a correct multiplication;* ***1 mark*** *for correct, simplified answer (improper fraction or mixed number). Total 3 marks.*

3. $\frac{1}{4}$ of $\frac{3}{10} = \frac{1}{4} \times \frac{3}{10} = \frac{3}{40}$
1 mark *for multiplying;* ***1 mark*** *for correct answer.*

4. Area of triangle $= \frac{1}{2} \times 1\frac{1}{5} \times \frac{6}{5} = \frac{1}{2} \times \frac{6}{5} \times \frac{6}{5} = \frac{18}{25}\text{ cm}^2$
This is the area of the rectangle.
Length of rectangle $= \frac{18}{25} \div \frac{2}{5} = \frac{18}{25} \times \frac{5}{2} = \frac{\overset{9}{\cancel{18}} \times \overset{1}{\cancel{5}}}{\underset{5}{\cancel{25}} \times \underset{1}{\cancel{2}}}$
$= \frac{9 \times 1}{5 \times 1} = \frac{9}{5}$ cm or $1\frac{4}{5}$ cm
1 mark *for writing a correct multiplication;* ***1 mark*** *for writing a division and turning into a correct multiplication;* ***1 mark*** *for correct, simplified answer (improper fraction or mixed number). Total 3 marks.*

5. $3\frac{3}{4} \div \frac{5}{6} = \frac{15}{4} \div \frac{5}{6} = \frac{15}{4} \times \frac{6}{5} = \frac{90}{20} = \frac{9}{2}$ or $4\frac{1}{2}$ or 4.5
Vasiliki can get 4 smaller pieces.
$\frac{1}{2} \times \frac{5}{6} = \frac{5}{12}$ m will be left over.
1 mark *for converting to improper fraction and writing a correct multiplication;* ***1 mark*** *for correct answer to the multiplication and identifying correct number of smaller pieces;* ***1 mark*** *for correct fraction left over. Total 3 marks.*

Page 7, Fractions, decimals & percentages

1. Lin's class: $\frac{6}{25} = \frac{24}{100} = 24\%$
Jay's class: $\frac{8}{32} = \frac{1}{4} = \frac{25}{100} = 25\%$
Lin is not correct. Jay's class has a (slightly) higher proportion of students who read fantasy books.
1 mark *for finding either 24% or 25% or for giving both fractions a common denominator;* ***1 mark*** *for a complete, correct explanation.*

2. Since $0.01 = \frac{1}{100}$, multiplying by 0.01 is the same as multiplying by $\frac{1}{100}$, which makes the answer 100 times smaller, so it is equivalent to dividing by 100. Sally is correct.
1 mark *for a correct explanation.*

3. $\frac{11}{28} = \frac{11}{2 \times 2 \times 7}$
If a fraction produces a terminating decimal, the prime factors in the denominator can only be 2s or 5s. This

fraction has a prime factor of 7 in the denominator, so it will produce a recurring decimal.

1 mark *for the prime factor decomposition of 28;* ***1 mark*** *for a correct explanation.*

4. $\frac{7}{10} = 70\%$; $70\% + 15\% = 85\%$; $100\% - 85\% = 15\%$

15% of the runs were half marathons.

Since 15% of 20 is 3, Jonathan ran 3 half marathons.

1 mark *for adding $\frac{7}{10}$ and 15% (either as percentages or fractions) and subtracting from 100% (or 1);* ***1 mark*** *for attempting to find 15% of 20;* ***1 mark*** *for the correct answer. Total 3 marks.*

Note that there are alternative methods.

5. Area used for housing and services $= \frac{5.5}{22} = \frac{1}{4}$

Fraction of this area used for services $= 1 - \frac{5}{8} = \frac{3}{8}$

Total area used for services $= \frac{3}{8} \times \frac{1}{4} = \frac{3}{32} = 9.375\%$

1 mark *for $\frac{3}{8}$;* ***1 mark*** *for multiplying by $\frac{1}{4}$;* ***1 mark*** *for correct answer as a percentage. Total 3 marks.*

Page 8, Recurring decimals

1. a $18\overline{)1.^{1}0^{10}0^{10}0^{10}0^{10}0}$ $\quad 0.0\dot{5}5\dot{5}5\dot{5}5$ $\quad \frac{1}{18} = 0.0\dot{5}$

b $33\overline{)20.^{20}0^{20}0^{20}0^{20}0}$ $\quad 0.\dot{6}0\dot{6}0$ $\quad \frac{20}{33} = 0.\dot{6}\dot{0}$

c $7\overline{)3.^{3}0^{2}0^{6}0^{4}0^{5}0^{1}0^{3}0}$ $\quad 0.\dot{4}28571\dot{4}$ $\quad \frac{3}{7} = 0.\dot{4}28571\dot{4}$

For each part, ***1 mark*** *for division;* ***1 mark*** *for the correct answer.*

2. Let $x = 0.\dot{5}$

Then $10x = 5.\dot{5}$

Subtracting x from $10x$, you have $9x = 5$, so $x = \frac{5}{9}$

1 mark *for finding x and 10x and subtracting;* ***1 mark*** *for the correct answer.*

3. Let $x = 0.\dot{8}\dot{4}$

Then $100x = 84.\dot{8}\dot{4}$

Subtracting x from $100x$, you have $99x = 84$, so $x = \frac{84}{99} = \frac{28}{33}$

1 mark *for finding x and 100x and subtracting;* ***1 mark*** *for $\frac{84}{99}$;* ***1 mark*** *for the correct answer. Total 3 marks.*

4. Let $x = 0.0\dot{5}\dot{6}$

Then $10x = 0.\dot{5}\dot{6}$

Also $1000x = 56.\dot{5}\dot{6}$

Subtracting $10x$ from $1000x$, you have $990x = 56$, so $x = \frac{56}{990} = \frac{28}{495}$

1 mark *for finding 10x and 1000x and subtracting;* ***1 mark*** *for $\frac{56}{990}$;* ***1 mark*** *for the correct answer. Total 3 marks.*

Page 9, Surds

1. a $\sqrt{18} - \sqrt{8} = 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$ $(a = 1)$

1 mark *for simplifying both surds;* ***1 mark*** *for correct answer.*

b $\sqrt{200} + \sqrt{72} - \sqrt{98} = 10\sqrt{2} + 6\sqrt{2} - 7\sqrt{2} = 9\sqrt{2}$ $(a = 9)$

1 mark *for simplifying the three surds;* ***1 mark*** *for correct answer.*

c $3\sqrt{2} + 7\sqrt{32} = 3\sqrt{2} + 7 \times 4\sqrt{2} = 3\sqrt{2} + 28\sqrt{2} = 31\sqrt{2}$ $(a = 31)$

1 mark *for simplifying $7\sqrt{32}$;* ***1 mark*** *for correct answer.*

d $\frac{14}{\sqrt{2}} = \frac{14\sqrt{2}}{2} = 7\sqrt{2}$ $(a = 7)$

1 mark *for rationalising the denominator (multiplying numerator and denominator by $\sqrt{2}$);* ***1 mark*** *for correct answer.*

2. a $(1 + \sqrt{3})^2 = (1 + \sqrt{3})(1 + \sqrt{3}) = 1 + \sqrt{3} + \sqrt{3} + 3 = 4 + 2\sqrt{3}$ $(a = 4, b = 2)$

1 mark *for expanding the brackets;* ***1 mark*** *for simplifying expression to correct answer.*

b $\frac{8}{2 - \sqrt{3}} = \frac{8(2 + \sqrt{3})}{(2 - \sqrt{3})(2 + \sqrt{3})} = \frac{16 + 8\sqrt{3}}{4 - 3} = \frac{16 + 8\sqrt{3}}{1} = 16 + 8\sqrt{3}$ $(a = 16, b = 8)$

1 mark *for rationalising the denominator (multiplying numerator and denominator by $2 + \sqrt{3}$);* ***1 mark*** *for 1 in the denominator;* ***1 mark*** *for the correct answer. Total 3 marks.*

c $\frac{\sqrt{3} - 1}{\sqrt{3} + 1} = \frac{(\sqrt{3} - 1)(\sqrt{3} - 1)}{(\sqrt{3} + 1)(\sqrt{3} - 1)} = \frac{3 - 2\sqrt{3} + 1}{3 - 1} = \frac{4 - 2\sqrt{3}}{2} = 2 - \sqrt{3}$ $(a = 2, b = -1)$

1 mark *for rationalising the denominator (multiplying numerator and denominator by $\sqrt{3} - 1$);* ***1 mark*** *for 2 in the denominator;* ***1 mark*** *for the correct answer. Total 3 marks.*

3. $(\sqrt{11} - \sqrt{8})(\sqrt{11} + \sqrt{8}) = 11 + \sqrt{11}\sqrt{8} - \sqrt{11}\sqrt{8} - 8$

$= 11 - 8 = 3$ as required

1 mark *for attempt to expand brackets;* ***1 mark*** *for cancelling middle terms;* ***1 mark*** *for fully correct working. Total 3 marks.*

Page 10, Index notation

1. Peter has multiplied the bases. Since the bases are different, this cannot be simplified as a simple power of 10

1 mark *for a correct explanation.*

2. $\frac{(2^7 \times 2^4)^{-1}}{2} = \frac{(2^{7+4})^{-1}}{2} = \frac{(2^{11})^{-1}}{2} = \frac{2^{11 \times (-1)}}{2} = 2^{-11-1} = 2^{-12}$

1 mark *for 2^{11} in the brackets;* ***1 mark*** *for correct answer.*

3. a $(3^{\frac{1}{4}})^{\frac{1}{4}} = 3^{\frac{1}{4} \times \frac{1}{4}} = 3^{\frac{1}{16}}$

1 mark *for correct answer.*

b $\sqrt[3]{5^2} = 5^{\frac{2}{3}}$

1 mark *for a fractional index with 3 in the denominator;* ***1 mark*** *for the correct answer.*

4. a $\left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$

1 mark *for correct answer.*

b $25^{\frac{1}{2}} = \sqrt{25} = 5$

1 mark *for correct answer.*

c $8^{\frac{2}{3}} = (\sqrt[3]{8})^2 = 2^2 = 4$

1 mark *for 2;* ***1 mark*** *for correct answer.*

d $\left(\frac{16}{9}\right)^{-\frac{3}{2}} = \left(\frac{9}{16}\right)^{\frac{3}{2}} = \left(\frac{\sqrt{9}}{\sqrt{16}}\right)^3 = \left(\frac{3}{4}\right)^3 = \frac{27}{64}$

1 mark *for $\frac{9}{16}$;* ***1 mark*** *for $\frac{3}{4}$;* ***1 mark*** *for correct answer. Total 3 marks.*

5. $3 \times \sqrt{27} = 3 \times (27)^{\frac{1}{2}} = 3 \times (3^3)^{\frac{1}{2}} = 3^1 \times 3^{\frac{3}{2}} = 3^{1 + \frac{3}{2}} = 3^{\frac{5}{2}}$

$n = \frac{5}{2}$ or $2\frac{1}{2}$ or 2.5

1 mark *for attempting to rewrite 27 with base 3,* ***1 mark*** *for $3^{\frac{3}{2}}$;* ***1 mark*** *for correct answer. Total 3 marks.*

6. $64 = 2^6$

$2^x \times 2^y = 2^6 \Rightarrow x + y = 6$ (1)

$4 = 2^2$

$2^x \div 2^y = 2^2 \Rightarrow x - y = 2$ (2)

(1) + (2): $2x = 8 \Rightarrow x = 4$

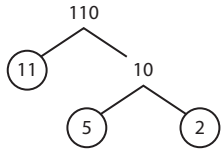
Substitute into (1): $4 + y = 6 \Rightarrow y = 2$

1 mark *for attempting to rewrite 64 and 2 with base 2;* ***1 mark*** *for either equation correct;* ***1 mark*** *for attempting to solve simultaneously;* ***1 mark*** *for correct values for x and y. Total 4 marks.*

Page 11, Prime factor decomposition

You might use a factor tree in your working with the same start and end as shown here but with different middle branches.

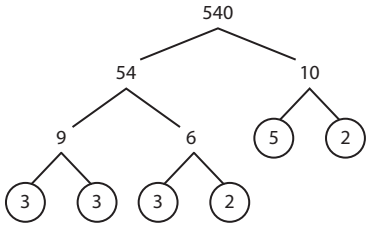
1.



$110 = 2 \times 5 \times 11$

1 mark *for finding or listing the prime factors;* ***1*** *for correct answer.*

2. a



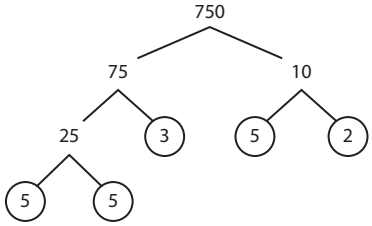
$540 = 2^2 \times 3^3 \times 5$

1 mark *for finding or listing the prime factors;* ***1 mark*** *for correct answer.*

b Since $15 = 3 \times 5$ and both 3 and 5 are prime factors of 540, then 540 must be divisible by 15

1 mark *for a correct explanation.*

3. a



$750 = 2 \times 3 \times 5^3$

1 mark *for finding or listing the prime factors;* ***1 mark*** *for correct answer.*

b Since $4 = 2 \times 2$, but 750 only contains the factor of 2 once, 750 is not divisible by 4

1 mark *for a correct explanation.*

4. a $2 \times 3^2 \times 7 \times 13$ is even since 2 is a prime factor.

1 mark *for correct answer.*

b To double a number, you multiply by 2, so the prime factor decomposition of a number twice as big will have another factor of 2. This is $2^2 \times 3^2 \times 7 \times 13$

1 mark *for correct answer.*

5. The prime factors of each number are:

$4 = 2 \times 2$; $5 = 5$; $6 = 2 \times 3$

Any number divisible by 4, 5 and 6 must have at least two 2s, one 5 and a 3, so the smallest such number is $2^2 \times 3 \times 5$

1 mark *for listing the prime factors of 4 and 6;* ***1 mark*** *for correct answer.*

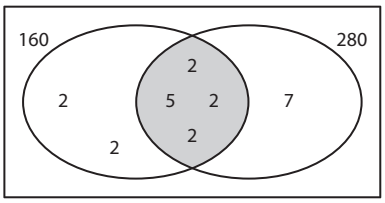
Page 12, Finding HCF and LCM

1. a $160 = 2^5 \times 5$

1 mark *for finding or listing the prime factors;* ***1 mark*** *for correct answer.*

b $280 = 2^3 \times 5 \times 7$

A Venn diagram to show the prime factors looks like this:



$HCF(160, 280) = 2^3 \times 5 = 40$

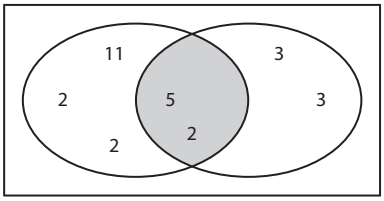
1 mark *for multiplying the common factors;* ***1 mark*** *for correct answer.*

c From the Venn diagram,

$LCM(160, 280) = 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 7 = 1120$

1 mark *for multiplying all appropriate factors;* ***1 mark*** *for correct answer.*

2.



a $HCF = 2 \times 5 = 10$

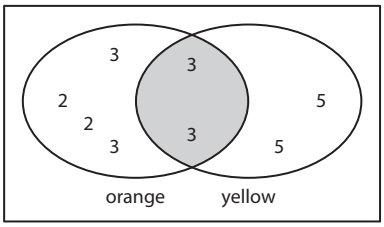
b $LCM = 2 \times 2 \times 11 \times 2 \times 5 \times 3 \times 3 = 3960$

1 mark *for correct Venn diagram or alternative method;* ***1 mark*** *for HCF;* ***1 mark*** *for LCM. Total 3 marks.*

3. $225 = 3^2 \times 5^2$

$324 = 2^2 \times 3^4$

A Venn diagram would look like this:



The HCF of the two numbers is 9, so Fran can sort her books into piles of a maximum of 9 if they are to be the same size.

1 mark *for the prime factors of 225;* ***1 mark*** *for the prime factors of 324;* ***1 mark*** *for correct answer. Total 3 marks.*

4. a You know that $4 = 2^2$ must divide into A, but $2 \times 3 \times 7$ only has one 2

Therefore, $x = 2$

b $A = 2 \times 2 \times 3 \times 7 = 84$

1 mark *for each correct answer.*

Page 13, Standard form

1. a $1.56 \times 10^8 = 156\,000\,000$ **b** $8.02 \times 10^{-3} = 0.008\,02$

1 mark *for each correct answer.*

2. a $48\,000\,000\,000 = 4.8 \times 10^{10}$ **b** $0.000\,0703 = 7.03 \times 10^{-5}$

c $95 \times 10^6 = 9.5 \times 10^7$ **d** $0.68 \times 10^{-4} = 6.8 \times 10^{-5}$

1 mark *for each correct answer.*

3. $150\,000\,000$ km $= 1.5 \times 10^8$ km

1 mark *for each correct answer.*

4. Putting all the numbers in either standard or ordinary form:

$2.1 \times 10^4 = 21\,000$; $2.3 \times 10^5 = 230\,000$;

$0.21 \times 10^4 = 2.1 \times 10^3 = 2100$; $2200 = 2.2 \times 10^3$

The order, starting with the biggest, is 2.3×10^5, 2.1×10^4, 2200, 0.21×10^4

1 mark *for converting at least two of the numbers correctly to an alternative form;* ***1 mark*** *for any three in the correct order;* ***1 mark*** *for all in the correct order. Total 3 marks.*

5. Virus: $0.000\,000\,05 = 5 \times 10^{-8}$ m
Bacteria cell: $4 \times 10^{-7} = 0.000\,0004$ m
The virus is smaller.
1 mark *for getting both numbers in the same form;* ***1 mark*** *for correct conclusion.*

6. Put all the populations in the same form.
If you put them all in standard form, you have:
Angola: 3.18×10^7; Uzbekistan: 3.29×10^7;
Malaysia: 3.19×10^7; Mongolia: 3.2×10^6
Uzbekistan has the biggest population.
1 mark *for putting all numbers in the same form;*
1 mark *for correct answer.*

Page 14, Calculating with standard form

1. a $(5 \times 10^4) + (6 \times 10^5) = 50\,000 + 600\,000$
$= 650\,000 = 6.5 \times 10^5$
1 mark *for converting to ordinary numbers or the same power of 10;* ***1 mark*** *for correct answer.*

b $(9 \times 10^{-3}) - (3 \times 10^{-4}) = 0.009 - 0.0003$
$= 0.0087 = 8.7 \times 10^{-3}$
1 mark *for converting to ordinary numbers or the same power of 10;* ***1 mark*** *for correct answer.*

c $(2.1 \times 10^8) \times (3 \times 10^{-5}) = 6.3 \times 10^{8+(-5)} = 6.3 \times 10^3$
1 mark *for 10^3;* ***1 mark*** *for correct answer.*

d $(8.2 \times 10^3) \div (4.1 \times 10^7) = 2 \times 10^{3-7} = 2 \times 10^{-4}$
1 mark *for 10^{-4};* ***1 mark*** *for correct answer.*

2. Using time $= \frac{\text{distance}}{\text{speed}}$,
$\text{time} = \frac{3000}{4 \times 10^3} = \frac{3 \times 10^3}{4 \times 10^3} = \frac{3}{4}$ hour = 45 minutes
1 mark *for dividing distance by speed;* ***1 mark*** *for $\frac{3}{4}$ hour;*
1 mark *for correct answer in minutes. Total 3 marks.*

3. Area $= (1.2 \times 10^2) \times (7 \times 10^3) = 8.4 \times 10^{2+3} = 8.4 \times 10^5$ km^2
1 mark *for multiplying;* ***1 mark*** *for 10^5;* ***1 mark*** *for correct answer. Total 3 marks.*

4. a Circumference $\approx 4 \times 10^9 \times 0.2 = 0.8 \times 10^9 = 8 \times 10^8$ cm
1 mark *for rounding 4.0075;* ***1 mark*** *for multiplication;*
1 mark *for correct answer in standard form. Total 3 marks.*

b It is an underestimate because 4.0075 is rounded down.
1 mark *for correct answer with explanation.*

Page 15, Simplifying expressions

1. a $3p - 5q + 3p^2 + 2q + 2q^2 - 9p^2 = 3p - 3q - 6p^2 + 2q^2$
1 mark *for $-3q$ and $-6p^2$;* ***1 mark*** *for the correct answer.*

b $5x^3 - 2xy - 6 + 6x^3 - 2 - 7xy + 8 = 11x^3 - 9xy$
1 mark *for $11x^3$ or $9xy$;* ***1 mark*** *for the correct answer.*

2. a Perimeter $= 3x + 3x + 7y + 7y = 6x + 14y$
1 mark *for an unsimplified expression;* ***1 mark*** *for the correct answer.*

b Area $= 3x \times 1.5x = 4.5x^2$
1 mark *for an unsimplified expression;* ***1 mark*** *for the correct answer.*

3. a $(2a)^3 = 8a^3$
1 mark *for 8;* ***1 mark*** *for a^3.*

b $(5a^2b^3)^2 = 25a^4b^6$
1 mark *for 25;* ***1 mark*** *for a^4 b^6.*

c $\frac{6x^2y^{-3}}{18yx^{-1}} = \frac{1}{3}x^3y^{-4}$ or $\frac{x^3}{3y^4}$
1 mark *for $\frac{1}{3}$;* ***1 mark*** *for x^3 y^{-4} or $\frac{x^3}{y^4}$.*

d $\sqrt{x^4y^6} = (x^4y^6)^{\frac{1}{2}} = x^2y^3$
1 mark *for x^2;* ***1 mark*** *for y^3.*

4. a $\frac{3^{-2} \times 3^8}{3^7} = \frac{3^6}{3^7} = 3^{-1}$
$3^{-1} = 3^x$, so $x = -1$
1 mark *for 3^6 in the numerator;* ***1 mark*** *for 3^{-1};* ***1 mark*** *for identifying that $x = -1$. Total 3 marks.*

b $2^5 \times 4^2 = 8^x$
$2^5 \times (2^2)^2 = (2^3)^x$
$2^5 \times 2^4 = 2^{3x}$
$2^9 = 2^{3x}$
$3x = 9$, so $x = 3$
1 mark *for writing 4 as 2^2 or 8 as 2^3;* ***1 mark*** *for 2^9 on the left-hand side;* ***1 mark*** *for the correct answer. Total 3 marks.*

Page 16, Solving linear equations

1 a $\frac{5-x}{2} = 12$; $5 - x = 24$; $5 = 24 + x$; $x = -19$
1 mark *for $5 - x = 24$;* ***1 mark*** *for the correct answer.*

b $\frac{2}{y} = 5$; $2 = 5y$; $y = \frac{2}{5}$
1 mark *for $2 = 5y$;* ***1 mark*** *for the correct answer.*

c $3 + p = 4p - 6$; $3 + 6 = 4p - p$; $9 = 3p$; $p = 3$
1 mark *for $9 = 3p$;* ***1 mark*** *for correct answer.*

d $3(3 - 2p) = 4 - 11p$
$9 - 6p = 4 - 11p$
$-6p + 11p = 4 - 9$
$5p = -5$
$p = \frac{-5}{5} = -1$
1 mark *for $5p = -5$;* ***1 mark*** *for correct answer.*

2. Sarah: n, Ewan: $n - 5$, Cameron: $2n$
Total: $n + (n - 5) + 2n = 35$
$4n - 5 = 35$
$4n = 40$
$n = 10$, so Sarah plays 10 holes.
1 mark *for $n - 5$ and $2n$;* ***1 mark*** *for adding and writing equal to 35;* ***1 mark*** *for correct answer. Total 3 marks.*

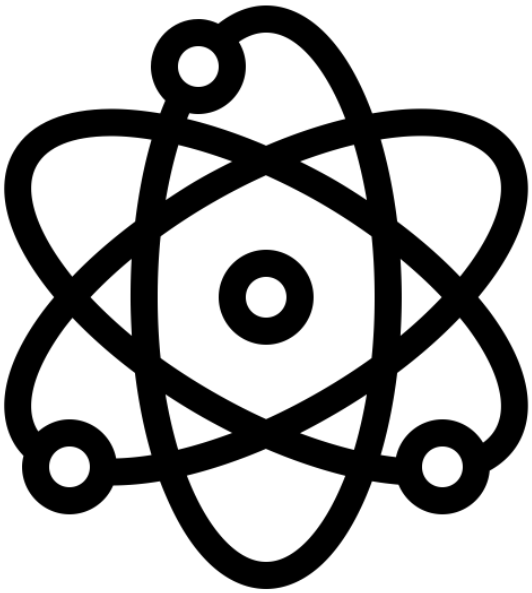
3. $2x + 3 = 3x - 4$; $3 + 4 = 3x - 2x$; $7 = x$
Rosalind's number is 7
1 mark *for a correct equation;* ***1 mark*** *for a correct rearrangement;* ***1 mark*** *for correct answer. Total 3 marks.*

4. a $2x - 1 = x + 3$; $2x - x = 3 + 1$; $x = 4$
1 mark *for a correct equation;* ***1 mark*** *for a correct rearrangement;* ***1 mark*** *for correct answer. Total 3 marks.*

b If $x = 4$, the shorter side is $x + 3 = 4 + 3 = 7$ cm
(or $2x - 1 = 2 \times 4 - 1 = 7$ cm).
The perimeter is $7 + 7 + y + y = 14 + 2y$.
Since $14 + 2y = 34$, $2y = 20$, $y = 10$
This means the area of the rectangle is $10 \times 7 = 70$ cm^2.
1 mark *for finding the length of the shorter side (7 cm);*
1 mark *for setting up an equation to find y;* ***1 mark*** *for $y = 10$;* ***1 mark*** *for correct answer. Total 4 marks.*

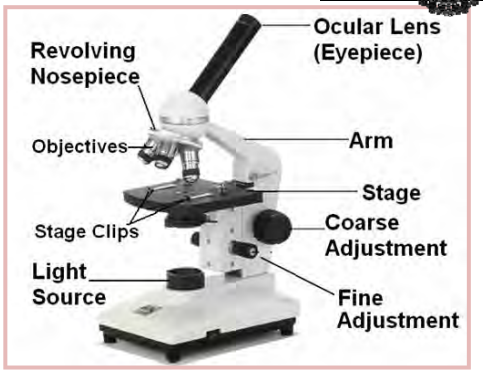
SCIENCE

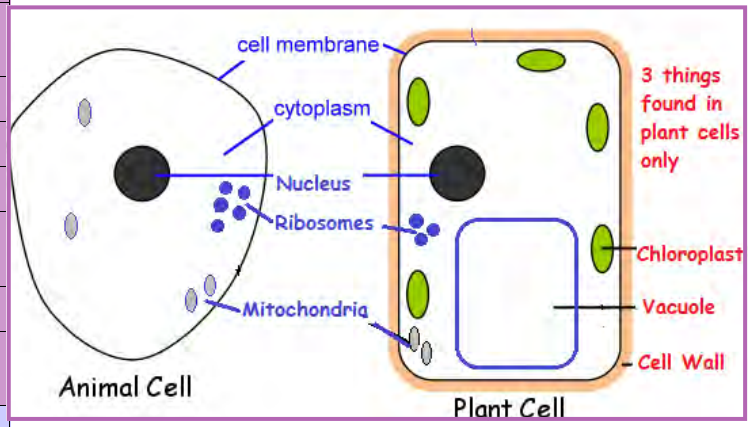
Use the knowledge organisers to create mind maps or flashcards for each topic. Then, when you have finished, answer the practice questions on the back of each knowledge organiser.

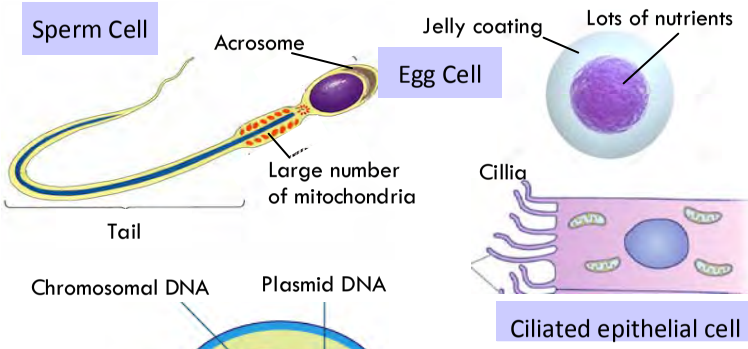


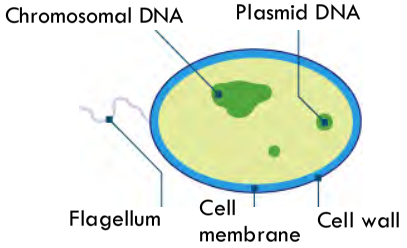
Biology- Topic 1- Key concepts (part 1)

Light Microscope	Uses light to see cell organelles (parts inside the cell), can see cells in colour.
Electron Microscope	Uses electrons to see smaller organelles such as ribosomes. Only in black and white.
Microscope lens	Eye piece lens– The lens you look through Objective lens—The part of the microscope that is closest to the specimen.
Magnification	How much bigger something appears compared with its actual size.
Resolution	The smallest distance between two points that can be seen as two separate points and not be blurred into one point.
Nucleus	Where the DNA is found. This helps control the processes of the cell.
Eukaryotic	A cell with a membrane surrounding its nucleus.
Cell membrane	The membrane that controls what goes into and out of a cell. It surrounds the nucleus and other organelles in a Eukaryote.
Ribosomes	Tiny sub-cellular structure that makes proteins.
Mitochondria	Where aerobic respiration occurs, releasing energy
Cytoplasm	The watery jelly inside a cell where the cell's activities take place.
Chloroplasts	Not found in animal cells- - A green disc containing chlorophyll, found in plant cells. Where the plant makes glucose, using photosynthesis.
Cell wall	Not found in animal cells- supports and protects the cell
Vacuole	Not found in animal cells- Plant cells have a large, permanent vacuole that helps to keep them rigid and stores cell sap.
Sperm cell	The male gamete (sex cell). Has a tail for swimming, a large number of mitochondria for energy production and acrosome in the tip of its head region that contains digestive enzymes for breaking down the outside of the egg cell.
Egg cell	The female gamete (sex cell). Has a jelly coat that protects the egg and hardens after fertilisation so only one sperm can penetrate the egg, cytoplasm packed with nutrients to supply to the fertilised egg for growth and development.
Haploid	Describes a cell that has one set of chromosomes.
Diploid	Describes a cell that has two set of chromosomes.
Ciliated epithelial cell	A cell that lines certain tubes in the body and has cilia on its surface.
Chromosomal DNA	DNA found in chromosomes but the term is often used to describe the large loop of DNA found in bacteria.
Plasmid	A small loop of DNA found in the cytoplasm of bacteria.
Flagellum	A tail-like structure that rotates, allowing a unicellular organism to move.
Prokaryotic	A cell with no nucleus is prokaryotic. Organisms such as bacteria, which have cells like this, are also said to be prokaryotic.









CB1a– Microscopes

1. What determines how good a microscope is at showing small details?
2. What has the development of the electron microscope allowed us to do?
3. What units are used for very small sizes?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

Strengthen

Produce a labelled diagram of a light microscope and use the diagram to explain how to magnify a small object.

Extend

Diatoms are algae, 20–120 µm in length and with 1 µm diameter 'pores' in their outer coats. Van Leeuwenhoek described diatom shapes but not their pores. Explain why.

Cb1b– Plant and animal cells

1. How are animal cells different to plant cells?
2. What do the sub-cellular structures in eukaryotic cells do?
3. How can we estimate the sizes of cells and their parts?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

Strengthen

Draw a plant cell and label its parts, describing what each part does.

Extend

An 'organelle' is a structure inside a cell with a specific function. Compare the organelles found in plant and animal cells

Cb1c– Specialised cells

1. How are some specialised cells adapted to their functions?
2. What is the function of a gamete?
3. What is the function of cilia?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

Strengthen

List the steps that occur between an egg cell entering an oviduct and it becoming an embryo, and explain how adaptations of specialised cells help each step.

Extend

Explain how both human gametes are adapted to ensure that the cell produced by fertilisation can grow and develop.

Cb1c– Inside bacteria

1. What are the functions of the sub-cellular structures in bacteria?
2. What are the differences between prokaryotic and eukaryotic cells?
3. How do we change numbers to and from standard form?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

Strengthen

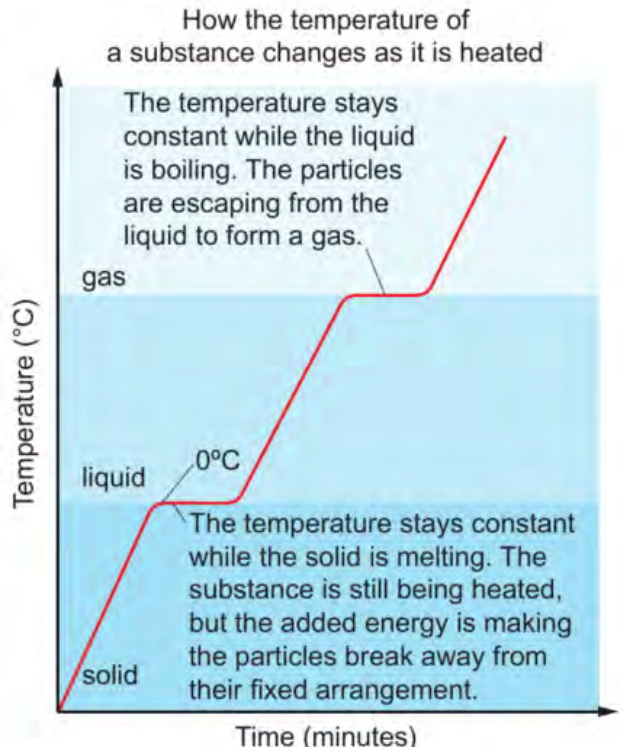
Draw a bacterium and label its parts, describing what each part does.

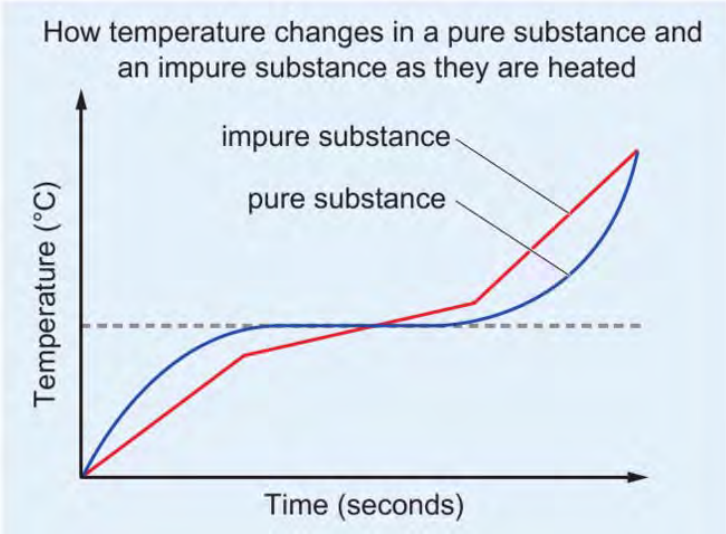
Extend

Compare eukaryotic and prokaryotic cells.

Chemistry Topic 1- Part 1 (CC1/CC2a)

Atom	The smallest neutral part of an element that can take part in chemical reactions.
States of matter	There are three different forms that a substance can have: solid, liquid or gas. These are the three states of matter.
Boiling point	The temperature at which a liquid boils.
Melting point	Temperature at which a substance changes from the solid state to the liquid state when heated; or from the liquid state to the solid state when cooled.
Physical change	A change in which no new substances are formed – like changes of state.
Chemical properties	How a substance reacts with other substances.
Particle	A tiny piece of matter that everything is made out of.
Particle model	A theory to explain the different properties and observations of solids, liquids and gases.
Pure	A single substance, with a fixed composition, that does not have anything else mixed with it.
Impure	A substance that is not pure.
Mixture	Two or more substances jumbled together but not joined to each other. The substances in many mixtures can be separated from each other.
Compound	A substance that can be split into simpler substances, because it contains the atoms of two or more elements joined together.
Element	A substance made up of only atoms with the same number of protons in the nucleus.
Melting points of pure and impure	Pure substances melt at a specific boiling point so produce horizontal shaped lines in the melting phase. Impure substance melt over a range of temperatures so produce a diagonal shape in this phase.





CC1– States of matter

1. What are particle like in substances in the solid, liquid and gas states?
2. What changes happens to particles during the different change state?
3. How do you decide what state a substance will be in at given temperature?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

<u>Strengthen</u>

Draw a diagram to show the states of matter. On your diagram, name each state change and describe what happens to the particles as it happens.

<u>Extend</u>

Explain why the arrangement, movement and energy of particles change during changes of states.

