HARROW SCHOOL

ENGLISH SCHOLARSHIP EXAM
2020

1½ hours

Instructions:

- This paper is in two sections worth equal marks; you are advised to divide your time evenly between the two.
- In both responses you will be marked for the quality of your writing (spelling, grammar and punctuation).
- Please begin your response to Section B on a new piece of paper.

SECTION A: WRITING

Imagine that your local council has decided to ban all cars, buses, lorries, and other motorised vehicles in the centre of town. They argue that this will reduce carbon emissions and pollution, make the town a more pleasant place to visit, and prevent the traffic jams that have habitually plagued the town.

Write an article for a local newspaper, arguing either for or against this new rule.

> Marks will be awarded for clarity and accuracy of writing, imaginative and thoughtful use of English, originality of thought and evidence of an ability to think critically and reflectively.

[25 marks]

SECTION B: READING

Remember to start this response on a new sheet of paper!

Read the following excerpt from Fiona Mozley's novel 'Elmet' and answer the question that follows.

We arrived in summer when the landscape was in full bloom and the days were long and hot and the light was soft. I roamed shirtless and sweated cleanly and enjoyed the hug of the thick air. In those months I picked up freckles on my bony shoulders and the sun set slowly and the evenings were pewter before they were black, before the mornings seeped through again. Rabbits gambolled in the fields and when we were lucky, when the wind was still and a veil settled on the hills, we saw a hare.

Farmers shot vermin and we trapped rabbits for food. But not the hare. Not my hare. A dam, she lived with her drove in a nest in the shadow of the tracks. She was hardened to the passing of the trains and when I saw her I saw her alone as if she had crept out of the nest unseen and unheard. It was a rare thing for creatures of her kind to leave their young in summer and run through the fields. She was searching. Searching for food or for a mate. She searched as if she were a hunting animal, as if she were a hare who had thought again and decided not to be prey but rather to run and to hunt, as if she were a hare who found herself chased one day by a fox and stopped suddenly and turned and chased back.

Whatever the reason, she was unlike any other. When she darted I could barely see her but when she stopped for a moment she was the stillest thing for miles around. Stiller than the oaks and pines. Stiller even than the rocks and pylons. Stiller than the railway tracks. It was as if she had grabbed hold of the earth and pinned it down with her at its centre, and even the quietest, most benign landmarks spun outrageously around, while all of it, the whole scene, was suckered in by her exaggerated, globular, amber eye.

And if the hare was made of myths then so too was the land at which she scratched. Now pocked with clutches of trees, once the whole county had been woodland and the ghosts of the ancient forest could be marked when the wind blew. The soil was alive with ruptured stories that cascaded and rotted then found form once more and pushed up through the undergrowth and back into our lives. Tales of green men peering from thickets with foliate faces and legs of gnarled timber. The calls of half-starved hounds rushing and panting as they snatched at charging quarry. Robyn Hode and his pack of scrawny vagrants, whistling and wrestling and feasting as freely as the birds whose plumes they stole. An ancient forest ran in a grand strip from north to south. Boars and bears and wolves. Does, harts, stags. Miles of underground fungi. Snowdrops, bluebells, primroses. The trees had long since given way to crops and pasture and roads and houses and railway tracks and little copses, like ours, were all that was left.

Daddy and Cathy and I lived in a small house that Daddy built with materials from the land here about. He chose for us a small ash copse two fields from the east coast main line, far enough not to be seen, close enough to know the trains well. We heard them often enough: the hum and ring of the passenger trains, the choke and gulp of the freight, passing by with their cargo tucked behind in painted metal tanks. They had timetables and intervals of their own, drawing growth rings around our house with each journey, ringing past us like prayer chimes.

Explore the narrator's thoughts and feelings about her new home and the hare in this passage.

Be sure to use quotations from the passage in your response.

[25 marks]

HARROW
SCHOOL

French Scholarship Examination 2020

60 Minutes

- *Section 1 Translation into English*
- *Section 2 Translation into French*
- *Section 3 Essay in French*

Write your answers on A4 paper in blue or black ink.

Use a separate, named page for each section

1. Translate into English. You should write ON ALTERNATE LINES.

L’incident s’est déroulé mardi matin après une soirée arrosée dans la banlieue de Colmar. Jean-Marc Duval, âgé de 27 ans, sous l'emprise de l'alcool, a craché sur un véhicule de police depuis le balcon situé au troisième étage d’un immeuble. Malheureusement il a perdu l'équilibre et a chuté du balcon. Par chance, il a atterri sur des buissons qui se trouvaient en bas de l’appartement. Il a été immédiatement hospitalisé mais ne souffre que de quelques fractures et d'un traumatisme crânien. Sa vie n’est pas en danger et la police n’a pas l’intention de l’interpeller. Cependant les policiers ont profité de la situation pour procéder au contrôle d'identité des autres participants de la fête qui avait lieu dans l’appartement. L'un d'eux était recherché par la justice après s’être évadé de prison. Il a été interpellé et placé en détention.

(30 marks)

PLEASE START ANOTHER SHEET OF PAPER AND WRITE ON ALTERNATE LINES

2. Translate the following sentences into French:

a) I get dressed

b) They go to the concert

c) You (tu) have set the table

d) She was very pleased

e) Marie has arrived

f) You (vous) can play tennis

g) I had taken the bus

h) Louis is going to leave

i) We will finish the book

j) We do not like the film

(30 marks)

PLEASE START ANOTHER SHEET OF PAPER AND WRITE ON ALTERNATE LINES

3. Write an article in French for your school website talking about your house.

You should mention:

- **A description of your house**
- **What you do / don't do to help at home**
- **Something you did recently at home that you enjoyed**
- **How you would like to change your house**
- **Where you intend to live when you are older and why**

(40 marks)

The account may be true or imaginary.

No credit will be given for pre-learnt but irrelevant material.

You should write using any tenses you consider appropriate. When you have finished, you should CHECK YOUR WORK VERY CAREFULLY, looking especially at verb forms, genders, adjectives and spelling.

Please do not write more than 150 words.
Keep each section of a roughly even length (ie. approximately 30 words each)
You should concentrate on **accuracy** (quality rather than quantity).

ROADS AND PATHS

Not necessarily rights of way

- M1 or A6(M) — Motorway; Service Area; 7 Junction Number
- A 35 — Dual carriageway
- A 30 — Main road
- B 3074 — Secondary road
- Narrow road with passing places
- Road under construction
- Road generally more than 4 m wide
- Road generally less than 4 m wide
- Other road, drive or track, fenced and unfenced
- Gradient: steeper than 20% (1 in 5); 14% (1 in 7) to 20% (1 in 5)
- Ferry — (V) Vehicle; (P) Passenger
- Path

RAILWAYS

- Multiple track; Single track } Standard gauge
- Narrow gauge or Light Rapid Transit System (LRTS) and station
- Road over; road under; level crossing
- Cutting; tunnel; embankment
- Station, open to passengers; siding

PUBLIC RIGHTS OF WAY

Not shown on maps of Scotland

- Footpath
- Bridleway
- Byway open to all traffic
- Restricted byway (no motorised vehicles)

The representation on this map of any other road, track or path is no evidence of the existence of a right of way

OTHER PUBLIC ACCESS

- Other routes with public access

The exact nature of the rights on these routes and the existence of any restrictions may be checked with the local highway authority. Alignments are based on the best information available.

- National Trail / Long Distance Route; Recreational route
- Permitted footpath; Permitted bridleway } See note below

Footpaths and bridleways along which landowners have permitted public use but which are not rights of way. The agreement may be withdrawn.

- Traffic-free cycle route
- 1 — National cycle network route number – traffic free
- 1 — National cycle network route number – on road

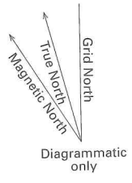
BOUNDARIES

- National
- County (England)
- Unitary Authority (UA), Metropolitan District (Met Dist), London Borough (LB) or District (Scotland & Wales are solely Unitary Authorities)
- Civil Parish (CP) (England) or Community (C) (Wales)
- National Park

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

- Site of antiquity
- 1066 — Site of battle (with date)
- VILLA — Roman
- Castle — Non-Roman
- Visible earthwork

Information provided by the Royal Commissions on Historical Monuments for England and Ancient and Historical Monuments for Scotland and Wales



Diagrammatic only

GENERAL FEATURES

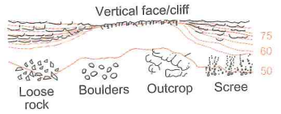
- Gravel pit; Sand pit
- Other pit or quarry; Landfill site or slag heap
- Place of worship +
- Current or former place of worship { with tower; with spire, minaret or dome
- Building
- Important building
- Glasshouse
- Youth hostel
- Bunkhouse / camping barn / other hostel
- Bus or coach station
- Lighthouse; disused lighthouse; Beacon
- Triangulation pillar
- Mast
- Windmill; with or without sails
- Wind pump; wind turbine
- pylon pole — Electricity transmission line
- Slopes

BP	Boundary post
BS	Boundary stone
CH	Clubhouse
FB	Footbridge
MP; MS	Milepost; milestone
Mon	Monument
PO	Post office
Pol Sta	Police station
Sch	School
TH	Town Hall
NTL	Normal tidal limit
+ W; Spr	Well; spring

HEIGHTS AND NATURAL FEATURES

- 52 · Ground survey height
- 284 · Air survey height

Surface heights are to the nearest metre above mean sea level. Where two heights are shown, the first height is to the base of the triangulation pillar and the second (in brackets) to the highest natural point of the hill



- Water; mud
- Sand; sand and shingle

ACCESS LAND (England & Wales)

- Access land boundary and tint
- Access land in wooded area
- Access information point
- MANAGED ACCESS — Access permitted within managed controls, for example, local byelaws

Portrayal of access land on this map is intended as a guide to land which is normally available for access on foot, for example access land created under the Countryside and Rights of Way Act 2000, and land managed by the National Trust, Forestry Commission and Woodland Trust.

Access for other activities may also exist. Some restrictions will apply; some land will be excluded from open access rights.

The depiction of rights of access does not imply or express any warranty as to its accuracy or completeness. Observe local signs and follow the Countryside Code.

VEGETATION

Vegetation limits are defined by positioning of symbols

- Coniferous trees
- Non-coniferous trees
- Coppice
- Orchard
- Scrub
- Bracken, heath or rough grassland
- Marsh, reeds or saltings.

ACCESS LAND (Scotland)

- Land open to the public by permission of the owners. The agreement may be withdrawn.
- National Trust for Scotland Property; always open
- National Trust for Scotland Property; limited access – observe local signs
- Forestry Commission Land
- Woodland Trust Land

In Scotland, everyone has access rights in law over most land and inland water, provided access is exercised responsibly (Land Reform [Scotland] Act 2003). **This includes walking, cycling, horse-riding and water access, for recreational and educational purposes, and for crossing land or water.** Access rights do not apply to motorised activities, hunting, shooting or fishing, nor if your dog is not under proper control.

