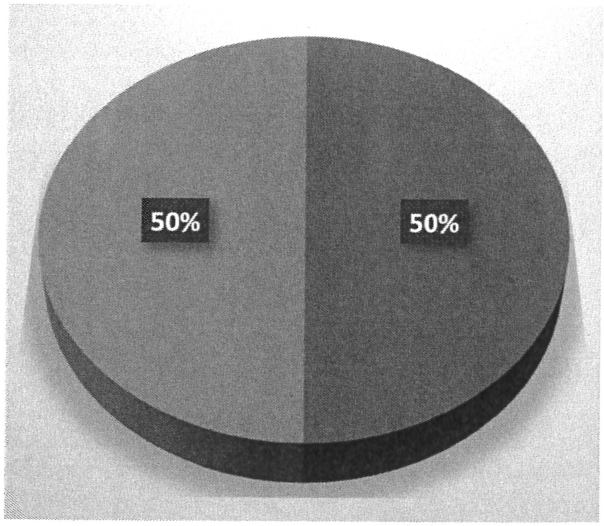
Name: .....

High Performance Learning

AQA GCSE DT Textiles Checklist

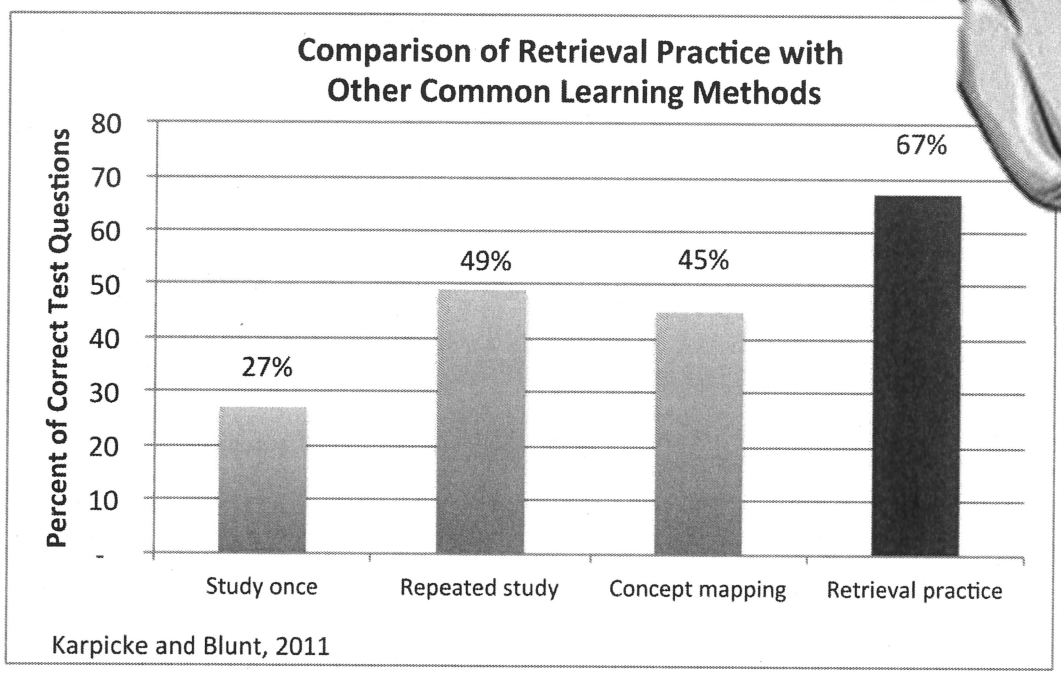
This booklet contains details of the various components of the GCSE DT Textiles course. It has all of the theory content you will be expected to know in order to achieve well by the end of the course. Use this knowledge to identify your **areas of ignorance** and **areas of strength**, both of which are essential to know if you are to carry out efficient, well-planned, well-aimed studying.

Remember that the course is a 50/50 balance of exams and design-and-make project (NEA). Always balance these two out!

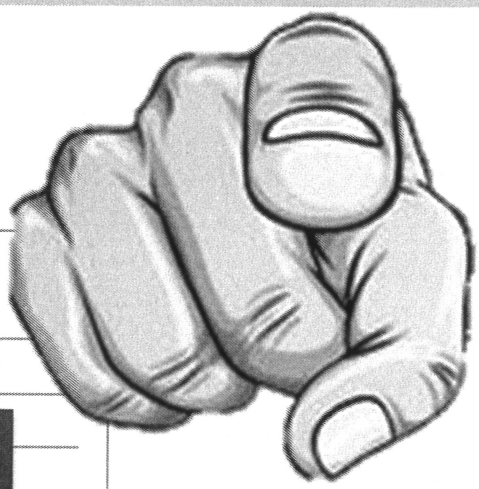


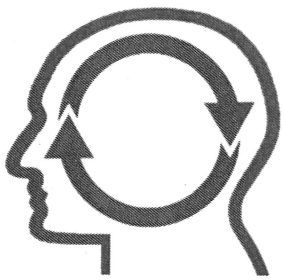
Retrieval Practive

The best revision method for **YOU!**



Karpicke and Blunt, 2011





Retrieval Practice [Practice Testing]

WHAT DO WE MEAN BY 'RETRIEVAL PRACTICE'?

Traditional revision methods may result in lovely posters or beautiful pages of highlighted notes and flashcards, but how do you **know** that you know the content? Simple... You TEST yourself by setting up challenges to remember how much you remember. Doing this at regular intervals will cement that knowledge into your memory like no other method and will also help identify your areas of ignorance. After all, how else do you know what areas you need to spend more time on if you can't identify your weaknesses? Thinking that you know more than you actually do is dangerous!