CC2a– Mixtures

1. What is the difference between a pure substance and a mixture?
2. What happens to its particles when a solid melts?
3. How do melting points allow you to spot the difference between pure substances and mixtures?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

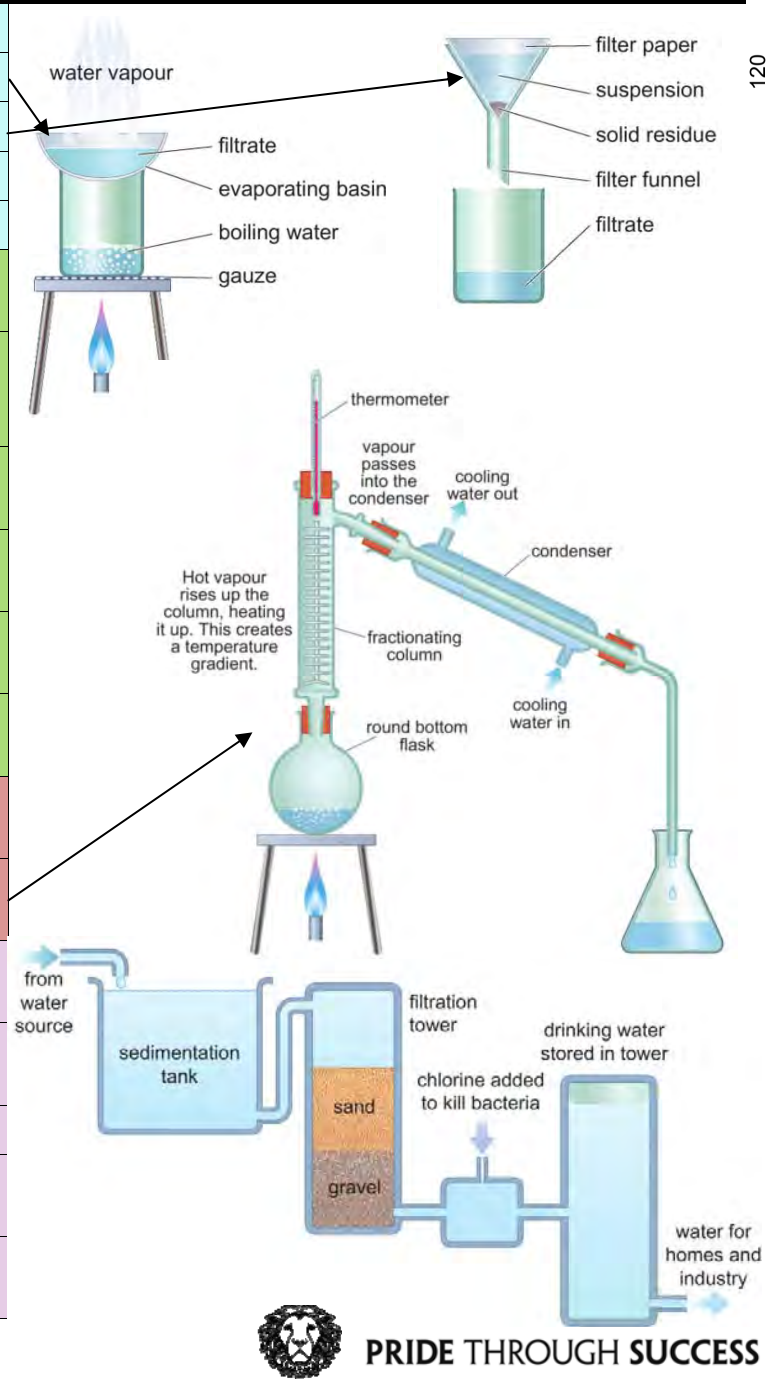
<u>Strengthen</u>

List ways in which pure substances are different from mixtures.

<u>Extend</u>

A piece of gold jewellery is 750 on the fineness scale. Would you expect the jewellery to have a sharp melting temperatures? Explain your answer.

Chemistry– Topic 2– Part 2 (CC2b-CC2e)	
Crystallisation	Separating the solute from a solution by evaporating the solvent.
Filtration	Using a filter to separate insoluble substances from a liquid.
Solvent	The liquid in which a solute dissolves to make a solution.
Solution	Formed when a substance has dissolved in a liquid.
Solute	Substance that dissolves in a liquid to make a solution.
Chromatography	A technique for separating the components of a mixture – for example different food colouring agents.
Paper chromatography	Chromatography carried out by spotting drops of the samples onto paper, and then allowing a solvent to move up the paper. Different components in the samples travel up the paper in the solvent at different rates.
Stationary phase	The surface through which the solvent and dissolved substances move in chromatography.
Mobile phase	When solvent moves along the paper carrying dissolved samples with it.
Chromatogram	The piece of paper showing the results of carrying out chromatography on substances.
Rf value	Ratio distance travelled by the solute to the distance travelled by the solvent under the same conditions.
Distillation	The process of separating a liquid from a mixture by evaporating the liquid and then condensing it (so that it can be collected).
fractional distillation	A method of separating a mixture of liquids with different boiling points into individual components (fractions).
Aquifer	Underground layer of rock containing groundwater, which can be extracted using a well or pump.
Chemical analysis	Using chemical reactions or sensitive machines to identify and measure substances in a sample.
chlorination	The process of adding chlorine to a substance, often to water.
Desalination	Produces fresh drinking water by separating the water from the salts in salty water.
Sedimentation	The process in which rock grains and insoluble substances sink to the bottom of a liquid.



CC2b– Filtration and crystallisation

1. How can filtration be used to separate mixtures?
2. How can crystallisation be used to separate mixtures?
3. What are the hazards and risks when separating mixtures by filtration and crystallisation?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

<u>Strengthen</u>

Explain how you would separate sand and salt from a mixture of the two.

<u>Extend</u>

Scientists looking for new substances in plants grind up the plants with methanol. This solvent dissolves many plant compounds. However, methanol is flammable and toxic (especially in the (especially if the vapour is inhaled). Large crystals can be made to help scientists work out what the compounds are made of. Explain how you would make plant-compound crystals using methanol.

CC2c– Paper chromatography

1. How can chromatography be used to separate mixtures?
2. What are the differences between mixtures and pure substances on a chromatogram?
3. How do you calculate Rf value?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

<u>Strengthen</u>

The police have taken four orange lipsticks from suspects. Explain the steps needed to find out if one of the lipsticks could have made a mark at the crime

<u>Extend</u>

A laboratory produces a list of Rf values for food colourings. Explain why Rf values are used and what information is needed for the Rf values to be useful.

CC2d– Distillation

1. What is distillation?
2. How do simple distillation and fractional distillation differ?
3. How would you reduce risks when carrying out a distillation experiment?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

<u>Strengthen</u>

Explain what distillation is and how the distillation apparatus (the still) works. Use a labelled diagram to make your explanation clear.

<u>Extend</u>

Pure ethanol ('alcohol') boils at 78.5°C .Explain how a 50:50 mixture of ethanol can be separated by fractional distillation.

CC2e-Drinking water

1. How would you chose which method to use to separate a mixture?
2. How is drinking water produced?
3. Why must water used in chemical analysis be pure?

Strengthen and/or extend your knowledge depending on how well you could answer these questions.

<u>Strengthen</u>

Draw flowcharts to describe two ways in which water can be made fit to drink.

<u>Extend</u>

A bottle of water has a label saying 'Suitable for chemical analysis'. Describe how this water has been produced.

HISTORY

Use the knowledge organisers on the following pages to create a mind map of key facts about the Russian revolution and cold war. Then answer the questions below.

1) Write an account of the events leading up to the Russian revolution of 1917
2) Write an account of events leading up to the Cuban Missile Crisis of 1962
3) "The main cause of the Cold War was the Truman doctrine". How far do you agree with this statement?

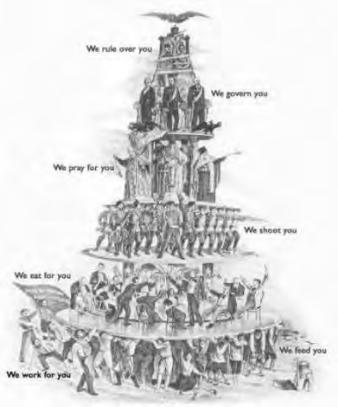
Year 9 History: Russia and the USSR Knowledge organiser.

Chronology, events and people

At the beginning of the Twentieth century, Russia was a vast empire spanning two continents - Europe and Asia. Communications were difficult, even though there had been enormous growth in railways in the 1890s, by 1900 Russia had only as many miles of track as Britain. The empire also contained around 130 million people and less than half of the population was Russian. The rest belonged to peoples who had been conquered by Russians. Many did not speak Russian and most were illiterate. Over 80% of the population were peasants and life for them was very hard. From 1894, Russia was ruled by Tsar Nicholas II who ruled as an **autocrat.** He believed that he had a divine right to rule - that is he had been chosen by God. **The Orthodox Church** was closely linked to the Tsar and supported his way of ruling. This is why many people thought of the Tsar as the 'little father'. However, Nicholas was a weak ruler and faced many different opposition groups such as the **Social Democrats** and **Liberals.** He also suffered humiliating defeats in both the Russo-Japanese War and the First World War. As a result, he was forced to abdicate in February 1917 following the Russian Revolution. For a few months, Russia was led by a **Provisional Government** however, in October 1917, the **Bolsheviks** seized power on a promise of **Lenin**, delivering 'Peace, Land and Bread'. Lenin is soon forced into a **Civil War** with the **White army** who oppose his rule and people of Russia suffer serious hardships for the next few years even resorting to cannibalism when a major famine hits in 1921. When Lenin dies in 1924, Stalin emerges as the next leader of the USSR. Throughout Stalin's rule, all groups of Russian people face severe hardships. The workers through the **Five Year Plans**, had to meet high production targets and work long hours. The peasants were forced into **Collectivisation** with anyone refusing being sent to the labour camps or executed. Furthermore, the USSR became a **totalitarian** state in which every aspect of people's lives was controlled and monitored by Stalin. Stalin also executed the **Great Purges** during which , millions of Russians in the Communist Party, the army, the arts and music and many other walks of life were arrested and either sent to the gulags or shot.

Key words

Autocrat - *a ruler with complete and absolute power.*
Bolshevik - *a member of one of the groups formed after the split of the Social democratic Party in 1903. This group was led by Lenin and believed that a small party of revolutionaries should seize power when the time was right.*
Collectivisation - *the process introduced by Stalin whereby individuals' land and farms were put together and ran as a committee.*
Five Year Plans – *These plans set production targets for industry e.g. 75 million tons of coal by 1932.*
Great Purges - *From 1934 to 1938, millions of Russians were arrested and either sent to the labour camps or shot.*
Lenin – *Leader of the Bolshevik party.*
Liberals -*A political group in Russia who wanted free elections and a parliament to rule Russia.*
Provisional government -*A temporary government set up after the revolution in February 1917until a new one could be elected.*
Social Democrats -*A political group in Russia who followed the teachings of Karl Marx and wanted to overthrow the Tsar and create a Socialist state.*
The Orthodox Church -*A branch of Christianity which was very important in Russia.*
White Army -*All the opponents of the Bolsheviks e.g. nobles and Tsarists.*



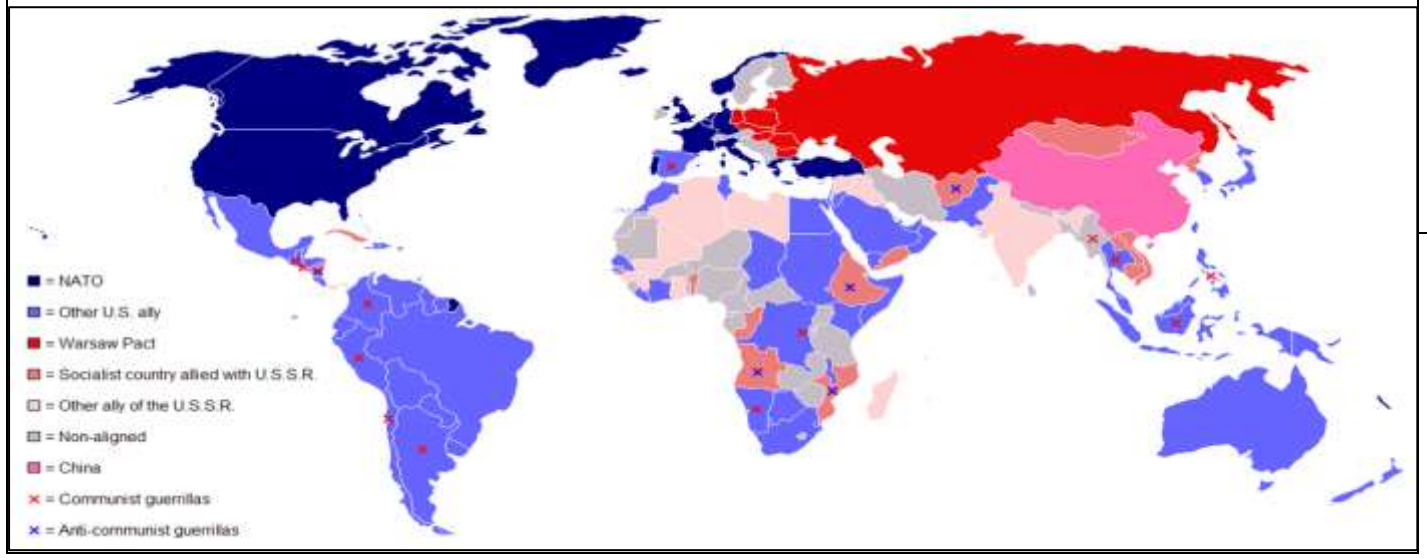
Key dates:

1st November 1894– Nicholas II becomes Tsar of Russia
1904-1905 – The Russo-Japanese War
15th March 1917 – Tsar Nicholas II abdicates
16th March 1917 – Provisional Government declared.
25th October 1917 – The Bolsheviks seize power in Russia
Summer 1918 – The Russian Civil War
21st January 1924 – The death of Lenin
1922 – 1953 – Stalin is General Secretary of the Communist Party.
1st December 1934 – The start of the Great Purges

THE COLD WAR KNOWLEDGE ORGANISER

Overview and Map

The Cold War was a long period of open, yet restrained, tension between the democracies of the western world and the communist countries of the east. The democratic west was led by the United States, whilst the communist east was spear-headed by the Soviet Union – the two world superpowers at the time. Whilst the two superpowers never directly declared war on one another, they fought indirectly via proxy wars, an arms race, and the space race, in order to gain political and ideological dominance. The map below shows the extent of their alliances in 1980, towards the end of the Cold War.



Key People

Dwight Eisenhower – (1890-1969) Dwight Eisenhower was a five star general of the US army and supreme commander of the Allied forces in western Europe, before becoming the 34th President of the United States. As President, he articulated his views on the 'Domino Theory', suggesting that Communism should be stopped before it spread. Whilst he ended the Korean War, he was the first President to send troops to Vietnam, and made preparations to make interventions in Cuba. He made efforts to limit nuclear weapons proliferation, but these were unsuccessful.

Joseph Stalin – (1878-1953) was the Communist leader/ dictator of the USSR during WWII. After the death of the Communist Leader Lenin, Stalin won a vicious grapple for power before eventually establishing himself as a totalitarian dictator. His own policies became known as 'Stalinism.' After World War II, Stalin became committed to taking both political and ideological control of eastern European states, believing this to be integral to creating a buffer between the democratic West. This quest for domination is seen as one of the predominant factors in starting the Cold War.

John F. Kennedy – (1917-1963) Commonly known as JFK, John F. Kennedy was the 35th President of the United States, who served between 1961-1963 at the height of the Cold War. The majority of his presidency involved managing relations with the Soviet Union. He authorized the failed Bay of Pigs invasion, but subsequently helped to diffuse the Cuban Missile Crisis, and made a famous speech about the Berlin Wall as being symbolic of Communist failure. He also expanded the US space programme. He was assassinated in 1963.

Nikita Khrushchev – (1894-1971) Nikita Khrushchev was the successor to Joseph Stalin, who led the Soviet Union between 1953 and 1964 – the tensest years of the Cold War. He was more liberal than his predecessor in domestic policy, and also cut Soviet forces. However, he built up the number of nuclear missiles. He was involved in the Cuban Missile Crisis, when nuclear war between the US and Soviet Union seemed to be imminent. In 1964, he was removed by his colleagues, replaced by Leonid Brezhnev.

Sir Winston Churchill – (1874-1965) was a British politician who served as the Prime Minister between 1940 and 1945 and again from 1951 to 1955. He took over after a disastrous start to the war in which Nazi Germany conquered much of Europe. The manner in which he forged crucial alliances with countries like the US and Russia undoubtedly aided the Allies victory. After the war, he was one of the first public figures to hypothesise about the significant dangers of an 'Iron Curtain' descending across Europe.

Fidel Castro – (1926-2016) Fidel Castro was a Cuban communist, revolutionary, and politician, who helped to lead the Communist revolution in Cuba. He was allied with the Soviet Union, and caused grave concern to the US as communism was now in the Americas. The CIA took charge of trying to overthrow Castro's government, using Cuban exiles, but got their strategy disastrously wrong in the Bay of Pigs invasion. Castro became a hero for his victory, and stayed in power right up until 2011.

Major Events

Event	Image	Description	Date/s	Fact
The Truman Doctrine		The Truman Doctrine was an American foreign policy created with the aim of countering Soviet geopolitical expansion. Announced to congress by President Harry S. Truman, the doctrine alleged that communist totalitarian regimes represented a significant threat to international peace. As a result, American support would be provided to countries threatened by Soviet communism.	12th March 1947	The Doctrine led to the formation of NATO, an alliance that is still in effect.
Berlin Blockade		During multinational occupation of post-World War II Germany, the Soviet Union blocked the Western Allies' railway, road and canal access to parts of Berlin under western control, in response to western introduction of the Deutsche mark. Via the 'Berlin Airlift', Allied planes were able to deliver vital supplies to Berliners.	24th June 1948 – 12th May 1949	It proved to be a PR disaster for Stalin, who had to remove the blockade in May 1949.
The Korean War		As a result of the Cold War, Korea had split into two states, with both claiming to be the sole legitimate government of all of Korea. This broke into war when communist North Korea (aided by Russia and China) invaded the South (backed by USA). The war eventually ended in stalemate. The country remained divided.	25th June 1950 – 27th July 1953	As no peace treaty was signed, the countries are still technically at war!
The Vietnam War		Vietnam was split – the North (backed Soviet Union) and South (backed by USA) engaged in a war lasting over 19 years. It also sprouted the Laotian and Cambodian Civil Wars, and resulted in all 3 states becoming Communist. It was an extremely deadly war, with around 2 million innocent civilians believed to have perished.	1st November 1955 – 30th April 1975	Images of napalm-burnt villagers turned public opinion against the war in the USA.
The Space Race		The USA and USSR intensified competition for spaceflight superiority. The race had origins in the nuclear arms race, in that successes demonstrated technological strength. USSR completed the first manned spaceflight, whilst USA were the first to send man to the moon.	2nd August 1955 – c.1975	USSR launched the first satellite into space on 4th Oct 1957 – *Sputnik 1.*
U-2 Plane Incident		A United States U-2 spyplane was shot down by the Soviet Air Defence Forces, whilst photographing targeted Soviet sites whilst deep into Soviet territory. Embarrassingly, the US was forced to admit this purpose after the USSR produced the pilot and evidence.	1st May 1960	The pilot, Gary Powers, was captured and convicted of espionage.
The Bay of Pigs Invasion		The Bay of Pigs Invasion was a failed military invasion of Cuba. The CIA-sponsored Brigade 2506 intended to overthrow the increasingly communist government of Fidel Castro, but were defeated after only 3 days.	17th -20th April 1961	The outcome made Castro a national hero.
Cuban Missile Crisis		The missile crisis was a 13-day confrontation between the USA and the USSR. The USA initiated ballistic missile deployment in Italy and Turkey, whilst the USSR deployed missiles in Cuba. It is often considered the point at which the Cold War came closest to all-out nuclear war. After tense negotiations, missiles were dismantled.	16th – 28th October 1962	Soviet missiles in Cuba were only 90km from Florida in the USA.
Non-Proliferation Treaty		The treaty on the non-proliferation of nuclear weapons, also known as the NPT, is an agreement to prevent the spread of nuclear weapons technology, and to promote peaceful use of nuclear energy. Both the US and the Soviet Union signed the treaty on 1st July 1968, alongside other nuclear-armed states, reducing tensions.	1st July 1968	Although it did not stop nuclear development, the NPT reduced US/ USSR tensions.
Fall of the Berlin Wall		The Berlin Wall had separated communist eastern section of Berlin Germany from west Berlin since 1961. However, the Soviet Union was beginning to collapse, and was struggling to hold onto East Germany. In November 1989, the Central Committee of East Germany opened up free movement across the wall. In In doing so, one of the major symbols of the Cold War itself was abolished.	9th November 1989	On October 3, 1990 Germany was officially reunified into a single country.

Timeline of Major Events

1945 – Potsdam Conference leads to distrust between the USSR and USA

1945 – The Iron Curtain divides east from west.

1946 – Policy of containment leads to the Domino Theory.

1947 – The Truman Doctrine pledges to resist Communism.

1948 – Stalin mounts the Berlin blockade in East Germany.

1949 – USSR tests its first nuclear bomb and the arms race begins.

1950-53 – The Korean War.

1955 – The Vietnam War begins.

1957 – The Space Race begins (ends around 1975).

1960 – The U-2 plane incident – US pilot Gary Powers captured.

1961 – Berlin Wall erected.

1961 – The Bay of Pigs: botched invasion of Cuba.

1961 – Cuban Missile crisis brings the world close to nuclear war.

1969 – Strategic Arms Limitation Talks.

1979 – Soviets invade Afghanistan.

1989 – Fall of the Berlin Wall.

1991 – Collapse of USSR. Cold War ends.

GEOGRAPHY

Use the knowledge organisers on the following pages to make mind maps of key facts about North and South America. Then, if you can, research and make mind maps about the geography of the following topics:

- The Grand Canyon
- Hurricane Katrina
- Detroit
- Las Vegas

NORTH AMERICA KNOWLEDGE ORGANISER

Map and Overview

-North America is the world's third largest continent by area. It covers about 24.7 million km², which is about 16.5% of the earth's total land area.

-North America is the fourth most populous continent, after Asia, Africa and Europe. Its population is about 580 million people.

-North America is in the western hemisphere (apart from Hawaii and parts of Alaska) and the northern hemisphere.

-The first people reached America over a frozen crossing from Siberia in the last Ice Age, between 40,000 and 15,000 years ago.

Countries of North America

Largest N. American countries

1. Canada – 9.98 million km²
2. USA – 9.83 million km²
3. Greenland (Den) – 2.16 million km²
4. Mexico – 1.96 million km²
5. Nicaragua – 130,375 km²

There are 23 countries in North America, and a further 9 states that are listed as dependencies of other nations.

Most populous N. American countries

1. USA – 328 million people
2. Mexico – 132 million people
3. Canada – 37 million people
4. Guatemala– 18 million people
5. Cuba – 11 million people

The United States

The United States is a large country made up of 50 states – including 48 on the US mainland, plus Alaska and Hawaii. It has the largest population of any country in North America, and the third largest population in the world. The USA is considered the richest and most powerful country in the world, at the forefront of world politics and economy.

Canada

Canada is the largest country by area in North America, and the second largest in the world (after Russia). As a whole, Canada is very sparsely populated – most of its population lives along the US border in the south, whilst very few people live in the central and northern areas of the country. Most of its land is dominated by forest and tundra.

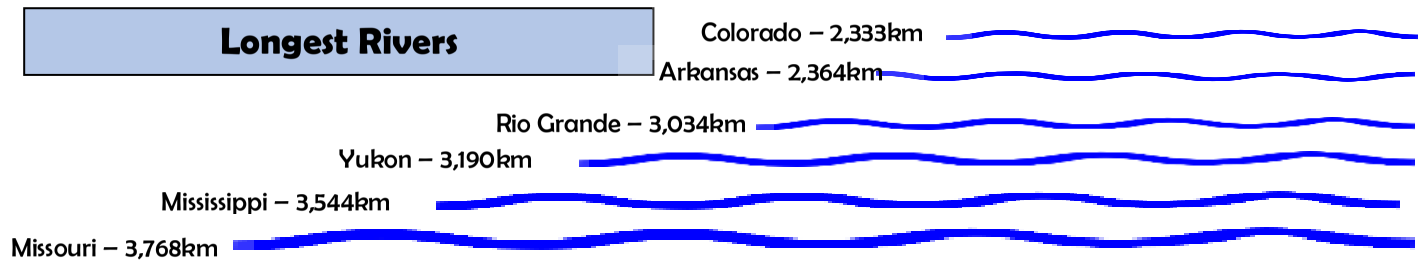
Central America

Central America is the region found on the southern tip of North America, and contains many smaller nations: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. The countries have many cultural similarities, and Spanish is the main language in the region. The area is sometimes considered as its own microcontinent.

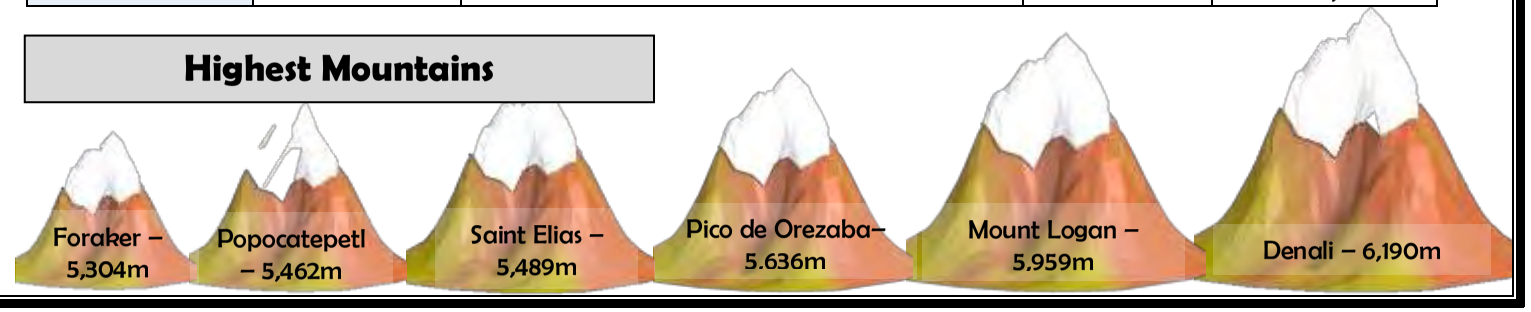
The Caribbean Islands

The Caribbean Islands are a number of tropical islands based in the Caribbean Sea off North America. The sea is considered as a part of the Atlantic Ocean. It is bordered by Mexico and Central America. Cuba is by far the largest Caribbean Island, with an area of 105,806 km². The Caribbean Islands are sometimes referred to as the West Indies.

Longest Rivers



Highest Mountains



Human Geography Features

Population Densities		The population density for North America is about 20 people per km². However, due to big cities in some areas (e.g. New York City) and extreme weather in others (e.g. northern Canada) people are not spread evenly.	**Where?** Parts of Central America and the Caribbean are also densely populated.	**Key Fact:** The most densely populated country in North America is Bermuda.
Manhattan, New York City		Manhattan is the business and entertainment centre of New York City, the largest city in the US. Manhattan is mostly on an island, with many high rise buildings, e.g. the Empire State Building, surrounding Central Park.	**What?** One WTC is the tallest building in Manhattan and the USA, at 546 metres.	**Key Fact:** In 2001, the original World Trade Centre towers were destroyed by terrorists.
Colonisation/ Languages		Throughout the 16th-17th centuries, European settlers (mainly from Britain, Spain and France) colonised different parts of North America. Many native North Americans became displaced by the colonisers.	**When?** The USA became independent from colonisers on July 4th, 1776.	**Key Fact:** The languages spoken in North America are mainly as a result of colonisation.
Sports/ Recreation		North America is relatively unique in that sports that originated in the region (e.g. American football, baseball, basketball) are more popular than the global sports popular elsewhere (e.g. football/soccer, rugby, cricket).	**What?** American football is the most popular sport in the USA	**Key Fact:** Lacrosse is the fastest growing sport in North America.
The Mexican Drug War		This an ongoing conflict between the Mexican government and several of the large drug cartels. This has been in response to the excessive wealth, control, and violence of the cartels.	**What?** Mexican cartels control 90% of illegal drugs entering the USA.	**Key Fact:** The Mexican government declared the war in 2006.

Physical Geography Features

The Mississippi River		The Mississippi River is the second-longest on the continent, with its basin including 32 states in the USA. North Americans have lived along the Mississippi River for thousands of years.	**What?** Along the river is amongst the most fertile places in the USA.	**Key Fact:** The Mississippi serves as a boundary between several states.
The Great Lakes		The Great Lakes are a series of interconnected lakes across the USA-Canada border. They include lakes Superior, Michigan, Huron, Erie and Ontario. By area, they are the largest lake system in the world, and 2nd by volume.	**What?** Because of their great size and their waves, they are sometimes called inland seas.	**Key Fact:** Only Lake Baikal in Russia has a larger volume than the North American Great Lakes.
Animals		Due to the extreme latitudes of the continent, there are a wide variety of animals adapted to different climates in North America. The brown bear is one of the largest and most powerful carnivores, whilst the American alligator is a feared predator in South-Eastern USA.	**What?** North America has 457 mammals, 662 reptiles & 300 amphibians.	**Key Fact:** American Alligators can attain lengths of longer than 4m – they are a serious threat to people.
Death Valley		Death Valley, located in eastern California, is one of the hottest places in the world. Its Badwater Basin is 86m below sea level, the lowest point on the continent.	**What?** It has an area of 7,800 km²	**Key Fact:** In 1913, the heat reached 56.7°C, the hottest ever recorded.
Hawaiian Islands		The Hawaiian Islands consist of 8 major islands, and many other smaller islets in the North Pacific Ocean. They are spread out over 2400km. The islands are the exposed peaks of a massive underwater mountain chain.	**Where?** The islands are about 3,000km from the nearest continent.	**Key Fact:** Mount Kea is the 'tallest' mountain in the world – 10,000m from base to tip (6,000m is below the sea).

SOUTH AMERICA KNOWLEDGE ORGANISER

Map and Overview

-South America is the fourth-largest continent in the world. It covers about 17.8 million km². It lies completely in the western hemisphere.

-South America is the fifth-most populous continent in the world – it has a population of around 420 million people (although over half of these people live in Brazil).

-The Equator cuts through the continent. Most of South America is in the southern hemisphere.

-Most of the people live on the east and west coasts; the southern coast and centre of the continent are sparsely populated.

Countries of South America

Largest S. American countries

1. Brazil– 8.5 million km²
2. Argentina – 2.8 million km²
3. Peru – 1.3 million km²
4. Colombia – 1.15 million km²
5. Bolivia – 1.1 million km²

There are 12 countries in South America, and a further 4 states that are listed as dependencies of other nations.

Most populous S. American countries

1. Brazil – 210 million people
2. Colombia – 49 million people
3. Argentina – 44 million people
4. Peru – 32 million people
5. Venezuela – 32 million people

Brazil

Brazil is by far the largest and most populous country in South America. It is also the 5th largest country in the world, by both area and population. The official language is Portuguese, and the most populous city is Sao Paulo. Rio de Janeiro harbour is its most famous landmark. Brazilians are known for samba dancing and a love of football.

Argentina

Argentina is a country located in the southern half of South America. Argentina is the 8th largest country in the world by area, and the largest Spanish-speaking country. Argentina endured a long fight for independence with Spanish invaders in the 19th Century, followed by a painful civil war. The climate in Argentina varies hugely from north to south.

Colombia

Colombia is a country in the north-west of South America. Colombia has been inhabited by indigenous peoples since at least 12,000 BCE. However, the Spanish arrived in 1499 and conquered much of the region. As a result, the national language is Spanish. Much of the population live in the highlands.

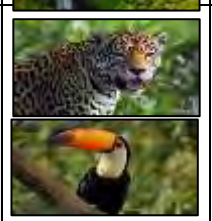
Peru

Peru is a country on the western side of South America. It has a diverse landscape, ranging from arid plains to the Andes mountains. Peru is known for being the centre of the Inca Empire – the Inca ruins of Machu Picchu remain a major tourist attraction today. The national language in Peru is Spanish.

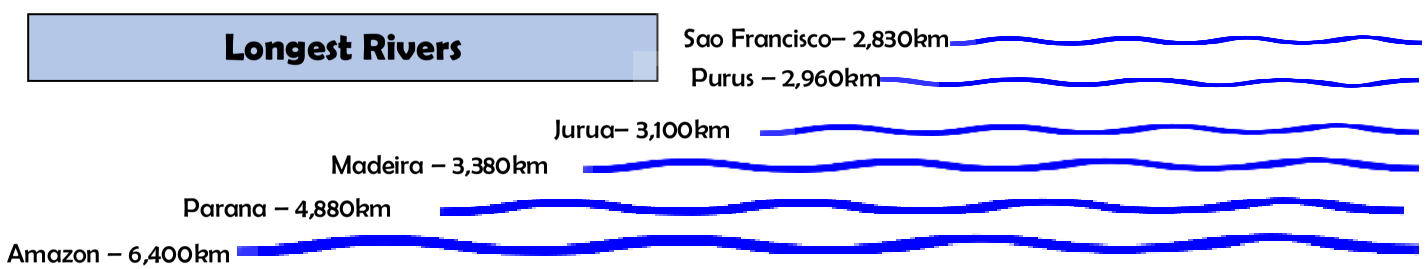
Human Geography Features

Deforestation		The Amazon Rainforest has been rapidly destroyed over the past 50 years – since 1970, nearly 800.000 km² of rainforest has been lost. The main causes are agriculture, illegal logging, and human encroachment into the forest.	**What?** About 20% of the total rainforest has now been cleared.	**Key Fact:** 150 acres of rainforest are destroyed every minute of the day.
Machu Picchu		The Inca Empire was the largest empire in pre-colonial South America. Machu Picchu was a large Incan citadel (fortified central area of town). Incans abandoned it after the Spanish invaded. It remained unknown until 1911.	**Where?** On a 2,430 metre mountain ridge in southern Peru.	**Key Fact:** It was built in 1450 in classic Inca style with dry stone walls
Colonisation/ Languages		Throughout the 16th-17th centuries, European settlers (mainly from Portugal and Spain, but also the French, Dutch and British) invaded and colonised South America. South Americans still speak European languages today.	**When?** Most countries gained independence in the 19thC.	**Key Fact:** Portuguese and Spanish are the main languages on the continent.
The Rio Carnival		The Rio Carnival is a festival held every year before Lent. It is considered the largest carnival in the world, with over 2 million people attending daily. It is filled with parades of revelers, dancers, floats and displays.	**When?** Friday before Ash Wednesday to Ash Wednesday.	**Key Fact:** The Rio Carnival has taken place since 1723.
Coffee Trade		The coffee plant is grown in abundance in South America, and many countries from the continent are the biggest producers of coffee in the world. Coffee is a huge regional export.	**Where?** Mainly Brazil, Colombia and Peru.	**Key Fact:** Brazil produces 2.5 million tonnes per year.

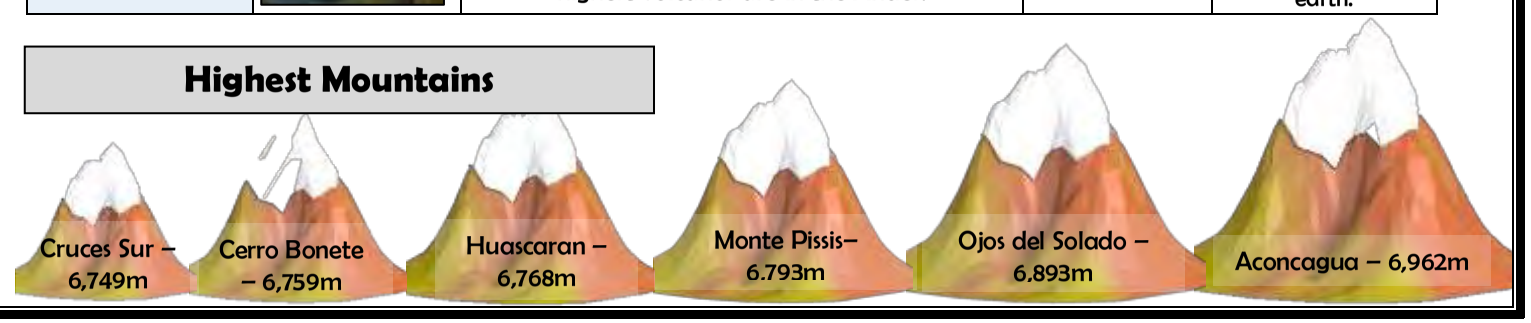
Physical Geography Features

The Amazon River		The Amazon River is the longest river in South America, and by some definitions, the world. It has a huge volume, discharging 20% of all river discharge into the ocean in the world!	**Where?** Peru, Bolivia, Colombia, Brazil, Ecuador, Venezuela	**Key Fact:** The Amazon is fed by hundreds of tributaries.
The Amazon Rainforest		The Amazon Rainforest is the largest rainforest in the world. The rainforest is about 5.5 million km² across nine different nations.	**What?** There are 16,000 tree species.	**Key Fact:** The Amazon contains around 390 billion trees!
Animals		The Amazon rainforest is so bio-diverse that it houses 1 in every 10 known species of animals. There are around 2.5 million insect species, 2,000 birds & mammals, 428 amphibians, and 378 reptile species One in 5 of all fish species live in the Amazon River and its tributaries. Animals include the jaguar, caiman, and anaconda.	**What?** Many creatures are dangerous to humans, e.g. snakes, piranha fish, poison dart frogs and electric eels.	**Key Fact:** An unknown amount of Amazon animals have become extinct since the 1970s, because of deforestation.
The Atacama Desert		The Atacama Desert is one of the driest places in the world. There are some places where there has been no recorded rainfall!	**Where?** The Atacama Desert is in Chile.	**Key Fact:** The desert is so dry due to its position in a 'two-way' rain shadow.
The Andes		The Andes are the tallest mountains in South America (and in the world after the mountain ranges in Asia). The range is about 7,000km long, extending north to south. The world's highest volcanos are in the Andes.	**Where?** Through 7 different South American countries.	**Key Fact:** The peak of Mount Chimborazo is the furthest point from the centre of the earth.