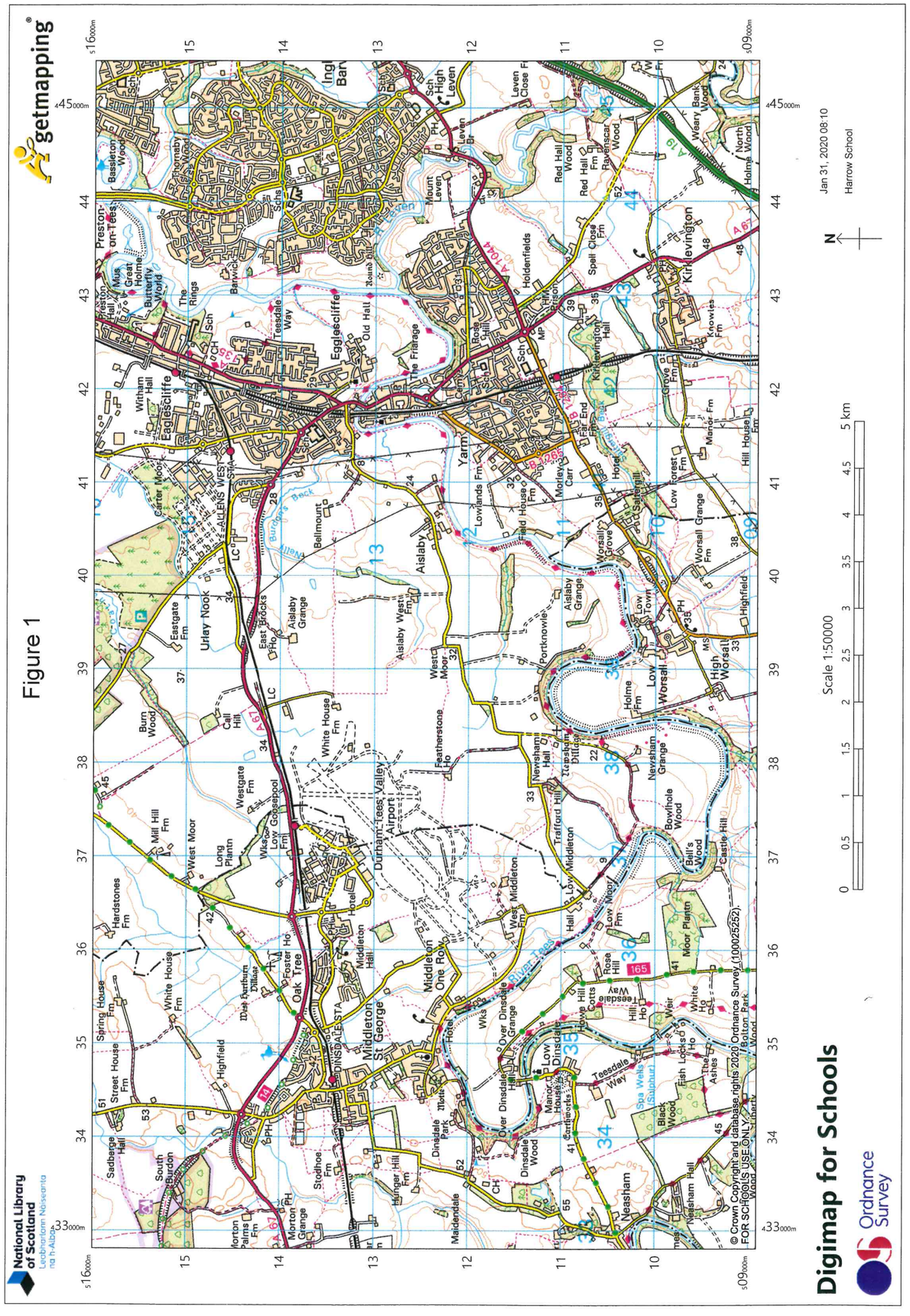
OTHER ACCESS

- DANGER AREA — Firing and test ranges in the area. Danger! Observe warning notices

TOURIST AND LEISURE INFORMATION

- Building of historic interest
- Cadw (Welsh heritage)
- Camp site
- Caravan site
- Camping and caravan site
- Castle / fort
- Cathedral / Abbey
- Country park
- Cycle trail
- English Heritage property
- Fishing
- Forestry Commission visitor centre
- Garden / arboretum
- Golf course or links
- Information centre
- Information centre, seasonal
- Horse riding
- Museum
- Nature reserve
- National Trust
- Other tourist feature
- P — Parking
- P&R — Park and ride, all year / seasonal
- Picnic site
- Preserved railway
- PC — Public Convenience
- Public house/s
- Recreation / leisure / sports centre
- Slipway
- Telephone (public / motoring organisation / emergency)
- Theme / pleasure park
- Viewpoint
- Visitor centre
- Walks / trails
- Water activites
- World Heritage site or area

Figure 1



HARROW
SCHOOL

Geography Scholarship Examination 2020

90 Minutes

Section 1 and 2 consist of short and medium length questions. Answer all questions in the space provided.

*Sections 3 consists of a choice of 4 essays. Answer **one** question on the examination paper in the space provided.*

You are advised to spend 25 minutes on section 1, 30 minutes on section 2 and 35 minutes on section.

Clearly name any extra paper used.

Use blue or black ink for written text.

You may use a pencil for diagrams.

You may use a calculator

QUESTION 1 **Answer ALL of QUESTION 1**

[spend 25 minutes on this section]

Use the Ordnance Survey map extract showing a stretch of the River Tees in the north east of England to answer the following questions:

a) Using **figure** 1, give a 6 figure grid reference for the **confluence** between the R Leven and R Tees **[1]**

……

b) Using **figure 1,** measure to the nearest kilometre the length of the stretch of river flowing from **354120** to **370102**

[2]

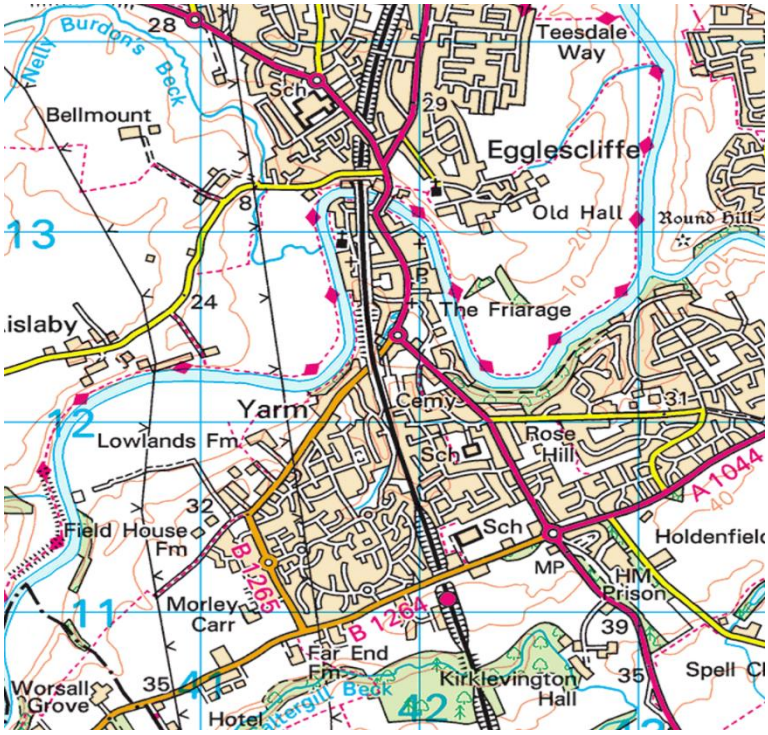
……

c) Identify the landform (also shown in **Figure 2** below) that falls in grid squares 4112, 4113, 4213, 4212

[1]

……

Figure 2: area around Yarm, North East England



d) In the space below, draw an **annotated** diagram to help explain the formation of this **landform**. **[6]**

e) **Using map evidence** from **figure 1**, suggest reasons why the settlement at Yarm has grown. **[6]**

……

……

……

……

……

……

……

……

……

……

……

……

f) Outline the ways that the risk associated with **flooding** could be reduced for the settlement of Yarm. **[4]**

……

……

……

……

……

……

……

……

……

……

[Total: 20 marks]

END OF QUESTION 1

QUESTION 2 **Answer ALL of QUESTION 2**

[spend 30 minutes on this section]

Use Figure 3 to answer questions a) and b).

Figure 3: The Changing Economic Structure of the UK

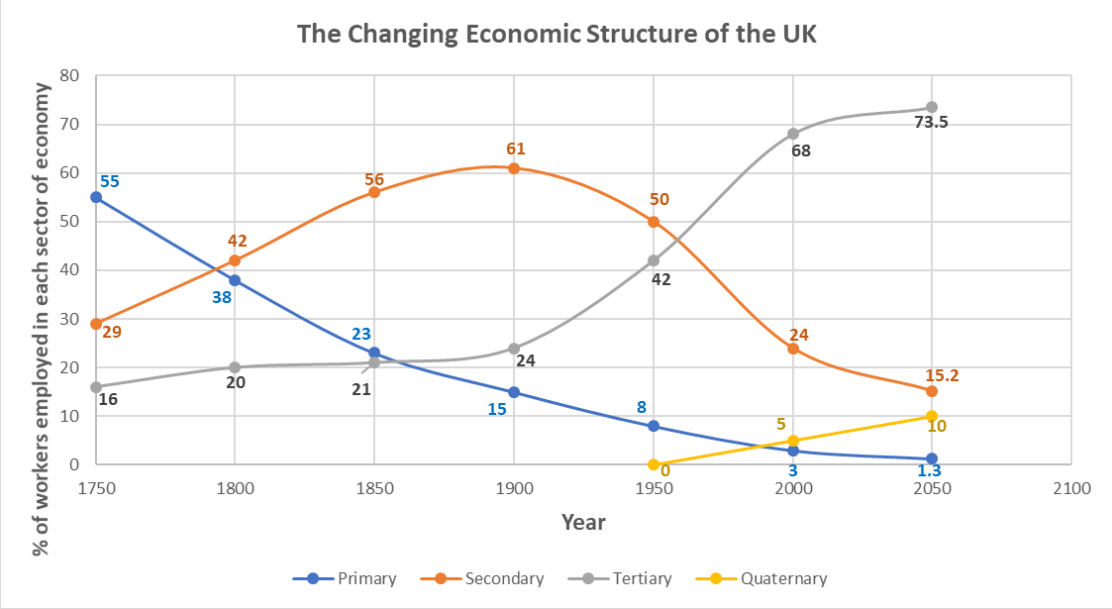


Figure 3 above shows how the UK's employment structure has changed and developed from 1750 to the present day.

a) With reference to **figure 3**, describe the changes in the UK's employment structure 1750 - 2050. **[4]**

……

……

……

……

……

……

……

……

b) With reference to **figure 3** and/or your own knowledge, **explain** the causes of the changes in the UK's employment structure 1750 - 2050.

[6]

……

……

……

……

……

……

……

……

……

……

……

……

……

Question 2 continues on the next page

Read **Figure 4** extract below and answer questions 2 c) and 2 d).

Figure 4: Shell in The Niger Delta

Nigeria is a country in West Africa with a population of 186 million and a Gross Domestic Product of US$405 billion. This GDP places Nigeria as the 27th largest economy in the world and the largest in Africa.

The contribution of oil to the Nigerian economy is significant. Estimates vary as to exactly how much oil revenue contributes to Nigeria's income, but it is widely believed that 80% of government funds come from the oil industry.
However, this vast wealth has come at great cost. For the people living in the main oil producing regions, there have been huge environmental problems, conflict, and restriction of opportunity. A number of multi-national corporations (MNCs) are involved, but Royal Dutch Shell (more commonly known as Shell) are perhaps the most widely associated with Nigeria. The impacts of oil extraction across Nigeria are numerous and are felt particularly in The Niger Delta region; an area of around 70,000km2 (approximately 7.5% of Nigeria's land mass). The Niger Delta is home to approximately 31 million people comprising of at least 40 ethnic groups. The Ogoni people are native inhabitants of the Niger Delta. The Niger Delta is home to 90% of Nigeria's oil reserves but also, at one time, rich biodiversity including plentiful plant, fish and primate populations as well as the largest diversity of butterfly species in the world.

From the many oil spills and leaks that have occurred, water sources are now hugely polluted. Local people rely on the water for cooking, bathing and drinking. It has been found that drinking water in the Niger Delta contains carcinogens up to 900 times above World Health Organisation levels. As a result of this water contamination, groundwater sources which feed the rich vegetation that the Delta is known for have also suffered. This has led to a loss of up to 10 percent of the native mangrove plantations. Such plantations are important for local communities as a source of income. Needless to say, the fish stocks in the Niger Delta have declined hugely, as a result of the oil leaks creating a toxic environment for marine life.

c) Suggest why a **multinational company** such as Shell would locate in a **developing country**.
[4]

……

……

……

……

……

……

……

……

……

d) Using **figure** 4 and your own knowledge, explain the **benefits** and **problems** associated with an **economic activity** such as oil extraction.

[6]

……

……

……

……

……

……

……

……

……

……

……

……

……

[Total: 20 marks]

END OF QUESTION 2

QUESTION 3

[Spend 35 minutes on this section]

Answer any **one** of the following essay questions and in each case refer to specific examples, places and processes.

Credit will be given for the use of named and located examples, and the use of well-labelled sketch maps and diagrams, where appropriate.

EITHER

a) To what extent can **urban development** ever be truly sustainable? **[20]**

OR

b) "If you want to get rich, first build a road" Discuss the extent to which this proverb is true with reference to **transport projects**. **[20]**

OR

c) With reference to a named **flooding event**, to what extent were the impacts due more to physical causes? **[20]**

OR

d) To what extent do you agree that the major issues facing humanity in the 21st century are **geographical**? **[20]**

Space to plan your answer:

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

[Total: 20 marks]

[Exam Total: 60 marks]

END OF EXAMINATION

HARROW
SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2020

CLASSICAL GREEK

1 hour

GENERAL INSTRUCTIONS:

You must attempt all questions in Section A: Comprehension, Section B: Grammar, and Section C: Translation.

You should make an intelligent guess at words you do not know, using your knowledge of English vocabulary and the English introduction to each passage.

Try to base any guesses on elements in the sentence that you definitely DO know and make sure that they make sense in context.

Use blue or black ink.

SECTION A: Reading and Grammar (50 marks)

1 **Identify the following Greek proper names.**

(a) Ποσειδων

(b) Ἑστια

(c) Μουσαι

(d) Ὑγεια

(e) Ἀσκληπιος **[5]**

2 **Transliterate the following (i.e. write them in Greek letters). Long vowels are indicated with a macron (e.g. 'ē' or 'ō'). Remember to add breathings where appropriate.**

(a) mythos

(b) monarchos

(c) bibliograhia

(d) isometron

(e) monosyllablos

[5]

3 **Change the following nouns from plural to singular, keeping the same case. Write out the Greek singular form and give the <u>basic meaning</u> of each word.**

Example: τους δουλους = τον δουλον (slave)

(a) τους φυλακας

(b) των γεροντων

(c) τα ἆθλα

(d) ταις τιμαις

(e) οἱ ποιηται

[10]

4 **Change the following nouns from singular to plural, keeping the same case. Write out the Greek plural form and give the <u>basic meaning</u> of each word.**

(a) τον ἵππον

(b) ἡ γη

(c) τοῦ ἐργου **[6]**

5 **Change the following verbs from single to plural, keeping the same person and tense. Then translate your answer.**

(a) εἶ

(b) ἐμενομεν

(c) πεμψουσι

(d) ἐλιπετε

(e) εὗρον (sg.) **[10]**

6 **The following English words are derived from Greek words. What do they mean in English?**

Write down any Greek work you might know related to the English work.

(a) arachnaphobia

(b) polemic

(c) hegemony

(d) deuteronomy

(e) proton

(f) trilogy **[6]**

7 **Write out any TWO of the following:**

(a) The full future of κρυπτω.

(b) 2nd declension noun τό σωμα in all its cases (singular & plural).

(c) The strong aorist of πιπτω.

(d) The definite article in all genders and cases (singular & plural). **[8]**

SECTION B: Sentences and Composition (35 marks)

1 Translate into English:

(a) κατά την ἐμην βιβλον, οἱ ἱπποι ἀει φευγουσι προς τον ποταμον. **[4]**

(b) πεντε ἡμερας ἐν τῃ κωμῃ ἐμενομεν, ἀλλα ἐπειτα ἐδραμομεν εἰς την πολιν. **[5]**

(c) τίνες εἰσὶν οἱ τῷ ποταμῷ πιπτομενοι; **[3]**

(d) ὁ στρατηγος ἀυτος τον του φυλακος οἰνον ἐλαβεν. **[4]**

(e) ἆρα δουλος τις ἐν τῃ ὁδῳ ἐστιν; **[4]**

κατά = according to + acc.

2 Translate into Greek:

(a) The leader wants to take the city of the enemies. **[5]**

(b) The rich old men were sleeping in the agora. **[5]**

(c) Wait on the island, o sailors, and guard the ships! **[5]**

SECTION C: Translation (30 marks)

Translate the passage into good English. Write your translation on alternate lines. Vocabulary is given at the foot of the page. You are strongly advised to write a translation in rough, and not to write out your neat copy translation until you have considered the whole story.

The Athenians try to benefit from a war between the Spartans (the Lacedaemonians) and Messenians, but their cunning plan (involving a poet called Tyrtaios) backfires.

πόλεμος ἦν τοῖς Λακεδαιμονίοις πρὸς τοὺς Μεσσηνίους. ἐν δὲ τῷ μαντείῳ οὕτως ἔλεγεν ὁ θεός. "τοῖς Λακεδαιμονίος νέμουσι τὴν νίκην οἱ θεοί, εἰ στρατγος τις ἐκ τῶν Ἀθηναίων ἡγεμονεύσει αὐτους."

ἦν δ' ἐν ταῖς Ἀθήναις Τυρταῖος τις, ἄνθρωπος φαῦλος τε και χωλός. ἐπεὶ δὲ παιδας ἐν διδασκαλείῳ ἐπαίδευε καὶ ὅπλων τε καὶ πολέμου ἄπειρος ἦν, οἱ Ἀθηναῖοι πρὸς τὴν Σπάρτην πέμπουσι τὸν Τυρταῖον. "οὕτως γάρ", ἔλεγον, "τὴν τῶν Λακεδαιμονίων νίκην κωλύσομεν, εἰ διδάσκλος ἡγεμονεύσει τοὺς στρατιωτας."

ἀλλ' οὐ μόνον διδάσκαλος ἦν ὁ Τυρταῖος ἀλλα καὶ ποιητής.

τότε οἱ Λακεδαιμονίοι ἐστασίαζον καὶ ἐν ἀθμυίᾳ ἦσαν διὰ τὸν πολέμον. ὁ οὖν Τυρταῖος τοῖς ᾠδοις ἐπαυσε τάς τε τῶν πολιτῶν ἁμίλλας καὶ τοὺς στρατιώτας ἔλυσε ἔκ τῆς ἀθυμίας. ὥστε τῶν πολεμίων πανταχοῦ περιῆσαν.

Vocabulary

το μαντείον	an oracle
νεμω	I grant
εἰ	if
ἡγεμονεύω	to lead
φαῦλος	foolish
χωλός	crippled
διδασκαλείον	a school
παίδευω	to educate
ἄπειρος	inexperienced
στασίαζω	to be in civil war
ἀθμυία	despair
ᾠδή	a song
ἁμίλλα	a quarrel
πανταχοῦ	*adv*. everywhere
περι-εἰμι + gen.	to defeat

HARROW
SCHOOL

History Scholarship Examination 2020

Time: 90 Minutes

There are three sections in this examination.

You are advised to spend approximately 30 minutes on each section.

The quality of your answers is more important than the quantity, so spend 5-10 minutes thinking and 20-25 minutes writing for each section.

Each section is worth 30 marks in total.

SECTION A

Read the background information, and study both sources. Then answer both questions.

Background Information

One of the biggest problems facing the victorious allies after the Second World War was what to do about Germany. It was agreed at Yalta that Germany should be divided into four zones (American, French, British and Soviet). Berlin was divided in the same way. The Soviet Union wanted to keep Germany weak and wanted reparations. The Western allies wanted Germany to recover. In 1947 the British and American zones were combined to help economic development and the French zone was added later. In response the Soviets began to disrupt and restrict travel between Berlin and the allied zones in Germany. In March 1948 the allies agreed to establish a federal system of government for the western parts of Germany and in June introduced a new German currency – the Deutsche Mark. On 24 June the Soviets blockaded all methods of surface transport between West Berlin and non-Soviet zones. They stopped supplying food to non-Soviet Berlin and cut off the electricity.

Was Soviet action over Berlin justified?

Source A: From a history book published in 1998.

Most historians now agree that the start of the Cold War was not inevitable and only really arrived because the victorious powers could not come to a suitable arrangement themselves. Germany itself had proved to be a real headache for the Western Allies. After the destruction of war, their zones were in economic chaos and the West needed Germany to recover. Stalin feared a recovering Germany. In his eyes Germany had to be weak and he wanted to ensure that reparations were paid to aid the recovery of the Soviet Union; which was clearly required after the devastation of the war. The US policy revolved around democratisation via education in order to make sure that communism did not gather any support. There can be no doubt that the Anglo-American stance was provocative and insufficiently sensitive to Stalin's security needs.

Soon after the war, George Marshall suggested publicly that the division of Germany was far from certain. However, in 1948 the Western Allies decided to have their own conference to discuss what should be done about Germany. The result of this meeting was an announcement which indicated clear plans for West Germany. In June, it was made clear that a government for West Germany would be established and on 18 June a new currency would be used for the first time in this region. The formation of this new currency led to Stalin reacting immediately. Berlin was deep in the Soviet zone of occupation and was linked to the western zones of Germany by vital roads, railways and canals. In June 1948, Stalin decided to block all these supply lines, cutting off the two-million strong population of West Berlin from western help.

Ultimately it was the US who were the first nation to break the terms agreed at Potsdam. Truman's stance at the beginning of the Cold War did nothing to assist successful negotiations and simply created an air of suspicion at a time when compromise was required.

Source B: From a history book published in 1960.

Although the Soviets favoured a united Germany, Stalin's main objective was the security of the Soviet Union. The first priority was to neutralise the German menace. Hence Stalin's policy of destroying Germany's economic power through reparations, which were a divisive issue from the start.

The Anglo-American strategy was driven by the fear that if Germans in the Western zone remained impoverished they would turn back to Nazism – or else to Communism. The emphasis was on reconstructing political institutions and giving Germans responsibility for their domestic affairs. Fortunately for the Western allies, Communist occupation policies in Berlin and the Soviet parts of Eastern Germany did not win over the Germans. If Stalin wanted Germany to remain united then Soviet tactics were not very sensible. From the beginning the Soviets established a Communist-led government without allied consent and set about breaking agreements made at Potsdam by extracting and dismantling whatever fell within their grasp.

And yet even by early 1947 a division of Germany was not certain – Marshall was still optimistic that whatever arrangements were made about Germany, a divided Germany would not be necessary. The real break came in the spring of 1947 at the Moscow meeting of the US, Britain, France and the Soviet Union. It was clear that the British and Americans were determined to build up the West German economy while the Russians still wanted a united Germany as envisaged at Potsdam. One American official said, 'It was the Moscow Conference of 1947 which really brought down the Iron Curtain.' In 1948 the Western Allies held their own conference on Germany. They announced they had agreed 'that close co-operation should be established among themselves in all matters arising out of Marshall Aid in relation to Western Germany. Such co-operation is essential if Western Germany is to make its full contribution to European recovery.' In June plans to form a West German government were announced. On 20 June a new currency was introduced into the Western zones. The Soviets replied by cutting communications between West Berlin and the Western zones.