Longest Rivers



Highest Mountains



FRENCH

Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create flashcards with the Spanish on one side and the English translation on the other. Either test yourself or get someone else to test you. When you feel confident, write a short paragraph about each topic using the vocabulary you have revised.

GCSE FRENCH KNOWLEDGE ORGANISER

DESCRIBING A PHOTO

Sur la photo il y a… (In the photo there is…)

PEOPLE

un homme	a man
une femme	a woman
un garçon	a boy
une fille	a girl
des jeunes	some young people
il est vieux	he is old
elle est vieille	she is old
grande	tall
petite	short
jolie	pretty/handsome

ACTIONS

il est en train de/ ils sont en train de	he is/they are in the middle of
...parler	...talking
...rire	...laughing
se disputer	arguing
marcher	walking
fêter	celebrating
travailler	working
jouer	playing
manger	eating

LOCATIONS

il/elle est	he/she is
ils sont	they are
dehors	outside
dedans	inside
à la maison	at home
en plein air	in the open air
des arbres	some trees
des édifices	some buildings
au collège	at school
au travail	at work

MOOD

il/elle semble	he/she seems
ils semblent	they seem
(mal)contente/s	(un)happy
triste/s	sad
fatiguée/s	tired
énervée/s	angry
surprise	surprised
pressée	in a hurry
ennuyée	bored
ravie	delighted

WEATHER

il fait beau	it's nice
il fait du soleil	it's sunny
il pleut	it's raining
il neige	it's snowing
il y a du vent	it's windy
il fait beau	it's nice
il fait du soleil	it's sunny
il pleut	it's raining
il neige	it's snowing
il y a du vent	it's windy

GENERAL

au premier plan	in the foreground
au deuxième plan	in the background
à gauche	on the left
à droite	on the right
près de	next to
devant	in front of
au milieu	in the middle
derrière	behind
je peux voir	I can see
la photo montre	the photo shows

GIVING YOUR OPINION

You can also give your opinion of the photo and add a little information, e.g.

J'aime cette photo parce que c'est coloré (colourful) *et j'adore jouer au foot*

TOPIC 1: Me, my family and friends

Je m'appelle Emilie et *j'ai* quatorze *ans*	**I'm called** Emilie and *I'm* 14 *years old*
J'aurai 15 **ans** dans trois mois	**I will be** 15 **years old** in three months
Je pense que je suis *assez* typique	**I think that** I am *quite* normal
Quand j'étais petit, j'étais *un peu* pénible	**When I was** little I was *a bit* annoying
mais plus maintenant car *j'ai grandi*	**but not anymore** because *I've grown up*
Tout le monde dit que je suis sociable	**Everyone says that** I am sociable
et que j'aime **m'amuser**	and that I like **to have fun**
Il y a cinq personnes *dans ma famille*	**There are** five people *in my family*
Mes parents **sont mariés depuis** 2001	My parents **have been married since** 2001
Ma mère qui s'appelle Ellie est généreuse	**My mum who is called Ellie is** generous
mais **mon père, Albert, est** *très* sévère	but **my dad, Albert, is** *very* strict
Je m'entends bien avec ma soeur Aline	I get on well with my sister Aline
J'ai de la chance de *l'*avoir	**I'm lucky** to have *her*
Ma grand-mère **est morte** *il y a* cinq ans	My grandmother **died** five years *ago*
Elle était sympa et **elle** *me* manque	She was nice and *I* **miss** her
Je pouvais *parler de tout* avec elle	**I could** *talk about everything* with her
Hier **je suis allée** en ville avec mon ami	Yesterday **I went** into town with my friend
car **il y avait** le marché de Noël	because **there was** the Christmas market
Nous **avons acheté** des cadeaux pour...	We **bought** presents for...
Ensuite **nous sommes allés** *voir* un film	Next **we went** *to see* a film
À l'avenir je voudrais *me marier*	**In the future** I would like *to marry*
Mon mari/femme idéale **serait**...	My ideal husband/wife **would be**...
J'aurai un *grand* mariage romantique	**I will have** a *large* and romantic wedding
Bien que *j'aie* une grande famille	**Although** *I have* (subjunctive) a large family
je **ne voudrais pas** avoir des enfants	I **wouldn't like** to have children

TOPIC 2: Technology in everyday life

Je me sers de mon portable *pour tchatter*	**I use** my phone *(for) to chat*
Je **l'**utilise aussi pour surfer sur internet	I also use **it** to surf the internet
Je ne m'**en** sers pas pour faire mes devoirs	I don't use **it** to do my homework
car l'écran est **trop** petit	because the screen is **too** small
J'aime **écouter** de la musique	I like **to listen** to music
et **faire des recherches** sur internet	and **do research** on the internet
Hier soir **j'ai téléchargé** des films	Last night **I downloaded** some movies
Puis je suis allée sur **les réseaux sociaux**	Next, I went on **social media**
et **j'ai actualisé** ma page personnelle	and **I updated** my homepage
Avant de *me déconnecter*	**Before** *switching off*
j'ai partagé un photo **sur** Instagram	**I shared** a photo on Instagram
Selon moi l'internet **peut être** dangereux	According to me the internet **can be** dangerous
Il est important de sécuriser son mot de passe	**It's important to** secure (y)our password
Il faut faire attention quand on est *en ligne*	**You must** pay attention when you're *online*
Et **il ne faut pas** *ajouter en ami*	And **you must not** *add as a friend*
les gens qu'**on ne connaît pas**	people that **you don't know**
D'autre part, *ce n'est pas* dangereux	**On the other hand**, *it's not* dangerous
Dans le passé les portables étaient *lents*	**In the past** phones were *slow*
Il était difficile de communiquer	**It was difficult to** communicate
Les ordinateurs étaient **grands** et *chers*	Computers were **large** and *expensive*
et la connexion **n'était pas** fiable	and the connection **was not** reliable
À l'avenir **il y aura** des robots	In the future **there will be** robots
et des voitures **sans conducteur**	and cars **without drivers**
La technologie **sera plus avancée**	Technology **will be more advanced**
et **plus rapide** dans vingt ans	and **faster** in twenty years

TOPIC 3: Free-time activities

Je fais beaucoup de sports **comme** le foot	I do a lot of sport **such as** football
pour développer mes capacités	**in order to** develop my skills
Je joue **au tennis** mais je ne fais pas *du vélo*	I play **tennis** but I don't go *cycling*
parce que **je le trouve** *trop* fatiguant	because **I find it** *too* tiring
Normalement **je regarde** *les infos*	Normally **I watch** *the news*
car **ça m'intéresse** beaucoup	because **it interests me** a lot
et **je ne rate jamais** les feuilletons	and **I never miss** the soaps
Au ciné **je préfère voir** les films d'action	At the cinema **I prefer to see** action films
en mangeant … et *en buvant* …	**while eating** … and *while drinking* …
Je trouve les films bon pour ma culture	**I find** films good for my culture
et j'aime regarder **les films étrangers**	and I like to watch **foreign films**
pour améliorer mes compétences linguistiques	**in order to improve** my language skills
Je suis **un rat de bibliothèque**	I'm **a bookworm**
Récemment **j'ai lu** un bon roman	Recently **I read** a good novel
Mais normalement **je préfère** écouter	But normally **I prefer** to listen
de la musique ou **à la** radio	**to** music or **to the** radio
plus que lire des livres	**more than** reading books
Le weekend prochain **je vais aller** au parc	Next weekend **I'm going to go** to the park
Il faut acheter *des choses* pour le collège	**I have to** buy *some things* for school
Ensuite je vais **traîner** avec *mes potes*	Next I'm going **to hang out** with *my homies*
Les loisirs sont importants pour déstresser	Hobbies are important for destressing
Je peux **oublier** mes soucis	I can **forget** my worries
Bien que je sois/je lise/je fasse...	**Although** I am/I read/I do...
C'est une **perte de temps**	It's a **waste of time**
On aurait préféré	We would have preferred

TOPIC 4: Customs and festivals in the French-speaking world

À mon avis **les fêtes** et *les jours fériés*	In my opinion **festivals** and *bank holidays*
sont importants pour **passer du bon temps**	are important for **having a good time**
Mais **en ce qui concerne** la Saint Valentin	But **as far as** Valentine's day **is concerned**
C'est **une perte d'argent**	It's **a waste of money**
Ma fête religieuse préférée est **Pâques**	My favourite religious holiday is **Easter**
Le chocolat, c'est **mon péché mignon**!	Chocolate is **my guilty pleasure**!
Nous **la** célébrons avec *toute la famille*	We celebrate **it** with *all the family*
Nous cherchons les œufs dans le jardin	**We look for** eggs in the garden
La fête de la musique *a lieu* en France	**World Music Day** *takes place* in France
pour célébrer **le début de l'été** le 21 juin	to celebrate **the start of summer** on 21st June
L'année dernière j'**y** ai participé	Last year I took part **in it**
et **tout le monde** jouait dans les rues	and **everyone** was playing in the streets
Quand **j'avais** quinze **ans**	When **I was** fifteen **years old**
J'ai fêté mon anniversaire avec mes amis	**I celebrated** my birthday with my friends
Nous sommes allés regarder un film	**We went** to watch a film
et quand **je suis rentrée** à la maison	and when **I got back** home
j'ai reçu **de nombreux** cadeaux	I received **a lot of** presents
Ce sera différent l'année prochaine	**It will be** different next year
J'aurai **une** grande **boum**	I will have **a** big **party**
Et toute ma famille **sera** là	And all my family **will be** there
Je serai traitée comme une princesse	**I will be treated** like a princess
Mon cadeau idéal serait un portable	**My ideal present** would be a phone
et **je pourrais** télécharger des applis	and **I would be able to** download apps
Je voudrais **aussi** des nouveaux vêtements	I'd **also** like some new clothes
pour porter à **ma fête d'anniversaire**	to wear to **my birthday party**

TOPIC 5: Home, town, neighbourhood and region

J'habite **à** Highbridge, une petite ville	I live **in** Highbridge, a small town
dans **le sud-ouest** de l'Angleterre	in **the south-west** of England
J'y habite avec ma famille *depuis* un an	**I have lived there** *for* a year
C'est situé au bord de la mer	**It's situated** by the seaside
Il n'y a grand-chose à faire **pour les jeunes**	There's not a lot **for young people** to do
Mais il y a **des magasins** et *un jardin public*	But there are **some shops** and *a park*
J'aime **habiter** à la campagne	I like **living** in the countryside
parce que c'est **plus tranquille qu'**en ville	because it's **quieter than** in town
Selon moi, ma région est très jolie	**According to me**, my region is very pretty
et en été il y a beaucoup de touristes	**and in summer** there are a lot of tourists
Ma région **est connue pour** le cidre	My region **is known for** its cider
et le fameux fromage de Cheddar	and the famous Cheddar cheese
C'est une région historique aussi	It's a historic region too
La semaine dernière **j'ai visité** le musée	Last week **I visited** the museum
et **j'y ai appris** beaucoup	and **I learned** a lot **there**
J'ai aussi **fait des courses** *en ville*	**I** also did some shopping *in town*
J'ai rencontré mes amies au ciné	I met my friends at the cinema
et **on a regardé** un film d'horreur	and **we watched** a horror film
Ça m'a donné la chair de poule!	**It gave me goosebumps!**
À l'avenir je voudrais habiter *en ville*	**In the future** I would like to live *in town*
À Londres **ou même** Bristol *c'est plus animé*	In London **or even** Bristol *it's livelier*
J'achèterais un appartement spacieux	**I would buy** a spacious apartment
Je sortirais tous les soirs	**I would go out** every evening
J'irais à toutes les boîtes de nuit	**I would go** to all the nightclubs
Je m'amuserais bien	I would have a lot of fun

TOPIC 6: Social issues

Pour aider les SDF/les démunis	To help the homeless/those in need
je travaille comme **bénévole** pendant l'été	I work as a **volunteer** during the summer
Je pense que **les associations caritatives**	I think that **charities**
jouent un rôle important dans **la société**	play an important role in **society**
en aidant ceux qui *ont besoin* d'eux	**by helping** those who *need* them
Bien que ne j'aie pas *trop* le temps	**Although** I don't have *too much* time
je voudrais **créer** une association caritative	I would like **to create** a charity
pour aider les mères *célibataires*	**to help** *single* mums
et **leurs enfants** car **ça m'inquiète** le plus	and **their children** because **that worries me** the most
Je vais collecter des choses nécessaires	**I'm going to collect** essential things
comme des produits d'hygiène	**such as** hygiene products
Je vais essayer de faire *mon mieux*	**I'm going to try** to do *my best*
pour que ces femmes *ne manquent de rien*	**so that** these women *don't lack anything*
Si j'avais plus de temps et d'argent	**If I had** more time and money
j'aiderais **le monde** entier	I would help **the** entire **world**
J'ai le cœur sur la main	**I am all heart**
Les jeunes **font face à** la pression des paires	Young people **face** peer pressure
En étant connectés *en ligne* tout le temps	**By being** connected *online* all the time
les jeunes **peuvent** *être* intimidés	young people **can** *be* intimidated
ce qui peut avoir un impact	**which** can have an impact
sur leur **santé mentale** et *travail scolaire*	on their **mental health** and *schoolwork*
Ils peuvent avoir **d'autres** problèmes	They can have **other** problems
comme **l'anorexie**, *les drogues* ou l'alcool	such as **anorexia**, *drugs* or alcohol
Il est important de parler de *ses* problèmes	**It's important** to talk about *one's* problems
pour *les* résoudre	**in order to** resolve *them*

PERFECT TENSE (*"has done/did"*)

Start with the present tense of *avoir/être*, then add the past participle of the second verb:

-er	-ir	-re
Remove **–er** Add **-é**	Remove **-r**	Remove **–re** Add **-u**
jou**er** → (j'ai) jou**é**	fin**ir** → (j'ai) fini	vend**re** → (j'ai) vend**u**

VERBS USING ÊTRE e.g. je suis allé(e)

monter	*entrer*	*sortir*	*venir*	*aller*	*naître*
partir	*descendre*		*arriver*	*tomber*	*rester*
mourir	*retourner*		***(and all reflexive verbs)***		

The past participle for these verbs must agree with the subject in gender and number:

je suis allé (m) *je suis tombée* (f)
on est entrés (mpl) *on est entrées* (fpl)

PRESENT TENSE (*"does/is doing"*)

Remove the -er/-ir/-re and add these endings:

	jouer	finir	vendre
je	jou**e**	fin**is**	vend**s**
tu	jou**es**	fin**is**	vend**s**
il/elle/on	jou**e**	fin**it**	vend
nous	jou**ons**	fin**issons**	vend**ons**
vous	jou**ez**	fin**issez**	vend**ez**
ils/elles	jou**ent**	fin**issent**	vend**ent**

ÊTRE
je suis / tu es / il est / nous sommes / vous êtes / ils sont
AVOIR
j'ai / tu as / il a / nous avons / vous avez / ils ont

SIMPLE FUTURE TENSE (*"will/shall do"*)

Add these endings to the infinitive:

	jouer	finir	vendr~~e~~
je	jouer**ai**	finir**ai**	vendr**ai**
tu	jouer**as**	finir**as**	vendr**as**
il/elle/on	jouer**a**	finir**a**	vendr**a**
nous	jouer**ons**	finir**ons**	vendr**ons**
vous	jouer**ez**	finir**ez**	vendr**ez**
ils/elles	jouer**ont**	finir**ont**	vendr**ont**

IRREGULAR STEMS

être (ser-)	*avoir* (aur-)	*faire* (fer-)
venir (viendr-)	*savoir* (saur-)	*aller* (ir-)
devoir (devr-)	*pouvoir* (pourr-)	*voir* (verr-)

IMPERFECT TENSE (*"was doing/used to do"*)

Remove *–ons* from the *nous* form of the present tense, add these endings (*ais/ais/ait/ions/iez/aient*)

	jouer	finir	vendre
je	jou**ais**	finiss**ais**	vend**ais**
tu	jou**ais**	finiss**ais**	vend**ais**
il/elle/on	jou**ait**	finiss**ait**	vend**ait**
nous	jou**ions**	finiss**ions**	vend**ions**
vous	jou**iez**	finiss**iez**	vend**iez**
ils/elles	jou**aient**	finiss**aient**	vend**aient**

NEAR FUTURE TENSE (*"is going to do"*)

Use the present tense of *aller* followed by the infinitive:

je	**vais**
tu	**vas**
il/elle/on	**va**
nous	**allons**
vous	**allez**
ils/elles	**vont**

jouer
finir
vendre
être
aller
vouloir
etc.

CONDITIONAL TENSE (*"would do"*)

Begin with the future stem, add imperfect endings:

	jouer	finir	vendr~~e~~
je	jouer**ais**	finir**ais**	vendr**ais**
tu	jouer**ais**	finir**ais**	vendr**ais**
il/elle/on	jouer**ait**	finir**ait**	vendr**ait**
nous	jouer**ions**	finir**ions**	vendr**ions**
vous	jouer**iez**	finir**iez**	vendr**iez**
ils/elles	jouer**aient**	finir**aient**	vendr**aient**

IRREGULAR STEMS
Same as for the simple future
EXTRA MARKS: USE WITH THE IMPERFECT TENSE
Si j'avais le temps, j'irais... (If I had time, I'd go to...)

PLUPERFECT TENSE (*"had done"*)

Very similar to the perfect tense, except you start with the *imperfect* tense of auxiliary verbs *avoir/être:*
e.g. j'*avais* joué, il *avait* fini, nous *étions* allés, elles s'*étaient* brossées les dents

SUBJUNCTIVE MOOD (expressing hope/fear/desire/wish etc.)

Remove *–ent* from the *ils* form of the present tense, add endings (*e/es/e/ions/iez/ent*)

e.g. ils jouent		jouer	finir	vendre
que	je	joue	finisse	vende
	tu	joues	finisses	vendes
	il/elle/on	joue	finisse	vende
	nous	jouions	finissions	vendions
	vous	jouiez	finissiez	vendiez
	ils/elles	jouent	finissent	vendent

IRREGULAR VERBS

être	(je sois)
avoir	(j'aie)
faire	(je fasse)
venir	(je vienne)
savoir	(je sache)
aller	(j'aille)
devoir	(je doive)
pouvoir	(je puisse)
vouloir	(je veuille)
falloir	(il faille)

ONLY USE THE SUBJUNCTIVE AFTER THESE PHRASES SUCH AS:

bien que	(although)	*vouloir que*	(to want that)
falloir que	(to be necessary that)	*préférer que*	(to prefer that)
désirer que	(to desire that)	*être important que, être essentiel que*	
penser que, croire que (negative only)		*être urgent que*	

e.g.	*je **veux que** tu le **fasses***	(I want you to do it – lit: I **want that** you **do** it)
	*je **préfère qu'**il **soit** sympa*	(I **prefer that** he **be** nice)
	*il **ne pense pas qu'**elle **soit** belle*	(He **doesn't think that** she **is** beautiful)
	***bien que** je n'**aie** pas l'argent*	(**although** I don't **have** the money)

PRONOUNS (SAYING "*it*")

Put *le*, *la* or *les* in front of the main verb

*je **le** mange*	I eat **it**
*je **l'**ai mangé*	I ate **it**
*je **le** mangeais*	I was eating **it**
*je vais **le** manger*	I'm going to eat **it**
*je **le** mangerai*	I will eat **it**
*je **le** mangerais*	I would eat **it**
*que je **le** mange*	that I eat **it** (subj.)

<u>If the pronoun is feminine or plural, you need to make the past participle agree:</u>

je ***les** ai mangé<u>s</u>*	I ate **them**
*je **l'**avais vu<u>e</u>*	I had seen **her**

Use *y* for 'there', and *en* for 'some/any':

j'**y** suis allé	I went **there**
je n'**en** ai pas	I don't have **any** [of them]

THE NEGATIVE

Put the negative around the main verb

ne...pas	not
ne...jamais	never
ne...rien	nothing
ne...personne	nobody
ne...que	only
ne...plus	no more/any more
ne...aucun	not a single one
ne...guère	hardly, barely
ne...ni...ni	neither...nor

EXAMPLES

*il **n'**a **jamais***	He **never** has
*il **n'**a **rien** bu*	He drank **nothing**
*il **ne** l'aura **pas***	He **won't** have it
*je **n'**ai vu **ni** l'un **ni** l'autre*	I didn**'t** see **neither** one **nor** the other

OPINION PHRASES

Don't just say *j'aime* or *je déteste*!

je pense que	I think that
je crois que	I believe that
à mon avis	in my opinion
selon moi	according to me
je trouve que	I find that
je préfère	I prefer
je dirais que	I would say that
je sais que	I know that
j'estime que	I reckon that
il me semble que	it seems to me that
il me paraît que	it appears to me that
en ce qui concerne X	as far as X is concerned

Don't forget – you should always justify your opinion using *parce que* or *car*!

COMPARATIVE & SUPERLATIVE

Replace "…" with any adjective

plus ... que	more ... than
moins ... que	less ... than
aussi ... que	as ... as
mieux	better
pire	worse
le/la plus ...	the most ...
le/la moins ...	the least ...
le/la mieux	the best (thing)
le/la pire	the worst (thing)

EXAMPLES

plus grand que	more tall/tall**er** than
moins grand que	less tall/short**er** than
aussi** grand **que	**as** tall **as**
*le **plus** grand*	the **most** tall/tall**est**
*la **moins** grande*	the **least** tall/short**est**

USING PROF3C

to ace the writing and speaking exams!

***P** ast tense*	Hier j'ai joué au foot
***R** easons (&)*	(J'adore le foot
***O** pinions*	parce que c'est top)
***F** uture tense*	Demain j'étudierai avec mes copains
***3** rd person*	Mes amis adorent le français
***C** onditional*	Je voudrais habiter en France à l'avenir

Use PROF3C to help you answer:

- 40/90 word essay (F)
- 90/150 word essay (H)*
- General conversation (F/H*)

* To have access to the highest marks for these questions, you should also try to add a subjunctive phrase, pronouns etc. too (everything from these two pages)

BEFORE, DURING, AFTER

Saying when something happens

***avant de** (+infinitive)*
before ___ing
avant de faire mes devoirs
(before doing my homework)

***après avoir** (+past participle)*
after having ____
après avoir fait mes devoirs
(after having done my homework)

***être en train de** (+infinitive)*
to be in the midst of ___ing
je suis en train de faire mes devoirs
I'm in the midst of doing my homework

EXAMPLE

Avant de sortir, ma mère m'avait demandé de ranger ma chambre *après avoir fait* mes devoirs, mais j'étais *en train de parler* sur mon portable

TOPIC 7: Global issues

L'environnement est **menacé**	The environment is **threatened**
par les émissions de dioxyde de carbone	by the emission of carbon dioxide
Les températures seront augmentées	Temperatures will rise
et **il y aura** un manque d'*eau potable*	and **there will be** a lack of *drinking water*
si **on ne protège pas** l'environnement	if **we don't protect** the environment
Il faut **réduire**, *réutiliser* et recycler	It is necessary to **reduce**, *reuse* and recycle
Je recycle le papier/carton/plastique/verre	I recycle paper/cardboard/plastic/glass
Je prends une douche *au lieu d'*un bain	**I take** a shower *instead of* a bath
J'éteins la lumière *quand je sors*	**I turn off** the light *when I go out*
Il faut aussi **baisser** le chauffage	It is also necessary **to turn down** the heating
avant de *quitter* la maison	**before** *leaving* the house
Ma mère **achète** *toujours* les produits bio	My mum *always* **buys** organic products
et mon père fait **du covoiturage**	and my dad does **carsharing**
Il va acheter **une voiture électrique**	He is going to buy **an electric car**
Je supporte **le commerce équitable**	I support **fair trade**
Je ne veux pas que les ouvriers soient *exploités*	**I don't want** the workers to be *exploited*
Récemment **j'ai participé** à *une manifestation*	Recently **I took part** in *a protest*
Je me suis inscrite à l'association WWF	**I subscribed** to the charity WWF
J'ai ramassé *les déchets* dans le parc	**I cleared up** *the rubbish* in the park
J'ai nettoyé le lac *près de chez moi*	I **cleaned** the lake *near to my house*
Au collège on va **trier** les déchets	At school we're going **to sort** the rubbish
On va organiser **une journée verte**	We're going to organise **a 'green' day**
On va planter **plus** de fleurs et d'arbres	We're going to plant **more** flowers and trees
J'ai la main verte	**I have green fingers**
Je vais **consommer** moins de *viande*	I'm going to **consume** less *meat*

TOPIC 8: Travel and tourism

D'habitude **je reste** en Angleterre *en été*	Normally **I stay** in England *during summer*
Il y a beaucoup **à faire** et *à visiter*	There is a lot **to do** and *to visit*
C'est ma destination **favorite/préférée**	It's my **favourite** destination
Je préfère **voyager** *en voiture*	I prefer **to travel** *by car*
parce que j'ai **toujours** *le mal de mer*	because I **always** get *seasick*
et **j'ai** *vraiment* **peur de** voler	and **I'm** *really* **scared of** flying
Quand j'étais petite *j'allais* en France	**When I was little** *I used to go* to France
Nous visitions Disneyland Paris	We used to visit Disneyland Paris
On **faisait la queue** depuis des heures	We **used to queue** for hours
pour voir **les manèges** et les princesses	to see **the rides** and the princesses
Je **ne** m'ennuyais **jamais**	I was **never** bored
Mes **dernières** vacances étaient terribles!	My **last** holiday was terrible!
On est allés en Californie **pendant un mois**	We went to California **for a month**
car mon père **a** toujours **voulu** *y* aller	because my dad **has** always **wanted** to go *there*
Mes frères **se sont chamaillés** tout le trajet	My brothers **bickered** the whole journey
La réceptionniste à l'hôtel était **impolie**	The hotel receptionist was **impolite**
et la chambre était très **sale**	and the room was very **dirty**
Le pire était de *perdre* mon passeport	**The worst thing** was *losing* my passport
Quel désastre!	What a disaster!
Si **je gagnais** la loterie	If **I won** the lottery
je voyagerais autour du monde	**I would travel around** the world
Je nagerais dans l'Océan Pacifique	**I would swim** in the Pacific Ocean
Je ferais de **la plongée**	I would go **scuba diving**
pour voir les poissons tropicaux	**in order to see** the tropical fish
Ce serait le pied!	**It would be awesome!**

TOPIC 9-10: My studies/Life at school or college

Mon collège **s'appelle** ...	My school **is called** ...
C'est un collège **mixte**	It's a **mixed/co-educational** school
Pour les jeunes **de** onze **à** dix-huit ans	For young people **from** 11 **to** 18 years old
Je trouve les profs sympa mais *un peu* strictes	**I find** the teachers nice but *a little* strict
Le collège est **grand** et *assez* moderne	The school is **large** and *quite* modern
Il y a **environ** treize cent *étudiants*	There are **approximately** 1300 *students*
Je porte une chemise blanche,	**I wear** a white shirt
une veste noire et un pantalon noir	a black blazer and black trousers
Je **n'aime pas du tout** mon uniforme scolaire	I **don't like** my school uniform **at all**
c'est **inconfortable** et *moche*	it's **uncomfortable** and *ugly*
Les cours **commencent** à neuf heures	Lessons **commence** at 9am
et **finissent** à trois heures **de l'après-midi**	and **finish** at three **in the afternoon**
Au collège **de mes rêves**	In the school **of my dreams**
il n'y aurait pas d'uniforme scolaire	**there wouldn't be a** school uniform
et le collège **finirait** à midi	and school **would finish** at noon
pour que je puisse bavarder l'après-midi	**so that I could** chat in the afternoon
J'étudie **l'anglais**, *les maths* et l'EPS	I study **English**, *Maths* and PE
mais **ma matière préférée**, c'est le français	but **my favourite subject** is French
parce que c'est **très** amusant	because it's **very** amusing
et le prof est **vraiment** sympa	and the teacher is **really** nice
Par contre je déteste les sciences	**On the other hand** I hate science
car c'est **trop** difficile et ennuyeux	because it's **too** difficult and boring
Bien que j'aie choisi la géographie	**Although** I've chosen Geography
je ne suis pas douée en ça	**I'm not gifted** at it
mais je **le** trouve *très* intéressant	but I find **it** *very* interesting

TOPIC 11-12: Education post-16/Job choices and career ambitions

Je **ne** vais **pas** aller au lycée	I am **not** going to go to college
Je vais étudier le français et l'allemand	**I'm going to study** French and German
Je pense que les langues sont importantes	I think that languages are important
pour trouver **un bon emploi**	to find **a good job**
Pour mon stage j'ai travaillé dans un bureau	**For work experience** I worked in an office
Ce n'était pas mal mais *c'était* ennuyeux	**It wasn't** bad but *it was* boring
Je crois que je voudrais *travailler* dehors	**I believe that** I'd like *to work* outside
parce que **j'aime** être *en plein air*	because **I like** to be *in the open air*
Je voudrais **devenir** vétérinaire	I would like **to become** a vet
D'abord **je dois** aller à l'université	First **I have to** go to university
parce qu'**il faut avoir** un diplôme	because **you have to have** a degree
Je sais que je dois travailler *dur*	**I know that** I must work *hard*
mais **je vais réussir** dans la vie	but **I'm going to succeed** in life
et je serai **fier/fière** de moi	and I will be **proud** of myself
Ma mère est **institutrice**	My mum is **a primary school teacher**
et mon père travaille **dans un magasin**	and my dad works **in a shop**
Ma mère trouve ça **enrichissant**	My mum finds it **rewarding**
et mon père adore **aider** les clients	and my dad loves **to help** the customers
En ce moment j'ai **un petit boulot**	At the moment I have **a part-time job**
Je fais du baby-sitting le soir	**I do babysitting** in the evenings
Ce n'est pas bien payé	It's not well paid
mais je veux **gagner** mon *propre* argent	but I want **to earn** my *own* money
Un jour je voudrais travailler *avec les enfants*	**One day** I'd like to work *with children*
après avoir travaillé *comme vétérinaire*	**after having** worked *as a vet*
mais **je ne sais pas** quand. *On verra*.	but **I don't know** when. *We will see*.

SPANISH

Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create flashcards with the Spanish on one side and the English translation on the other. Either test yourself or get someone else to test you. When you feel confident, write a short paragraph about each topic using the vocabulary you have revised.

Módulo 1 – ¡Desconéctate!

Learn the phrases below using LOOK, COVER, WRITE, CHECK!

Durante el verano ***hago*** artes marciales.	During the summer *I* ***do*** martial arts.
(No) *me* **gusta** tomar el sol.	*I* (don't) ***like*** sunbathing.
(A ella) le **mola** ver películas.	*She* ***likes*** watching films.
Tengo seis semanas de vacaciones en verano	*I* ***have*** six weeks holiday in summer
Prefiero ir a España.	*I* ***prefer*** to go to Spain.
Mi padre ***prefiere*** *alojarse* en un hotel.	*My dad* ***prefers*** to stay in a hotel.
Fui de vacaciones a Francia	*I* ***went*** on holiday to France.
El invierno pasado ***fuimos*** de vacaciones a Alemania.	Last winter *we* ***went*** on holiday to Germany.
Fui con *mi* familia	*I* ***went*** with *my* family
Viajé en avión.	*I* ***travelled*** by plane.
Me alojé en un camping.	*I* ***stayed*** on a campsite.
El primer día ***saqué*** muchas fotos.	On the first day *I* ***took*** a lot of photos.
Lo mejor **fue** cuando ***visité*** la Sagrada Familia	The best thing **was** when *I* ***visited*** the Sagrada Familia.
Lo peor **fue** cuando ***perdí*** *mi* móvil.	The worst thing **was** when *I* ***lost*** *my* phone.
Lo **pasé** fenomenal	It **was** amazing!
Fue horroroso porque ***vomité*** en una montaña rusa.	It was horrific because *I* ***vomited*** on a rollercoaster.
Quiero hablar con el director porque el aire acondicionado no **funciona**.	*I* ***want*** to talk to the manager because the air conditioning does not **work**.
La habitación **está** sucia	The room **is** dirty

Adapting the phrases for your own work:

Underlined	This is additional information that can be changed for what you want to say.
Bold	These are verbs which can be changed for different people or tenses.
Italic	These words must be changed if you are talking about a different person.

Challenge:
When learning the vocabulary, practise using other tenses, changing details, and talking about other people.

Módulo 1 – ¡Desconéctate!

Learn the verbs below using LOOK, COVER, WRITE, CHECK!

Yo Form	PRESENT	PRETERITE	IMPERFECT	NEAR FUTURE
HACER (to do)	hago	hice	hacía	voy a hacer
IR (to go)	voy	fui	iba	voy a ir
ALOJARSE (to stay)	me alojo	me alojé	me alojaba	voy a alojarme
VIAJAR (to travel)	viajo	viajé	viajaba	voy a viajar
VISITAR (to visit)	visito	visité	visitaba	voy a visitar
TENER (to have)	tengo	tuve	tenía	voy a tener
SACAR (to take)	saco	saqué	sacaba	voy a sacar

My Progress with this topic:

Date	F Score	H Score	Date	F Score	H Score

Expand and adapt your vocabulary:

My independent vocabulary:

Módulo 2 – Mi vida en el insti

Learn the phrases below using LOOK, COVER, WRITE, CHECK!

Estudio inglés y español.	***I study*** English and Spanish.
(No) ***me*** **interesa** la tecnología.	***I am*** (not) *interested* in technology.
(No) ***le*** **interesan** las matemáticas.	***He/she is*** (not) *interested* in maths.
Prefiero la música porque ***es*** menos aburrida que el dibujo.	*I* ***prefer*** music because *it* ***is*** less boring than art.
Odio las ciencias porque ***son*** más difíciles que la geografía.	*I* ***hate*** science because *it* ***is*** harder than geography.
Mi profe ***crea*** un buen ambiente.	My teacher **creates** a nice atmosphere.
Aprendo mucho porque *mi* profe **explica** bien.	*I* ***learn*** a lot because *my* teacher **explains** well.
Tenemos que llevar un uniforme.	*We* ***have*** to wear a uniform.
Llevo una chaqueta negra y una corbata azul.	*I* ***wear*** a black blazer and a blue tie.
El uniforme **mejora** la disciplina.	The uniform **improves** discipline.
Me **gusta** porque las diferencias económicas no **son** tan obvias.	I **like** it because financial differences **are** not as obvious.
En *mi* insti hay una piscina grande y nueva.	In *my* school there is a big, new pool.
En *mi* escuela primaria no había una biblioteca.	In *my* primary school there was no library.
Lo bueno **es** que **hay** un gimnasio bien equipado.	The good thing **is** that there **is** a well-equipped gym.
Lo peor **es** que no **se debe** llevar piercings.	The bad thing **is** you **must** not wear piercings.
Tampoco **se permiten** los móviles en clase.	Mobile phones **are** not allowed in class either.
Vamos **a participar** en un intercambio a Zaragoza.	*We* ***are*** **going to participate** in an exchange to Zaragoza.
Soy miembro del club de judo desde hace tres años.	*I* have been a member of judo club for 3 years.

Adapting the phrases for your own work:

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Challenge:
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Módulo 2 – Mi vida en el insti

Learn the verbs below using LOOK, COVER, WRITE, CHECK!

Yo Form	PRESENT	PRETERITE	IMPERFECT	NEAR FUTURE
ESTUDIAR (to study)	estudio	estudié	estudiaba	voy a estudiar
LLEVAR (to wear)	llevo	llevé	llevaba	voy a llevar
INTERESAR (to be interested in)	me interesa(n)	me interesó/ interesaron	me interesaba(n)	me va(n) a interesar
Useful verbs for describing school				
THERE IS/ARE	hay	hubo	había	habrá
IT IS/ARE	es/son	fue/fueron	era/eran	será/serán
IT HAS	tiene	tuvo	tenía	tendrá

My Progress with this topic:

Date	F Score	H Score	Date	F Score	H Score

Expand and adapt your vocabulary:

My independent vocabulary:

Módulo 4 – Intereses e influencias

Learn the phrases below using LOOK, COVER, WRITE, CHECK!