It is sometimes suggested that American decisions like the Truman Doctrine and the Marshall Plan pushed Stalin from compromise to rigidity, and that European divisions were caused by America's insensitivity. But this was not so. The immediate cause of the division of Germany and Europe lies in Stalin's own errors. He squandered his advantage by uncompromising tactics. If he hoped to let Germany rot until a resentful Germany fell into his lap, he miscalculated. But Germany was at his feet. All the Soviet Union had to do was accept the Marshall Plan and convince the Germans of Moscow's good faith in seeking a neutral, independent Germany. This would have shifted the balance of advantage.

Questions

1. Explain in your own words what the historian means when he states that: 'there can be no doubt that the Anglo-American stance was provocative and insufficiently sensitive to Stalin's security needs.' [10 marks]

2. Study Sources A and B. How and why do they differ in their interpretation of the reasons why tension between the USSR and the Western Allies escalated after World War II. [20 marks]

SECTION B

Answer ONE of these questions.

Either

'Far too much time is spent in English schools learning about English history.' How far do you agree with this statement? [30 marks]

or

'What is the most important turning point in the history of the world?' Explain the reasons for your choice and why it is the most important. [30 marks]

SECTION C

5. Study the two maps. What can you tell from them about Great Britain in the early 20th Century? [30 marks]

HARROW
SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2020

LATIN

1 ½ hours

GENERAL INSTRUCTIONS:

You must attempt all questions in Section A: Comprehension, Section B: Grammar, and Section C: Translation.

If you have time at the end, you should attempt to answer the Section D and Section E.

You should make an intelligent guess at words you do not know, using your knowledge of English vocabulary and the English introduction to each passage.

Try to base any guesses on elements in the sentence that you definitely DO know and make sure that they make sense in context.

Use blue or black ink.

Section 1: Translation

The pirates were such a menace, especially to Roman citizens, that Rome was finally forced to send Pompey against them with huge forces at his disposal.

pessimum scelus piratarum erat cives capere, tum praemium pro eis petere. alii captivi, qui clamaverunt se cives Romanos esse, necati sunt; aliis imperaverunt ut plurimam pecuniam darent. mox mare tam plenum piratarum fuit ut nemo navigare vellet; Romae igitur populus frumentum non recepit. tandem senatores Pompeium miserunt ut piratas oppugnaret; cui imperium terra marique datum est. ille naves quingentas, et viginti quattuor legiones accepit. Pompeius cum omnibus his copiis Roma profectus est. mari in tredecim partes diviso, duces Romani piratas in omnibus partibus simul oppugnaverunt; ita illi circumdati captique sunt. mox totum mare Romanum fuit.

Names

Pompeius, Pompeii (m)	Pompey

Vocabulary

malus, peior, pessimus	bad, worse, worst
scelus, sceleris (n)	crime
promitto, promittere, promisi	to promise
pirata, -ae, m.	a pirate
populus, m.	people
frumentum, -i, n.	food, grain
quingenti, quingentae, quingenta	500
tredecim	13
divido, dividere, divisi, divisus	to divide
simul	at the same time
circumdo, circumdare, circumdedi,circumdatus	to surround
liber, libera, liberum	free

Translate the passage into good English.

Use alternate lines.

[30 marks]

Section 2: Comprehension

Pompey received a warm welcome in Rome, but had to leave once more to deal with those pirates who had survived.

piratis victis, Pompeius Romam rediit. plurimi cives ad portas convenerunt ut eum in urbem ingredientem salutarent. cives enim gaudebant quod tabernae iam plenae erant omnium rerum. pauci tamen piratae, qui non occisi erant, in Ciliciam effugerant; nam ibi castra in montibus habebant. Pompeius, simulac hoc cognovit, timebat ne piratae nautas vectoresque iterum vexare conarentur. Roma igitur profectus, piratas tam celeriter secutus est ut brevissimo tempore alios in interficeret, alios caperet. quorum pessimis in carcerem missis, castris deletis, ceteros liberavit. hoc bellum tribus mensibus confectum est.

Names

Cilicia, Ciliciae (f)	Cilicia (a Roman province in Asia)

Vocabulary

pirata, -ae, m.	a pirate
vector, vectoris (m)	traveller, sea-farer
vexo, vexare, vexavi, vexatus	I trouble
proelium, proelii (n)	battle
carcer, carceris (m)	prison
mensis, mensis (m)	month

Answer the follwing questions. Make sure to number your answers correctly.

a) What did Pompey do after defeating the pirates? [1]
b) *plurimi... salutarent* (lines 1-2): describe Pompey's reception. [3]
c) What made the citizens happy? [2]
d) *pauci... habebant* (lines 3-4): explain what was happening in Cilicia. [4]
e) Why did Pompey react to these events? [2]
f) *Roma... caperet* (lines 5-6): write down and translate two words or phrases that emphasise the speed with which Pompey dealt with the pirates. [4]
g) *quorum... liberavit* (line 7): explain what happened to the two groups of pirates. [3]
h) *hoc bellum... confectum est* (lines 7): what information are we given about the war? [1]

[20 marks]

Section 3: Grammar

Julius Caesar had to flee for his life when he asked for too much.

lulius Caesar, ubi iuvenis erat, sacerdos esse cupiebat. quod eo tempore Sulla maximum imperium Romae tenebat, Caesar ad eum adiit. “si me sacerdotem facies” inquit “gratias tibi agam.” sed hoc illi non placuit; credidit enim Caesarem nimis iuvenem esse. ubi hunc honorem iterum petivit, Sulla in animo habuit eum occidere. quo cognito Caesar Roma celeriter fugit ne necaretur.

Names

lulius Caesar, lulii Caesaris (m)	Julius Caesar
Sulla, Sullae (m)	Sulla (dictator of Rome)

Vocabulary

sacerdos, -dotis, m.	a priest
nimis	too (much)
placuit + dat.	*it was not pleasing to…*

1. *eo tempore* (line 1): state and explain the **case** of this word. [2]
2. Identify **one** examples of a **preposition** in line 2. [1]
3. *adiit:* (line 2): identify the **tense** of this verb [1]
4. *facies (line 2)*: identify the tense of this verb. [1]
5. *eum* (line 2): what **case** is this pronoun and explain **why** it is that case? [2]
6. *Caesarem* (line 3): what **case** is this noun and **why** it is that case? [2]
7. *esse* (line 3): what tense is this infinitive? [2]
8. *hunc* (line 4): what case is this pronoun in and why? [2]
9. *Roma* (line 4): what case is this noun in? [1]
10. necaretur (line 5): this verb is subjunctive. Why? [1]

[15 marks]

Section 4 (Optional): Composition

Translate the following sentences into Latin (make sure that you think very carefully about the role of each word *in English first* before you attempt to translate into Latin):

1. The boy said that the slave is sleeping in the garden. [5]

2. The father was working in order that the children have food. [5]

3. The general led the soliders into the camp through the night. [5]

4. The brave man was being praised by the citizens. [5]

Vocabulary

puer, pueri, m.	boy
dico, dicere, dixi, dictus	to say
dormio, dormire	to sleep
liberi, liberorum	children
cibus, -i, m.	food
habeo, habere	to have

[20 marks]

Section 5 (Optional): Grammar

A conspiracy was formed to restore Tarquinius to the throne of Rome.

olim Tarquinius erat rex Romae. hic vir erat crudelis. post multos annos civis quidam, Brutus nomine, eum ex urbe expulit. deinde Brutus primus consul Romae factus est. pauci tamen iuvenes Tarquinium redire volebant, quod regem quam consulem habere malebant. dum consilia faciunt, servus omnia audita ad Brutum rettulit; qui iuvenes rapi iussit. inter iuvenes autem erant duo filii Bruti.

Names

Tarquinius, Tarquinii (m)	Tarquinius
Brutus, Bruti (m)	Brutus

Vocabulary

expello, expellere, expuli, expulsus	I drive out, expel
consul, consulis (m)	consul (high-ranking statesman)

1. Identify an example of a **preposition with an accusative.** [1]
2. Identify an example of an **passive infinitive**. [1]
3. Identify an example of a **preposition with an ablative noun**. [1]
4. Identify an example of an **present tense infinitive.** [1]
5. Identify an example of an **verb in the imperfect tense.** [1]
6. Identify an example of a **verb in the passive voice.** [1]
7. Identify an example of an **adverb.** [1]
8. Identify an example of an **past passive participle.** [1]
9. Identify an example of a **verb in the perfect tense**. [1]
10. Identify an example of an **noun in the plural nominative.** [1]

[10 marks]

Harrow School

MATHEMATICS PAPER 1 SCHOLARSHIP EXAMINATION 2020

1 ½ Hours

Calculators and geometrical instruments are permitted

Instructions:

- Answer in the spaces in the question paper.
- Show your working clearly

1.

a. Expand and simplify fully

$$4x(3-2x)+(3x)^2-x$$

_____ [3]

b. Simplify fully

$$\frac{2x^2(x+3)}{6xy}$$

_____ [2]

c. Factorise fully $ab^2+abc-ab$

_____ [2]

d. Solve

$$\frac{1}{2}x+\frac{1}{3}(x-1)=5$$

_____ [3]

2.

a. $HCF(36, x) = 12$ and $LCM(36, x) = 180$. Find the value of x.

_____ [2]

b. Write as one fraction

$$\frac{a}{b} + \frac{b}{a}$$

_____ [2]

c. Simplify

$$5 \div \frac{x}{y}$$

_____ [1]

3. A class consists of 4 boys and 6 girls. The mean test score for the whole class is 6.5. The mean for the girls is 7. What is the mean for the boys?

_____[3]

4. A quarter-circle has area $20cm^2$. Calculate its perimeter. Give your answer to one decimal place.

_____[4]

5. A phone company charges a fixed cost each month plus an amount proportional to the amount of data used. Kat uses 10GB of data and pays £22 per month. Charlie uses 15GB of data and pays £28 per month. Natalya pays £37 per month. How much data does he get?

_____[3]

6. Calculate

$$1 - (1 - 3) - (2 - 4) - (3 - 5) - \cdots \ldots (99 - 101)$$

_____[2]

7. Rufus has a meal in a restaurant. He decides to leave an 18% tip. He tips £3.60. How much does he pay in total including the tip?

_____[3]

8.

a. Find the nth term formula for the sequence that starts 7,9.5,12,14.5, ……

_____[2]

b. Does 67.5 appear in this sequence? Explain your answer.

_____[2]

c. Find the missing numbers a and b in the sequence

$a, 3, b, 5, 7, 12, 19, \ldots\ldots$

_____[2]

9. Solve

a.

$$3^{x+1} = 9^2$$

_____[2]

b.

$$\frac{2x}{3x+1} = \frac{4x}{3x+3}$$

_____[3]

c. $4 - 3x \geq 10$

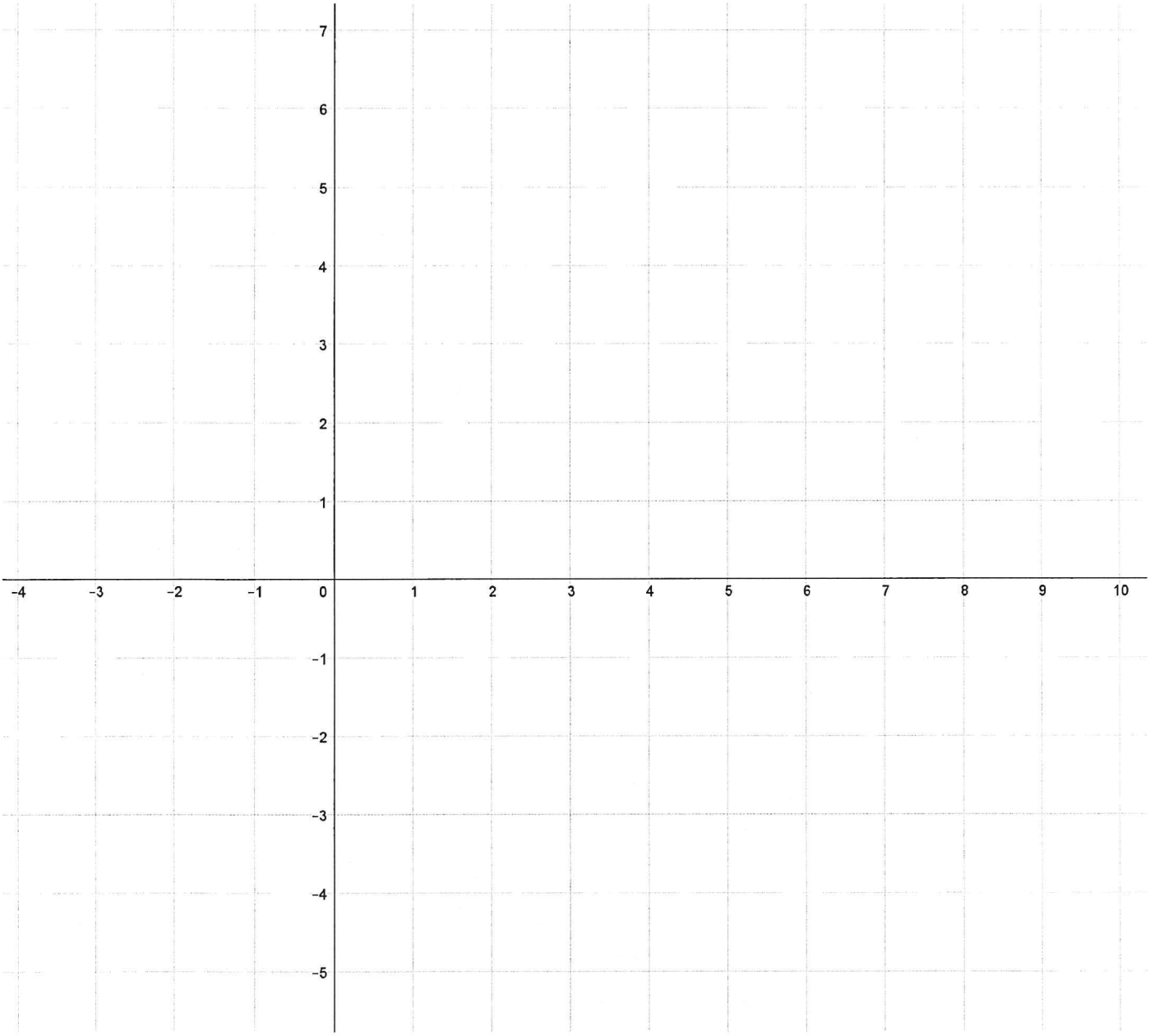
_____[2]

10.

a. On the axes below draw the graphs of:

i) $y = 3x - 1$

ii) $3x + 4y = 12$

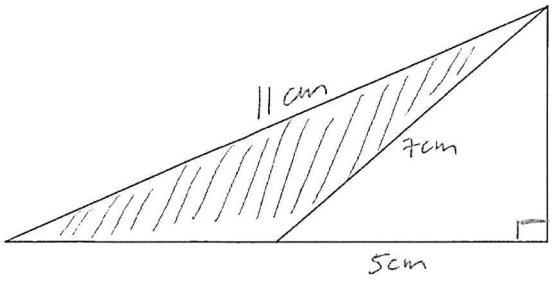


_____ [4]

b. Does the point (14,50) lie on, above or below the line $y = 3x - 1$. You must explain your answer

_____ [1]

11. Calculate the shaded area of the shape below. Give your answer to three significant figures.



_____[4]

12. Solve

$$3x^2 + 2y^2 = 35$$

$$2x^2 - y^2 = 14$$

_____[4]

13. A bag contains some red counters, some blue counters and some green counters. There are twice as many reds as blues. There are 5 more reds that greens.

    The probability I pick a red is $7/15$. How many green counters are there?

    You must show clear logical working for this question. Answers based on trial and error will receive maximum of 1 mark.

_____[4]

HARROW
SCHOOL

Scholarship Examination 2020

Mathematics II

Time: **90 Minutes**

Instructions and advice:

Write your solutions on lined paper, using blue or black ink or pencil.
Calculators, geometric instruments (protractor, set square, compass etc.) and squared paper may NOT be used.

This paper is designed to be very challenging.
Very few (if any) candidates should expect to finish it.
Greater credit will be given for a smaller number of complete solutions to some of the questions rather than a larger number of incomplete attempts.

You do not need to attempt the questions in the order in which they are presented (indeed, you are advised to first read all the questions then start by attempting those with which you feel the most comfortable).

You must show all your working and explain all your reasoning.

PLEASE NOTE: This paper is <u>not just about getting the right answers</u>; correct answers on their own will earn few marks. You will be marked more on the <u>PRESENTATION</u> of your solutions, the <u>EXPLANATION</u> of your working and the <u>JUSTIFICATION</u> of your final answers.

---

1. This month (February 2020) is a very interesting one…

a. It has five Saturdays in it. Find the next year in which February will have five Saturdays.
Note: February has 28 days except in years which are multiples of four, when it has 29 days.
You are given $364 = 7 \times 52$.

b. The date on 2nd February was special because it was a *palindrome* – that is, it read the same backwards as forwards when written in the UK format [two-digit day, two-digit month, four-digit year] – 02022020. Determine how many days there are between 02 Feb 2020 and the next date which is a palindrome in the UK.

c. 2nd February was in fact particularly special because it was also a palindrome when written in USA date format [two-digit month, two-digit day, four-digit year].

i. Determine, *to the nearest thousand*, how many days there are between 02 Feb 2020 and the next date which is a palindrome in *both* the UK and the USA.

ii. Determine, *to the nearest ten thousand*, how many days there are between 02 Feb 2020 and the *next* date which is a palindrome in both the UK and the USA (i.e. the date *after* the one in part (c)(i)).

2. Matt write books. In the books he writes, the pages are numbered in reverse (so in a book with 100 pages, the first page is page 100 and the final page is page 1).
Gary has a collection of books by Matt.

a. The book he is currently reading is 378 pages long.

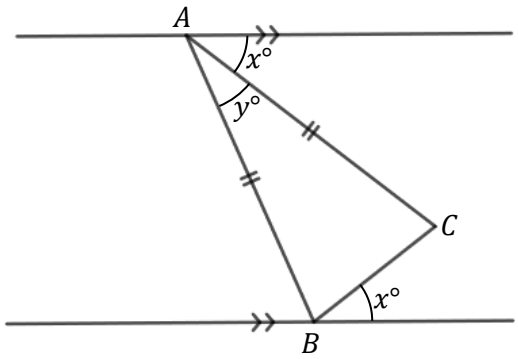
i. Gary has just started reading page 214. How many pages has he read?

ii. Later, Gary notices he has read four sevenths of it. What page has he just finished?

b. Gary has read four fifths of a book with 135 pages when he notices that the page number is the same as the number of a page he is on in a different book, which has 315 pages. What fraction of the 315-page book has he read?

c. Gary is part-way through another book. He notices that, if he reads 25% more pages than he has read already, the page number of the page he is on would be halved. What fraction of the book has he read?
NB Do not attempt to find out how many pages there are in Gary's book because that is impossible!

3. In the figure below, the two horizontal lines are parallel (as indicated). The triangle ABC is isosceles, with $AB = AC$, and the angles x and y are defined as marked.



Prove that $x < 45°$.

4. Natalya starts counting out loud from one. Assuming she takes no breaks (for eating/sleeping etc.), estimate how long it would take her to get to $1\,000\,000$.
You should state any assumptions you make.

5. A Rubik's cube is an example of a 3×3 cube made up of twenty-seven 1×1 cubes. Ian takes a Rubik's cube and paints every visible face white. He then dismantles the cube into its constituent 1×1 cubes. Eight of these smaller cubes have white paint on three of their faces, and one of them has no paint on it at all.

a. Find how many of the smaller 1×1 cubes have:

i. one face which have been painted white

ii. two faces which have been painted white

He now takes a larger $n \times n \times n$ cube made up of lots of smaller 1×1 cubes, paint all its faces white, and dismantle it into its constituent 1×1 cubes.

b. Find, in terms of n, how many of the smaller 1×1 cubes have:

i. Three faces painted white

ii. No faces painted white

iii. One face painted white

iv. Two faces painted white

Ian notices that the ratio (number of cubes with no white faces) : (number of cubes with one white face) is $1:1$.

c. Find the ratio (number of cubes with two white faces) : (number of cubes with three white faces).

6. You are given that $(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$. Using this fact:

a. Expand and simplify:

i. $(x-y)^3$

ii. $\left(x + \frac{1}{x}\right)^3$

iii. $(2a+3b)^3$

b. Calculate:

i. 1001^3

ii. 97^3

c. Calculate:

i. $\sqrt[3]{8000 + 1200 + 60 + 1}$ $\left(= \sqrt[3]{9261}\right)$

ii. $\sqrt[3]{1124864}$

7. A teacher writes a positive whole number less than 4000 on the board. One boy says that the number is a multiple of 2, a second boy says that it is a multiple of 3, and so on consecutively until the eleventh boy says that it is a multiple of 12. The teacher notices that all the boys were right except two, and that the two boys who were wrong spoke one after the other.

What was the number that the teacher wrote on the board? Explain your reasoning.

8. The *floor function*, written $\lfloor x \rfloor$, means "the largest whole number less than or equal to x".
So, for example, $\lfloor 2020 \rfloor = 2020$, $\lfloor 5.99 \rfloor = 5$ and $\lfloor \pi \rfloor = 3$.

a. Explain why, if $\lfloor x \rfloor = 1$, then $1 \leq x < 2$.

b. Is it always the case that $\lfloor x + 3 \rfloor = \lfloor x \rfloor + 3$? Briefly justify your answer.

c. Give an example that demonstrates that $\lfloor 2x \rfloor$ is not always the same as $2\lfloor x \rfloor$.

d. Find the range of values of x for which

i. $\lfloor x \rfloor = \left\lfloor \frac{199}{2} \right\rfloor$

ii. $\lfloor x - 5 \rfloor = 14$

iii. $5\lfloor x \rfloor = 40$

iv. $\lfloor 5x \rfloor = 40$

v. $\frac{12}{\lfloor x \rfloor} = 3$

vi. $\left\lfloor \frac{12}{x} \right\rfloor = 3$

e. Give a brief description of the type of numbers for which $\lfloor nx \rfloor = n\lfloor x \rfloor$ (where n is a whole number).

f. Draw a sketch of the graph $y = \lfloor x \rfloor$ between 0 and 5.

g. Solve $\left\lfloor \frac{x}{2} \right\rfloor = \left\lfloor \frac{x}{3} \right\rfloor$. *(You may assume that x is not negative)*
Hint: you may want to consider the points where each side of this equation changes from one integer to the next.

There are no questions printed on this page.