Después del insti ***juego*** al futbolín con *mis* amigos.	After school *I* ***play*** table football with *my* friends.
Los fines de semana *vamos* a la pista de hielo.	At the weekend *we go* to the ice rink.
Normalmente ***gasto*** *mi* paga en libros.	Normally *I* ***spend*** *my* pocket money on books.
La semana pasada ***jugué*** al baloncesto.	Last weekend *I* ***played*** basketball.
Mi hermana ***hizo*** equitación.	*My sister* ***went*** horse riding.
Me **molan** programas de deportes.	*I* ***like*** sports programmes.
Sin embargo *mi madre le* **encantan** documentales.	However *my mum* ***loves*** documentaries.
No ***soy*** teleadicto porque no ***veo*** más de dos horas al día.	*I* ***am*** not addicted to TV because *I* ***don't*** **watch** more than two hours a day.
En mi tiempo libre *suelo* hacer deporte.	In my free time *I usually* do sports.
Solemos ir al cine y dar un paseo.	*We usually* go to the cinema and go for a walk.
Cuando *era* más joven *jugaba* al tenis de vez en cuando	When *I* was younger *I* played tennis from time to time.
Mi hermana solía jugar al voleibol pero ahora *hace* natación.	*My sister* used to play volleyball but now *she swims*
Esta semana *he* visto dos películas.	This week *I have* watched two films. .
Prefiero ir al cine porque el ambiente **es** mejor.	*I* ***prefer*** to go to the cinema because the atmosphere **is** better.
Rafa Nadal **es** *mi* modelo a seguir porque **tiene** mucho éxito.	Rafa Nadal **is** *my* role model because he **is** very successful.
Taylor Swift **es** *mi* modelo a seguir porque **usa** su fama para ayudar a otros.	Taylor Swift **is** *my* role model because she **uses** her fame to help others.

Adapting the phrases for your own work:

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Italic	These words must be changed if you are talking about a different person.

Challenge:
When learning the vocabulary, practise using other tenses, changing details, and talking about other people.

Módulo 4 – Intereses e influencias

Learn the verbs below using LOOK, COVER, WRITE, CHECK!

Yo Form	PRESENT	IMPERFECT	PERFECT	FUTURE
JUGAR (to play)	juego	jugaba	he jugado	voy a jugar
HACER (to do)	hago	hacía	he hecho	voy a hacer
VER (to watch)	veo	veía	he visto	voy a ver
SOLER (to tend to)	suelo	solía		
PREFERIR (to prefer)	prefiero	prefería		
GASTAR (to spend money)	gasto	gastaba	he gastado	voy a gastar
SER (to be)	soy	era	he sido	voy a ser

My Progress with this topic:

Date	F Score	H Score	Date	F Score	H Score

Expand and adapt your vocabulary:

My independent vocabulary:

Módulo 5 – Ciudades

Learn the phrases below using LOOK, COVER, WRITE, CHECK!

Vivo en Londres. Está en el sur de Inglaterra.	*I* ***live*** in London. It is in the south of England.
Es una ciudad muy grande y moderna.	It **is** a very big and modern city.
En *mi* ciudad **hay** unos museos y muchas tiendas.	In *my* town there **are** some museums and lots of shops.
Hace dos años no había ni mercado ni bolera.	Two years ago there was no market or bowling alley.
Me **encanta** dónde ***vivo*** porque siempre **hay** mucho que hacer.	*I* ***love*** where *I* ***live*** because there **is** always lots to do.
En la panadería se puede comprar pan.	In the bakery you can buy bread.
El banco **abre** a las nueve por la mañana y **cierra** a las cinco por la tarde.	The bank **opens** at 9 in the morning and **closes** at 5 in the afternoon.
Para ir a la plaza mayor sigue todo recto, pasa el puente y toma la tercera calle a la izquierda.	To get to the main square, go straight ahead, pass the bridge, and take the third street on the left.
¿Me puede ayudar? ¿Cuánto *cuesta* el llavero?	Can you help me? How much does the keyring *cost*?
Mi pueblo está situado al lado del río.	*My* town is situated next to the river.
El clima **es** frío y **llueve** mucho.	The climate **is** cold and it **rains** a lot.
Mañana ***visitaré*** la catedral en el centro de la ciudad.	Tomorrow ***I*** **will visit** the cathedral in the centre of the city.
Mi hermano ***nadará*** en el mar.	*My brother* **will swim** in the sea.
Si hace buen tiempo, ***iremos*** a la playa.	If the weather is nice, *we* **will go** to the beach.
Si hace mal tiempo, no ***harán*** una excursión.	If the weather is bad, *they* **will not do** a trip.
Lo mejor de *mi* ciudad **es** que el transporte público **es** muy bueno.	The best thing about *my* city **is** that the public transport **is** very good.
Lo peor **es** que **hay** pocos espacios verdes.	The worst thing **is** that there **are** few green spaces.

Adapting the phrases for your own work:

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Challenge:
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Módulo 5 - Ciudades

Learn the verbs below using LOOK, COVER, WRITE, CHECK!

Yo Form	PRESENT	PRETERITE	IMPERFECT	FUTURE
VIVIR (to live)	vivo	viví	vivía	viviré
VISITAR (to visit)	visito	visité	visitaba	visitaré
IR (to go)	voy	fui	iba	iré
HACER (to do)	hago	hice	hacía	haré
THERE IS/ARE	hay	hubo	había	habrá
IT IS THEY ARE	es son	fue fueron	era eran	será serán
IT HAS THEY HAVE	tiene tienen	tuvo tuvieron	tenía tenían	tendrá tendrán

My Progress with this topic:

Date	F Score	H Score	Date	F Score	H Score

Expand and adapt your vocabulary:

My independent vocabulary:

Módulo 6 – De Costumbre.

Learn the phrases below using LOOK, COVER, WRITE, CHECK!

Desayuno a las ocho.	*I* ***have*** **breakfast** at 8 o'clock.
Cuando *era* más pequeño *desayunaba* cereales todos los días.	When *I* was younger *I used* to eat cereal for breakfast every day.
Cenamos muy tarde por la noche.	*We* ***eat*** dinner very late at night.
A las seis *me* ***levanto*** y *me* ***ducho***.	At 6 o'clock *I* ***get up*** and *I* ***shower***.
A las siete ***salgo*** de casa.	At 7 o'clock *I* ***leave*** the house.
No *me* ***encuentro*** bien. *Me* ***duele*** la garganta.	*I* ***don't feel*** well. *My* throat **hurts**.
Estoy enfermo hoy. ***Tengo*** un resfriado.	*I* ***am*** unwell today. *I* ***have*** a cold.
Normalmente *los españoles* ***comen*** mucha fruta.	Normally *the Spanish* ***eat*** lots of fruit.
Mi plato favorito **es** la paella porque *me* ***encanta*** arroz.	*My* favourite dish **is** paella because *I* ***love*** rice.
Me ***gustaría*** probar tortilla española.	*I* ***would*** **love** to try Spanish omelette.
Ayer ***celebramos*** el cumpleaños de *mi* padre.	Yesterday *we* ***celebrated*** *my* dad's birthday.
Comimos en un restaurante caro y ***abrió*** *sus* regalos.	*We* ***ate*** in an expensive restaurant and *he* ***opened*** his presents.
Soy vegetariano/a. No ***como*** carne ni pescado.	*I* ***am*** a vegetarian. *I* ***don't*** **eat** meat or fish.
Soy alérgico al gluten.	*I* ***am*** allergic to gluten.
Vamos a celebrar un día especial con toda la familia.	*We* ***are*** **going to celebrate** a special day with the whole family.
Mi cantante favorito **es** Ed Sheeran.	*My* favourite singer **is** Ed Sheeran.
El año que viene ***voy*** **a** **ir** a un concierto de Ed Sheeran.	Next year ***I am*** **going to** **go** to an Ed Sheeran concert.
¡***Cantaremos*** y ***bailaremos***!	*We* ***will*** **sing** and **dance**.

Adapting the phrases for your own work:

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Challenge:
When learning the vocabulary, practise using other tenses, changing details, and talking about other people.

Módulo 6 – De Costumbre.

Learn the verbs below using LOOK, COVER, WRITE, CHECK!

Yo Form	PRESENT	PRETERITE	IMPERFECT	NEAR FUTURE
Desayunar (To eat breakfast)	desayuno	desayuné	desayunaba	voy a desayunar
Comer (To eat (lunch))	como	comí	comía	voy a comer
Cenar (To eat dinner)	ceno	cené	cenaba	voy a cenar
Doler (to hurt)	me duele	me dolió	me dolía	me va a doler
Beber (to drink)	bebo	bebí	bebía	voy a beber
Celebrar (to celebrate)	celebro	celebré	celebraba	voy a celebrar
Bailar (to dance)	bailo	bailé	bailaba	voy a bailar

My Progress with this topic:

Date	F Score	H Score	Date	F Score	H Score

Expand and adapt your vocabulary:

My independent vocabulary:

Módulo 7 – ¡A Currar!

Learn the phrases below using LOOK, COVER, WRITE, CHECK!

Soy cocinero y ***trabajo*** en un restaurante.	***I am*** a chef and I work in a restaurant
Trabajo como enfermero en un hospital.	***I work*** as a nurse in a hospital
Soy una persona muy creativa	***I am*** a very creative person
Es un trabajo exigente.	**It is** a demanding job
Me **encanta** *mi* trabajo porque **es** muy variado.	***I love*** *my* job because it is very varied
Para ganar dinero ***reparto*** periódicos.	To earn money, *I* ***deliver*** **newspapers**
No *tengo* un trabjao a tiempo parcial pero en casa ***paso*** la aspiradora	***I don't have*** a part-time job but at home ***I vacuum***.
Gano cinco euros a la hora	***I earn*** five euros an hour
Suelo cortar el césped	***I usually*** *cut* the grass
Hice *mis* practices laborales en la empresa de *mi* madre.	***I did*** my work experience *in my mum's* company
Aprendí muchas habilidades nuevas.	***I learnt*** a lot of new skills
Domino el inglés *y* ***hablo*** un poco de español.	***I am fluent*** in English and ***I speak*** a bit of Spanish
Aprender un idioma te abre la mente.	Learning a language opens your mind
He trabajado en una oficina y *he* estudiado español.	*I have* worked in an office and I *have* studied Spanish
En el futuro ***quiero*** vivir en Colombia.	In the future ***I want*** to live in Colombia
Tengo la intención de casar*me* y tener hijos.	***I plan*** to get married and have children
Me gustaría viajar por el mundo	*I would* like to travel the world
Espero ser feliz.	***I hope*** to be happy

Adapting the phrases for your own work:

Underlined	This is additional information that can be changed for what you want to say.
Bold	These are verbs which can be changed for different people or tenses.
Italic	These words must be changed if you are talking about a different person.

Challenge:
When learning the vocabulary, practise using other tenses, changing details, and talking about other people.

Módulo 1 – ¡A Currar!

Learn the verbs below using LOOK, COVER, WRITE, CHECK!

Yo Form	PRESENT	PRETERITE	IMPERFECT	NEAR FUTURE
SER to be	soy	fui	era	voy a ser
TRABAJAR to work	trabajo	trabajé	trabajaba	voy a trabajar
HACER to do	hago	hice	hacía	voy a hacer
HABLAR to speak	hablo	hablé	hablaba	voy a hablar
DOMINAR to speak fluently	domino	dominé	dominaba	voy a dominar
GANAR to earn	gano	gané	ganaba	voy a ganar
SOLER to use to	suelo		solía	

My Progress with this topic:

Date	F Score	H Score	Date	F Score	H Score

Expand and adapt your vocabulary:

My independent vocabulary:

Módulo 8 – Hacia un mundo mejor.

Learn the phrases below using LOOK, COVER, WRITE, CHECK!

Vivo en una casa moderna.	*I* **live** in a modern house.
***Le* gustaría vivir** en un piso cómodo.	*He/She* **would like to live** in a comfortable flat
Nuestro piso **está** en la tercera planta.	*Our* flat **is** on the third floor.
Para cuidar el medio ambiente ***vamos*** en bibi.	To protect the environment *we* ***travel*** by bike.
También ***separamos*** la basura.	*We* also ***separate*** the rubbish.
En el futuro *reciclaremos* todo lo posible.	In the future *we will recycle* everything possible.
Creo que ***llevo*** una dieta sana.	I think *I* ***lead*** a healthy diet.
No ***como*** muchos dulces.	*I don't* ***eat*** a lot of sweets.
Debería comer más verduras porque contienen mucha fibra.	*I* ***should*** *eat* more vegetables because they contain a lot of fibre.
Para *mí* el problema más serio **es** la drogadicción.	For *me* the most serious problem **is** drug addition.
Me preocupa el desemplo porque **hay** muchas personas sin hogar.	Unemployment **worries *me*** because **there are** lots of people without a home.
La destrucción de los bosques **es** muy preocupante.	The destruction of forests **is** very worrying.
Se debería plantar más árboles.	One should plant more trees.
Hay que ahorrar agua.	You must save water.
No ***tomo*** drogas porque es peligroso.	*I don't* ***take*** drugs because it is dangerous.
Mis amigos ***beben*** alcohol porque *les* **relaja**	My friends ***drink*** alcohol because it **relaxes** them.
Los Juegos Olimpicos **elevan** el orgullo nacional.	The Olympic Games **raise** national pride.
Me encanta la Copa Mundial de Fútbol porque **une** comunidades.	*I* ***love*** the Football World Cup because it **unites** communities.

Adapting the phrases for your own work:

Underlined	This is additional information that can be changed for what you want to say.
Bold	These are verbs which can be changed for different people or tenses.
Italic	These words must be changed if you are talking about a different person.

Challenge:
When learning the vocabulary, practise using other tenses, changing details, and talking about other people.

Módulo 8 – Hacia un mundo mejor.

Learn the verbs below using LOOK, COVER, WRITE, CHECK!

Yo Form	PRESENT	PRETERITE	IMPERFECT	NEAR FUTURE
Vivir (To live)	vivo	viví	vivía	voy a vivir
Reciclar (To recycle)	reciclo	reciclé	reciclaba	voy a reciclar
Llevar (To lead)	llevo	llevé	llevaba	voy a llevar
Comer (to eat)	como	comí	comía	voy a comer
Tomar (to take)	tomo	tomé	tomaba	voy a tomar
Beber (to drink)	bebo	bebí	bebía	voy a beber
preocupar (to worry)	me preocupa	me preocupó	me preocupaba	va(n) a preocuparme

My Progress with this topic:

Date	F Score	H Score	Date	F Score	H Score

Expand and adapt your vocabulary:

My independent vocabulary:

DRAMA

Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create a mind map for each topic that contains key facts and images. Once you have created a mind-map you should put it away and try to recreate it from memory, then look at your original mind-map and add what you have missed.

Knowledge Organiser

DRAMA

GCSE

A: Know your Drama course

Component 1 Understand Drama	Component 2 Devising Drama	Component 3 Texts In Practice
What is assessed?	**What is assessed?**	**What is assessed?**
Knowledge and understanding of drama and theatre. Study of a set text Blood Brother. Analysis and evaluation of the work of live theatre makers.	Process of creating devised drama. Performance of devised drama (as performer or designer.) Analysis and evaluation of own work (devising log)	Performance of two extracts from one play. Free choice of play but it must contrast with Blood Brothers. Can be a monologue.
How it's assessed	**How it's assessed**	**How it's assessed**
Written exam 1hr 45mins Open book (clean text) 80 marks 40% of GCSE Marked by AQA **Section A:** Theatre Roles and terminology (4) **Section B:** Study of Blood Brothers. 4 questions on given extract from the play (44) **Section C** Live theatre production: one question on the work of theatre makers in a single live theatre production.	Devising log (60 marks) Devised performance (20 marks) 80 marks in total 40% of the GCSE Marked by teachers and moderated by AQA	Performance of extract 2 (20 marks) Performance of extract 2 (20 marks) 40 marks in total 20% of the GCSE Marked by a visiting examiner.

B: Features of a play

Performance Style:	the way in which something is performed. A realistic performance has a believable or life-like performance style, or a comedy might feature multi-role or physical comedy as its performance style.
Character:	a person or other being (such as a talking animal) in a play, novel or film.
Character list:	a list of the characters that appear in the play. Some lists include a short description of the characters, such as their age or occupation.
Genre:	a category of drama such as historical drama or musical.
Stage directions:	descriptions of aspects of the play not conveyed by the actors' speeches. These may include a description of what the set or characters look like, their actions and how certain lines are spoken. It may also note pauses, silences or beats to indicate when characters are not speaking.
Monologue:	a long speech spoken by one character.
Plot:	the main events of the play presented in a particular sequence by the playwright.
Dramatic climax:	the moment of greatest dramatic tension in a play.
Resolution:	the end of the plot when the problems of the play are resolved
Dialogue:	what the characters say.

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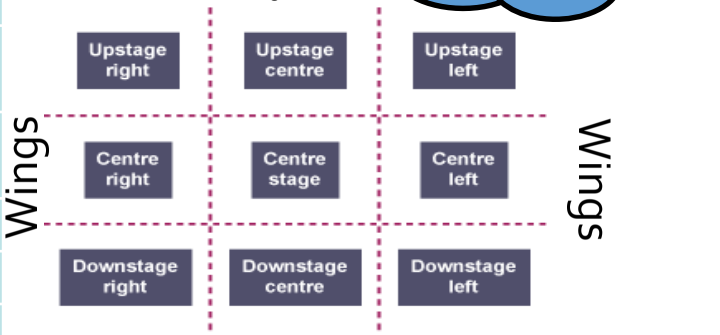
DRAMA GCSE

C: Terminology and areas of the stage

Realistic	A performance style that is life like or naturalistic.
Multi role	When an actor plays more than one character in a performance.
Physical comedy	The use of (over-exaggerated) body movement, gesture and facial expression to create comedy.
Pause, silence, beat	A stop in the script. Often used for the dramatic effect of creating tension or to mark an important moment in the performance.
Plot	The main events of the play.
Tension	A sense of anticipation or anxiety.
Playwright	The person responsible for writing a play.
Act	A play is divided into Acts
Scene	An Act is divided into scenes

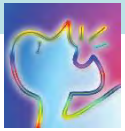
Backstage

Remember: The areas of the stage are always from the performer's point of view as they are standing on the stage.



D: Vocal and Physical Skills

VOCAL SKILLS



Accent	A way of pronouncing a language (country, area or social class)
Volume	How loud or quietly someone speaks
Pitch	How high or low someone speaks
Tone	How something is said – sarcastic tone, happy tone, sad tone
Timing	Use of pause or silence. The rhythm of the way you speak
Pace	How fast or slow someone speaks
Intonation	The rise and fall of the voice
Phrasing	How something is said for dramatic effect (pause, emphasise words)
Emotional range	Happy, sad, scared, shy, nervous (linked with tone)
Delivery of lines	Working with other actors (linked with timing) action - reaction

PHYSICAL SKILLS

Posture	How someone stands and/or sits (slouched, upright)
Gesture	How someone uses their hands and arms when they are speaking
Facial expression	How the face is used to communicate feeling. (EG – open mouthed, scrunched eyes, pouted lips.)
Movement	How someone moves around the stage space. This also includes physical theatre movement (dance, unison movement.)
Gait	How someone walks (stride, leap, shuffle.)

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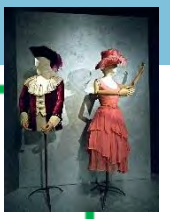
GCSE

E: Theatre Roles and responsibilities

THEATRE MAKER:
PLAYWRIGHT
WHAT THEY DO:
Writing the script of the play including the dialogue and stage directions.

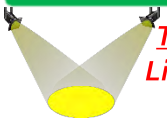
Theatre Maker:
Understudy

What they do:
Learn a part including lines and movements, so they are able to take over from someone when needed.



THEATRE MAKER:
Costume Designer

WHAT THEY DO:
Design what the actors wear on stage. Making sure that costumes are appropriate for the style and period of the piece.



Theatre Maker:
Lighting designer

What they do:
Design the lighting states and effects that will be used in a performance. Understanding the technical capabilities of the theatre and creating a lighting plot.

THEATRE MAKER:
SOUND DESIGNER
WHAT THEY DO:
Designing the sound required for the performance, which may include music and sound effects. Considering if microphones are needed and creating a sound plot.

Theatre Maker:
Technician

What they do:
Operating the technical equipment (lighting and sound boards) during a performance.

THEATRE MAKER:
Stage Manager

WHAT THEY DO:
Running the backstage elements of the play and supervising backstage crew. Organises the rehearsal schedule and keeps a list of props and other technical needs. Creating a prompt book and calling the cues for the performance.

THEATRE MAKER:
PERFORMER

WHAT THEY DO:
Appearing in a production, for example by acting, singing, dancing or singing. Creating a performance or assuming a role on stage in front of an audience.

THEATRE MAKER:
Theatre Manager

WHAT THEY DO:
Running the theatre building, including overseeing the Front of House staff and the box office staff who sell tickets.

Theatre Maker:
Director

What they do:
Overseeing the creative aspects of the production. Developing an idea for the production. Liaising with designers, rehearses the actors and ensures all technical elements are ready. Giving notes to the actors to help them improve their performance and agreeing the blocking of the actors.

Theatre Maker:
Set Designer

What they do:
Designing the set of the play. Providing sketches and other design materials before overseeing the creation of the set.

THEATRE MAKER:
Puppet Designer

WHAT THEY DO:
Designing the puppets for a production, taking into account the style of puppets and how they will be operated.

Knowledge Organiser

DRAMA

GCSE

Section F: Staging Configurations

Sightline: the view of the audience.

Backdrop: a large painted cloth hung as part of the scenery.

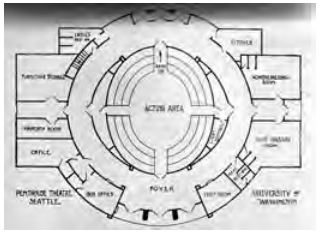
Theatre In The Round

ADVANTAGES:

- Directors and actors often find this a very **dynamic,** interesting space because the audience is close to the stage.
- The actors enter and exit through the audience, which can make the audience feel more engaged.
- Unlike spaces such as proscenium arch theatre, there is no easily achieved **'fourth wall'** separating the audience from the acting area.

DISADVANTAGES:

- Designers cannot use **backdrops** or flats, as this would block the audience's view.
- Stage furniture has to be chosen very carefully so that **sightlines** are not blocked.
- Actors have to be carefully blocked so that no section of the audience misses important pieces of action or facial expressions for too long.



A staging configuration where the audience are seated around all sides of the stage.

ADVANTAGES:

- Stage pictures are easy to create as the audience look at the stage from roughly the same angle.
- Backdrops and large scenery can be used without blocking sightlines.
- There may be **fly space and wing space** for storing scenery.
- The frame around the stage adds to the effect of a fourth wall, giving the effect of a self contained world on the stage.

DISADVANTAGES:

- Some audience members may feel distant from the stage.
- The **auditorium** could feel very formal and rigid.
- Audience interaction may be more difficult.

Fourth Wall: an imaginary wall between the audience and the actors giving the impression that the actors are unaware they are being watched.

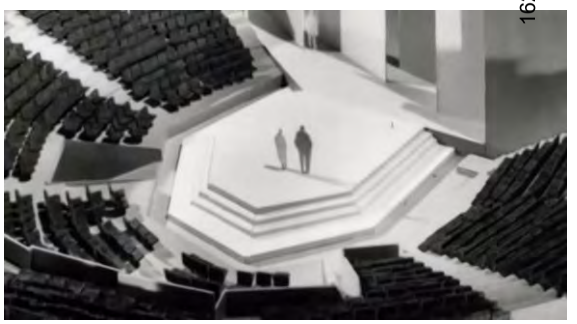
Proscenium Arch

This is a common form of theatre for larger theatres or opera houses. The proscenium refers to the arch around the stage which emphasises that the audience is seeing the same stage picture. The area in front of the arch is called an apron.

Thrust Stage

DISADVANTAGES:

- Sightlines for audience on the extreme sides can be obstructed.
- The audience on the left and right sides of the auditorium have each other in their view.
- **Box sets** cannot be used.



A thrust stage protrudes into the auditorium with the audience on three sides. This is one of the oldest theatre types of stage.

ADVANTAGES:

- ✓ Combine some of the advantages of proscenium arch and theatre in the round stages.
- ✓ As there is no audience on one side of the stage, backdrops, flats and large scenery can be used.
- ✓ The audience may feel closer to the stage.

Auditorium: the part of the theatre where the audience sits.

Knowledge Organiser

DRAMA

GCSE

Section F: Staging Configurations

Fly Space: area above the stage where scenery may be stored and lowered to the stage.

Traverse Stage

ADVANTAGES:
- The audience feel very close to the stage as there are two long front rows.
- They can see the reactions of the other side of the audience facing them, which can work well for audience interaction.
- Sometimes, extreme ends of the stage can be used to create extra acting areas.

On a traverse stage, the acting area is a long, central space with the audience seated on either side facing each other.

Audience

STAGE

Audience

DISADVANTAGES:
- Big pieces of set, scenery or backdrops can block sightlines.
- The acting area is long and thin, which can make some blocking challenging.
- Actors must be aware of making themselves visible to both sides of the audience.
- Lighting for traverse stages needs to be arranged carefully to avoid shining light in to the audience's eyes or light spilling on to them unnecessarily.

Promenade

To promenade means 'to walk' and promenade theatre is when the audience stand or follow the actors through the performance. This may occur in a conventional theatre space or it may be designed for a **site specific** show when an unconventional space is used for the production.

ADVANTAGES:
- ✓ This is an interactive and exciting type of theatre where the audience feel very involved.

End on Staging

End on staging is similar to a proscenium arch stage, as the audience is seated along one end of the stage directly facing it. However, it does not have the large proscenium frame.

ADVANTAGES:
- ✓ The audience all have a similar view.
- ✓ Stage pictures are easy to create.
- ✓ Large backdrops or projections may be used.

DISADVANTAGES:
- Audience members on the back rows may feel very distant from the stage.
- It doesn't have the frame of the proscenium arch theatre, which can enhance some types of theatre.
- It may not have the wing and fly areas typical of proscenium arch theatre.

DISADVANTAGES:
- The audience may find moving about the space difficult or get tired standing.
- Actors and crew need to be skilled at moving the audience along and controlling their focus.
- There can be health and safety risks.

Wing Space: areas to the side of the stage. This is where actors wait, unseen by the audience, to enter the stage. Where props are stored.

Knowledge Organiser

DRAMA GCSE

Catharsis – when the events of a play make the audience feel strong emotions like fear or sadness and they get it out, creating an emotional release.

Section G: Form and Genre

FORM *– is the* ***type*** *of drama (decided by the playwright).*
GENRE *– refers to what sort of* ***story a performance tells.***

EXAMPLES OF FORM:

FORM	CONVENTIONS
PLAY	Dialogue (either scripted or improvised) between several characters.
MUSICAL	Some dialogue between characters but also some singing and dancing.
MIME	The performer(s) should remain silent and convey meaning through movement and facial expression.
MONOLOGUE	One performer who talks directly to the audience.

Sub-genres of comedy:

FARCE – improbable situations and physical humour entertain the audience.

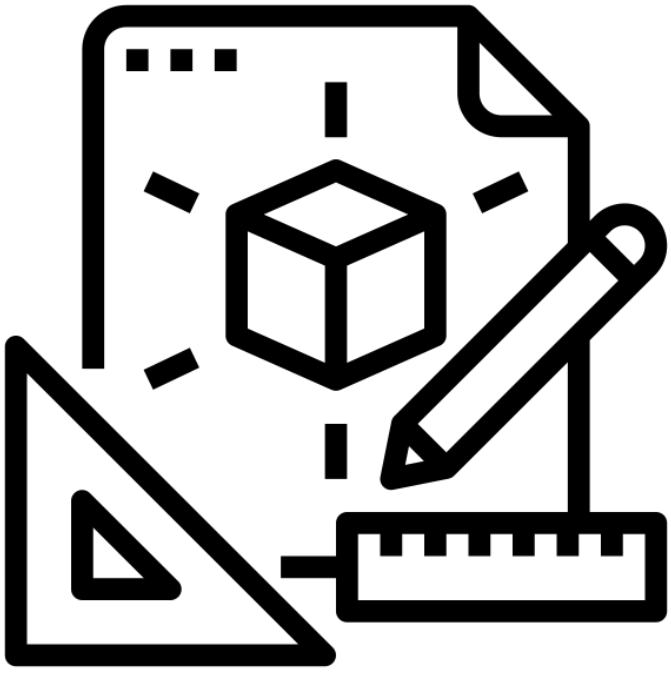
PARODY – makes fun of an existing piece of work (eg – another play) by imitating it.

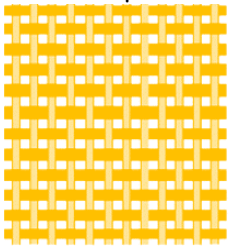
SATIRE – mocks something serious (eg- politics) by highlighting how ridiculous it is.

GENRE	CHARACTERISTICS OF THAT GENRE
TRAGEDY ***Sophocles*** ***Shakespeare***	- Developed by Ancient Greeks - Serious plot - Sad ending – death of one or more main characters - Aim to produce 'catharsis' for the audience - Most modern tragedies have characters from more normal backgrounds, making it easier for the audience to relate to them. - TRAGICOMEDY contains both comedy and humour.
DOCUMENTARY THEATRE (DOCUDRAMA) ***Recorded Delivery theatre company***	- Takes stories from real life and brings them to the stage - Modern genre of theatre - Plot, character and script taken from factual sources like newspapers, letters and interviews. - Real life events portrayed in an authentic way. - Performers can repeat source material word for word. This is known as VERBATIM THEATRE. A popular way to deliver strong message about topical issues.
MELODRAMA ***Pantomime***	- Unbelievable plots - Extreme emotions and exaggerated acting - Stories about love with a happy ending - Music features heavily in Melodrama but doesn't contribute to the plot. Incidental music is played in the background to add to the overall mood.
COMEDY ***Shakespeare***	- Also date back to Ancient Greece - Light hearted plot, witty dialogue - Happy ending for the main characters - Shakespeare used techniques such as wordplay and mistaken identity to create comedy - Visual comedy – characters' appearance, actions and use of props create humour as well as their words.

DESIGN TECHNOLOGY

Choose and complete as many of the challenges on the next page as you can.



1. Design a new PE Sports Top for school. 	2. Product analysis. Find an image of a dress or trousers in 19th Century and 21st Century. Compare them, how has fashion changed? Why has it changed? 	3. Create a company profile on one of the following companies: Primark Zara Under Armour 	4. Up cycle an old T-Shirt **(MAKE SURE YOU ASK PERMISSION FIRST!!)** 	5. Participate in an online design museum virtual tour. Create an info poster about it. 
6. Make a story board showing how cotton goes from fibre to fabric. 	7. Make and decorate a letter for your room. 	8. List as many textiles products in your home that you can find and name the fabric that it is made from. 	9. Design and fully annotate an idea for a children's soft toy. 	10. Design a logo for a pet clothing brand. 
11. Imagine your dream bedroom. Create a mood board of inspirational imagery, furniture, textures, patterns. 	12. Design a band T-shirt for your favourite band/ artist. 	13. Try and make origami clothes. 	14. Design a new trainer that represents you! Use ACCESS FM to annotate. 	15. Using wool or string, teach yourself to finger knit using YouTube videos. 
16. Render 4 Pillows. Sketch a leather pillow, corduroy pillow, denim pillow and satin pillow. 	17. Design a hydro-chromic umbrella. You must show designs for when the fabric is dry and when it is wet. 	18. Make a mind map about sustainable textiles and fabrics. 	19. Design a repeat pattern fabric based on the work of Mary Quant. 	20. Write an acronym for the word FASHION explaining why textiles, design and fashion are important. 
21. With a parent/ guardian permission and supervision, iron 4 different items. 	22. Design a punk rock outfit inspired by Vivienne Westwood. 	23. Cut out 1.5cm strips of various papers. Create your own weave pattern. 	24. Draw a poster showing Natural and Synthetic Fibres. You must have at least 4 examples in each. 	25. Create a designer profile on Alexander McQueen. 

FOOD PREPARATION AND NUTRITION

Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create a mind map for each topic that contains key facts and images. Once you have created a mind-map you should put it away and try to recreate it from memory, then look at your original mind-map and add what you have missed.

KS4 KNOWLEDGE ORGANISER - FOOD, NUTRITION AND HEALTH

Eight tips for healthy eating

The Department of Health has produced the following practical tips to help you make healthier choices. They are:

1) Base your meals on starchy foods
2) Eat lots of fruit and veg
3) Eat more fish
4) Cut down on saturated fat and sugar
5) Eat less salt
6) Get active and be a healthy weight
7) Don't get thirsty
8) Don't skip breakfast

change 4 life
Eat well Move more Live longer

5 A DAY YOUR WAY

2. PROTEIN

- is a **macronutrient**
- **is formed** from **chains of amino acids.**
- **8 amino acids** need to be provided by the diet and are called **essential** amino acids. **Children require 2 more.**
- Protein is used for specific functions in the body: **growth, repair, maintenance** and is a **secondary energy source.**

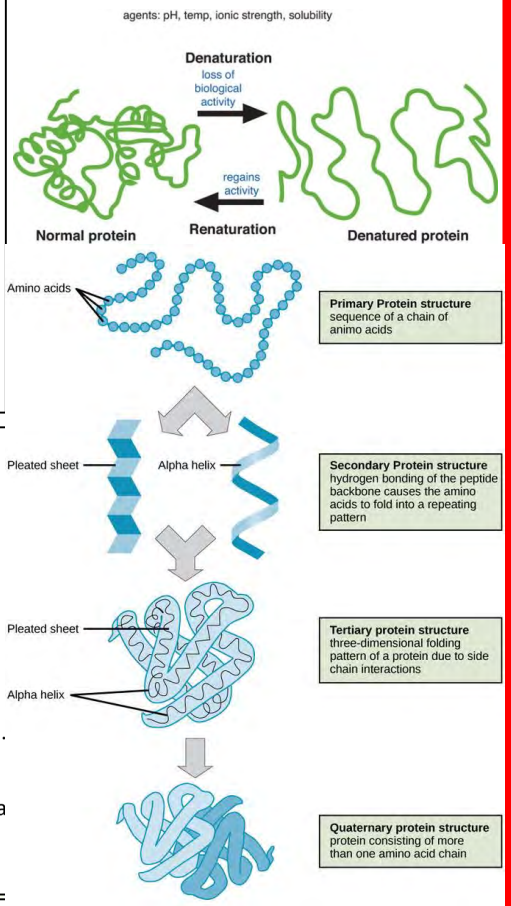
BIOLOGICAL VALUE

The biological value of protein means the amount of essential amino acids present.

Animal protein sources contain **all the essential amino acids** required by the body **HBV high biological value.**

Mycoprotein (Quorn) and texturised vegetable protein (TVP) are of HBV too.

Proteins from plant sources are **of low biological value** and lack some essentia amino acids. The exception is soya, which is a plant protein of HBV.

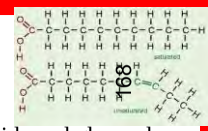


PROTEIN EXCESS AND DEFICIENCIES

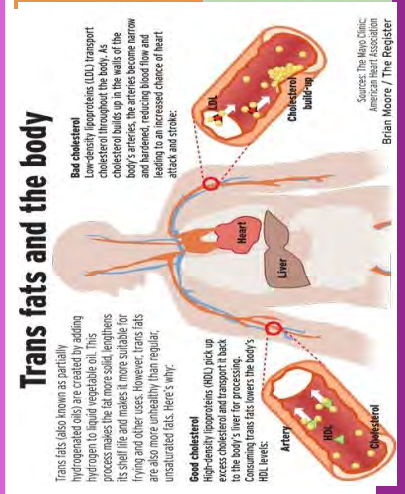
third source of energy. In developing countries KWASHIORKOR occurs.

more protein required in - babies and children for growth - adolescents for growth spurts - pregnant women (baby) - nursing mothers (lactation).

3. FAT



- is a **macronutrient**
- Made up of fatty acids and glycerol.
- structure of fatty acids influences their effect on health and cooking choice.
- fat soluble vitamins A,D,E and K.
- Provides protection for the bodies major organs
- Fat is a component of hormones.



4. CARBOHYDRATE

- is a **macronutrient**
- Body needs a constant supply of glucose, for energy.
- **Dietary fibre** is a form of carbohydrate.
- are produced during photosynthesis.
- mono, di, poly saccharides

Types of Fiber

Soluble fiber

- Gelatinous texture (jams)
- It has demulcent properties that protect the stomach. **(gastritis, heartburn)**
- It helps to treat **constipation** and to reduce **cholesterol.**
- It is contained in fruits, vegetables, legumes, seaweed.

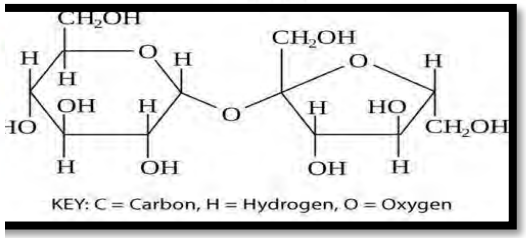
Insoluble Fiber

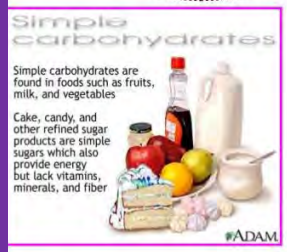
- Dry Texture (wheat bran).
- It satisfies the appetite and has **laxative effect** (obesity).
- It reduces cholesterol.
- It is contained in whole grains, nuts and seeds.