HARROW
SCHOOL

Philosophy and Applied Ethics
Scholarship Examination 2020

75 minutes

You have 30 minutes to read through the five articles and then 45 minutes to answer the question. Do take time to plan and draft your answer.

Use blue or black ink for text.

Source A

Plato, *Euthyphro* 9A–11B

The phrase pious is no longer commonly used. Pious refers to things which are morally right.

Socrates: Consider this question: Is what is pious loved by the gods because it is pious, or is it pious because it is loved by the gods?

Euthyphro: I don't understand what you mean, Socrates.

Socrates: Well, I will try and explain more clearly. Do we seek of things as carried and carrying, led and leading, seen and seeing? And do you understand that in all such pairs of terms each is different from the other?

Euthyphro: Yes I think I understand.

Socrates: Is there also something that is loved and someone else that is loving?

Euthyphro: Of course.

Socrates: Tell me, then: is a carried thing carried because one carries it, or for some other reason?

Euthyphro: No; the reason is just that.

Socrates: And a led thing is led because one leads it and a seen thing because one sees it?

Euthyphro: Certainly.

Socrates: Then what do we say about piety? Isn't it loved by all the gods, according to your definition?

Euthyphro: Yes.

Socrates: Just because it is pious, or for some other reason?

Euthyphro: No; because it is pious.

Socrates: So it is loved because it is pious, not pious because it is loved?

Euthyphro: It seems so.

Socrates: But it is because a thing is loved by the gods that it is an object of love or god-beloved.

Euthyphro: Of course.

Socrates: Then what is god-beloved is not the same as what is pious, Euthyphro, nor is what is pious the same as what is god-beloved, as you assert; they are two different things.

Euthyphro: How do you make that out Socrates?

Socrates: Because we agree that what is pious is loved because it is pious, and not pious because it is loved; isn't that so?

Euthyphro: Yes.

Socrates: And we agree that what is god-beloved is god-beloved because the gods love it, from the very fact of their loving it; and that they do not love it because it is god-beloved.

Euthyphro: That is true.

Socrates: But if what is god-loved were identical with what is pious, my dear Euthyphro, then if what is pious were loved because it is pious, what is god-beloved would be loved because it is god-beloved; and if what is god-beloved were god-beloved because it is loved by the gods, then what is pious would be pious because it is loved by them. As it is, you can see that the relation between them is just the opposite; which shows that they are entirely different from each other. The one is lovable because it is it loved, and the other is loved because it is lovable.

Source B

Abraham and Isaac

God tested Abraham. He said to him, 'Abraham!'
And he said, 'Here I am'.
God said, 'Take your son, your only son, Isaac, whom
you love, and go to the land of Moriah, and offer him as a burnt offering
on one of the mountains that I shall show you (Genesis 22:1-2).

If you are not familiar with this story, it is important to know that Abraham and his wife Sarah had waited a long time to have Isaac. God had promised them a child in their old age, against all the odds, who would carry the promises of many future generations. And yet God asks Abraham to sacrifice him! Even if it does not raise formidable moral questions, it is at least counter-intuitive. But Abraham does not falter. He takes Isaac as commanded and it is not until Abraham raises the knife to kill his son that God intervenes. Abraham's willingness to kill Isaac is enough for God to know that the patriarch would not 'withhold his only son' from him. A ram is conveniently found in a thicket and offered in Isaac's place.

Source C

The Danish philosopher Søren Kierkegaard struggled with Abraham and Isaac story in his book *Fear and Trembling*. Was it ever reasonable for man to be asked to abandon what he understands to be intrinsically good in order to fulfil the demands of faith? Kierkegaard reached the conclusion that it was, since faith is the highest virtue, exemplified in Abraham's willingness to sacrifice his son for what must have seemed at best a capricious God and, at worst, a malevolent one. Kierkegaard argued that we should not confuse ethics or morality with doing the will of God, since Abraham was being called to a level of obedience that went beyond human understanding of morality. In this case, being bound to the moral law of society would have been a hindrance to his fulfilling God's will. Nevertheless, John Habgood exposes the 'nagging doubt' that remains: 'If morality is supposed to be universal, can it really be discounted, even under such extreme pressure from God?'
(*Varieties of Unbelief*).

Source D

'Without God, everything is permitted.'
Dostoyevsky's *The Brothers Karamazov* (1879-1880)

Source E

'I say quite deliberately that the Christian religion, as organised in its churches, has been and still is the principal enemy of moral progress in the world… [religion] …prevents our children from having a rational education; religion prevents us from removing the fundamental causes of war; religion prevents us from teaching the ethic of scientific co-operation in place of the old fierce doctrines of sin and punishment. It is possible that mankind is on the threshold of a golden age; but if so, it will first be necessary to slay the dragon that guards the door, and this dragon is religion.'
(Bertrand Russell's *Why I Am Not a Christian*)

Question:

'Good morals come from God.'

Evaluate this view.

In your answer you should:

- give reasoned arguments to support this statement
- give reasoned arguments to support a different point of view
- reach a justified conclusion.

To help, you might like to think about the following key questions:

1. Do morals come from God? If not, where do they come from?
2. Suggest evidence for and against the argument that religion is immoral.
3. Do religious people stand a better chance of being moral than non-religious people?
4. Could God command a wicked act?

We would encourage you to use the sources and to give examples to help your arguments.

HARROW SCHOOL 13+ SCHOLARSHIP
SCIENCE EXAMINATION 2020
SECTION A: MULTIPLE CHOICE ANSWER SHEET

For each of the multiple choice questions 1 – 30 in Section A, fill in the circle A, B, C or D on the grid below which you feel is the best answer. **USE AN HB PENCIL**

ENTER YOUR NAME IN THE BOX BELOW

Name

1	A	B	C	D	17	A	B	C	D
2	A	B	C	D	18	A	B	C	D
3	A	B	C	D	19	A	B	C	D
4	A	B	C	D	20	A	B	C	D
5	A	B	C	D	21	A	B	C	D
6	A	B	C	D	22	A	B	C	D
7	A	B	C	D	23	A	B	C	D
8	A	B	C	D	24	A	B	C	D
9	A	B	C	D	25	A	B	C	D
10	A	B	C	D	26	A	B	C	D
11	A	B	C	D	27	A	B	C	D
12	A	B	C	D	28	A	B	C	D
13	A	B	C	D	29	A	B	C	D
14	A	B	C	D	30	A	B	C	D
15	A	B	C	D					
16	A	B	C	D					

Key

A B C D

ZIPGRADE.COM

13+ Scholarship Science Paper SECTION A 2020 (3515)

SECTION A: ***Science Multiple Choice Questions***

For each of the questions in this section, identify which one of the answers A, B, C or D is correct and then indicate your answer on the separate *Multiple Choice Answer Sheet*.

1. The formation of slag, $CaSiO_3$, is useful to remove impurities from a blast furnace. Which of the following best describes the formation of slag?

$$CaO + SiO_2 \rightarrow CaSiO_3$$

a) Thermal decomposition
b) Neutralisation
c) Displacement
d) Combustion

2. A student wishes to determine the percentage composition of rock salt, which is a mixture of sand and salt. She adds the mixture to warm water and filters off the sand, which is left to dry. She then recovers the salt by evaporation.

Substance Measured	Mass/ g
Rock salt before separation	17.5
Sand obtained from filtration	10.5

What proportion of rock salt is salt?

a) 30 %
b) 40 %
c) 50 %
d) 60 %

3. The following reaction was carried out.

calcium carbonate + hydrochloric acid → calcium chloride + **unknown gas** + water

The unknown gas was tested, and the following observations were made:

Bubbled through limewater	Tested with lit splint
Limewater turns milky	Lit splint extinguishes

What is the identity of the unknown gas?

a) Argon
b) Oxygen
c) Carbon dioxide
d) Water vapour

4. Bromothymol blue and phenolphthalein are indicators used to determine pH. The colours of bromothymol blue and phenolphthalein are summarised below.

Indicator	Colour in acidic solutions	Colour in neutral solutions	Colour in alkaline solutions
Bromothymol blue	yellow	blue	blue
Phenolphthalein	colourless	colourless	purple

Determine what colours the two indicators would be at the following pH values.

	Bromothymol blue		Phenolphthalein	
	pH 1	**pH 7**	**pH 11**	**pH 14**
a)	yellow	blue	colourless	colourless
b)	yellow	blue	purple	purple
c)	blue	blue	colourless	purple
d)	blue	blue	purple	colourless

5. Natrolite, $Na_2Al_2Si_3O_{10}$, is a compound that is useful as a catalyst. Which of the following rows contains the correct number of atoms and elements for natrolite?

	Number of atoms	Number of elements
a)	4	17
b)	4	4
c)	17	17
d)	17	4

6. Some solids, such as Iodine, sublime when heated. Which of the following statements best describes sublimation?

a) Particles move slower and form a liquid
b) Particles spread apart and move at high speed
c) The density of particles increases
d) The particles become lighter and slide over each other

7. The mass of one atom for three elements are given in the table below.

Element	Mass (u)
Sodium	23
Oxygen	16
Calcium	40

Which of the following substances is heaviest: CaO, Na_2O or O_2?

a) CaO
b) Na_2O
c) O_2
d) They all have the same mass

8. Which of the following would **not** be observed in the following reaction?

solid zinc + hydrochloric acid solution → zinc chloride solution + hydrogen gas

a) Heat is released
b) Fizzing
c) The zinc dissolves
d) The zinc ignites

9. In which row are the applications most suited for the metals given?

	Application			
	Roofing & piping	Jewellery	Protecting the surface of iron from rusting	Constructing the body of an aircraft
a)	gold	aluminium	lead	zinc
b)	aluminium	zinc	gold	lead
c)	zinc	lead	aluminium	gold
d)	lead	gold	zinc	aluminium

10. A hydrocarbon is a compound of only carbon and hydrogen. The mass of one atom of carbon and hydrogen is given below:

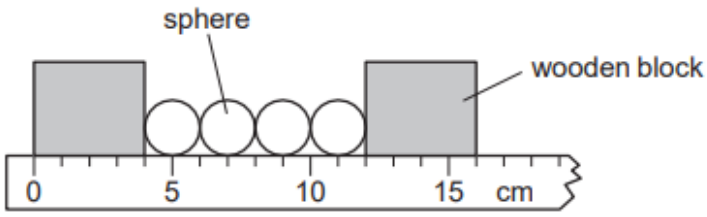
Element	Mass (u)
Carbon	12
Hydrogen	1

What is the formula of the hydrocarbon with a mass of 72 u?

a) C_5H_{12}
b) C_4H_{18}
c) C_6H_6
d) C_7H_2

11.

The diagram shows four identical spheres placed between two wooden blocks on a ruler.



What is the diameter of one sphere?

A 1.0 cm B 2.0 cm C 3.0 cm D 4.0 cm

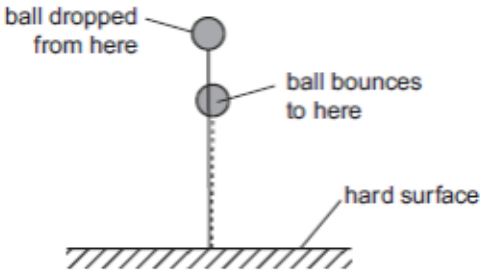
12.

Which energy resource does not derive its energy from the Sun?

A geothermal
B hydroelectric
C oil
D waves

13.

A ball is dropped on to a hard surface and bounces. It does not bounce all the way back to where it started, and so has not regained all of its original gravitational potential energy.



Which statement accounts for the loss of gravitational potential energy?