5 micronutrients

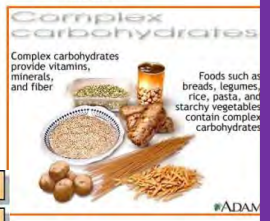
Fast release of Energy

Slow release of Energy

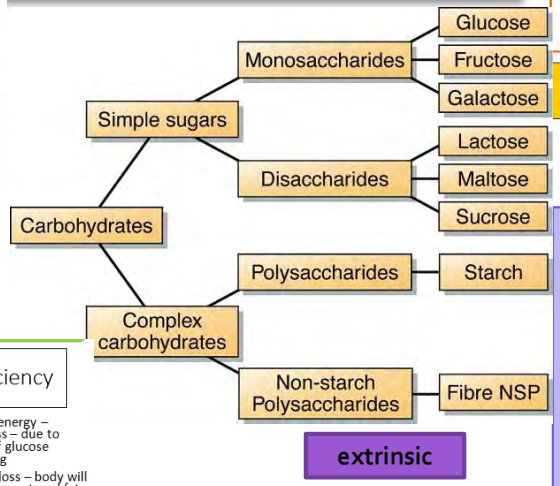




Simple/Sugary. They provide us with glucose Fructose, galactose, lactose, maltose, sucrose.



Complex/Starchy. They provide us with **Starch** & **Fibre/NSP**



intrinsic

- Intrinsic – fruit and veg – easier for body to absorb

extrinsic

Free sugars – sugars added to food. Processed sugars.

Too much sucrose	Excess	Deficiency
• Obesity and tooth decay. • Tooth decay = plaque + sucrose = acid = holes in teeth • Hyperactivity • Highs and lows	• Obesity • Hyperactivity • Poor health • Dental caries • Diabetes caused by the effect excess sugar has on the pancreas (see next slide)	• Lack of energy – tiredness – due to levels of glucose dropping • Weight loss – body will start to use stored fats in the adipose tissue • Severe weakness – once body has used up all reserve fat for energy will start to pull it from protein to keep brain and vital organs working

PROTEIN COMPLEMENTATION

Protein of LBV can be eaten together to provide all the essential amino acids. Called protein complementation.

This is important for vegetarians and vegans.

Vitamin	Major Function	Dietary Sources
Fat Soluble		
A	Maintenance of skin, bone, teeth, growth, and vision	Carrots, broccoli, spinach, eggs, cheese, and milk
D	Maintenance and growth of bones	Milk, egg yolk, tuna, and salmon
E	Antioxidant	Vegetable oils, whole grains, green leafy vegetables
K	Blood clotting	Green leafy vegetables, cabbage, and milk
Water Soluble		
B_1 (thiamin)	Energy production	Breads, pasta, pork, oysters
B_2 (riboflavin)	Energy production	Milk, meat, cereals, pasta, dark green vegetables
B_3 (niacin)	Energy production	Poultry, meat, tuna, cereal, pasta, bread, nuts, legumes
B_6 (pyridoxine)	Protein and fat metabolism	Avocados, green beans, spinach, cereals, bread
B_{12}(cobalamine)	Red blood cell formation	Meat, fish, milk, eggs
Folic acid	DNA synthesis, red blood cell formation	Dark green leafy vegetables, fortified cereals, wheat germ, oranges, bananas
Pantothenic acid	Macronutrient metabolism, hormone synthesis	Cereals, bread, nuts, eggs, dark green vegetables
Biotin	Fatty acid synthesis, energy production	Egg yolk, green leafy vegetables
C (ascorbic acid)	Antioxidant, maintenance of bones, teeth, collagen	Citrus fruits, melons, strawberries, tomatoes, green peppers, potatoes

Mineral	Major Function	Dietary Sources
Major Minerals		
Calcium	Growth, bone and teeth formation, nerve impulses	Dairy, dark green vegetables, sardines, clams
Sodium	Body water and acid–base balance, nerve function	Abundant in most foods
Potassium	Body water and acid–base balance, nerve function	Meat, milk, fruits, vegetables, cereals, legumes
Chloride	Acid–base balance	Table salt, seafood, meets, eggs, milk
Phosphorous	Bone and teeth formation, acid–base balance	Dairy, meat, fish, poultry, nuts, grains
Trace Minerals		
Iron	Component of hemoglobin and enzymes	Meats, eggs, legumes, grains, dark green vegetables
Chromium	Glucose and energy metabolism	Fats, meats, cereals
Zinc	Component of enzymes	Milk, shellfish, wheat bran

Year 10/ 11 Knowledge Organiser
WJEC Food Preparation & Nutrition: Unit 2 – Food Choice

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Key Words:

1. **Kosher:** refers to food that is allowed to be eaten because it is considered clean in Judaism.
2. **Halal:** meat which has been slaughtered in a specific way.
3. **Lacto vegetarian:** are vegetarians who eat no fish, meat, meat products, or eggs, but eat dairy foods.
4. **Lacto-ovo vegetarian:** are vegetarians who eat no fish, meat, meat products, but eat eggs and dairy products.
5. **Vegan:** are vegetarians who eat no fish, no meat, meat products, eggs or dairy foods. Only plant foods are eaten.
6. **Ethical:** relating to moral principles or the branch of knowledge dealing with these.
7. **Diabetes:**is a condition caused because the pancreas doesn't produce any, or enough, insulin to control the amount of sugar in the blood.
8. **Coeliac:** is a person suffering from coeliac disease.
9. **Gluten:** is a general name for the proteins found in flour.
10. **Lactose intolerance:** means you cannot digest lactose.
11. **Allergy:** also known as allergic diseases, are a number of conditions caused by hypersensitivity of the immune system to something in the environment that usually causes little or no problem in most people. These diseases include hay fever, food allergies, atopic dermatitis, allergic asthma, and anaphylaxis.
13. **Regional:** relating to the regions of a country.
14. **Multicultural:** relating to or containing several cultural or ethnic groups within a society.
15. **Cuisine:** is a style of food characteristics to a particular country or region.
16. **Food intolerance:** is a sensitivity to some foods.
17. **Lactose:** is the sugar naturally found in milk.
18. **Coeliac disease:** is a bowel disease; a sensitivity to gluten.
19. **Seasonal:** refers to foods that are only available at certain times of the year.
20. **Physical Activity Level (PAL):** is the amount of physical activity you do each day, for example sitting, standing, running and exercise.
21. **Disposable income:** is what money is left over for saving or spending after taxes are subtracted from income.
22. **Food miles:** are the distance that food is transported as it travels from producer to consumer.
23. **Carbon footprint:** is the amount of greenhouse gases produced in the production and transportation of foods.
24. **Anaphylaxis:** Anaphylaxis is a severe and potentially life-threatening reaction to a trigger such as an allergy. It's also known as **anaphylactic shock**.

How nutritional needs vary depending on age

1. As we age our nutritional needs change due to a number of reasons.
2. **YOUNG CHILDREN** – growth spurt – require more protein, calcium and vitamin D. Teething – calcium, fluoride and VitD, developing immune system, fewer sugary sweets and drinks to prevent overweight and tooth decay.
3. **TEENAGERS –** Calcium and vitamin D for growth spurts and bones, iron to prevent anaemia, eat regularly for energy, fewer sweets and sugary drinks to prevent obesity.
4. **ADULTS AND THE ELDERLY** – more dietary fibre to prevent obesity, diabetes and cancers, more vitamin D and calcium for bones, fewer sugars snacks and drinks, elderly need less energy and energy dense foods, more iron to prevent anaemia and maintain healthy red blood cells, less salt ad more water to reduce hypertension.

Portion size and costing when planning a meal.

1. Eating the correct portion size ensures that individuals nutritional ad energy needs are met. Must stay within the family budget.

Diet, Nutrition and Health:

1. **Hypertension** – condition in which blood pressure is too high. Due to obesity, smoking ..
2. **Iron deficiency anaemia –** condition caused by a lack of iron in the diet.
3. **Obesity –** Condition in which fat is stored by the body in large amounts.
4. **Coronary heart disease** – condition in which blood vessels in the heart are narrowed by cholesterol plaque build –up.
5. **Type 2 diabetes** – chronic condition in which blood sugar levels are abnormally high.
6. **Skeletal disorders** – group of diseases of the skeletal system caused by a deficiency of micronutrients.
7. **Energy –is the number of calories you need to consumer every day to maintain function and body mass.**
8. **Energy needs – depend on sex, age, height, weight, occupation, lifestyle, body composition.**
9. **BMR –** basal metabolic rate.
10. **PAL –** physical activity level
11. **BMR x PAL = total energy expenditure (TEE)**
12. **BMI – body mass index.**

Religion

1. **Rastafarians –** eat i-tal (clean, natural and pure), coconut oil, herbal tea, fruit and veg. Don't eat pork, salt, milk coffee, alcohol.
2. **Buddhists** – eat a vegetarian diet, don't eat meat and alcohol.
3. **Muslims –**eat halal food only, don't eat pork, alcohol, fish and shellfish, without scales.
4. **Jews –** eat kosher food, don't eat shellfish, pork, meat with diary.
5. **Hindus –**eat milk, main vegetarian, don't eat beef and alcohol.
6. **Sikhs –** eat a vegetarian diet,, don't eat alcohol, kosher, halal, beef.
7. **Christians –**eat generally everything, don't eat meat on a Friday.

Ethical beliefs

1. May be based on – animals suffering, how food is made or how food production affects the environment.
2. **Fair-trade** – global movement focused on ensuring fair working conditions, prices and wages to farmers and workers in developing countries.
3. **Animal welfare** – Movement focused on ensuring the well-being of animals and humane conditions for rearing animals.
4. **Organic foods** - Plants and animals are grown and reared in the most natural way possible.
5. **GM foods** – Plants or animals in which DNA has been altered.
6. **Local produce** – local food fresher, tastier, cheaper, fewer food miles and lower carbon emissions.
7. **Food miles –** Distance from a farm to the plate.
8. **Carbon footprint** – amount of carbon dioxide and other greenhouse gases emitted during the production of the food.
9. **Greenhouse gases** - carbon dioxide, water vapour, nitrous oxide, ozone .

Medical Conditions

1. **Food intolerances –** reaction of the digestive tract to a food ingredient.
2. **Most common intolerances** – lactose, gluten (in wheat, barley, rye and oats)
3. **Symptoms and diet** – cause bloating, stomach cramps or diarrhoea.
4. **Food allergy** – reaction of the immune system to a food ingredient.
5. **Most common allergens –** nuts, eggs, milk, wheat, fish and shellfish.
6. **Symptoms and diet** – can cause a severe, life threatening reaction.
7. **Anaphylactic shock** – must avoid the food.

Factors influencing food choices:

1. **Physical activity level** – amount of energy needed to perform daily tasks.
2. **Healthy eating** – a balanced and varied diet.
3. **Lifestyle** – the way people live.
4. **Food availability** – the amount and variety of food available.
5. **Seasonality** – availability of foods.
6. **Cost of food** – the price of food products.
7. **Income** – disposable income is the amount of money a family can spend on rent and food.
8. **Preferences** – some prefer sweet or savoury.
9. **Enjoyment** – eat certain foods for enjoyment.
10. **Time available to prepare food** – busy
11. **Time of day** – breakfast, lunch and dinner.
12. **Celebration** – plays an important part for special occasions.

British Cuisine:

1. **England** – Cornish pasty, Yorkshire pudding, fish and chips, English breakfast, sandwiches, roast dinner, beer and cider.
2. **Wales** – Cawl meaty broth, welsh rarebit, Glamorgan sausage, welsh cakes, bara brith, laver bread.
3. **Northern Ireland** – colcannon, soda bread, black pudding, Irish stew, oatmeal, Irish cream, whiskey and beer.
4. **Scotland** – porridge, scotch broth, Dunlop cheese, kippers, haggis, scotch pie, oat cakes

International Cuisine:

1. **Mediterranean cuisine –** olives and olive oil, grapes, wine, fish, seafood, tomatoes, aubergines, courgettes.
2. **Chinese** – noodle, rice, pork, duck, chicken, Chinese cabbage, water chestnuts, bamboo shoots, mushrooms, bean sprouts, soy sauce
3. **Japanese** – rice, soya, fish, seafood, noodles, seaweed, eggs, seasonal foods, green tea, wasabi.
4. **India** – rice, lentils, chickpeas, beans, coconut milk, ghee butter, paneer cheese.

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Why do we cook food?

1. **Making it safe** – heat fills bacteria, inactivates harmful enzymes and toxins.
2. **To develop flavours** – water evaporation, adding sugar – caramelisation and other reactions add flavour.
3. **To improve texture –** makes food easier to eat.
4. **To improve shelf life** – cooking kills microorganisms which could spoil the food.
5. **To increase variety** – one product may be cooked in many different ways.

Heat transfer

1. CONDUCTION- direct heat from the saucepan to the food inside.

HOB → PAN → FOOD

E.G. boiling water

2. CONVECTION – indirect transfer of the heat through water or air.

OVEN → AIR → FOOD

E.G. steaming vegetables, baking muffins.

3. RADIATION – indirect transfer of heat through heat waves.

- **Microwaves send electromagnetic waves –** heating up the food.
- Used in grills and barbeques.

HEAT → WAVES → FOOD

E.G grilling meat, tasting bread, microwaving soup

Sensory evaluation

1. **Smell –** Olfactory system responds to aroma stimuli and sends information to the brain.
2. **Touch –** helpful in judging the texture, consistency and mouthfeel of the food.
3. **Eyesight –** important when presenting food, more appetising, colourful, neat and decorated.
4. **Hearing –** crunchiness and crispiness indicates its freshness.
5. **Taste –** taste buds located on the tongue. 5 tastes – sweet, sour, salty, bitter and umami.

How does cooking affect food?

1. **Appearance** – meats shrink, cakes rise, eggs become solid, sauces thicken, rice and pasta increase in size.
2. **Colour** - Foods become golden or brown, red and green vegetable may lose colour.
3. **Flavour** – ay become sweeter, more pronounced, rich.
4. **Texture** – eggs set, vegetables and meats soften, chips become crunchy, bread becomes crispy, custard becomes creamy, sauces thicken.
5. **Smell** – is more pronounced because essential oils fill the air and are more easily detected by the olfactory system.
6. **Maillard reaction –** high temperatures, sugar and protein react with each other producing brown compounds what affect the colour, taste and smell of food. E.g.. Browning of onions.

Cooking methods – oil based methods

1. **Deep fat frying –** foods become golden and crunchy, but their nutritional value is poor. (loss of vitamins, high fat content)
2. **Shallow frying –** seals the surface of food and helps to obtain crunchy top and juicy interior.
3. **Stir frying –** low fat. Helps to preserve nutritional value of food.

Cooking methods – water based methods

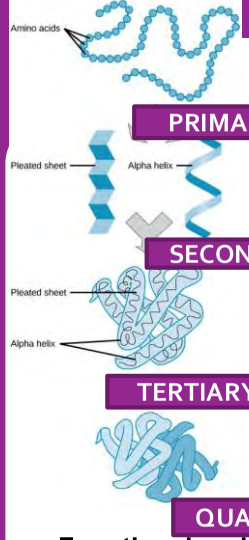
1. **Steaming** – Helps preserve nutritional value of food. Low in fat.
2. **Boiling** – May cause vitamin loss. Low in fat.
3. **Simmering**- long time required. Causes vitamin loss.
4. **Blanching –** prevents enzymic browning and oxidation, preserves nutritional value.
5. **Poaching –** ideal for preparing delicate ingredients.
6. **braising** – long time required. Causes vitamin loss.

Cooking methods – dry methods

1. **Baking -** long time required. Causes vitamin loss. Palatability is improved (cakes and other baked goods become sponge like and often have crispy top).
2. **Roasting -** Helps to reduce amount of fat in food. Long time required. Decreases vitamin content. Helps to obtain a crispy skin or surface.
3. **Grilling** – may create harmful substances. Usually low in fat.
4. **Dry-frying –** Reduces amount of fat n food. Nutritional value is preserved.

Functional and chemical properties of food

Protein



Macromolecules built of thousands of amino acids bonded together into long chains.

AMINO ACID- PEPTIDES- POLYPEPTIDES (PROTEINS)

Functional and chemical properties

1. **Denaturation –** damage of the protein's structure caused by:

a) **Heat –** during cooking, proteins vibrate resulting in hydrogen bonds being broken.

b) **Acid –** hydrogen atoms from the acid bind with nitrogen from the protein, preventing it from forming hydrogen bonds within protein molecules, and so it cannot form a 3D structure.

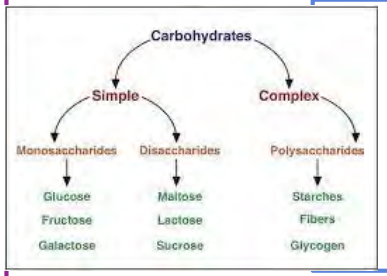
c) **Mechanical action** – during whisking, protein uncoils and exposes hydrophobic areas, which stick together and form a foam.

2. **Coagulation –** aggregation (heating) of protein particles into larger lumps, causing it to set. Eg setting of egg.
3. **Syneresis –** leakage of water from overcooked (over-coagulated) proteins. Usually associated with eggs.
4. **Gluten formation –** complex, net-like protein built of glutenin and gliadin. Proteins from wheat, rye, barley and oats. Net traps and hold air bubbles during proving and baking.

Glutenin+gliadin+water= gluten net, soft springy texture.

5. **Foam formation –** air bubbles trapped in a liquid (e.g. egg white). Whisking makes proteins unravel and denature.

Carbohydrate



Macromolecules which include mono-, di- and polysaccharides (built of thousands of monosaccharides bonded together.

Functional and chemical properties

1. **Gelatinisation –** happens when starch granules absorb water, swell and break during heating, causing mixture to thicken and form a gel when cooled.

Starch+water+heat= gelatinisation

2. **Dextrinisation –** happens when starch chains break down into shorter chains of dextrin's, during the process, molecules of water evaporate and carbon is left to give brown colour, occurs during baking and tasting bread and other baked goods.

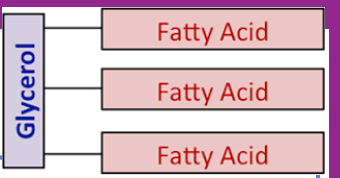
Starch+heat=dextrinisation

2. **Caramelisation –** happens when sugar is heated to a very high temp, causing it to liquidise and form a thick, brown syrup, during the process, water evaporates and carbon is left to create a brown or black colour, occurs during roasting of vegetables, making caramel and fudge etc.

Sugar+heat=caramelisation

1. **ENZYMIC BROWNING –** discolouration of fruits and vegetables as a result of oxygen reacting with enzymes and plant cell substances.
2. **Slow down – lower temp, adding heat and acid, removing the oxygen.**
3. **Oxidation –** substances react with oxygen changing the appearance, smell and nutritional value of food.

Fats and oils



1. Macromolecules built of a glycerol head and fatty acid tail.
2. Fat particles are **immiscible -** they are repelled by water molecules and separate from it, forming little droplets of oil in the mixture, and eventually creating a coat on top of it.

Functional and chemical properties

1. **Shortening –** when fat participles surround starch to produce a waterproof layer. Prevents gluten formation.
2. **Aeration –** trapping air bubbles in a fat mixture, e.g. cream or butter, to improve its texture.
3. **Plasticity –** ability of fat to be easily spreadable and melt at various temperatures. Depends on the length of the fatty acid chain.
4. **Melting point -** temp when fat turns to oil.
5. **Emulsion –** stable mixture of oil and water.

Water-in-oil emulsion – butter

Oil-in-water emulsion - milk

2. **Emulsifiers-** used bind together molecules into a stable emulsion. E.g. lecithin from egg yolk used to make mayonnaise.

Raising agents

1. **MECHANICAL –** methods of trapping air bubbles to mixtures or between layers. Whisking, beating, folding, rubbing-in, sieving, creaming.
2. **BIOLOGICAL –** yeast is a singe-celled fungus used in the production of baked goods, cheese, wine and beer.

YEAST+SUGAR+WARMTH+LIQUID- CARBON DIOXIDE+ALCOHOL/ACID.

3. **CHEMICAL –** bicarbonate of soda and baking powder. CO_2 bubbles form and cause the batter to rise, while proteins set and structure becomes stable.

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WJEC Food Preparation & Nutrition: Unit 4 – Food Safety

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Food spoilage and contamination

1. Food spoilage may be caused by many various microorganisms – bacteria, yeast and moulds – as well as by enzymes naturally present in the food products.

Microorganisms

1. Tiny organisms visible only under a microscope e.g. bacteria, yeast and mould.
2. Warmth – ideally a temperature between 5°c and 63°c.
3. Water – microorganisms grown better in moist conditions.
4. Good – ideally protein, but sometimes also sugar.
5. Time – the longer the time, the more time microorganisms have to multiply.
6. DANGER ZONE – 5°C – 63°C. Bacteria growth above and below these temperatures is slower.
7. Growth controlled – by storing food in proper conditions, freezing and refrigerating food, cooking food before eating, not refreezing food once it has been defrosted.

Enzymes

1. Enzymes - Biologically active protein-based molecules.
2. Catalysts – speed up the rate of chemical reactions.
3. Enzymes are necessary for fruit to ripen.
4. Enzymic browning – darkening of fruit and vegetables caused by enzymes and should be avoided to preserve nutritional value of food. Browning can be stopped by:-
5. Blanching – food put into boiling water then immediately plunged into cold water or ice.
6. Use of acids – use of lemon juice or vinegar. Acid denatures and deactivates enzymes, because they are built of protein.

Key terms

1. **Shelf life –** period of time during which food can be safely stored and eaten.
2. **Food poisoning –** illness caused by eating contaminated food or drinking contaminated water.
3. **First in, first out –** Rule which says that the oldest foods should be eaten first.
4. **Vacuum packing –** Packaging food in airtight foil bags to remove oxygen and prevent spoilage.
5. **Food covering –** prevents from light, air, oxygen and dust, protects from pests and rodents, tainting.
6. **Perishable foods –** have a fairly short shelf life and need to be stored in the fridge. Raw and cooked meat, especially minced, raw and cooked poultry, raw and cooked fish and shellfish, milk and dairy, eggs, vegetables and fruit.
7. **Insulated cold bag** – used to transport high-risk foods and maintain their low temperature.
8. **Best before –** applied to food quality (look, flavour and colour) and it's relatively safe to eat the food after that date: it is used on dry, frozen or tinned foods and eggs.
9. **Use by** – applies to food safety so it might be harmful to eat a food after that date: used on fresh foods such as milk and dairy.
10. **Ambient storage** – storing at room temperature usually around 20°c.
11. British Lion Scheme – food safety mark which guarantees that eggs are produced in the Uk and that al the hens have been vaccinated against salmonella.

Cross-contamination

1. Cross-contamination – is when bacteria, toxins or food particles are transferred to a food product.

Caused by:-

- Waste food and rubbish
- Pests and rodents
- The cooks hand
- Work surfaces and equipment
- Other contaminated foods, including high-risk foods.

2. Anaphylactic shock – is a life-threatening reaction of the immune system to an allergen

Most common allergens – nuts, fish and seafood, milk and eggs.

Food poisoning

1. Food poisoning – is a disease caused by eating spoiled or contaminated food. Such food may contain certain microorganisms, toxins or enzymes.
2. Pathogenic bacteria – microorganisms which cause disease.
3. Carrier – a person who carries a pathogen but shows no symptoms of a disease.
4. Symptoms – stomach pains and cramps, nausea and vomiting, diarrhoea, fever, shivering
5. Campylobacter – raw poultry and unpasteurised milk.
6. E. Coli – undercooked beef, unwashed vegetables, dirty hands.
7. Salmonella – raw eggs, meat and poultry, unpasteurised milk.
8. Listeria – ready-to-eat foods, unpasteurised milk, dirty hands.
9. Staphylococcus aureus – salads, ham, eggs, tuna, poultry, cream, hands of an infected person.

Use in food production and signs of food spoilage

BACTERIA

1. **FOOD SPOILAGE –** Clostridium botulinum produces a toxin which causes meat bulge. Most bacteria do not cause visible signs of spoilage.
2. **USE IN FOOD MANUFACTURING** – cheese used a starter culture LACTOBAILLUS to give a balanced aroma taste and texture. Yoghurts – starter culture, probiotics – health benefits.
3. **WHY DOES THIS WORK?** Bacteria ferment lactose from milk into lactic acid, giving food a sour taste and coagulates the protein. Causes yoghurt to become thicker.

YEAST

1. **FOOD SPOILAGE** ferments sugar in juices and beverages, making them sour, fizzy and foamy.
2. **USE IN FOOD MANUFACTURING** Bread, doughnuts and other baked goods use yeast to help them rise.
3. **WHY DOES THIS WORK?** Yeast ferments sugar in foods and produces carbon dioxide to help it rise. It also crates fizz in some alcoholic drinks.

MOULD

1. **FOOD SPOILAGE** Creates a green, white or black coating on food products such as bread, grapes, tomatoes and jams.
2. **USE IN FOOD MANUFACTURING** Blue cheeses, such as Stilton, have a mould called Penicillium added to give them a distinctive texture, taste and aroma.
3. **WHY DOES THIS WORK?** Mould breaks down polysaccharides into shorter chains, which changes the taste of the food.

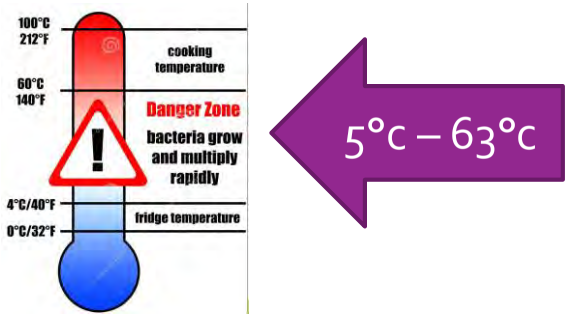
ENZYMES

1. **FOOD SPOILAGE** Turn bananas, apples, potatoes and other foods brown.
2. **USE IN FOOD MANUFACTURING** Rennet is an enzyme used in cheese production to coagulate milk.
3. **WHY DOES THIS WORK?** Enzymes react with oxygen and turn yellow pigments in food into brown melanin.

Temperature Control

1. Tainting – means that the m=smell of one food contaminates other food. Always cover.
2. Freezer burn – involves the dehydration and oxidation of food caused by improper freeing. E.g. inadequate packaging.

Freezing	-18°c
Chilling	0°c – 5°c
Cooking	Above 75°c
reheating	Above 75°c.



Correct use of a domestic fridge and freezer

Food safety principles when cooking and preparing food

1. PERSONAL HYGIENE

- Always wash hands before and after cooking and dry with disposable paper towels.
- Avoid touching your face or hair
- Tie your hair back and cover with a hairnet.
- Avoid cooking when your ill.
- Change clothes and use an apron.
- Cover any wounds with a waterproof plaster.
- Do not wear rings or other jewellery when cooking.

2. SEPARATE FOODS

- Separate raw and cooked foods both when preparing and storing food.
- Cover prepared food and store in closed containers.
- Use dedicated, colour-coded utensils.
- Wash dishes straightway in hot water to avoid pests and cross-contamination.

3. WORK SURFACES

- Clean thoroughly after dealing with high-risk foods.
- Use soapy hot water or antibacterial spray to clean any spills.
- Use a clean kitchen towel or disposable paper towels.

4. TEMPERATURE CONTROL

- Make sure the temperature inside food reaches 75°c both when cooking and reheating.
- Make sure the temperature of served food is above 63°c.
- Do not put hot food straight into the fridge – let it cool for 90 minutes.
- Ensure correct cooking time to avid cold spots.
- Defrost thoroughly to avoid cold spots.

Year 9 Knowledge Organiser
WJEC Food Preparation & Nutrition: Unit 5 – Food Provenance

Supporting health

1. Healthy eating – what we eat has a huge impact on our health. Too little may lead to a nutrient deficiency. High level of processing could lead to a lack of nutrients.
2. **Governments and producers –** strive to make food safe and healthy for consumers by adding substances which are beneficial for health.
3. **Cholesterol-lowering spreads –** fat spreads enriched with plant sterols and plant stanols. Substances proven to effective lower blood cholesterol level an prevent atherosclerosis.
4. **Cholesterol –** fatty substance necessary for correctly transporting fats around the body.

LDL – Bad as increases cholesterol amount in blood. Can block up the block vessels.

HDL – good as it transports cholesterol to the liver, which can remove its excess from the body.

5. Health outcomes of increased cholesterol and excessive fat consumption – excess. Cholesterol deposited in the blood vessels and create atherosclerotic plaque. Risk of hypertension, CHD, heart failure and stroke.

Food fortification

1. **Food fortification** – during processing many food products lose their nutritional value. The main function of food fortification is to:-

- **Restore the nutritional value of foods**
- **Improve the nutritional value of foods**
- **Make food more suitable for certain groups of consumers**
- **Prevent diseases caused by malnutrition.**

2. **Fortification required by law:-**

Wheat flour and bread – Thiamine – prevent beri beri, help release energy from food. **Niacin** to prevent pellagra, **calcium** to prevent rickets and osteoporosis, iron to prevent iron deficiency and anaemia.

Vegetable fat spreads. Vit A – prevent growth and eyesight issues eg. Night blindness, **Vit D** – prevent rickets and osteoporosis.

Simi-skimmed and skimmed milk. Vit A – prevent growth and eyesight issues e.g. night blindness.

Food additives

	advantages	disadvantages
Colouring	• Improve the look of food • Make appetising	• Hides poor quality food • hyperactivity in children.
Emulsifiers and stabilisers	• Prevents ingredients from separating • Maintain the texture	• Flatulence and bloating. • Hides poor quality ingredients.
Flavourings	• Improve taste and smell • More appetising.	• Hides poor quality ingredients • Increase appetite.
preservatives	• Increased shelf life • Prevent oxidation and spoilage.	• May cause allergic and anaphylactic shock. • Cause cancer

Genetic modifications

1. **Plant cell –** cells contain DNA. DNA built of tiny genes which encode all information about an organism.

Cell- nucleus- chromosome-DNA- gene

2. **Modern technologies –** allow people to manipulate the DNA code.

- cut out unwanted genes to avoid disease.
- Modify the sequence of genes.
- Paste new genes to add new features

3. **Genetically modified –** when the DNA has been changed.

advantages	disadvantages
Resistant to weather condition, pests	GM seeds contaminate fields.
Need fewer nutrients to grow	No proof that they are safe
Less need for fertilisers and herbicides	May increase risk to allergies and cancer. And obesity.
Animals produce more muscle tissue and milk	The use of bacteria and viruses in production cause new diseases.
Produce high-yield crops, high nutrition.	Resistance to antibiotics. Pests develop resistance.

Food production – primary sources of food.

1. **Primary source** – foods in their natural, raw state e.g. milk, what grains, apples.
2. **Primary processing of food –** doesn't significantly affect the natural values of food products. **Sorting, trimming, discarding, washing, wrapping, draining, trussing, cutting, heat treatment, milling, deboning, skinning, deseeding.**
3. **Making of flour –** harvesting and transport to mill, separating from dirt etc, washing and drying, milling, sieving.
4. **Bran – the outer layer of a grain.**
5. **Heat treatment of milk.**

- **Pasteurisation –** 72c for 15 sec to kill pathogenic bacteria.
- **Ultra-heat-treatment –** heated 135c for 1-2 seconds, kill bacteria.
- **Microfiltration –** milk pushed through very fine membranes.
- **Sterilisation –** heated to 110°c for 30 mins. Nutrients + flavour affected.
- **Drying –** condensed, then dried, fall in B vitamin levels.

Food production – secondary sources of food.

1. **Secondary source –** goods that have been changed e.g. yoghurt, flour, jam
2. **Secondary processing of food** – affects natural features to obtain new food products. Smoking, irradiation, adding additives, fermentation, cooking/heating, drying and freeze-drying.
3. **The making of pasta** – harvesting, milling, mixing, kneading, adding flavourings and colourings, rolling, pasteurisation, cut into shapes, drying, packaging
4. **Jam** – harvesting, washing, crushing, adding water and sugar, simmering, pouring into jars.
5. **Pectin** – natural gelling agent present in fruit.
6. **Acid** – can be naturally occurring. May be added to the mixture to help release the pectin.
7. **The making of yoghurt** – milk cows, transporting of milk, pasteurisation and homogenisation, warming to 42°c, adding starter culture, fermentation (ripening), cooling, adding flavourings, packaging.
8. **Starter cultures** – probiotic bacteria begins the fermentation process.
9. **Fermentation** – changing lactose into lactic acid by adding bacteria. Change in PH leads to coagulation and thickens mix.
10. **Making of cheese** – milking, transportation, pasteurisation, homogenisation, adding starter culture, fermentation, added rennet, cutting curd, pressing, add salt, pressing, ageing.
11. **Rennet** – enzyme which coagulates milk and increases curdling.
12. **Whey:** liquid by-product of cheese production.

Food and the environment, and sustainability of food.

1. **Danger of carbon dioxide –** production creates carbon dioxide. This creates a layer around the earth which reflects warmth back onto the earth. Average temp rises.
2. **Carbon footprint –** amount of CO2 and greenhouse gases emitted into the environment. By input, processing and output.
3. **Global warming** – rise in average temperature on earth due to extravagant release of greenhouse gases.

CO2 layer – heat cannot escape – rise in temp – glaciers melt- fierce hurricanes, rainfall- crop failure – food shortage.

1. **Greenhouse gases** – vapour, CO2, nitrous oxide, methane, ozone, CFC's, absorb infrared radiation and trap heat.
2. **Food miles –** distance from the field to the plate.
3. **Food production –** direct and indirect effect on the environment by creating various pollutants and by causing deforestation.
4. **Packaging –** using fossil fuels to produce, tonnes thrown away, unrecycled creates pollution, animals, birds and fish swallow debris and die, some **never** decompose.
5. **Fairtrade** – foundation and ethical movement focused on supporting farmers and sustainability of food. Fair wages and prices, improved working condition, empowers local communities, education for all.
6. **Food availability** – climate change affects food availability. Droughts, flood causes crop failure. Therefore no plants to eat and no food for animals.
7. **Food security** – when all people, at any time, have access to nutritious, healthy food in sufficient amount.
8. Seasonal foods – foods which are characteristic of a given season when they ripen and are harvested.

Spring – sprouts, kale, lettuce, spring onion, radish
Summer – peas, berries, courgettes, cucumbers, apricots, cherries
Autumn – apples, pears, plums, aubergine, pumpkin, celery
Winter – potatoes, carrots, parsnips, beetroots, Brussel sprouts, onion.
Advantages – reduce food miles and carbon footprint, cheaper, higher in nutrients and tastier.

9. Food waste – due to buying or cooking too much, not eating before it goes off. Effect – waste of money, pollution, carbon footprint increased. Prevention – planning, only cook what's needed, store leftovers, prevent spoilage, make compost from left overs.

Increased food availability	Decrease food availability
Use of GM seeds and organisms Use modern technologies store longer Transportation of food.	Climate change Insufficient land Growing world population Overexploitation of soil and fisheries, limited resource e.g. water and fossil fuels.

Food sources

1. **Food sources** – where and how food is made depends on climate, soil quality, availability of water, resources, availability of land, size of population. Religion, ethical beliefs.
2. **Grown** – orchards, fields, polytunnels.
3. **Reared** – sheds, barns, fish farms
4. **Gathered** – in forests, near the roads,
5. **Caught** – open spaces and forests oceans and seas.

Sustainable fishing

1. **Sustainable fishing –** fishing in natural fisheries limited to certain period of time. Giving the shoal time to reproduce and restore itself. Policy set by the Marine Stewardship Council.
2. **Advantages of fish farms –** protect the natural ecosystems, prevent overexploitation of fisheries, keep animal welfare standards, protect wild species diversity. Prevent by catch.
3. **By catch –** accidental catch of a sea organism which wasn't the primary goal of the fishing.
4. **Disadvantages of fish farms –** fish tanks often overcrowded, fed low-quality feed affecting their flavour and nutritional value, might be fed antibiotics, increasing risk of antibiotic resistance.
5. Methods of fishing

Purse seining – use large nets to trap fish.
Longlining – use longline, fish attach to a hook on the line
Bottom trawling – pulling a large net along the sea bottom.

Farming:

1. **Organic farming –**

- **No chemicals**
- **Little or no use of pesticides**
- **No artificial fertilisers**
- **No herbicides**
- **No GM feed or seeds**
- **Antibiotics are only used when necessary**
- **Crop rotation may be applied to preserve soil quality**
- **Animal welfare standards are kept.**

2) **Intensive farming –**

- **Chemicals such as pesticides, herbicides and artificial fertilisers are used to prevent crop failure.**
- **Antibiotics are used to prevent diseases in livestock, not to cure them.**
- **GM feed and seeds are used to obtain high –yield crops.**
- **Animal welfare standards are often violated.**

Local and seasonal foods

1. **Characteristic of countries or regions, as well as certain seasons of the year.**

- **Fresher**
- **More nutritious**
- **Tastier**
- **Empowers local farmers**
- **Support local communities**
- **May be cheaper than imported foods**
- **Supports biodiversity of specifies**
- **Limited offer/ small variety of foods offered**
- **Limited availability/ short time for purchase**
- **Depends on weather conditions and local climate**
- **May be more expensive than imported foods**

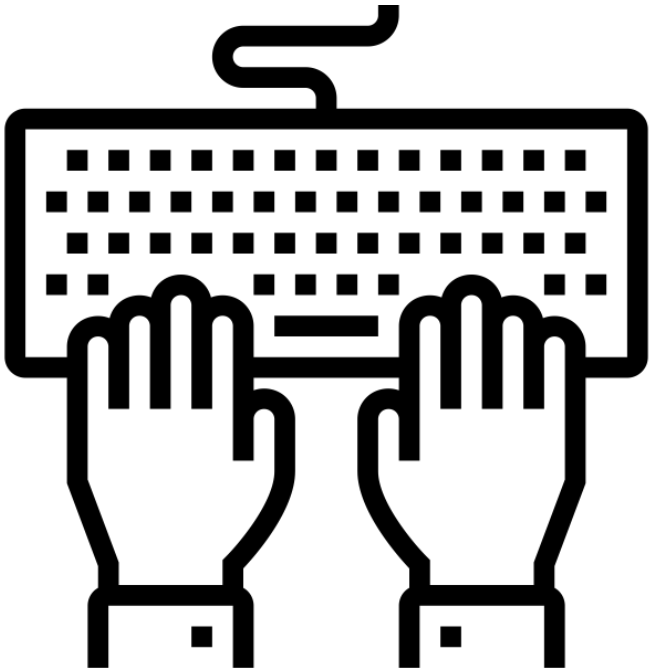
Genetically modified foods:

1. **Come from GM animals or plants, or GM microorganisms are used during production.**

- **Resistance to pests and unfavourable weather conditions.**
- **More nutrients, e.g. beta-carotene in golden rice.**
- **Fewer pesticides and herbicides are used.**

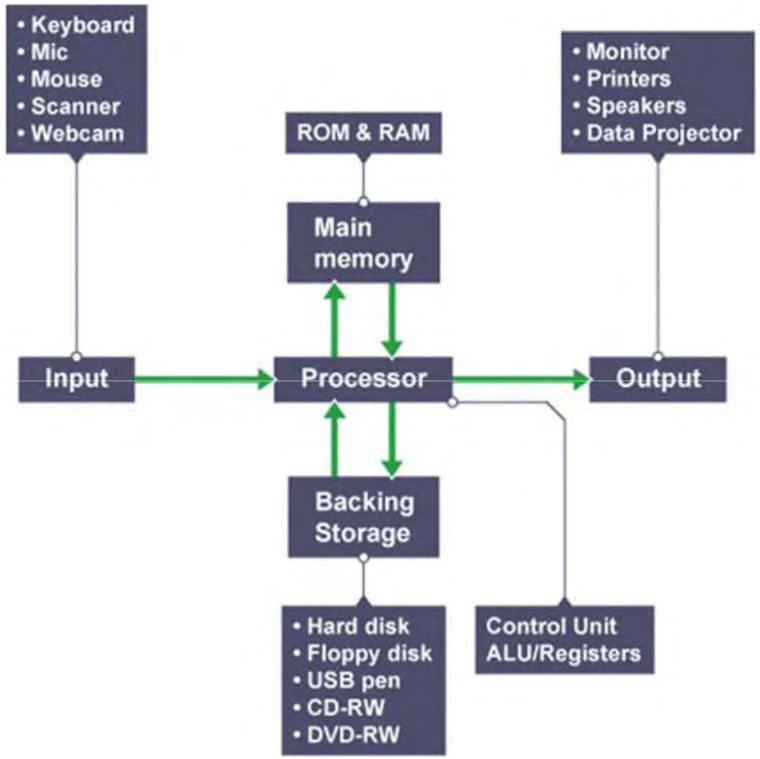
COMPUTER SCIENCE

Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create a mind map for each topic that contains key facts and images. Once you have created a mind-map you should put it away and try to recreate it from memory, then look at your original mind-map and add what you have missed.

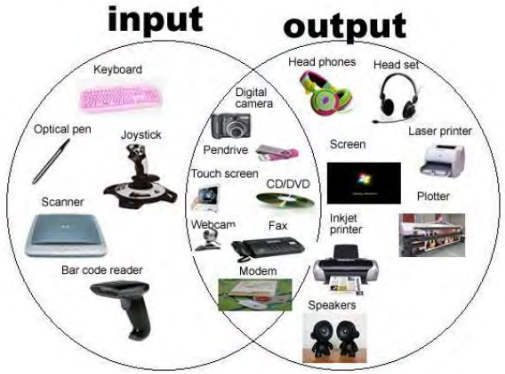


Computer Science
Unit 0 Hardware

Key vocab	
Hardware	Computer hardware is the physical parts or components of a computer
Peripheral	A peripheral device is any auxiliary device such as a computer mouse or keyboard that connects to and works with the computer in some way.
Input peripheral	A device that may be connected to a computer system. They are used to bring data from the physical world into the computer system.EG Mouse, touchscreen.
Output peripheral	A device that may be connected to a computer system. They are used to bring data from the computer into the physical world. EG A monitor or speakers.
Storage peripheral	A device which is used to store data & files on. EG CD, Memory stick.



Hardware	
BIOS	Basic Input Output System. A small program is stored on this ROM chip to load the operating system correctly.
CMOS Battery	Small battery used to keep track of the time when a computer is switched off.
CPU	Central Processing Unit. The device used to control and execute commands within the computer. The performance is measured in GHz, which is the number of processes which can be executed in 1 second.
GPU	Graphics Processing Unit. Used for processing of graphics, particularly used by gamers and graphic designers.
Hard drive	Area of storage used to retain documents and programs. A form of long term memory. Alternatives may include SSD or hybrid drives.
Motherboard	The motherboard connects all components to each other, which allows them to communicate.
PCI	An expansion port that allows a computers capabilities to be upgraded. Components that may be upgraded include GPU, sound cards and NICs.
PSU	Power Supply Unit. Converts mains AC to low-voltage DC power to power all components of a computer. Random
RAM	Access Memory, a place where data and instructions that are currently in use by the CPU or have recently been used are stored.

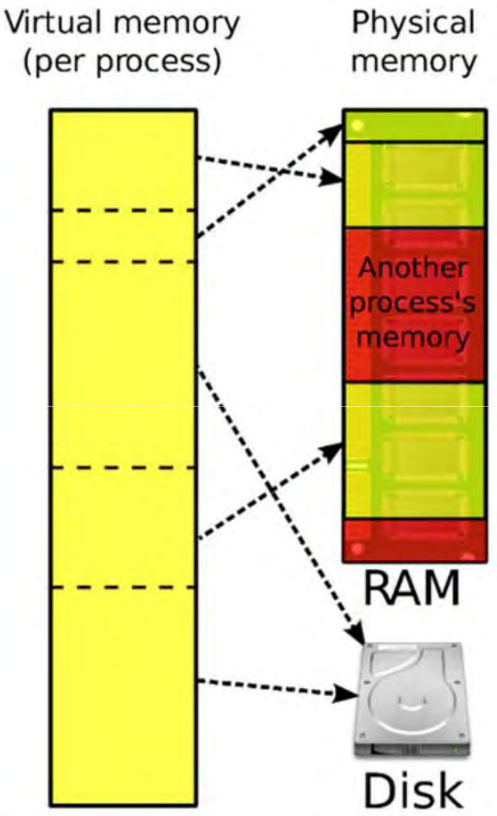


GCSE Computer Science
1.2 Memory

Key vocabulary	
Primary Memory	Memory used to store data and instructions that are required by the CPU.
RAM	Random Access Memory is volatile memory used to store data and instructions which are needed by the CPU. Also referred to as main memory.
Dynamic RAM	Contains 1 transistor and capacitor that hold charge briefly. This needs to be refreshed every few milliseconds.
Static RAM	Uses 5 transistors which are wired together to represent each bit. No need to be refreshed. More wiring per bit.
ROM	Read only memory. Used to store the boot sequence as this should never be changed. This memory is non-volatile.
Bootstrap loader	A small program that loads the operating system. Once the operating system is loaded it takes care of the rest.
Flash Memory	Electrons are forced into a layer between two barriers which hold the charge by using a high electric current.
Virtual Memory	When RAM is full, a section of the hard drive can be used to store programs and instructions.
Volatile	Storage which needs to have power to store data. If power is lost, data is lost.
Non-Volatile	Storage which does not lose its contents when the power is lost.

The CPU will first search for data in the Cache memory and then move further away until it finds what it is looking for. The further away from the CPU, the longer data will take to transfer.

RAM vs ROM	
RAM	**ROM**
Volatile memory	Non-volatile memory
Stores the user data / programs / part of the operating system that is currently in use.	Used to store the BIOS / bootstrap loader.
Memory can be written to or read from.	Memory can only be read from and not written to.



Computer Science
Secondary Storage

Key vocabulary	
Secondary Storage	A non-volatile storage medium which stores files and programs. Examples include the hard drive (HDD) and solid state drives (SSD).
Magnetic devices	Magnetic disks are read and written to with a moving head inside the disk drive. They often contain moving parts and are susceptible to damage. Magnetic devices can be either internal or portable.
Solid State devices	SSD has no moving parts. It retains an electronic charge using logic gates. Examples include SD cards and USB memory sticks. Also referred to as flash storage.
Optical devices	Optical media includes CD, DVD and Blu-Ray disks. Lasers are used to read and write data to a disk. Data is stored on tracks around the disk as a series of pits which represent binary code.
Cloud storage	Cloud storage refers to saving data in an off-site location maintained by another party. Examples include Dropbox, Google and Microsoft. This relies on having an internet connection to be able to upload and download files from a cloud server.

Comparing secondary storage	
Capacity	The amount of space that is available to store files. Generally measured in GB.
Speed	How quickly a computer can read and write data from a storage device.
Portability	How easy a device is to be transported. Some devices may be permanent hardware, others may be easier to transport.
Durability	Will the device withstand a certain amount of damage without corrupting files?
Reliability	The length of time that a device is expected to last for, how long will it retain functionality?
Cost	The cost of a device is compared in terms of cost per GB.

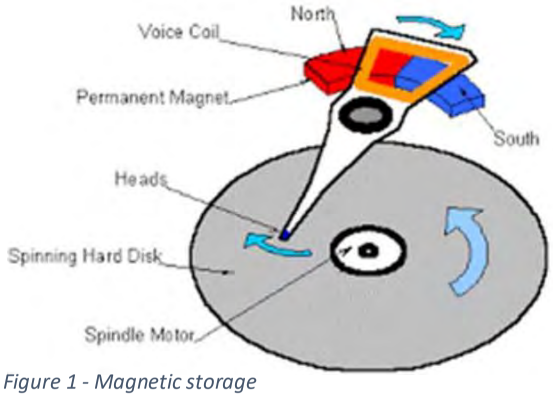


Figure 1 - Magnetic storage

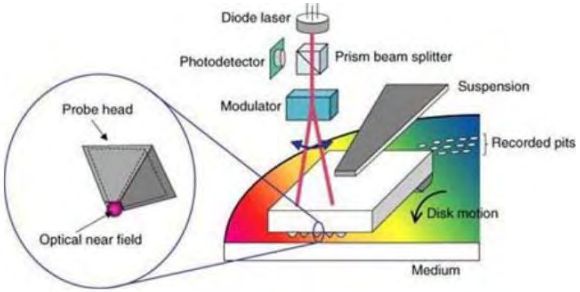


Figure 2 - Optical storage

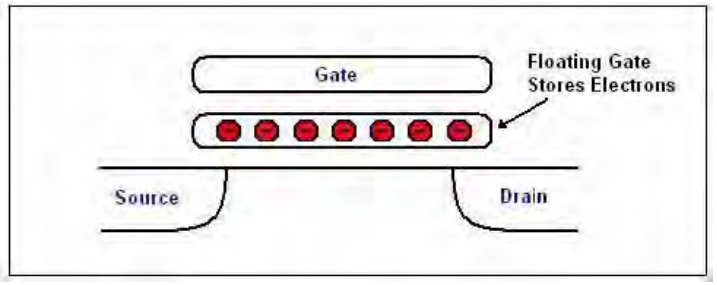


Figure 3 - Solid State storage

Computer Science
1.4 Wired and wireless Networks

NIC	Network Interface Controller. The component that allows a device to connect to a network, typical examples are WiFi and Ethernet.
WAP	Wireless Access Point. The point to which a wireless-enabled device connects to a network. It normally connects to or is built into a router.
Hub	The role of a hub is to allow communication between multiple devices in a network. They are used in LAN networks. Hubs will send a copy of the packets received to all devices on a network. When the devices receive packets they will either accept or reject them, they use the destination IP address to do this.
Switch	The role of a switch is to allow communication between multiple devices in a network. They are used in LAN networks. A switch will behave like a hub when it is switched on, however it will learn which devices are connected to which ports, and then send packets directly to the correct computer, saving bandwidth.
Router	A router is designed to route packets across wide area networks such as the internet. It will pass packets between other routers until the final destination is reached. Modern routers have built in WAP and switches.
UTP	Unshielded Twisted Pair. A cable used for providing fast data transmission and minimal interference. Relatively easy to install.
Coaxial Cable	Bulkier than UTP and less convenient to install.
Fibre Optic	A cable which transmits light at the speed of light to send binary code. Not subject to interference from neighbouring cables.
Wireless	A commonly used connection as it gives portability to devices and required minimal alteration to buildings. Easy to add new devices to the network.

Network	A collection of computer systems that are linked together and can share data.
Node	A device connected to a network via a link.
Links	The interface on which multiple devices can communicate. Such as a cable or wireless.
Client	A client is a piece of computer hardware or software that accesses a service made available by a server.
Server	A server is an instance of a computer program that accepts and responds to requests made by another program, known as a client.

LAN	A Local Area Network. All devices are connected on one site. The network may be in a single building or campus or group of buildings in a small area. Management and maintenance is usually completed by a group of network engineers.
WAN	A Wide Area Network. Typically covers a large geographical area, talking in many cities or worldwide. The connections are typically provided by a telecoms company such as BT. The largest example of a WAN is the internet. A WAN connects multiple LAN networks.
PAN	Personal Area Network. Personal devices are often connected to each other in a home or a car.
WLAN	Wireless LAN
MAN	Metropolitan Area Network. Devices are connected in a city. Not commonly used as many devices now use the internet.
SAN	Storage Area Network where multiple servers provide a large-scale storage facility.
VPN	Virtual Private Network. A part of the internet that is sealed off from public use and reserved for an organisation. It is not a physical network but behaves as one.

1.6 System Security Forms of Attack, Threats to Networks, Identifying Vulnerabilities

Cyber Security Risks	
Blagging	Knowingly or recklessly obtaining or disclosing personal data or information without the consent of the controller (Owner of data). EG Employees sharing passwords.
Hacking	Attempting to gain access to a system through cracking passwords.
Human Error	People are often the weakest part of security systems and criminals take advantage of human error and gullibility.
Malware	Software that can harm devices, which is installed on someone's device without their knowledge or consent. May be spread by email, messaging services or downloading infected files.
Phishing	Emails designed to appear as a reputable organisation to gain trust of users and harvest personal information.
Poor Network policy	Network policies are not always designed to provide maximum security. For example, a strong policy should recommend changing passwords regularly and ensure that the passwords used are strong.
Spyware	Secretly monitors user actions (eg. key presses) and sends info to a hacker.
SQL Injection	Exploiting a technique that exploits security weaknesses in websites. Achieved by inserting malicious code into a database field on a website such as a password field.
Trojan	Trojans are malware disguised as legitimate software. Unlike viruses and worms, Trojans do not replicate themselves – users install them not realising they have a hidden purpose.
Virus	Viruses attach (by copying themselves) to certain files. Users spread them by copying infected files and activate them by opening those files.
Worm	Worms are like viruses but they self-replicate without any user help, meaning they can spread very quickly.

Types of Hacking	
Brute Force Attack	An attack that runs through a list of different passwords or letters until access to an account is gained,
Denial-of-service	Where a hacker tries to stop users from accessing a part of a network or website, mostly by flooding the network with useless requests, making the network very slow or completely inaccessible.
Data Interception and Theft	Shouldering is attempting to look over someone's shoulder when using an ATM. Measures to reduce this risk include destroying paper documents when no longer needed, logging off or locking computers when not in use and locking rooms containing computers.
Forms of Network Attack	
Passive	Where someone monitors data travelling on a network and intercepts any sensitive information they find.
Active	When someone attacks a network, for example with malware.
Insider	When someone within an organisation exploits their network access to steal information.
Brute force	A type of active attack used to gain information by cracking passwords through 'trial and error'. Uses likely password combinations to gain access to user accounts.
Identifying and preventing vulnerabilities	
Network Forensics	Use of software for capturing, storing and analysing network events. The outcome is finding out communication between whom, when, how and how often.
Penetration (Pen) Testing	A strategy to identify security weaknesses including: -Gathering information about the target of possible attacks -Identifying possible entry points to the network -Attempting to break in -Report findings and respond.
Internal Pen Testing	Puts the tester in the position of an employee with standard access rights to the network to determine how much damage they could do.
External Pen Testing	May target servers within a business to see how easy they are to break and how it can be achieved.
Acceptable Use Policies (AUP)	Procedures and precautions which are in place to make network users aware of threats and the steps they must take when using the network.

Computer Science
1.6 System Security Preventing Vulnerabilities

Key Vocab	
Antimalware	Software designed to protect a computer in one of 3 ways: preventing installation of harmful software, preventing important files from being changed, scanning for virus activity on the system and removing as appropriate. Antimalware protects against worms, Trojan Horses, spyware, adware and keyloggers.
Antivirus	Software designed to protect against viruses.
Update	New malware is released regularly and so anti-malware definitions must be up-to-date to protect form the latest viruses.
Firewall	Hardware or software designed to prevent unauthorised access to or from a private network or intranet. All messages entering or leaving the network will pass through the firewall to be examined.
Password Protection	In a networked environment such as a school or a company, multiple users use many of the computers. Passwords should be strong (Not easy to guess, lower and uppercase letters, numbers, symbols).
Access Levels	Part of an access control procedure for computer systems, which allows a system administrator to set up a hierarchy of users. Thus, the low-level users can access only a limited set of information.
Encryption	Changing data before transmission so someone can only decipher it with the appropriate key to unlock information. Interceptors would find the message unintelligible.
Key	A cryptographic key is a string of bits used by a cryptographic algorithm to transform plain text into cipher text or vice versa. This key remains private and ensures secure communication.
Symmetric Key encryption	A secret key algorithm (sometimes called a symmetric algorithm) is a cryptographic algorithm that uses the same key to encrypt and decrypt data.
Asymmetric key encryption	Asymmetric cryptography, also known as public key cryptography, uses public and private keys to encrypt and decrypt data. The keys are simply large numbers that have been paired together but are not identical (asymmetric).

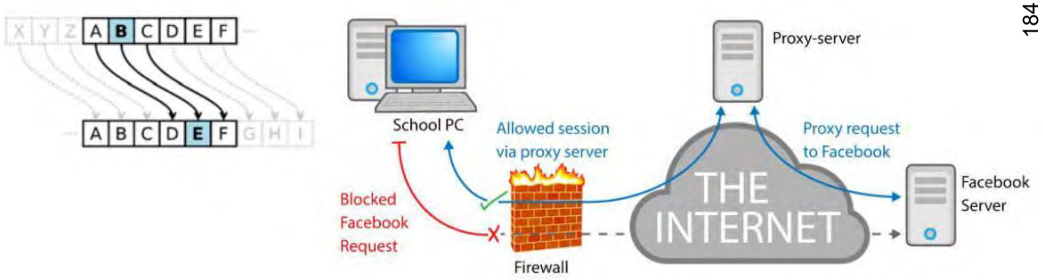


Figure 1 - A firewall sits on the edge of a network and chooses which traffic to allow through using a set of rules. As shown above the rules may not always be strong enough.

Symmetric encryption methods such as the Caesar cipher involve shifting letters along the alphabet.

Figure 3 –

Plaintext	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Ciphertext	F	O	X	A	B	C	D	E	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V	W	Y	Z

Plaintext	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Ciphertext	B	C	D	E	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V	W	Y	Z	F	O	X	A

Cipher to use in HW

Figure 2 - Keyword encryption involves using a keyword to begin filling up the alphabet, then the rest is filled with remaining letters.

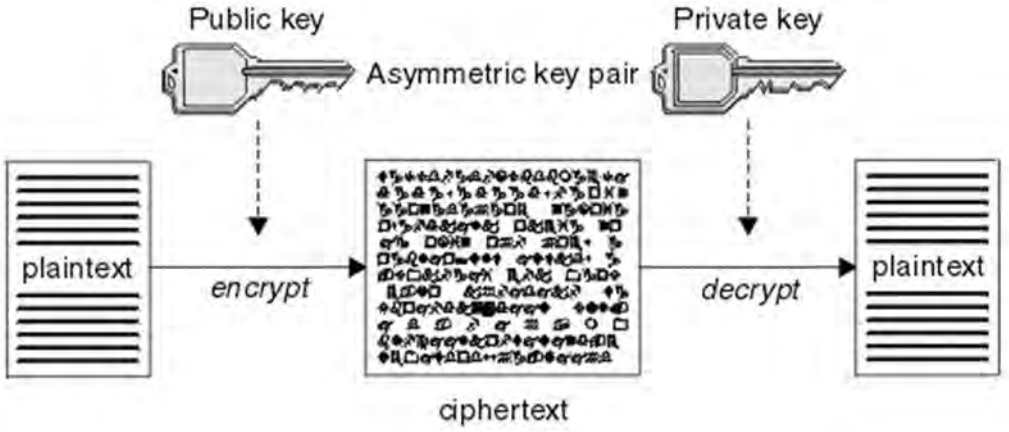


Figure 4 - Asymmetric key encryption uses public keys to encrypt data for somebody who then uses their private key to decrypt it.

Examples of pseudocode syntax and explanations	
`x = 5`	Declares a new variable called x and gives it a numerical value of 5
`name = "Bob"`	Creates a new variable called name and sets its value to "Bob"
`str(x)`	Casts the value in x to be a string value
`int(x)`	Casts the value in x to be an integer value
`float(x)`	Casts the value in x to be a float value
`print(name)`	Prints a variable to the screen
`print("Hello")`	Prints the given string in quotes to the screen.
`name = input("Please enter your name")`	An input from the user which asks them for their name and stores in a variable.

`for i = 0 to 7`
`  print("Hello")`
`next i`
	A count controlled loop which will print "Hello" 8 times (0-7 inclusive).

`while answer != "Computer"`
`  answer = input("What is the password?")`
`endwhile`
	A condition controlled loop which asks a user for a password until they correctly guess with "Computer".

`do`
`  answer = input("What is the password?")`
`until answer == "Computer"`
	A condition controlled loop which asks a user for a password until they correctly guess with "Computer".

`entry = input("Enter a selection")`
`if entry == "a" then`
`  print("You selected a")`
`elseif entry == "b" then`
`  print("You selected b")`
`else`
`  print ("Unrecognised selection")`
`endif`
	Selection can be carried out to identify certain situations within a program. The program here takes an input and prints different statements for the A and B selection.

`function triple(number)`
`return number * 3`
`endfunction`
	Creates a simple function to triple a number given as an input.

`array names[3]`
`names[0] = "Ahmad"`
`names[1] = "Ben"`
`names[2] = "Catherine"`
	Creates an array called names, the length is set to 3. Names are then added to the positions in the array.

2.2 Programming Techniques

`print('hello!')`	Prints a value on screen (in this case, hello!)
`input('')`	Inputs a value into the computer.
`x=input('')`	Inputs a value and stores it into the variable x.
`x=int(input(''))`	Inputs a value into x, whilst also making it into an integer.
`print(str(x))`	Prints the variable x, but converts it into a string first.
`if name == "Fred":`	Decides whether the variable 'name' ha a value which is equal to 'Fred'.
`else:`	The other option if the conditions for an if statement are not met (eg. name = 'Bob' when it should be Fred)
`elif name == "Tim"`	elif (short for else if) is for when the first if condition is not met, but you want to specify another option.
`#`	# is used to make comments in code – any line which starts with a # will be ignored when the program runs.
`for i in range(0,10):`	Loops any code indented after this line a certain number of times, in this case, 10.
`while x < 10:`	Loops any code indented after this line until the condition is met, in this case x becoming equal to or greater than 10.
`list = ['','']`	Creates a variable and makes it an array – a list which can store many values.

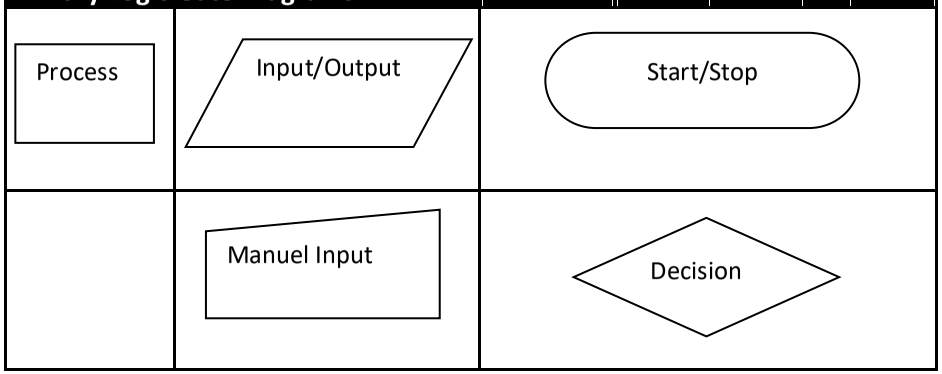
Python	A programming language which is quite close to English!
Programming	The process of writing computer programs.
Code	The instructions that a program uses.
Sequence	Parts of the code that run in order and the pathway of the program reads and runs very line in order.
Selection	Selects a pathways through the code based on whether a condition is true
Iteration	Code is repeated (looped), either ***while*** something is true or ***for*** a number of times
Algorithm	A set of rules/instructions to be followed by a computer system
Variable	A value that will change whilst the program is executed. (eg. temperature, speed)
Function	A collection of code that works outside the main program. These are created to speed up programming. They can be called from a single line of code at any time.
Comparative Operator	When comparing data, an operator is used to solve the equality such as <>, != or ==
Syntax	The punctuation/way that code has to be written so that the computer can understand it. Each programming language has its own syntax.
Data Type	This indicates how the data will be stored. The most common data types are integer, string, and float/real.
String	A collection of letters, numbers or characters. (eg, Hello, WR10 1XA)
Integer	A whole number. (eg. 1, 189)
Float/Real	A decimal number, not a whole number. (eg. 3.14, -26.9)
Boolean	1 of 2 values. (eg. True, False, Yes, No)
Variable.write	File.write("VariableName")
open	Open a text file
List	MyList = ["Apple","Fruit","Bannana","Parsnip"]

a	append	**w**	write	**r**	read

Key vocab	
Algorithm	A set of instructions which is followed to solve a given problem. Can be represented using a flowchart or Pseudocode.
Abstraction	Removing any unnecessary detail from a problem in order to solve it. Identifies the information that can be removed from the problem without changing it.
Decomposition	Breaking a large problem down with no known solution into smaller steps and stages.
Algorithmic thinking	Algorithmic thinking is a way of getting to a solution through the clear definition of the steps needed – nothing happens by magic.
Searching algorithm	An algorithm for finding values within a set of data.
Linear search	When a list is unsorted and an item needs to be found the algorithm will start at the beginning and move through until it finds the required value.
Binary search	If a list is sorted, an efficient search can be undertaken. It works by repeatedly dividing the set in half and checking where the value is in relation to the current one. It continues until the list has been fully checked or the search term found.
Sorting Algorithm	An algorithm used to sort a set of data into a given order. Examples include bubble sort, insertion sort and merge sort.
Sequencing	Writing steps down in an order in which they must happen.
Selection	Being able to select between different options or scenarios.
Iteration	Iteration is the act of repeating a process, either to generate an unbounded sequence of outcomes, or with the aim of approaching a desired goal, target or result.
Variable 	A value, which can change when a program is run. A variable is a memory location. It has a name that is associated with that location; the location stores some data.

Data types		
Integer	A whole number, such a 3, -45, 108	2 or 4 bytes
Real / Float	A number with a fractional part such as 43.69, -9.32.	4 or 8 bytes
Char / Character	A single character where a character can be any letter, digit, punctuation mark or symbol that can be typed.	1 byte
String	Zero or more characters. A string can be null (empty), just one, or several character.	1 byte per character
Boolean	A Boolean variable has the value of True or False.	1 byte

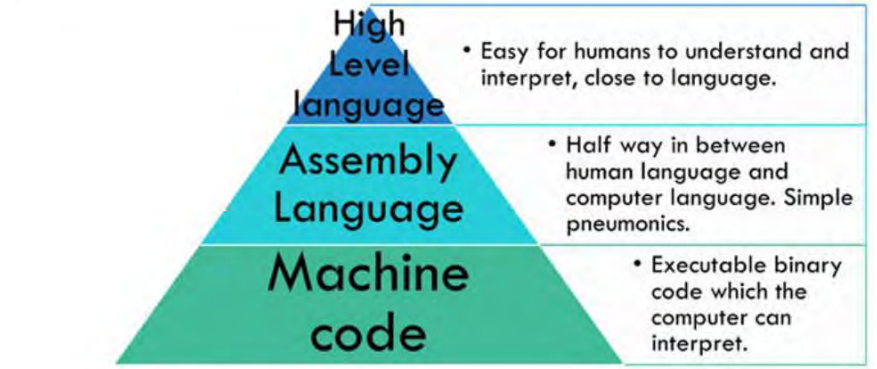
Binary Logic Gate Diagrams



Computer Science
Theory 2.5 – Translators and programming tools

Key Vocab	
Opcode	The part of an instruction that tells the CPU the operation to be Executed.
Operand	The part of the instruction that tells the CPU that data or which to Apply the opcode.
Translator	A program that converts source code (High level) to m code (Low Level).
High level code	Programming languages that are most like human language. They make programming easier because the programmer can concentrate on the logic of the program and not worry about the Hardware.
Low level code	Binary code that a CPU can execute.
Assembly Language	A low-level symbolic code made of pneumonic words converted by An assembler.
Assembler	A translator for converting assembly language code to object code.
Instruction set	The complete set of instructions that a processor can handle.
Source code	The program written in a high-level language before conversion to Machine code.
Object code	The machine code produced by a computer.
Compiler	Compiles work through the source code, spot certain errors and Translate all code into a machine code file called object code. Object Code is stored in a file to be executed.
Linker	A program used with a compiler or assembler to provide links to the Libraries needed for an executable program.
Interpreter	Interpreters work through the source code and translate it one Command at a time then immediately execute it. When errors are Found the process of execution will stop. (Like in Python).
Execution	The process of running a program.
Editor	A software used to write source code in a simple way. No frills.
Integrated Development Environment	A software tool that provides many of the utilities required to develop a program in one place. Common features may include an editor for a particular language, debugging tools, systematic progression through a program and a linker.
Run time environment	All the necessary facilities to run a program on a different platform, rather than creation of a program.

Programming Standards
Code should follow agreed conventions (EG Lowercase for variable names, schemes to be followed).
Language code is written in.
Functions used to tidy up repeated code.
Comments explain the code clearly.
Correct use of indentation.
Useful identifiers (File names & Variable names)
Code should follow agreed conventions



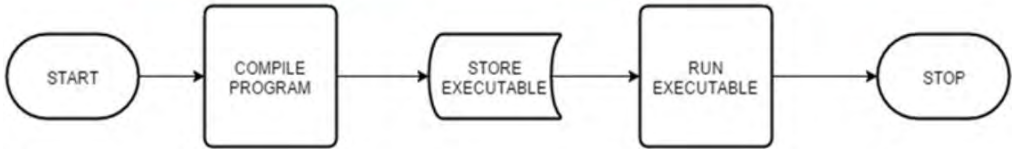


Figure 1 - How a compiler translates programs.

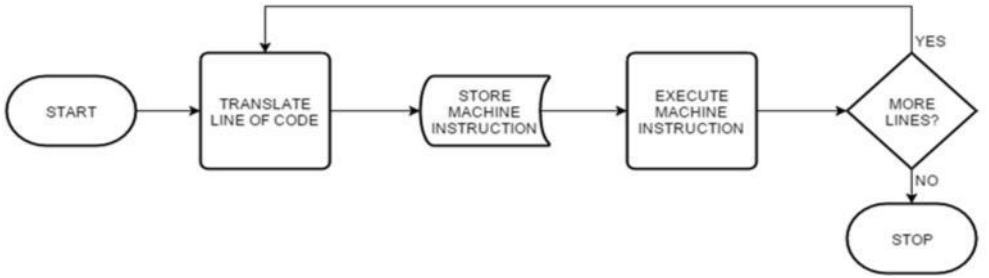
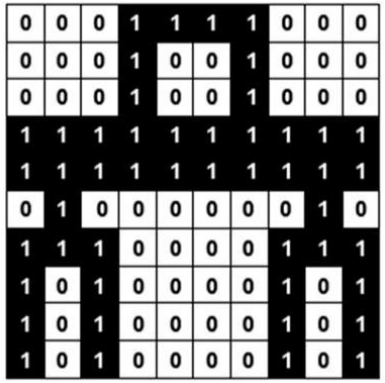


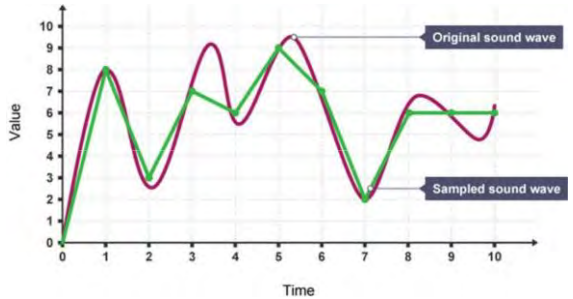
Figure 2 - How an interpreter translates programs.

Binary	Numbering system which uses base 2 (0s & 1s) – the only language that computers truly understand. 0 means off, 1 means on.
Denary	Numbering system which uses base 10 (0-9) – these are our normal numbers that we use every day. (Otherwise known as decimal)
Hexadecimal	Numbering system which uses base 16 (0-9 and A-F). These numbers are used to represent colours and code in assembly language, as they are easier for humans to understand than binary.
Binary addition	Adding binary numbers together (see rules of binary addition).
Overflow	If you cannot represent a number in the given amount of space (IE more bits are needed to represent a number), then this is an overflow error.
Binary Shift	Moving bits within a binary number in a certain direction. Any empty positions are filled with 0.
Check digit	An additional digit at the end of a string of numbers used to check for mistakes in transmission. ISBNs are formed of 12 bits for the item number, then the 13th is a check digit.

Bit	The smallest amount of data (stands for ***b****inary dig****it***) (0 or 1).
Byte (B)	8 bits
Kilobyte (KB)	1024 bytes
Megabyte (MB)	1024 kilobytes
Gigabyte (GB)	1024 megabytes
Terabyte (TB)	1024 gigabytes
Petabyte (PB)	1024 terabytes

Binary Addition	
0+ 0	= 0
0+ 1	= 1
1+ 0	= 1
1+ 1	= 0, carry a 1
1+ 1 + 1	= 1, carry a 1



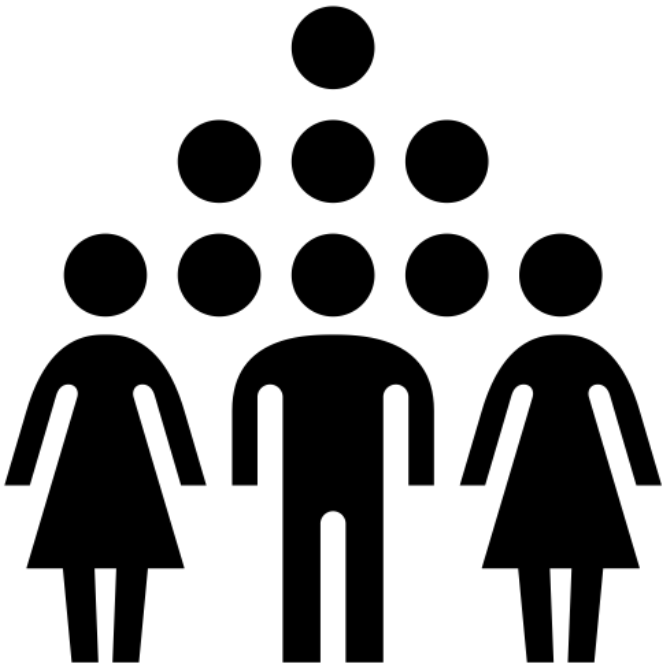


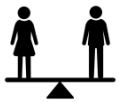
Character	A single letter, number or symbol. (e.g., A, 1, !)
Character set	A set of characters used in a language, which are each represented using a unique binary number.
ASCII	A character set which uses 7 bits to store a maximum of 128 characters. This uses the binary numbers 0 to 127.
Extended ASCII	The same as ASCII, though uses 8 bits (1 byte) to represent 256 characters using the numbers 0 to 255.
Unicode	The modern standard for representing characters in a computer system. Uses 16 bits to allow 65,536 characters to be represented.
Image	A picture that has been created or copied and stored in electronic form.
Bitmap	A map of bits, whereby the image is made of pixels.
Vector	An image represented using lines and shapes with specific properties such as line and fill colour. Data about each shape is stored in binary.
Pixels	The individual units (dots) that make up an image.
Colour depth	The number of bits, which are used to represent each pixel in an image. Increased numbers of colours means more bits are needed.
Resolution	The level of detail in an image, measured in dots per inch (dpi). If the size of an image is increased then the quality will reduce.
Metadata	Data, which is stored about a file. Examples include the type of file, date and time created, file size and geolocation.
Sampling	Method of converting an analogue sound signal into a digital file containing binary numbers.
Sample rate	The frequency at which you record the amplitude of a sound. Measured in Hertz.
Sample resolution	The number of bits used to store each sample.
Sample size	The number of seconds over which the sample was taken.
Compression	The re-encoding of data so that less bits are used to store it. Usually done to increase speed of transmission.
Lossy	Removes data completely to reduce the size of a file (eg. JPG).
Lossless	Organises data to reduce the size of a file without removing any information (eg. ZIP).