A. Energy was destroyed as the ball hit the ground.

B. Energy was destroyed as the ball travelled through the air.

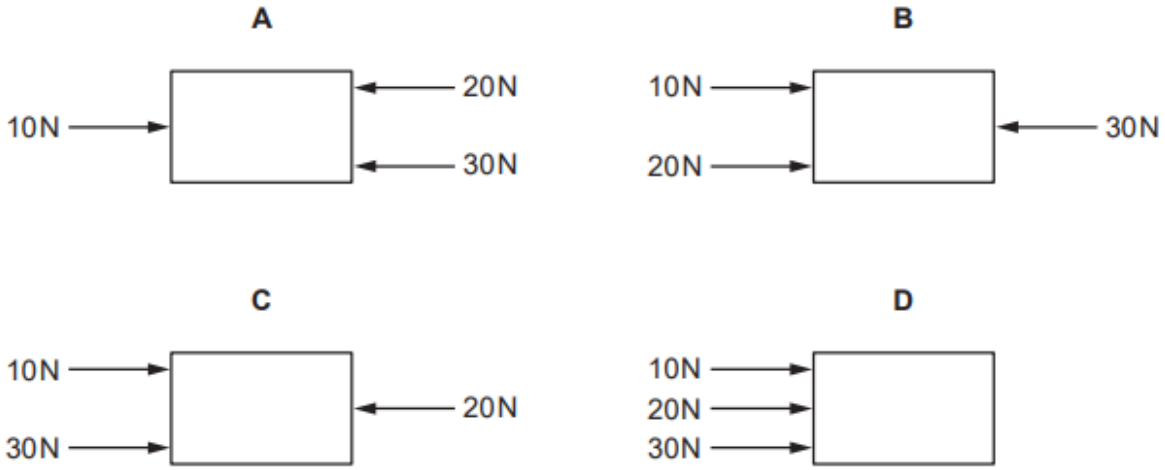
C. The chemical energy and elastic energy of the ball have increased.

D. The internal (heat) energy of the ball and its surroundings has increased.

14.

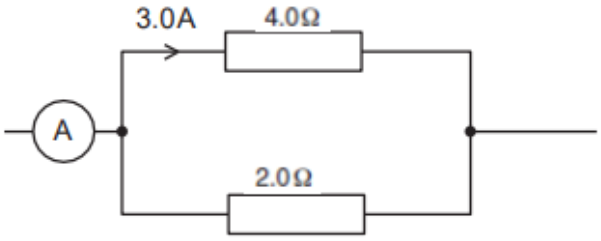
The diagrams show four identical objects. Each object is acted on by only the three forces shown.

Which object accelerates to the right, with the **smallest** acceleration?



15.

The diagram shows part of an electrical circuit.



The current in the 4.0 Ω resistor is 3.0 A.

What is the current in the ammeter?

A. 4.5A

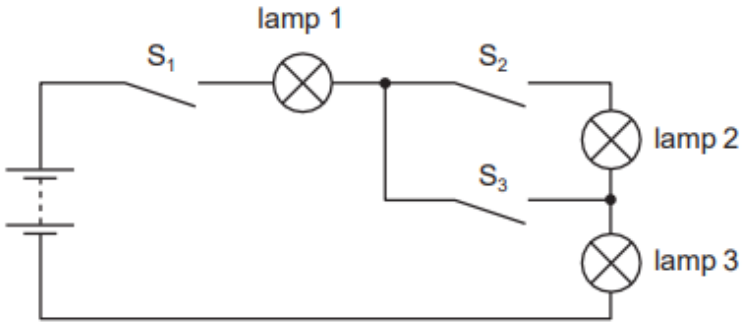
B. 6.0A

C. 9.0A

D 12.0A

16.

The diagram shows a circuit containing three lamps and three switches S_1, S_2 and S_3.



Lamp 1 and lamp 3 are lit, but lamp 2 is not lit.

Which switch or switches is/are closed?

A. S_1 only

B. S_1 and S_2

C. S_1 and S_3

D. S_2 and S_3

17.

An ice cube at a temperature of 0 °C is put into a drink at a temperature of 10 °C.

After a short time, some of the ice has melted and the drink has cooled to a temperature of 8 °C.

What is the temperature of the remaining ice?

A 0 °C B 2 °C C 4 °C D 8 °C

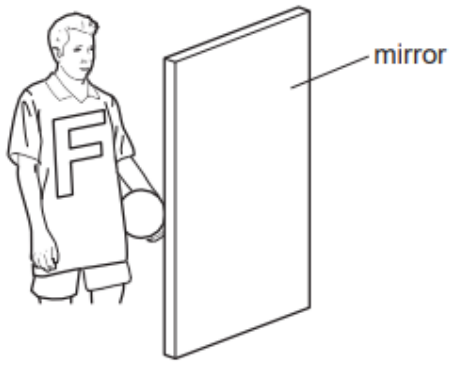
18.

Car tyre pressures are often measured in units of *psi* (pounds per square inch), which is not the same as the standard unit of pressure, the Pascal (where 1 *Pa* = 1 newton per square metre). Given that 1.00 *inch* = 2.54 *cm* and 1.00 *pound force* = 4.45 *N*, what is a tyre pressure of 36.0 *psi* equivalent to in standard units of pressure?

A. 63.1 *Pa*
B. 160 *Pa*
C. 6310 *Pa*
D. 248000 *Pa*

19.

A boy wears a shirt with a letter F on the front. He stands in front of a plane mirror.

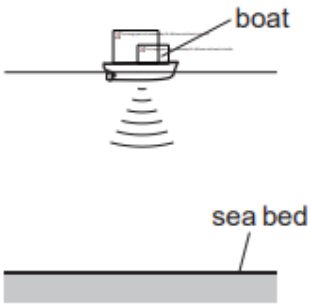


What does he see in the mirror?

A B C D

20.

A pulse of sound is produced at the bottom of a boat. The sound travels through the water and is reflected from the sea bed. The sound reaches the boat again after 1.2 s. The speed of sound in the water is 1500 m/s.



How far below the bottom of the boat is the sea bed?

A 450 m B 900 m C 1800 m D 3600 m

21. Which of the following is concerned with the study of animals (only)?

a) zoology
b) botany
c) physiology
d) biology

22. What part of the body would a cardiologist be most concerned with?

a) brain
b) liver
c) lungs
d) heart

23. What is the correct way to write the scientific name for the human species?

a) Homo Sapiens
b) homo sapiens
c) Homo sapiens
d) homo Sapiens

24. What would be the percentage increase in the global human population if it increased from 7.7 billion today to 9.8 billion in 2050?

a) 2.1
b) 27
c) 22
d) 1.2

25. What, approximately, is the surface area (external) of an adult human body?

a) 180 cm^2
b) 18 000 cm^2
c) 180 000 cm^2
d) 1 800 000 cm^2

26. What is the correct word equation for the chemical reaction that takes place during the manufacture of beer?

a) glucose + oxygen → ethanol
b) glucose → lactic acid
c) glucose + oxygen → carbon dioxide + lactic acid
d) glucose → carbon dioxide + ethanol

27. Iodine solution is placed on a sample of food. It remains a brown/orange colour. What can you conclude from this experiment about this food?

a) it does not contain starch
b) it contains glucose
c) it does not contain glucose
d) it contains starch

28. When was Charles Darwin's book *On the Origin of Species* first published?

a) 1492
b) 1771
c) 1859
d) 1953

29. Which of the following is not a treatment for cancer?

a) chemotherapy
b) radiotherapy
c) physiotherapy
d) surgery

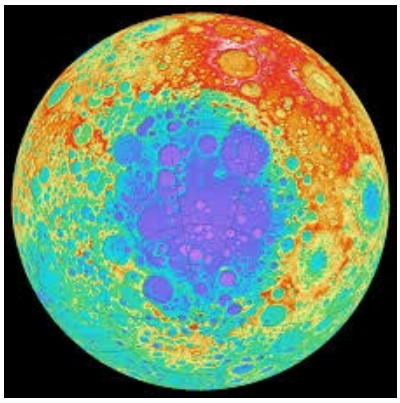
30. Which of the following animals are warm-blooded?

a) reptiles
b) amphibians
c) fish
d) birds

SECTION B: *Physics Comprehension*

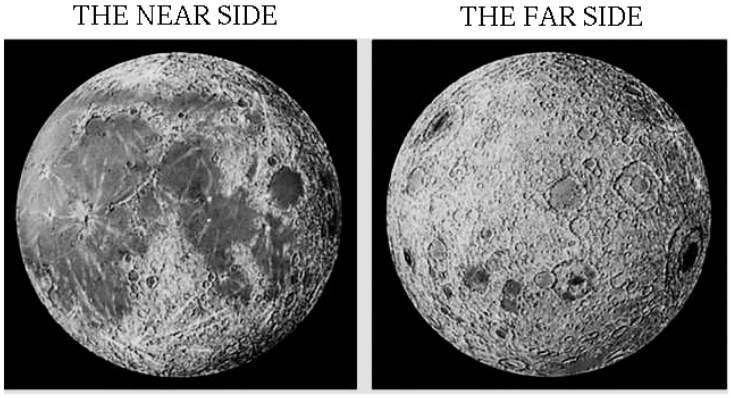
Read the following article and answer the questions relating to it that follow.

On the evening of January 2nd 2019, a Chinese lander named for an ancient moon goddess touched down on the lunar far side, where no human or robot has ever ventured before. Nearly ten hours later, Chang'e-4 deployed its Yutu 2 rover into the Von Kármán crater, part of the lunar far side's vast South Pole-Aitken basin (see image below). The distance from the basin's depths to the tops of the highest surrounding peaks is nearly 10 miles. China's Chang'e-4 mission launched toward the Moon on December 7th 2018 and entered orbit around our cosmic companion on December 12th 2018. Chang'e-4 consists of a lander and a rover, as well as a relay satellite to help communicate with Earth.



The Moon's South Pole-Aitken basin, a low-lying feature more than 2,400 km across that covers nearly a quarter of the moon's surface. Image credit: NASA, 2014

The Moon has orbited Earth for more than 4.5 billion years, and over that time, Earth's gravitational pull has forced the Moon's rotation speed to sync up with its orbital speed. As a result, the Moon takes the same time to both rotate on its axis and to orbit the Earth. That means the same side of the Moon always faces Earth, and the far side is the half we can't see from the planet's surface.



Note the very different appearance of the near side and the far side of the Moon.

You may have heard the far side referred to as the "dark side" of the moon, but that's a misnomer. The far side is not permanently in darkness and in fact, the moon's far side is lighter in colour since it lacks the near side's darker basins, which create the patterns that we see. It is difficult to maintain communication with Earth during a far-side landing and when Apollo astronauts orbited and passed across the Moon's far side, they were totally cut off from the rest of humankind.

Scientists on the Chang'e-4 team are interested in studying ancient craters within the South Pole-Aitken basin, such as Von Kármán. To do so the lander carries a range of instruments including a particle detector and a transmitter which can produce radar to penetrate the moon's surface.

Adapted from a National Geographic article by Michael Greshko

1. How long, in days, did it take Chang'e-4 to reach the Moon?

(1)

_____

2. Once it had reached the Moon, how long did it take Chang'e-4 to land on the surface?

(1)

_____

3. Why do you think the lander took a much longer time to actually land on the surface than it did to get to the Moon?

(1)

_____

_____

_____

4. The image of the Moon's South Pole-Aitken basin is not a 'real-colour' image; the colours (purple, green, yellow and red stand out in particular) do not represent the real colours of the Moon. What do you think the colours might represent in this image?

(1)

_____

_____

5. The article states that the Moon's rotation speed (the speed at which it spins on its own axis) has synced up with its orbital speed (the speed at which it orbits the Earth). How long will one full rotation of the Moon take?