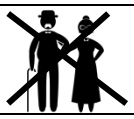
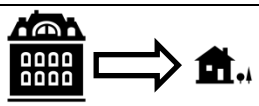
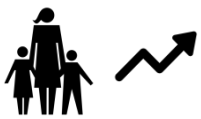
128	*64*	*32*	*16*	*8*	*4*	*2*	*1*

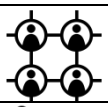
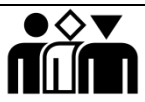
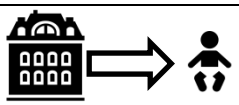
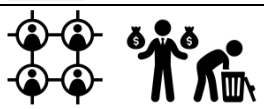
SOCIOLOGY

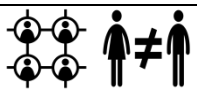
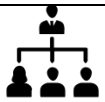
Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create a mind map for each topic that contains key facts and images. Once you have created a mind-map you should put it away and try to recreate it from memory, then look at your original mind-map and add what you have missed.



FAMILIES – KNOWLEDGE ORGANISER – FAMILY FORMS AND CONJUGAL ROLES		
FAMILY FORMS		
NUCLEAR FAMILY		A **heterosexual** couple and their children living together.
EXTENDED FAMILY		**Relatives** outside of the nuclear family (e.g. grandparents, aunts etc).
RECONSTITUTED FAMILY		A **blended or step family** that includes children from previous relationships.
LONE PARENT FAMILY		A family with **one parent.**
SAME SEX FAMILY		A family where a **gay or lesbian couple** live with their children.
EMPTY NEST FAMILY		A nuclear family where the **children have left home**.
BEANPOLE FAMILY		A multi-generational, extended family
THE RAPOPORTS'S 5 TYPES OF DIVERSITY IN UK FAMILIES		
CULTURAL DIVERSITY		1. Families are different in their **culture, values and beliefs**.
LIFE COURSE DIVERSITY		2. Families are different in the **stage that they are at** (e.g. newly married compared to an **empty nest** family).
ORGANISATIONAL DIVERSITY		3. Families are different in the way they are **organised** (e.g. **nuclear** compared to **reconstituted** or **lone parent**).
GENERATION/ COHORT DIVERSITY		4. Families are different depending on **the year they were born** (e.g. couples married in the 1950s often expected marriage to last for life).
SOCIAL CLASS DIVERSITY		5. Families are different in their **social classes and wealth.**
CONJUGAL ROLE RELATIONSHIPS		
CONJUGAL ROLES		**Segregated conjugal roles** are when there is a clear division of domestic labour and tasks are divided by gender. This was normal in the early 20th century.
		**Joint conjugal roles** are when there is no rigid division of household tasks into male and female jobs. Some sociologists suggest that conjugal roles are becoming more **joint**.
		**Symmetrical families** are when spouses perform different tasks but men and women share household responsibilities equally. Some sociologists, such as Young and Willmott, argue that over time families in Britain are becoming more **symmetrical.**
THE FEMINIST PERSPECTIVE OF OAKLEY ON THE IDEA OF THE CONVENTIONAL FAMILY.		Oakley defines the conventional family as a **nuclear family where the male and female parents are married and live with their children (aka cereal packet family)**. She considered the conventional family to be a form of **social control** and that women often have a **dual burden** (meaning they go out to work but also do the majority of the housework and childcare). However, she noticed that **other forms of family are becoming increasingly popula**r, such as lone parent or same sex families.

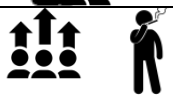
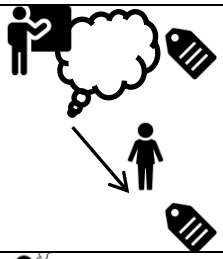
FAMILIES – KNOWLEDGE ORGANISER – CHANGING FAMILIES		
CHANGING RELATIONSHIPS WITHIN FAMILIES		
HOW RELATIONSHIPS WITHIN FAMILIES HAVE CHANGED OVER TIME.		1. Children's **needs and rights** are more widely recognised.
		2. People see their **extended family much less**.
		3. The extended family are still important but that their role is more likely to take the form of **phone calls and financial help**.
THE PRINCIPLE OF STRATIFIED DIFFUSION.		Young and Willmott developed the theory of **stratified diffusion.** This is the idea that **changes in norms and values start amongst the wealthier people in society** and then over time others start to behave in the same way.
CHANGING PATTERNS IN UK MARRIAGE AND DIVORCE SINCE 1945		
CHANGING PATTERNS IN MARRIAGE		1. There are **fewer marriages** and more people are **cohabiting.**
		2. An **increasing number of babies are born to couples who aren't married** and these births are no longer stigmatised.
		3. **Civil partnerships** for same sex couples have been legal since 2005, while **same sex marriage** was introduced in 2014.
		4. People are **putting off marriage until they are older.**
CHANGING PATTERNS IN DIVORCE		The number of **divorces per year has increased** since 1945 although there have been times when it decreased and the number peaked in 1993.
THE CONSEQUENCES OF DIVORCE		1. There has been an **increase in lone parent and reconstituted families**.
		2. Some **children lose contact with parents** or extended family following a divorce.
		3. Divorce can lead to **loss of income** for the former partners.

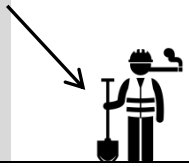
	 4. Divorced people, particularly men, may experience **a loss of emotional support** if their friends and social networks change.
FAMILIES 3 – KNOWLEDGE ORGANISER – PERSPECTIVES ON FAMILIES	
FUNCTIONALIST PERSPECTIVES ON FAMILIES	
THE FUNCTIONALIST PERSPECTIVE 	**Nuclear families** are positive both for individuals and society because
	 1. They control **sexual activity**
	 2. They encourage **reproduction**
	 3. They ensure that children are **socialised**
	 4. They help to maintain the **economy** because the work is split between the husband and wife in **their conjugal roles.**
PARSONS (FUNCTIONALIST) ON THE TWO MAIN FUNCTIONS OF THE FAMILY	 1. The nuclear family supports **primary socialisation,** ensuring the children learn the **culture** and **values** of their society.
	 2. The nuclear family also supports **personal stabilisation for the adults.** This means that the adults support each other emotionally if their lives are stressful (aka '**warm bath' theory**).
CRITICISMS OF FUNCTIONALIST PERSPECTIVES ON FAMILIES	
UNREALISTIC IDEALISATION	 Functionalists such as Parsons have an **unrealistic idea of 'perfect' families**. The reality is usually more complicated.
DYSFUNCTIONAL FAMILIES	 Functionalists ignore **dysfunctional families and marital breakdown** where there might be **conflict, child abuse, stress and domestic violence.**
LOSS OF TRADITIONAL FUNCTIONS	 Functionalist views are no longer relevant and are based on an **outdated, traditional view of families**. Families now are much more diverse.
LACK OF CONTACT WITH WIDER KINSHIP NETWORKS	 In the past families used to maintain close contact with the extended family. Nowadays people move around more and so **often don't have much contact with the extended family.**
MARXIST PERSPECTIVES ON FAMILIES	
THE MARXIST PERSPECTIVE 	Marxists are usually **critical** of the nuclear family because
	 (1) **They keep society unequal** (e.g. the bourgeoisie send their children to private schools and pass their wealth and property on to them)
	 2) **Through primary socialisation working class children learn to accept their position** in an unfair, capitalist society.

ZARETSKY'S MARXIST PERSPECTIVE ON THE DEVELOPMENT OF FAMILIES		The family was originally a unit of production (e.g. **all members of the family worked together)** but now **there is a split between the 'private sphere' and wor**k. This means that **women are expected to work for free** (e.g. cleaning and childcare) while **men go to work to support the economy**. Only socialism can end this artificial separation.
FEMINIST PERSPECTIVES ON FAMILIES		
THE FEMINIST PERSPECTIVE 	Feminists are usually **critical** of the nuclear family because	
		Through **primary socialisation** families help to **reproduce gender inequalities.** The word **canalisation** describes how parents channel children towards gendered toys and activities e.g. girls get dolls, boys get action figures.
DELPHY AND LEONARD'S FEMINIST CRITIQUE OF FAMILIES		The family is **patriarchal.** Men benefit from the **unpaid work of women** even when women have jobs they still do most of the housework.
		The family is **hierarchical**. The husband usually has more power and makes most of the decision.

EDUCATION – KNOWLEDGE ORGANISER – TYPES OF EDUCATION AND PERSPECTIVES		
TYPES OF SCHOOL AND SCHOOLING		
FORMAL EDUCATION		Takes places in educational establishments such as schools and universities.
INFORMAL EDUCATION		Takes place when people learn from their everyday life.
PRIMARY		Schools for children aged 5-11
SECONDARY		Schools for children aged 11-16. Includes comprehensive schools, free schools, special schools and academies.
INDEPENDENT SCHOOLS		Fee paying schools. These include private schools and public schools (older fee paying schools). Around 7% of English schoolchildren attend independent schools.
STATE SCHOOLS		State schools do not charge fees. Their intake is more socially mixed.
HOME SCHOOLING		Children are taught at home by parents or tutors.
DE-SCHOOLING		Illich argues that schools repress children and promote passive conformity. He argues that education should be abolished and that children should be able to decide what to learn based on their natural curiosity.
FORMAL CURRICULUM		The content of the planned lessons that learn at school.
HIDDEN CURRICULUM		The unintended lessons that children learn at school. These can be through the school rules, things that happen at break times etc.
PERSPECTIVES ON EDUCATION		
FUNCTIONALIST PERSPECTIVE		1. **Education serves the needs of the economy**. It gives people the knowledge and skills that people will need for work.
		2. **Education facilitates social mobility.** Gifted students from disadvantaged backgrounds can achieve qualifications and move up to a higher social class.
		3. **Education fosters social cohesion**. Schools help to reinforce the social bonds, norms and values that unite different people in society.
DURKHEIM'S FUNCTIONALIST PERSPECTIVE		The main function of education is **socialisation;** teaching children the norms and values of their society. Through history, for example, children learn that they are part of a community. By following school rules, children learn the difference between right and wrong
PARSONS FUNCTIONALIST PERSPECTIVE		The education system helps society to be **meritocratic.** Children are successful because of their abilities and effort not their family background. **Education acts like a sieve**, grading students and allocating them to jobs based on their abilities (this is known as their **achieved status**).
MARXIST PERSPECTIVE		1. **Education serves the interests of the ruling class**. For example, it promotes the idea that capitalist society is fair and meritocratic.

		2. **Education reproduces the class structure**. Children from privileged backgrounds are more likely to leave with better qualifications and get better jobs.
		3. **Education is a form of negative secondary socialisation.** Children learn to accept hierarchy and obey rules which prepare them to accept their role in a capitalist society.
BOWLES AND GINTIS'S MARXIST PERSPECTIVE		Bowles and Gintis use the term **correspondence principle** to describe the way that education (through the hidden curriculum) **trains children for life in the capitalist system** and prevents rebellion or revolution. School and work, for example, both involve uniforms, strict time-keeping, hierarchy, rewards, punishments, boring tasks etc.
EDUCATION – KNOWLEDGE ORGANISER – ACHIEVEMENT		
SOCIAL CLASS AND EDUCATIONAL ACHIEVEMENT		
SOCIAL CLASS		In general, **middle class students achieve better exam results than working class students.**
HALSEY'S STUDY ON EDUCATIONAL DESTINATIONS	 	Halsey, Heath and Ridge researched the educational destinations of school children. They conducted a large, fact to face study that divided people into three social classes based on their father's occupation; service class (e.g. professionals such as doctors), intermediate class (e.g. office workers) and working class (e.g. manual labourers). **Children born into the service class did much better at school and were more likely to go to university than the intermediate class and both did better than the working class.**
EXPLANATIONS FOR CLASS DIFFERENCE		1. **Economic circumstances:** Students from affluent backgrounds usually have the facilities to help them study (space, PC etc), parents often employ tutors and live in the catchment areas of good schools.
		2. **Parental values:** Parents from the upper and middle classes often value education and expect their children to do well. Parents from the working class might be less interested or have lower expectations.
		3. **Cultural Capital:** Middle class parents often have the knowledge and skills to be able to help their children with school work and revision.
BALL'S STUDY ON PARENTAL CHOICE	 	Ball, Bowe and Gewirtz argue that the publication of league tables has led **increased competition between schools**. However, **middle class parents have an advantage in this competition** because they can afford to move to good schools or to pay for their children to travel further to those schools.
GENDER AND EDUCATIONAL ACHIEVEMENT		
GENDER		In general, **girls do better than** boys in both GCSEs and A levels than boys.
		Girls are more likely to study subjects such as English and Art at A level, whereas boys are more likely to study physics and maths.
EXPLANATIONS FOR GENDER DIFFERENCES		1. **Women's rights:** Changes to the law have made gender discrimination in education illegal. Feminism has meant that girls now are expecting to get a job and be financially independent.
		2. **Anti-school sub-culture amongst boys:** Peer pressure may encourage boys to see school and educational success as 'uncool'.
		3. **Gendered curriculum:** The hidden curriculum encourages the perception that some subjects are masculine whilst others are feminine.
ETHNICITY AND EDUCATIONAL ACHIEVEMENT		

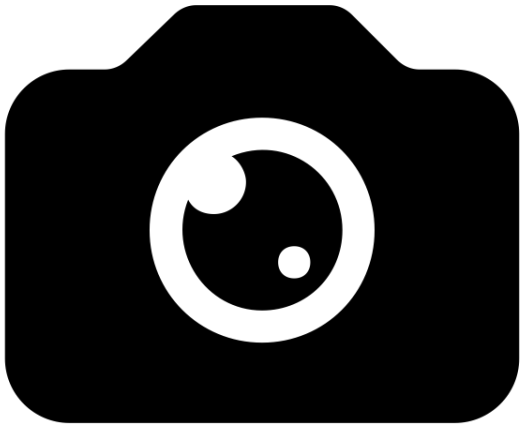
ETHNICITY		In general, **students from some minority ethnic groups** (e.g. Chinese) **achieve better exam results than others** (e.g. Black Caribbean).
EXPLANATIONS FOR ETHNICITY DIFFERENCES: HOME FACTORS		1. **Economic circumstances:** Students from some minority ethnic groups (e.g. Black Caribbean) are more likely to experience material deprivation than those from others.
		2. **Parental values:** Some ethnic minority parents (e.g. British Chinese) are more likely to value education and educational success.
		3. **Cultural capital:** White, middle class parents often have the knowledge and skills to be able to help their children with school work and revision.
EXPLANATIONS FOR ETHNICITY DIFFERENCES: SCHOOL FACTORS		1. **Ethnocentric curriculum:** The idea that the formal curriculum is biased towards white, European culture
		**2. The hidden curriculum:** The hidden curriculum emphasises white, mainstream norms and values (e.g. school uniform policy).
		3. **Institutional racism:** When the policies and procedures of an organisation result in discrimination. Some people argue that the high rate of fixed-term exclusions of Black Caribbean boys is evidence of institutional racism in schools.
EDUCATION – KNOWLEDGE ORGANISER – PROCESSES WITHIN SCHOOLS		
STREAMING		**Students are allocated to a band based on their overall ability** and are taught in this band for most of their subjects.
THE EFFECTS OF STREAMING		1. **Promotes class differences in achievement:** A disproportionately high number of lower stream students are drawn from the working class.
		2. **Creates an anti-school sub-culture:** In response to being labelled as failures, some lower stream students reject the school's values and rules.
SETTING		**Students are allocated to a class based on their achievement in that subject**. They will be taught in different classes for different subjects.
THE EFFECTS OF SETTING		Students are often set because of their behaviour rather than their achievement. Students are often not moved up or down a class for practical reasons (e.g. class size).
MIXED ABILITY TEACHING		Students are taught in **mixed ability classes.**
LABELLING AND THE SELF-FULFILLING PROPHECY		**Negative labelling of students can lead to a self-fulfilling prophecy**. For example, students who are told that they are low ability in maths come to believe that and give up more easily in maths lessons.
THE INTERACTIONIST PERSPECTIVE		Interactionism focuses on small-scale interactions between teachers and students. Research suggests that **teachers label students based on factors such as their appearance, gender, ethnicity and how well they conform to the school's rules, norms and values.**
BALL ON TEACHER EXPECTATIONS		Ball undertook a case study of streaming in a secondary school. **Some students changed their behaviour over time as a result of teacher expectations.** For example, teachers expected students in the 'top' band to be well-behaved and hard working and students in the 'bottom' band to be slow to complete work and poorly behaved. Over time, students' behaviour began to mirror these expectations.
THE KEY IDEAS OF WILLIS ON THE CREATION OF COUNTER SCHOOL CULTURES.		Willis carried out a study of 12 working class boys ('lads') in a single sex school. He used qualitative methods to explore their counter-school culture. They resisted the school and its rules and focussed on 'dossing' ad 'having a laff.' They saw the more conformist boys as 'cissies.' They saw manual work as masculine and white collar work as effeminate. Willis followed the 'lads' into their jobs and argues that the **anti-school culture**



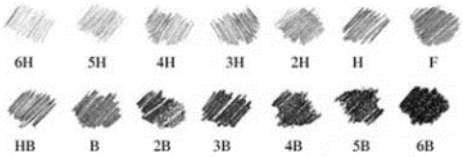
prepared them for working class jobs where they adopted similar attitudes.

ART AND PHOTOGRAPHY

Use the information that follows to test yourself on key words/phrases for each topic (using the look/cover/check technique), to research the work of artists and photographers and to develop your own responses to practitioners as we have been doing in class.



Knowledge Organiser
Art GCSE Art and Design

	Assessment Objectives / Skills	Knowledge and Understanding	Key words	1.Techniques & processes that may be covered
	Students will be required to demonstrate the ability to:	Students will learn: **TRANSFERRABLE SKILLS**	REMEMBERING, UNDERSTANDING, ANALYSING, APPLYING, CREATING, EVALUATING	Drawing from observation, Drawing from secondary sources, drawing using a grid, Shading, crosshatching, hatching, stippling, blending tones using a range of pencils, using pencil crayons, biro, pen and wash.
1	**AO3: RECORD IDEAS OBSERVATIONS & INSIGHTS** relevant to the theme of the PORTFOLIO as it progresses.	-The ways in which meanings, ideas and intentions can be communicated through drawing Annotation: students will be expected to record a purposeful written annotation using suitable specialist vocabulary, demonstrating an understanding of the formal elements.	Observation, primary & secondary sources, composition, proportion, balance, perspective, depth, colour, line, form, tone, texture, annotation	 Painting (acrylic, watercolour) Collage, modelling, mixed media, digital editing, textile techniques (batik, tie- dye) Printing (mono printing, block printing, foam printing.)
2	**AO1: DEVELOP IDEAS** through investigations demonstrating critical understanding of artist's work.	-How sources inspire the development of ideas, through exploring the work and approaches of artists that link to the theme.	Respond, describe, explain, analyse, research, select, inspiration, explore, pastiche, realism, abstract	**2.Themes you may cover** A portfolio of work based on a starting point. Starting points include Indulgence, Inside/Outside, Distorted, Derelict, Cultures, In the News
3	**AO2: REFINE WORK** by exploring ideas, selecting and experimenting with appropriate media, materials, techniques and processes	-Experimenting using different media, materials, techniques and processes. Looking at the ways in which they can be used in relation to students' own creative intentions.	Making connections, variety, explore, select, develop, reflect, experiment	**3. Artists for inspiration that may be covered** Van Gogh- for his mark making technique. Ben Heines – for his use of tone. Mark Powell –for his use of biro on recycled paper. Artists chosen independently to develop your portfolio.
4	**AO4: PRESENT** a personal and meaningful response that realises intentions and demonstrates understanding of visual language.	-Ability to produce a final outcome that links all of the portfolio together. - Use of the visual language through application of the formal elements.	Meaningful, personal, final piece, formal elements, explain, evaluate.	4. **Presentation of the portfolio** All work should be neatly presented in display folders with clear annotations.

Art and Design Knowledge Organiser

Assessment Objective 1: Contextual Understanding – Develop ideas through investigations, demonstrating critical understanding of sources

1 Mind Mapping – Ideas presented around the theme of the work

Central idea.
This is the starting point of your Mind Map and represents the topic you are going to explore.
Your central idea should be in the centre of your page and should include an image that represents the Mind Map's topic.

Branches.
The main branches which flow from the central image are the key themes. You can explore each theme or main branch in greater depth by adding smaller branches.

Key words.
When you add a branch to your Mind Map, you will need to include a key idea. An important principle of Mind Mapping is using **one word per branch**. Keeping to one word sparks off a greater number of associations compared to using multiple words or phrases.

Colour coding.
This links the visual with the logical and helps your brain to create mental shortcuts. The code allows you to categorise, highlight and analyse information. Colours also make images more appealing and engaging.

Include images.
Images have the power to convey much more information than a word or sentence. They are processed instantly by the brain and act as visual stimuli to recall information.

2 Moodboard – A collage of ideas using collected images

Consider your theme.
Do you want it quite narrow or are you happy to collect a wider range of ideas.

Use a range of sources.
Internet images, photographs, wallpaper/fabric samples, lettering.

Don't limit yourself.
Even if it doesn't directly link to your starting point it may relate to the theme. Consider colours and words to help you.

Apply your ideas.
Your moodboard will directly link to the development of your project. If there is empty space fill it with sketches or annotations.

Pick a style.
Pulling it all together with a colour theme or visual style will make your page work together as a whole.

3 Artist Research – showing your understanding of an artists work or style

Biographical information.
Birth, death, style, education, important works

Social, historical and economic influences.
What was happening at the time? Were they responding to anything that was happening around them?

Technical information.
How was their produced? What methods and materials did they use?

Artistic influences.
Who influenced their work? Did their work influence anyone else?

Collected images.
Select images that are relevant and that appeal to you, make comments about why you like them

Copied images.
Show your understanding by reproducing examples of their work

Presentation.
Must be A3 or 2 A4 sheet, include a clear title and relevant background

When analysing work, use the Content/Form/Process/Mood model

4 Analysing Art Work

Content – Looking at the subject of the work.
What is it? What exactly can you see? What is happening? What does the work represent?
What does the artist call the work?
Does the title change the way we see the work?
What is the theme of the work?
Landscape, portrait, journey, moment, memory, event, surreal, fantasy, abstract, message.

Form – Looking at the formal elements.
What colours does the artist use? Why? How is the colour organised?
What kind of shapes can you see?
What kinds of lines and marks does the artist use?
What is the surface like? What textures can you see?
What patterns can you see?
How big is the work?
Light, delicate, layered, strong, rough, dark, peaceful, dripped, textured, scale, vivid, bright.

Process – How the work has been developed and made.
What materials and tools have been used?
What is the evidence for how it has been made?
Painted, drawn, woven, printed, cast, stitched, constructed, collaged.

Mood – Looking at the communication of moods and feelings.
How does the work make you feel?
Why do you feel like this?
Does the colour, texture, form or theme of the work affect your mood?
Quiet, contemplative, thoughtful, hopeful, peaceful, elated, joyful, reflective.

Art and Design Knowledge Organiser

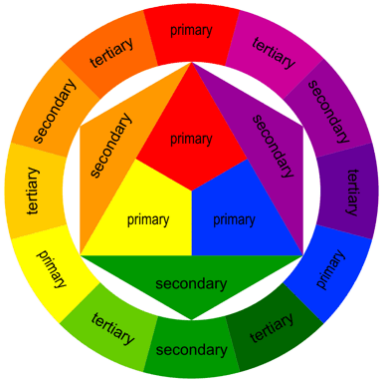
Assessment Objective 2: Creative Making – refine work by exploring ideas and experimenting with appropriate media, materials, techniques and processes

1

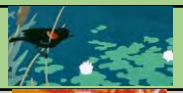
Media	The substance that an artist use to make art
Materials	The same as media but can also refer to the basis of the art work eg, canvas, paper, clay
Techniques	The method used to complete the art work, can be generic such as painting or more focus such as blending
Processes	The method used to create artwork that usually follows a range of steps rather than just one skill

3

Colour Theory	
Primary= RED, YELLOW, BLUE	Complimentary; Colours opposite on the colour wheel
Secondary= Primary+Primary	Harmonious; Colours next to each other on the wheel
Tertiary= Secondary+Primary	Monochromatic; shades, tones & tints of one colour
Shades – add black	Hue – the pigment
Tint – add white	Warm; RED, ORANGE YELLOW. Cold; BLUE, GREEN, PURPLE



2

Pencil		The basic tool for drawing, can be used for linear work or for shading
Biro		Drawings can be completed in biro and shaded using hatching or cross hatching
Pastel (chalk/oil)		Oil and chalk pastels can be used to blend colours smoothly, chalk pastels give a lighter effect
Coloured pencil		Coloured pencil can be layered to blend colours, some are water soluble
Acrylic paint		A thick heavy paint that can be used smoothly or to create texture
Watercolour		A solid or liquid paint that is to be used watered down and layered
Gouache		A pure pigment paint that can be used like watercolours or more thickly for an opaque effect
Pressprint		A polystyrene sheet that can be drawn into to print white lines – can be used as more than 1 layer
Monoprint		Where ink is transferred onto paper by drawing over a prepared surface
Collograph		A printing plate constructed of collaged materials
Card construction		Sculptures created by building up layers of card or fitting together
Wire		Thick or thin wire manipulated to create 2d or 3d forms
Clay		A soft substance used for sculpting, when fired can be glazed to create shiny colourful surfaces
Batik		A fabric technique using hot wax to resist coloured inks
Silk painting		Fabric inks painted onto silk, Gutta can be used as an outliner to prevent colours mixing

Art and Design Knowledge Organiser

Assessment Objective 3: Reflective Recording – Record ideas, observations and insights relevant to intentions as work progresses

1

Methods of Recording

Observational drawing	Drawing from looking at images or objects
First hand observation	Drawing directly from looking at objects in front of you
Second hand observation	Drawing from looking at images of objects
Photographs	Using a camera or smartphone to record images will class as first hand observation
Sketches	Basic sketches and doodles can act as a starting point for development

Stages of Drawing

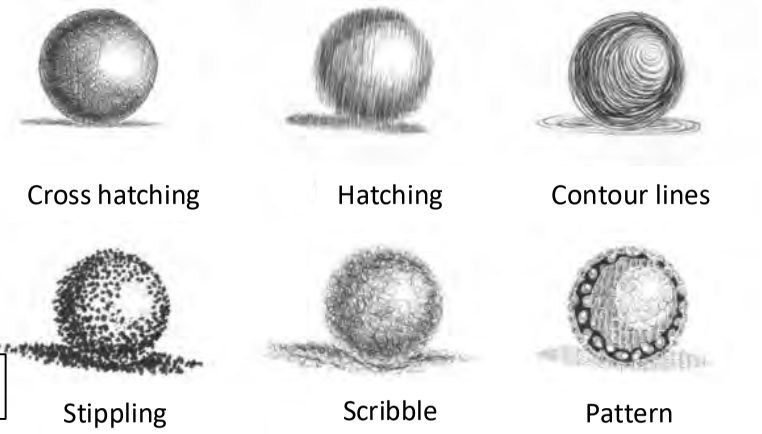
Basic shapes → Accurate shapes → Detail → Shade

2

Tonal shade

Produce a range of tones by varying the pressure and layering – consider using softer pencils for darker shades

Alternative shade techniques



3

Annotation

Describes writing notes, using images and explaining your thoughts to show the development of your work.

Step 1- Describe
What is this an image of?
What have you done here?
What was this stage of the project for?

Step 2- Explain
How was this work made?
How did you produce particular effects? How did you decide on the composition?

Step 3- Reflect
Why did you use these specific methods? Why do particular parts work better than others?
Why might you do things differently next time?

Art and Design Knowledge Organiser

Assessment Objective 4: Personal Presentation: Present a personal and meaningful response that realises intentions and demonstrates understanding of visual language.

1 Formal Elements of Art

LINE	the path left by a moving point, e.g. a pencil or a brush dipped in paint. It can take many forms. e.g. horizontal, diagonal or curved.
TONE	means the lightness or darkness of something. This could be a shade or how dark or light a colour appears
TEXTURE	the surface quality of something, the way something feels or looks like it feels. There are two types : Actual and Visual
SHAPE	an area enclosed by a line. It could be just an outline or it could be shaded in.
PATTERN	a design that is created by repeating lines, shapes, tones or colours. can be manmade, like a design on fabric, or natural, such as the markings on animal fur.
COLOUR	There are 2 types including Primary and Secondary . By mixing any two Primary together we get a Secondary

2 Composition Layouts

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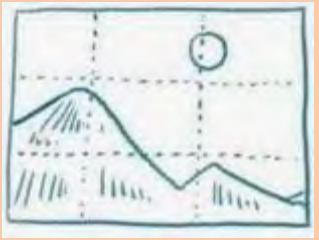
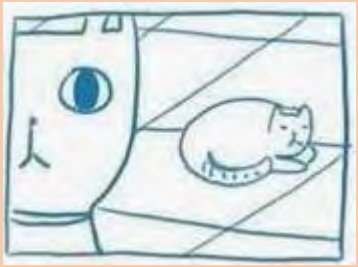
Rule of thirds – Place focal objects at 1/3 or 2/3 of the image horizontally or vertically. Not in the middle





Balance elements. If there is an emphasis on one side balance it out with smaller objects on the other

Simplify and fill. Enlarge or crop the image to fill the space

Use lines. Lines will draw the viewer in, they don't have to be straight, consider S or C

3

A Rough	A Visual/ Maquette	Final Piece
A basic sketch of a final idea	A small image or model created in selected materials	An image or sculpture pulling all preparatory work together

Artists techniques to inspire your portfolio further.

Alfred Basha

WHERE: Born in Italy in.
WHEN: 1989- present day.

WHAT:A graphic designer/Artist who made drawings inspired by nature.

HOW: He would use fine black inked pen with attention to detail.

INSPIRED BY: Nature particularly the animal world. He was also influenced by surrealist art and would merge animals with the natural world.

SALVADOR DALI

WHERE: born SPAIN

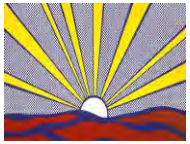
WHEN: 1904-1989

WHAT: Surrealist artist.

HOW: Painting (oil on canvas), drawing, photographer, sculptor

INSPIRED BY; His painting style was influenced by the Renaissance masters such as Raphael and Michelangelo

ROY LICHTENSTEIN



WHERE: America

WHEN: 1923-1997

WHAT: Pop artist

HOW: Made prints, paintings and sculptures

INSPIRED BY comic strips, Lichtenstein produced precise compositions that often had 2 meanings. His work was influenced by popular advertising and the comic book style.

JONE BENGOA

WHERE: Born in Spain

WHEN: 1996-present

WHAT: Realistic and expressive eye portraits depicting different emotions

HOW: Watercolour paintings

INSPIRED BY; It is said that "the eyes are the windows to the soul" and she manages to express it in her realistic eye paintings.

BEN HEINES

WHERE: Born in Belgian

WHEN: 1983-Present day

WHAT: He is an accomplished illustrator and photographer. His name became famous in 2010 with the invention of a new art form titled "Pencil Vs Camera".

INSPIRED BY: He is an enthusiastic traveler, he is inspired by nature, animals, architecture, friendship. He loves discovering new cities and cultures.

Andres Preis

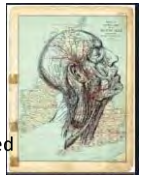
WHERE: Born in Germany

WHEN: 1988- present day

WHAT: A graphic designer/illustrator who prefers tradition drawing techniques.to detail and digital art.

INSPIRED BY: He was inspired by advertising especially posters for his compositions.

Mark Powell



WHEN; Contemporary artist

WHERE; American born but London based

WHAT; Reuses old envelopes, maps & books as canvases to produce incredible drawings. His sketches are made using only a Biro pen, and they often incorporate original stamps and postage marks. .

INSPIRED BY; Jean Michael Basquait and Chuck Close

Photography Knowledge Organiser Autumn Term

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Framing and Composition:

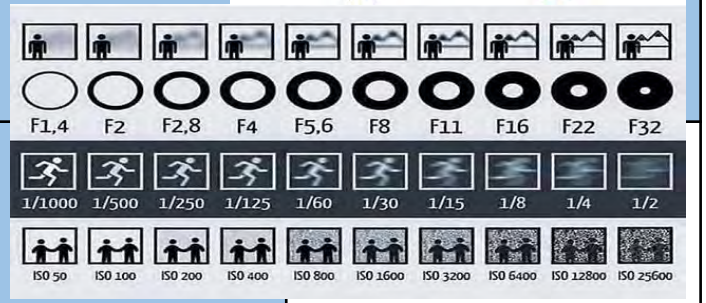
1. **framing** is the presentation of visual elements in an image, especially the placement of the **subject** in relation to other objects. **Framing** can make an image more aesthetically pleasing and keep the viewer's focus on the framed object(s).
2. **composition** is the placement or arrangement of visual elements or 'ingredients' in a work of art, as distinct from the subject. It can also be thought of as the organization of the elements of art according to the principles of art.

7. Exposure and 8. Exposure Triangle

A photograph's exposure determines how light or dark an image will appear when it's been captured by your camera.
Over exposure = too light.
Under exposure = too dark.
Exposure can be manipulated using 3 elements.
Aperture, ISO, shutter speed.
This is known as the **Exposure Triangle**.

The **rule of thirds** is applied by aligning a subject with the guide lines and their intersection points, placing the horizon on the top or bottom line, or allowing linear features in the image to flow from section to section.

9. Aperture
The size of the hole in the lens.
This is measured as an f/stop.
Small aperture = less light = big f/stop.
Large aperture =more light= small f/stop.



Leading The Eye. The primary use for **diagonal lines** is to lead the eye to a certain point in the **photo** and they are extremely effective at doing this. When you intersect a **diagonal line**, or point it in the direction of a particular object, the tension created draws the eye towards this point.

10. Shutter Speed
The time taken for the shutter to close.
Fast = less light = freezes motion.
Slow = more light = motion blur

Symmetry **means centred**. Neatly **centred composition** is the best way to emphasise various kinds of symmetry, both horizontal or vertical.

11. ISO
ISO is the sensitivity of the image sensor to light. Low ISO= the less sensitive your **camera** is to light and the finer the grain (reduced noise). Higher **ISO** are used in darker situations to get faster shutter speeds.

12. Front Lighting
the least dramatic, front lighting illuminates the subject

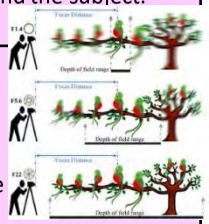
13. Back Lighting
the sun or other light source emanates from behind the subject. Creates silhouettes.

6. Golden Ratio

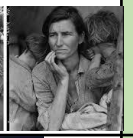
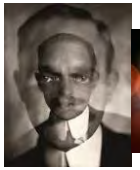
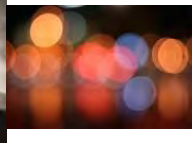
The rule of thirds is an simple version of a more advanced mathematical equation known as the **golden ratio** (also known as the Fibonacci Sequence). The **golden ratio** is found in nature. 1,1,2,3,5,8,13,21,34. The 2 proceeding numbers in the sequence are added together to get the next. They join in an anti clockwise helix.

14. Side lighting
perfect for emphasizing texture, defining depth, and bringing out patterns. 45 angle is good for portraits.

15. Depth of Field
Shallow = part of The frame is in Focus.
Deep = All the frame Is in focus.



Photography Knowledge Organiser SpringTerm

Genre **Documentary photography** usually refers to a popular form of**photography** used to chronicle events or environments both significant and relevant to history and historical events as well as everyday life.	  	Kitra Cahana Mike Brodie Tim Hetherington Thomas Gudzowaty Edward Burtynsky Lynsey Addario Corey Arnold John Decker Stephanie Sinclair Steve Mc Curry
Photo-journalism in which written copy is subordinate to pictorial usually photographic presentation of news stories or in which a high proportion of pictorial presentation is used; broadly : news **photography**.	   	Dorothea Lange Mary Ellen Mark Dayanita Singh Alec Soth Diane Arbus Peter Hugo Bruce Davidson Boris Mikhailov Don McCullen Chris Steele Perkins
Studio photography A **photographic studio** (also known as a**photography studio** or **photo studio**) is a workspace to take, develop, print and duplicate**photographs**. ... The **studio** may have a darkroom, storage space, a **studio** proper where **photographs**are taken, a display room and space for other related work.	  	Joe McNally Scott Kelby Annie Leibovitz David Bailey Fernando Decilitiis Jaime Travezan Eric Almes
Location photography shooting is the shooting of a film or television production in a real-world setting rather than a sound stage or backlot. ... Second unit **photograph** is not generally considered a **location** shoot. Before filming, the locations are generally surveyed in pre-production, a process known as **location** scouting and recce.	  	Ansel Adams Henri Cartier Bresson Annie Leibovitz Brian Duffy Dorothea Lange Yousef Karsh Brassai Robert Cape Jay Mansel Jerry Ulesman
Experimental imagery Abstract **photography**, sometimes called non-objective, **experimental**, conceptual or concrete **photography**, is a **means** of depicting a visual image that does not have an immediate association with the object world and that has been created through the use of photographic equipment, processes or materials.	   	Aaron Siskind Marco Brever Alvin Langdon Anna Atkins Gaston Bertin Josh Brash Brno del Zou
Installation is an artistic genre of three-dimensional works that often are site-specific and designed to transform the perception of a space.	  	Joshua Citarella Sara Cwyner Martine Syms Artie Vierkant Kate Steciw Leigh Ledare Lucas Blacklock Ryan Forester Timur Si Quin Marco Scozzaro

Photography Knowledge Organiser Summer Term

Camera Techniques

1. Bokeh

Bokeh is the orbs created when lights are out of focus in an image. It's a neat effect to have in the background of a photo, c…s.