(1)

_____

_____

6. Why does the synchronization of the Moon's rotation speed and its orbital speed mean that the same side of the Moon always faces the Earth? Use a diagram to illustrate. You might like to compare with how things might look if the Moon did not rotate at all.

(3)

_____

_____

_____

_____

_____

7. The article mentions two instruments that the lander carries. Can you think of any other instruments that might be on board?

(1)

_____

_____

8. Why is it a misnomer to say that the far side is permanently dark? You may find it helpful to draw another diagram.

(2)

_____

_____

_____

_____

9. When the Apollo astronauts went to the Moon, they communicated with Earth using radio waves. The article says that when Apollo astronauts orbited and passed across the Moon's far side, they were totally cut off from the rest of humankind. Why do you think that was?

(2)

_____

_____

_____

_____

10. It is hoped that the studies made by Chang'e-4 may pave the way for the installation of a radio telescope on the far side of the Moon. Why might the far side of the Moon be a helpful location for a radio telescope for exploring the rest of the universe?

(2)

_____

_____

_____

11. Using information from the article calculate the approximate circumference of the Moon.

(1)

_____

_____

12. Use your answer to the previous question to calculate the approximate speed, in km/h, of the surface of the Moon as it rotates.

(4)

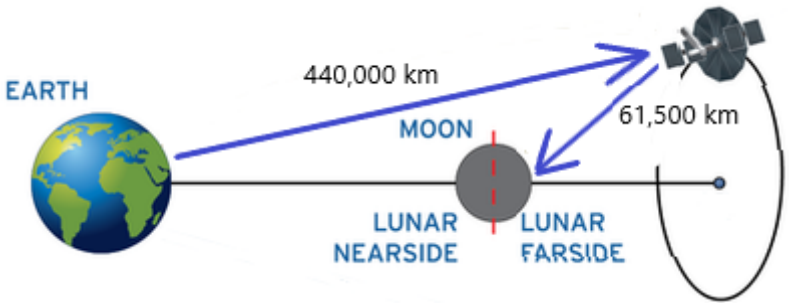
_____

_____

_____

_____

13. The blue arrows in the diagram below show the path taken by a radio signal sent from Earth to the Chang'e-4 rover asking for a position update.
Radio waves travel at the speed of light, c = 300,000 *km/s*.



After sending the signal, how long must a radio operator wait to receive a reply?

(4)

_____

_____

_____

_____

Section B: TOTAL = ☐ ***/ 24***

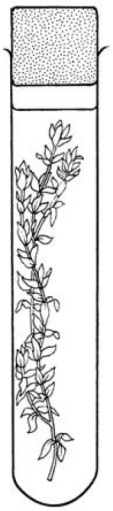
SECTION C: ***Biology Experiment Question***

Carbon dioxide plays an important role in plants. It is a reactant in photosynthesis and a product of aerobic respiration.

a) Draw a molecule of carbon dioxide in the space below to show how the atoms that make up the molecule are joined together.

(1)

A student wished to study the effect of photosynthesis and aerobic respiration on gas exchange in plants. She decided to use pondweed for her study. She placed a piece of pondweed in a boiling tube containing hydrogencarbonate indicator solution (HCIS).



b) Label the apparatus shown in the diagram above.

(1)

HCIS can be used as an indicator of carbon dioxide since it changes colour depending on the level of carbon dioxide present.

Level of carbon dioxide	Colour of HCIS
low	purple
normal	red
high	yellow

c) Carbon dioxide forms a weak acid when dissolved in water. If HCIS is a yellow colour does that indicate a low pH or a high pH? Explain your answer.

(2)

_____

_____

_____

The student placed the boiling tube containing pondweed and HCIS in different light conditions for 12 hours.

Condition	**Colour of HCIS**	
	At start	**After 12 hours**
dark	red	
dim light	red	red
bright light	red	

d) Complete the table of results to show the colour of HCIS after 12 hours in the dark and in bright light.

(2)

e) Explain the colour changes in the three conditions.

(6)

Dark:

_____

_____

Dim light:

_____

_____

Bright light:

_____

_____

f) Describe how you could set up a 'control' experiment to show that it was the pondweed that caused the colour change of the HCIS.

(2)

_____

_____

g) Limewater is another indicator that can be used to show an increase in the level of carbon dioxide. Suggest why it would not be a suitable indicator to use in this experiment.

(1)

_____

_____

Section C: TOTAL = ☐ ***/ 15***

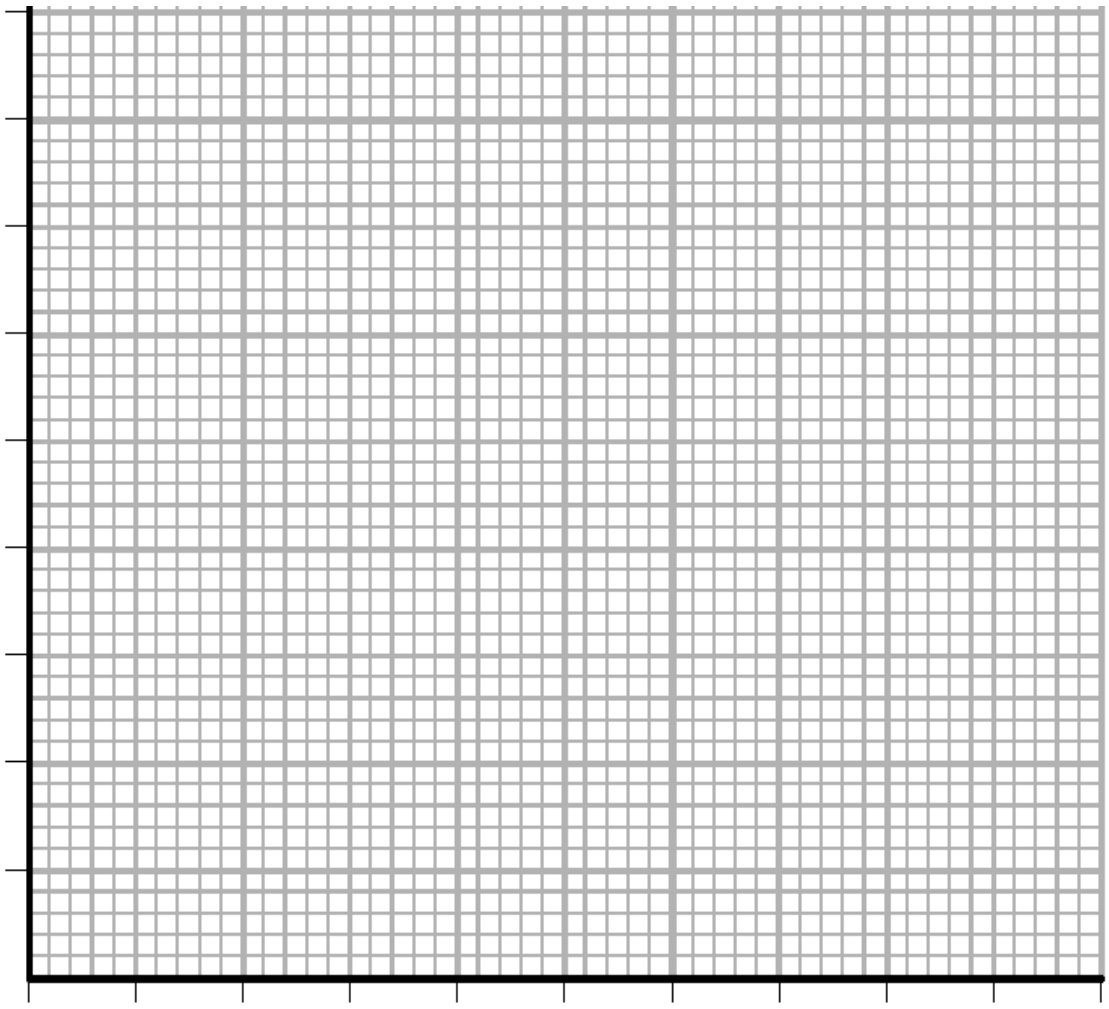
SECTION D: ***Chemistry Problem Solving***

Aquatic life relies on dissolved oxygen in order to respire. The following table gives values for the solubility of oxygen gas in distilled water, in units of miligrams of oxygen per litre of water, at a given temperature. The values were measured at sea level.

Temperature (*ºC*)	**Solubility (*mg / L*)**
0	14.6
10	11.3
20	9.1
30	7.6
40	6.5
50	5.6

1. Plot a line graph on the grid below to show the relationship between temperature and solubility of oxygen. Draw a **smooth curve** to connect the points.

(3)



2. Describe the relationship between the temperature of the solution and the solubility of oxygen in distilled water.

(1)

_____

_____

3. Compare the trend shown in this graph to that we would expect to observe for the relationship between the temperature of the solution and the solubility of a salt.

(1)

_____

_____

4. Write a chemical equation to show oxygen gas dissolving into water. Include state symbols in your answer.

(2)

_____

_____

5. Give a chemical test for oxygen gas.

(1)

_____

_____

The mass of oxygen that can be dissolved in water depends on the salinity (the amount of salt dissolved in the water). As the salinity increases the solubility of oxygen gas decreases.

6. Sketch a curve **on your graph** that could describe the solubility of oxygen gas in seawater.

(1)

Hypoxia occurs in fish when the dissolved oxygen content of the water that they are in is too low. The minimum mass of dissolved oxygen required before the onset of hypoxia depends on the species of fish. Lake trout, a freshwater fish, require at least 7 *mg / L* of dissolved oxygen to survive.

7. Use your graph to suggest the maximum temperature of water that lake trout can survive in before the onset of hypoxia.

(1)

…… *ºC*

A typical medium-sized freshwater aquarium sold in the United States contains 30 US gallons of water.

8. Calculate the mass of oxygen, **in grams**, dissolved in a medium-sized aquarium at 25 *ºC*. Give your answer to **1 decimal place**.

1 US gallon = 4546 cm^3 1 L = 1000 cm^3 1 g = 1000 mg

(3)

…… *g*

According to Henry's Law, the dissolved oxygen content of water is proportional to the percentage of the air above it that is oxygen. This is useful to find the amount of dissolved oxygen at varying altitude where atmospheric pressure differs.

Henry's Law can be expressed :

Equation 1

$$H = \frac{100 \times s}{a \times p}$$

Key:

H is Henry's constant
s is mass in miligrams of dissolved oxygen in 1 litre of water
a is the percentage abundance of oxygen in the atmosphere
p is the atmospheric pressure.

The percentage abundance of oxygen is 21 %, and the atmospheric pressure at sea level is 1 *atm*.

9. Use your graph to find the value of *H* for the solubility of oxygen in fresh water at 15 *ºC*, measured at sea level. Give your answer to **1 decimal place**.

(3)

_____

_____

_____

_____

…… *mg / L atm*

The highest large lake in the world is Lake Titicaca in the Andean Altiplano. Lake Titicaca is at an elevation of 3,812 metres. The atmospheric pressure at 3,812 metres is 0.6 *atm*. The proportion of the air at this altitude that is oxygen is the same as at sea level.

10. Rearrange equation 1 to give a new equation that could find *s*.

(1)

_____

11. Using your value of *H* or otherwise, calculate the dissolved oxygen content in Lake Titicaca, when the temperature of the water is 15 ºC, assuming it is freshwater.

(2)

_____

_____

…… *mg / L*

12. Would you expect to find lake trout in Lake Titicaca? Explain your answer.

(1)

_____

_____

Section D: TOTAL = ☐ ***/ 20***