2. Burst Mode

You can take photos one at a time. Or, you can turn the burst mode on and the camera will continue snapping photos as long as you hold the button down, or until the buffer is full (which is a fancy way of saying the camera can't process any more). Burst speeds differ based on what camera you own, some are faster than others. Just how fast is written in "fps" or frames (pictures) per second.

3. Flash Sync

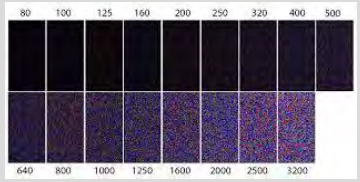
You probably know that the flash is a burst of light—flash sync determines when the flash fires. Normally, the flash fires at the beginning of the photo, but changing the flash sync mode adjusts when that happens. The rear curtain flash sync mode, for example, fires the flash at the end of the photo instead of the beginning.

4. Histogram

In photography, a histogram is a chart that depicts how many light and dark pixels are in an image. If the chart peaks towards the left, the image has a lot of dark hues. If the chart peaks to the right, the image has a lot of light hues. If those peaks are cut off at the edges, the image is underexposed (on the left edge) or overexposed (on the right edge).

5. Noise

Noise is simply little flecks in an image, also sometimes called grain. Images taken at high ISOs have a lot of noise, so it's best to use the lowest ISO you can for the amount of light in the scene.



6. RAW

RAW is a file type that gives the photographer more control over photo editing. RAW is considered a digital negative, where the default JPEG file type has already been processed a bit. RAW requires special software to open, however, while JPEG is more universal.

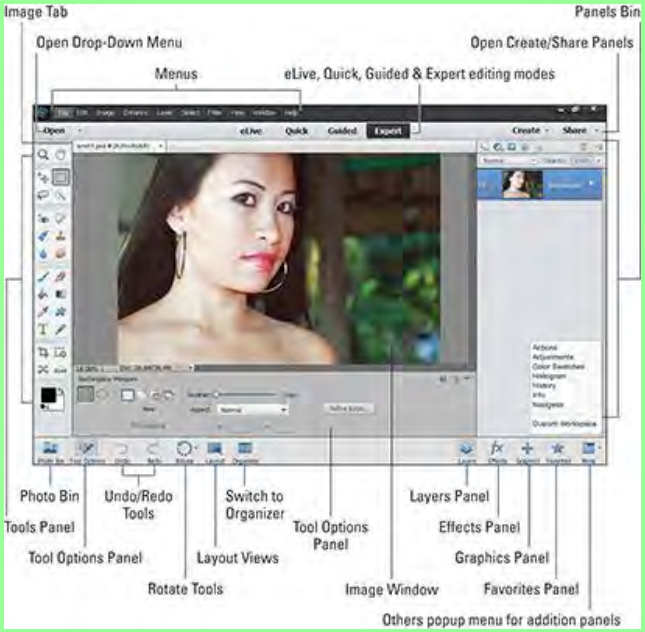
7. Time Lapse

A time lapse is a video created from stitching several photos together taken of the same thing at different times. Don't confuse a time lapse with a long exposure, which is a single image with a long shutter speed.

8. White Balance

Your eyes automatically adjust to different light sources, but a camera can't do that—that's why sometimes you take an image and it looks very blue or very yellow. Using the right white balance setting will make what's white in real life actually appear white in the photo. There's an auto white balance setting, but like any automatic setting it's not always accurate. You can use a preset based on what light you are shooting in like sun or tungsten light bulbs, or you can take a picture of a white object and manually set the white balance.

9. Photoshop Elements 14



10. Editing Sites

https://www.fotor.com/app.html#/editor

http://photogramio.com/

https://www.befunky.com/

https://www.picmonkey.com/photo-editor

https://photoeditor.polarr.co/

https://ipiccy.com/

https://www.dafont.com/

SPORT

Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create a mind map for each topic that contains key facts and images. Once you have created a mind-map you should put it away and try to recreate it from memory, then look at your original mind-map and add what you have missed.

Unit 1
Learning Aim A- Components of Fitness

Components of physical fitness	Components of skill related fitness
Aerobic endurance	Agility
Muscular endurance	Balance
Flexibility	Coordination
Speed	Power
Muscular strength	Reaction time
Body composition	

Physical Fitness

Aerobic Endurance
The ability of the cardiorespiratory system to work efficiently, supplying nutrients to the working muscles. This is needed for long distance events.

What is the cardiorespiratory system?
- ✓ Uptakes oxygen from air breathed in
- ✓ Transports oxygen around body to working muscles
- ✓ Removes waste products such as carbon dioxide

AEROBIC- in the presence of **oxygen** (long distance events)
ANAEROBIC- **without oxygen** (short distance or power events)

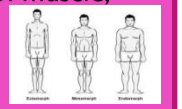
Muscular Endurance
The ability of muscles to work repeatedly against a light to moderate load without getting tired.

Speed
Accelerative speed: This is the speed generated in order for a performer to be at their top speed. *Eg- long jump run up*
Pure speed: This is needed for events that are won by achieving the quickest time. *Eg- 100m sprint*
Speed endurance: This is an athlete's ability to sustain speed over a long period of time with short recovery periods. *Eg- a footballer*

SPEED (m/s) = DISTANCE TRAVELLED / TIME TAKEN

Muscular Strength
The maximum force that can be generated by a muscle or group of muscles. Weights will be heavy and therefore repetitions are low.

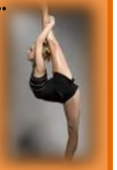
Body Composition
This is the combination of muscle, fat and bone.



EcTomorph- **T**all and **T**hin
EnDomorph- Short and **D**umpy
Mesomorph- **M**uscular

Flexibility
The ability to move a joint fluidly through a complete range of movement.

Some sports require all round flexibility whereas some sports require flexibility at specific joints.



Skill Related Fitness

Coordination
The ability to use body parts together accurately. This is needed in most sports.

HAND-EYE coordination
FOOT-EYE coordination
HAND-HAND coordination

Power
POWER = STRENGTH x SPEED

The ability to use strength at speed.

Therefore the faster or stronger a motion, the more powerful it will be.

Balance
The ability to maintain the centre of mass over a base of support.

STATIC BALANCE- maintaining a balance whilst stationary. *Eg- handstand*
DYNAMIC BALANCE- maintaining a balance whilst in motion. *Eg- cartwheel*

Reaction time
The time taken for a performer to respond to a stimulus. *Eg- sprinter*

Agility
The ability to change direction quickly. *Eg- rugby players*

Heart Rate (HR)
The number of times your heart beats per minute (bpm)
Resting Heart Rate (HR)
Your heart rate at rest
Maxmimum Heart Rate (HRmax)
The maximum number of times the heart should beat before it becomes unsafe.

HR max = 220 - age

BORG scale
The BORG rating of perceived exertion (RPE) scale is used to measure how hard a perfomer thinks they are working.

Training zones
The target zone you train in depends on the type of benefits you are hoping to achieve.

You must work out your HR max before you can calculate your target heart rate zones!

Basic principles of training

Frequency **How often you train.**
This should be gradually increased.

Intensity **How hard you train.**
This should be gradually increased.

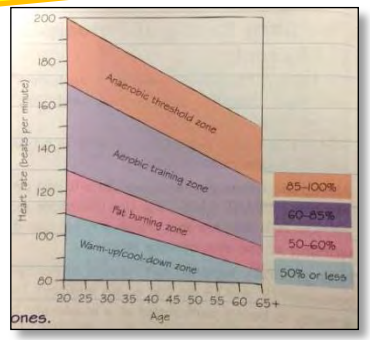
Time **How long you train for.**
This should be gradually increased.

Type **The training method used.**
This should be specific to the component of fitness the performer aims to develop.

Remember FITT!

Target Heart Rate
This is the recommended maximum heart rate for a training zone and is used to measure exercise intensity.

RPE Scale	
6	
7	Very, Very Light
8	
9	Very Light
10	
11	Fairly Light
12	
13	Somewhat Hard
14	
15	Hard
16	
17	Very Hard
18	
19	Very, Very Hard
20	



The BORG scale can be used to predict heart rate:
RPE x 10 = approximate HR (bpm)

Unit 1
Learning Aim A- Principles of Training

Specificity
This means that the training is relevant to the individual's sport, activity or fitness related goals.

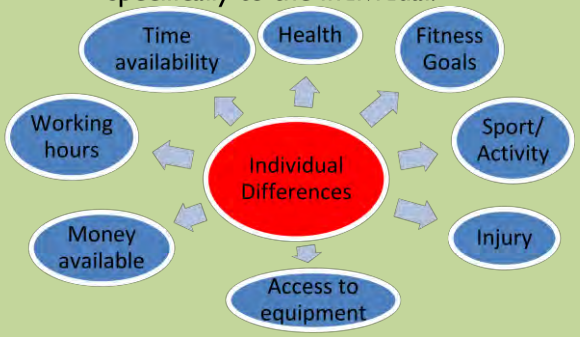
Overload
Training must be demanding enough to cause the body to adapt.
For the body to make fitness gains, it must get more demanding over time- this is called **progressive overload**.
Overload can be achieved by gradually increasing FITT

Adaptation
This is when your body adapts to cope with increased training. This usually happens during rest times.

Reversibility
Fitness can be lost if training is stopped or if the intensity of training is not sufficient enough.

HYPERTROPHY- When a muscle grows in size.
MUSCLE ATROPHY- When a muscle loses size

Individual differences & lifestyle factors
Fitness programmes should be designed specifically to the individual.



Rest and Recovery
Rest is very important as it allows training adaptations to occur and the body to recover from any damage. Rest time also allows energy stores to be replenished.

Variation
A variety of training routines should be used to avoid boredom. It will also help to reduce the risk of injury caused by repetition of the same training methods.

Unit 1
Methods of Training

Circuit training

This is a series of different activities that can be either sport-specific or tailored to improve certain aspects of fitness.

Intensity can be easily increased by increasing time on stations and decreasing rest time.
Circuit training is great for variation!

Continuous training

This is a steady pace, low-moderate intensity training method used for developing aerobic endurance.
Continuous training includes working for long periods of time/over long distances without stopping.

Fartlek training

Fartlek training involves running at different speeds or over different terrains.
Walk periods might be included for recovery but there are no rest periods.

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Flexibility training

This is used to stretch the muscles and increase flexibility. There are 3 types of flexibility training:

1- Static stretching

-Active: This is performed independently where the performer applies their own force to stretch the muscle.

-Passive: This is known as assisted stretching wherein the performer requires the help of another person or object to stretch the muscle.

2- Ballistic stretching

This is when fast, jerky movements are used through the complete range of motion. This is usually in the form of bobbing or bouncing.

3- Proprioceptive neuromuscular facilitation (PNF)

This is when a muscle is stretched to its limit and then held for 6-10 seconds. The muscle is then relaxed before being stretched again- this time further.

Plyometric training

This method of training is used to develop explosive power and strength. It works by making muscles exert maximal force when contracting and then relaxing rapidly. Plyometric training can include bounding, jumping and press ups with claps.

Speed training

Speed training is specific to the type of speed a performer wants to develop.
1- Acceleration sprints: used to work on acceleration such as for long jump run up.
2-Hollow sprints: used to develop speed endurance. Sprinting periods are followed by periods of walking to allow for recovery.
3-Interval training: this is used to develop speed over a set distance.

Weight training

This is used to improve strength or endurance.
Strength endurance: 50-60% of 1RM & 20 reps.
Elastic strength: 75% of 1RM & 12 reps.
Maximum strength: 90% of 1RM and 6 reps.

1RM- the maximum weight a person can lift in one contraction.
Rep- how many times a lift is done. These make up a set.

Interval training

Interval training is where periods of high intensity work are followed by periods of rest. A performer works for a maximum of 5 minutes before resting in preparation to work again. This form of training is specifically useful for power or speed athletes.

Body Mass Index (BMI)

Used to measure fat and determine if a person is overweight.

$$BMI = \frac{weight\ (kg)}{height^2\ (m^2)}$$

Bioelectrical Impedance Analysis (BIA)

Used to predict the percentage of body fat in a person.

Participants must not exercise for 12 hours prior to the test, or eat or drink within 4 hours of the test.

Participant data should be entered into machine before BIA electrodes are connected to each wrist and foot, sending electrical impulses through the body.

Skinfold Testing

Skinfold calipers are used to measure fat at various locations on the body.

Males: Chest, Abdominal, Thigh.

Females: Stomach, Tricep, Thigh.

Pre-Test procedures

Informed consent must be given by all participants. A PAR-Q form may be used to provide medical information.

Reliability- Using the same methods for each test- are results consistent?

Validity- Accuracy of results- do they measure what you need?

Practicality- How easy it is to carry out tests- are expenses and equipment required?

Muscular Endurance Tests- Sit Up or Press Up Test

Complete as many sit ups or press ups (depending on selected muscle group) as possible in one minute.

Advantages: Quick and easy- no equipment needed. Disadvantages: Correct technique important.

@LWarnerPE

Unit 1
Learning Aim C: Fitness Testing

Why are fitness tests important?

-Provide information on current fitness levels

-Can be used to plan training programme

-Can be used to measure progress

Agility Test- Illinois Agility Test

Start lying on floor face down. On 'go' get up and print around course in direction indicated.

Advantages: Cheap to do. Minimal equipment needed.

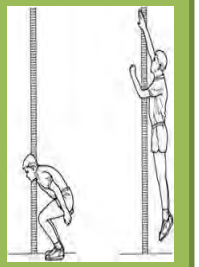
Disadvantages: Good surface needed to minimise slipping risk.

Anaerobic Power Test- Vertical Jump Test

Stand with dominant side against board and reach up to record standing reach height. One dip is allowed then the participant must jump and touch the board as high as they can.

Advantages: Quick to do. Minimal equipment needed.

Disadvantages: Only measures power in legs.



Flexibility Test- Sit & Reach Test

Reach slowly forwards on sit and reach box, keeping legs flat on the floor.

Advantages: Easy and quick.

Disadvantages: Does not measure entire body flexibility.

Strength Test- Grip Dynamometer Test

Hold dynamometer parallel to the side of body (arms by side) with display facing away from body. Squeeze as hard as possible for 5 seconds without moving arm.

Advantages: Minimal equipment needed.

Disadvantages: Only measures strength of arm muscles.

Speed Test- 35 Metre Sprint Test

Sprint as fast as possible over 35m whilst a peer times using a stopwatch.

Advantages: Easy and quick.

Disadvantages: Assistant and non-slip surface needed.

Aerobic Endurance Tests- 1. Step Up Test

Step up and down bench in time with metronome. Do this for 5 minutes before taking pulse reading.

Advantages: Easy and quick. Disadvantages: Requires correct reading of pulse in order to be reliable.

2. Multi-Stage Fitness Test

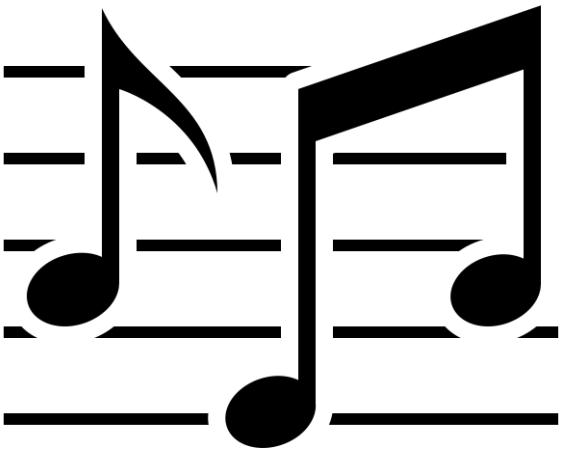
20m shuttle runs in time with bleeps that gradually increase pace.

Advantages: Large numbers can be tested at once. Cheap to do.

Disadvantages: Not suitable for all (eg- elderly and asthma sufferers). Requires high levels of motivation.

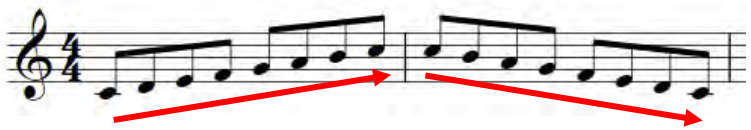
MUSIC

Use the information that follows to either test yourself on key words/phrases for each topic (using the look/cover/check technique) or create a mind map for each topic that contains key facts and images. Once you have created a mind-map you should put it away and try to recreate it from memory, then look at your original mind-map and add what you have missed.

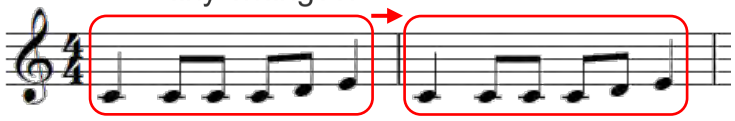


MELODY

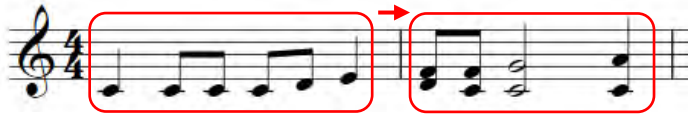
Direction Rising Falling



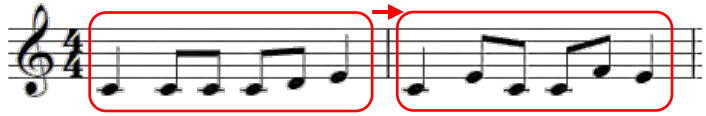
Repetition Doing the same thing again, without any changes.



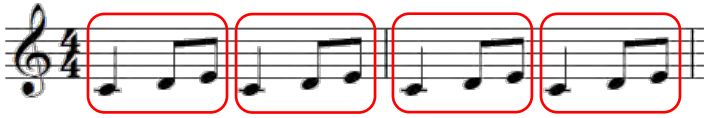
Contrast Doing something completely different.



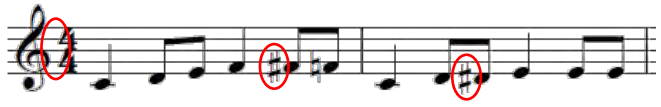
Imitation Doing the same thing again, with some changes (similar).



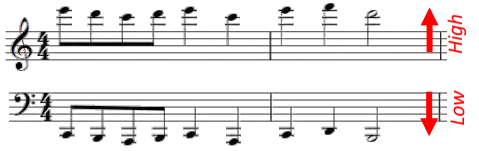
Ostinato A short repeated idea.



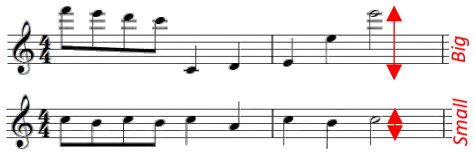
Chromatic The melody uses notes that aren't in the scale / key of the piece.



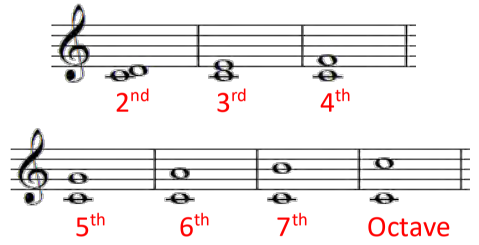
High or low. **Range**



Big or Small.

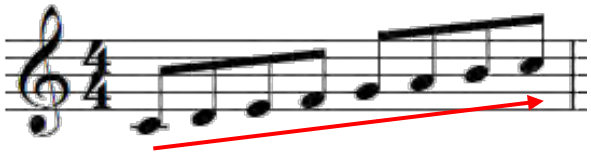


Interval The distance between two notes



**Count the start note & end note*

Conjunct (Moving In Step) **Type of movement**



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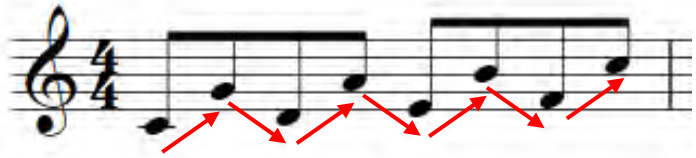
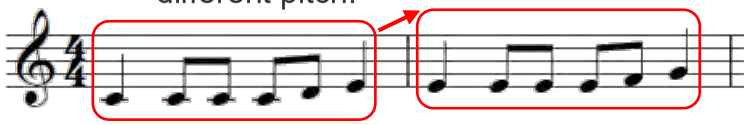
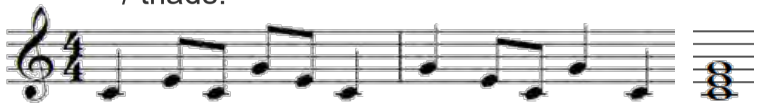
Disjunct (Moving In Leaps)



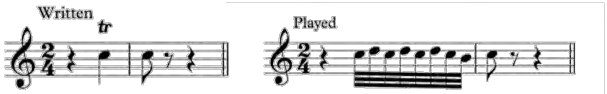
Sequence Doing the same shape idea but at a different pitch.



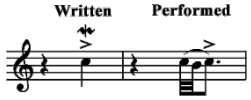
Triadic The tune is based on notes from the chords / triads.



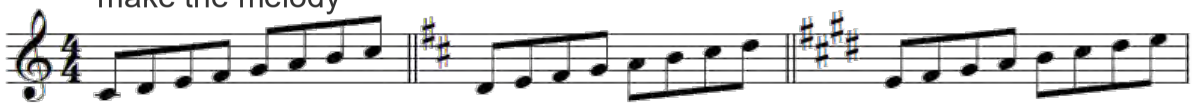
Ornaments Trills



Mordents



Scale The series of notes in a key that are used to make the melody



etc...

I 1.Tonic
II 2.Supertonic
III 3.Mediant
IV 4.Subdominant
V 5.Dominant
VI 6.Submediant
VII 7.Leading Note

ARTICULATION

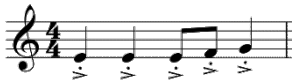
(How the notes are played)

Not Dynamics…

Articulation is the way the performer plays / sings the note, not how loud they do it. That would be Dynamics instead.

More Than One…

You can write more than one type of articulation for the same note. For example:



**Staccato & Accented*

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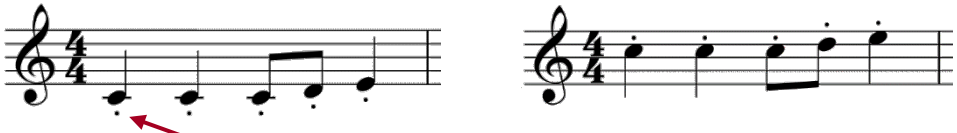
Staccato

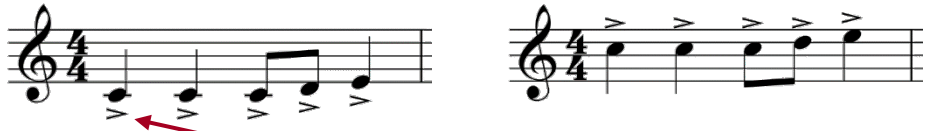
Staccato means short and detached /seperated. **You will likely hear a gap between each note.*



Shown by writing a **dot** just above/below the head of the note.

Accented

Give extra emphasis or force to the marked notes.



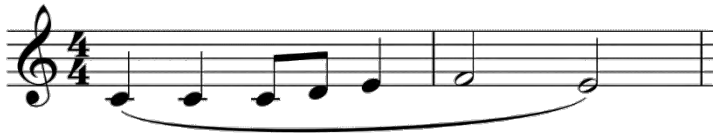
Shown by writing an **accent** above/below the head of the note.

Legato

To play the music smoothly, without breaks between notes.

Slurred

Playing the notes in a legato style, without breaks between notes.



Shown with a **slur** on the score.

How? Some examples:

String Instruments - Play the notes without changing the direction of the bow.

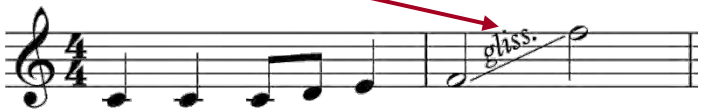
Brass & Wind Instruments - Only tongue the first note, not the others.

Glissando

**You can glissando upwards or downwards*

A slide between two notes.

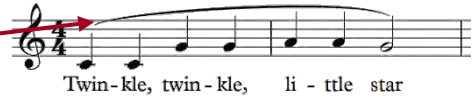
Marked with a **glissando** on the score.



Some Associated Markings On Vocal Music…

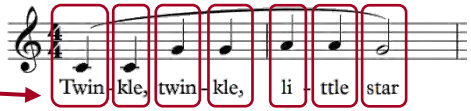
Phrase markings

Slurs drawn onto the score to show singers what to sing in one breath.



Syllabic

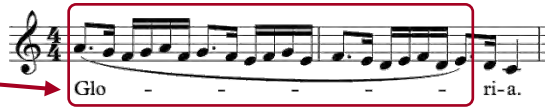
Where the music is written with one note per syllable.



Melismatic

Where the music is written with more than one note per syllable.

**A slur is used to show the notes on one syllable*



DYNAMICS

(The volume of the music)

Describing What You Hear

Comment on any changes - don't sum up the whole example with one word (unless it doesn't change!)

The music starts… then… the music ends...

Writing Dynamics

Dynamics can create contrast in music.

Dynamics can add expression to the music.

Dynamics can allow the listener to hear the most important lines in the music.

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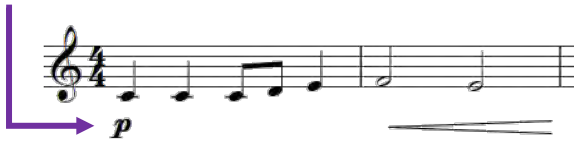
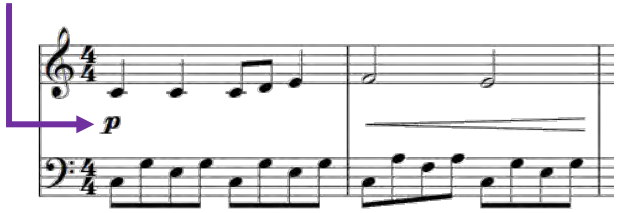
On The Score

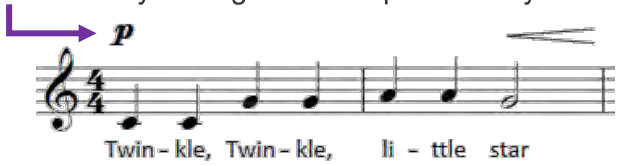
Dynamics are marked underneath the music, to show the instrument how loudly it should play:

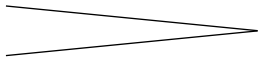


If it is a piano, the dynamics usually go in-between the two staves:



For singers, dynamics usually go above the stave, so that they don't get mixed up with the lyrics:



Marking	Italian Term	Meaning
pp	Pianissimo	Very Quiet
P	Piano	Quiet
mp	Mezzo Piano	Moderately Quiet
mf	Mezzo Forte	Moderately Loud
f	Forte	Loud
ff	Fortissimo	Very Loud
	Crescendo	Getting Louder
	Diminuendo	Getting Quieter
sfz	Szorzando	Sudden Accent

Shh … *!!!*

Change gradually

Baroque Period: Dynamics were rarely used (no crescendos and diminuendos). Use of Terraced Dynamics.

Classical Period: Some dynamics, to add contrast.

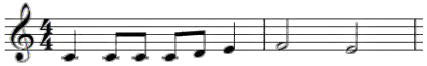
Romantic Period: Lots of crescendos & diminuendos and a large range of dynamics to add expression.

Writing Your Own Dynamics

If using crescendos and diminuendos, make sure you say how loud/quiet you want the music to get. This will clearly show what you want.

TEXTURE

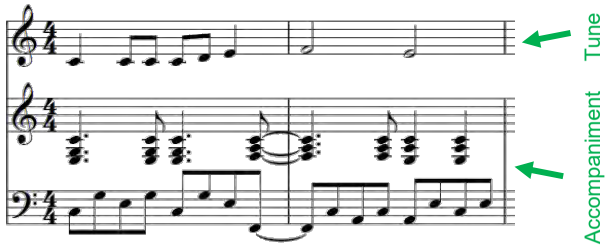
Monophonic
Music with only one part (one note at a time).



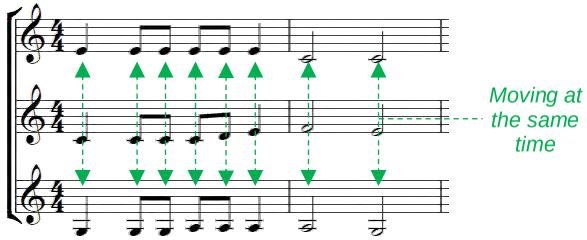
*You can have as many players or singers as you want on the same part so long as it is the only part. No chords!

Antiphonal
Two groups of musicians play/respond to each other from two different performing positions.

Melody & Accompaniment
A melody (tune) plus some accompanying chords or ideas.

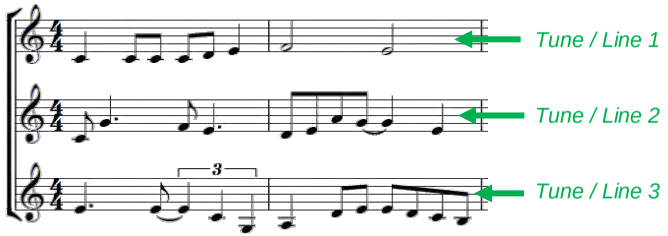


Homophonic
All parts move in chords at the same time.



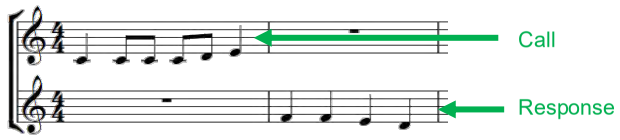
*Homo-phonic = same-sound… they have the same rhythm

Polyphonic
Several (2 or more) independent lines of music.

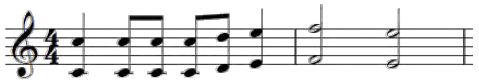


*Poly-phonic = many-sounds… several (two or more) different tunes.

Call And Response
One idea played/sung and then another performer(s) responding.



Octaves
When parts move together, an octave apart.



*Same note name but different pitch.

What Is The Instrument's Role

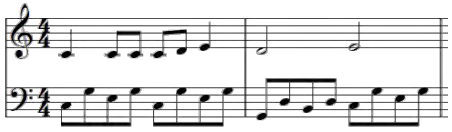
Melody – The tune.

Accompaniment – The parts supporting the tune.

Countermelody – A second melody that fits with the main tune.

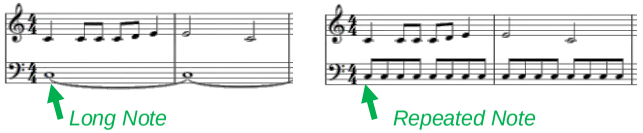
Bass Line – The lowest sounding part.

Alberti Bass
Accompaniment found mainly in the left hand part of piano music.
Don't play all three notes of the triad together; break them up into four equal notes. Usually lowest, highest, middle, highest.

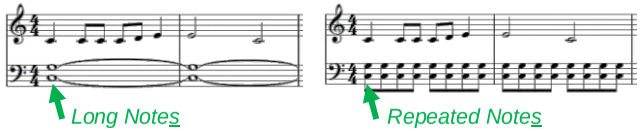


Why doesn't Mr Edwards like playing an Alberti Bass? It gives him the EBGBs.

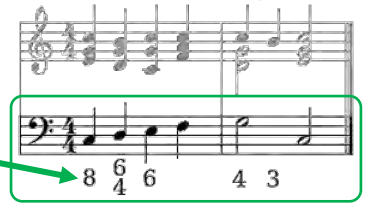
Pedal
A long or repeated note – *usually in the bass.*



Drone
Long or repeated notes – *usually a 5th apart.*



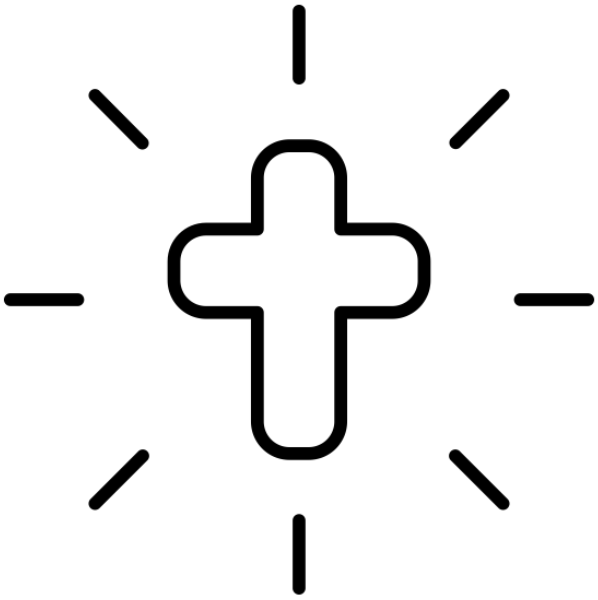
Basso Continuo
The part given to instruments in The Baroque Period that played the bass line and chords, accompanying the melody, using figured bass.



*Harpsichord, bass viol, organ, lute…

RELIGION, ETHICS AND PHILOSOPHY

Use the knowledge organiser on the next page to test yourself about key Christian beliefs (using the look/cover/check method). Then, create a mind map using what you can remember. Look back at the knowledge organiser and add anything you have forgotten to your mind map.



KNOWLEDGE ORGANISER: CHRISTIAN BELIEFS	
The nature of God	**Omnipotent** – All powerful. Can do anything.
	Loving – God loves us like a father.
	Just – God is the ultimate judge because he knows everything and is loving
Problem of evil	If God is **loving** He must want to stop evil and suffering. If God is **omnipotent** then He is able to stop evil and suffering. However, evil and suffering still exist.
The Trinity	Most Christians believe that there are three persons in one God; **Father, Son** and **Holy Spirit**. Each of these is wholly God but they are not the same. Some Christians do not believe this.
Different Christian beliefs about creation	All Christians believe that **God is the creator of the universe** and that the universe he created was **good.**
	Fundamentalist Christians believe that the world was created by God in six days, **literally** as described in the book of Genesis because it is written in the Bible **"All scripture is God breathed."**
	Liberal Christians believe that the Genesis account is **not literally true**. They believe it is an **allegory** with a message that God is the creator and Lord of the universe.
Role of the Word	During creation the **Word "was with God and was God**" and creation was done through the **Word**. Christians believe this shows the role of Jesus in creation.
Role of the Spirit	Before creation, the **Spirit** of God **"hovered over the waters."** This refers to the role of the **Holy Spirit** in creation.
Christian beliefs about the afterlife	**Judgement** – All Christians believe that after death they will be judged by God.
	Particular Judgement – Some Christians believe that they will be judged immediately after they die because Jesus said to the thief **"today you will be with me in paradise."**
	General Judgement – Some Christians believe that they will not be judged until they are resurrected at the end of the world and judged by Jesus, as described in the **Parable of the Sheep and Goats.**
	Resurrection – Most Christians believe that they will be resurrected on **Judgement Day**
	Heaven – Heaven is a place where God is and where the saved will be happy for ever
	Hell – Hell is a place of **eternal suffering**. Some Christians don't believe that a loving God would condemn people to hell for eternity.
	Purgatory – A place where, according to Roman Catholics, the soul is **purified** before it goes to heaven.
The incarnation	Incarnation means '**God made flesh**.' Most Christians believe that God became human in the form of Jesus. The term '**Son of God'** is used to express this relationship.
The death, resurrection and ascension of Jesus	**Crucifixion** – Jesus was scourged and crucified. As he died, he asked God to forgive his murderers.
	Resurrection – Christians believe that three days after he died, Jesus rose from the dead and was seen by various followers and disciples.
	Ascension – Christians believe that fourty days after the resurrection, Jesus rose into heaven to be with God until judgement day.
Sin	Sin means to break God's laws. According to the Bible **"all have sinned and fallen short"** and **"the wages of sin are death."**
	The **original sin** was Eve eating the forbidden fruit, which caused Adam and Eve to be banished from the Garden of Eden and into a world of suffering. This event is known as **The Fall.**
The role of Christ in salvation	Christians believe that Christ's sacrifice was an act of **atonement** that paid the penalty for our sins and meant that all can be saved.
Salvation	**Salvation** means to be saved from the consequences of sin. There are three main beliefs about how this comes about, grace, law and spirit
	Grace – this is the belief that salvation is a gift from God that is unearned and undeserved
	Law – this is the belief that salvation is earned by using our free will to choose to follow the laws of God as described in the **parable of the sheep and the goats.**
	Spirit – Christians believe that after Christ's ascension, God remains on earth in the form of the Holy Spirit which pays an important role in salvation. It motivates people to become Christian and helps them to understand the faith.