The act of information retrieval, or calling information to mind, leads to that memory being strengthened and it builds automatic recall in the future. Retrieval practice is a powerful tool for improving learning without more technology, money, or class time. It's not easy, but it is proven to work!

2 Specification at a glance

This qualification is linear. Linear means that students will sit all their exams and submit all their non-exam assessment at the end of the course.

2.1 Subject content

1. Core technical principles (page 9)
2. Specialist technical principles (page 19)
3. Designing and making principles (page 28)

2.2 Assessments

Paper 1
What's assessed • Core technical principles • Specialist technical principles • Designing and making principles
How it's assessed • Written exam: 2 hours • 100 marks • 50% of GCSE
Questions **Section A – Core technical principles (20 marks)** A mixture of multiple choice and short answer questions assessing a breadth of technical knowledge and understanding. **Section B – Specialist technical principles (30 marks)** Several short answer questions (2–5 marks) and one extended response to assess a more in depth knowledge of technical principles. **Section C – Designing and making principles (50 marks)** A mixture of short answer and extended response questions.

Non-exam assessment (NEA)
What's assessed Practical application of: • Core technical principles • Specialist technical principles • Designing and making principles
How it's assessed • Non-exam assessment (NEA): 30–35 hours approx • 100 marks • 50% of GCSE

Task(s)
• Substantial design and make task
• Assessment criteria:
  • Identifying and investigating design possibilities
  • Producing a design brief and specification
  • Generating design ideas
  • Developing design ideas
  • Realising design ideas
  • Analysing & evaluating
• In the spirit of the iterative design process, the above should be awarded holistically where they take place and not in a linear manner
• Contextual challenges to be released annually by AQA on 1 June in the year prior to the submission of the NEA
• Students will produce a prototype and a portfolio of evidence
• Work will be marked by teachers and moderated by AQA

3 Subject content

Our GCSE Design and Technology specification sets out the knowledge, understanding and skills required to undertake the iterative design process of exploring, creating and evaluating. The majority of the specification should be delivered through the practical application of this knowledge and understanding.

Topics and themes have been grouped to help you teach the specification, but these are not intended as a route through the specification, you can teach the content in any order. The subject content has been split into three sections as follows:

- Core technical principles
- Specialist technical principles
- Designing and making principles

Core technical principles (page 9) covers core technical principles and all content must be taught. Specialist technical principles (page 19) covers specialist technical principles where students will go into greater depth. Each principle should be taught through at least **one** material catergory or system. Designing and making principles (page 28) covers design and making principles and all content in this section must be taught.

The specification content is presented in a two column format. The left hand column contains the specification content all students must cover, and forms the basis for the assessments. This column sets out what students must know and understand to ensure they study the topic in appropriate depth and gives teachers the parameters in which the subject will be assessed.

Students must also demonstrate mathematical and scientific knowledge and understanding, in relation to design and technology. The right hand column throughout this section illustrates where the maths and science skills and knowledge can be applied to the wider design and technology content. These are examples of where these skills can be applied and are not intended to be exhaustive.

The maths and science skills and knowledge as required by the DfE, are set out in Appendix 1: Links to maths and science (page 57) of this document.

3.1 Core technical principles

In order to make effective design choices students will need a breadth of core technical knowledge and understanding that consists of:

- new and emerging technologies
- energy generation and storage
- developments in new materials
- systems approach to designing
- mechanical devices
- materials and their working properties.

All of this section must be taught and all will be assessed.

3.1.1 New and emerging technologies

Students must know and understand the impact of new and emerging technologies on contemporary and potential future scenarios in relation to the following areas:

Industry

Content	Potential links to maths and science
The impact of new and emerging technologies on: • the design and organisation of the workplace including automation and the use of robotics • buildings and the place of work • tools and equipment.	

Enterprise

Content	Potential links to maths and science
Enterprise based on the development of an effective business innovation: • crowd funding • virtual marketing and retail • co-operatives • fair trade.	

Sustainability

Content	Potential links to maths and science
The impact of resource consumption on the planet: • finite • non–finite • disposal of waste.	Taking into consideration the ecological and social footprint of materials.

People

Content	Potential links to maths and science
How technology push/market pull affects choice. Changing job roles due to the emergence of new ways of working driven by technological change.	

Culture

Content	Potential links to maths and science
Changes in fashion and trends in relation to new and emergent technologies. Respecting people of different faiths and beliefs.	

Society

Content	Potential links to maths and science
How products are designed and made to avoid having a negative impact on others: • design for disabled • elderly • different religious groups.	

Environment

Content	Potential links to maths and science
Positive and negative impacts new products have on the environment: • continuous improvement • efficient working • pollution • global warming.	

Production techniques and systems

Content	Potential links to maths and science
The contemporary and potential future use of: • automation • computer aided design (CAD) • computer aided manufacture (CAM) • flexible manufacturing systems (FMS) • just in time (JIT) • lean manufacturing.	

How the critical evaluation of new and emerging technologies informs design decisions

Content	Potential links to maths and science
That it is important to consider scenarios from different perspectives and considering: • planned obsolescence • design for maintenance • ethics • the environment.	Ethical factors and consideration of ecological and social footprint.

3.1.2 Energy generation and storage

Students should understand how energy is generated and stored and how this is used as the basis for the selection of products and power systems.

Fossil fuels

Content	Potential links to maths and science
How power is generated from: • coal • gas • oil. Arguments for and against the selection of fossil fuels.	How to choose appropriate energy sources.

Nuclear power

Content	Potential links to maths and science
How nuclear power is generated. Arguments for and against the selection of nuclear power.	How to choose appropriate energy sources.

Renewable energy

Content	Potential links to maths and science
How power is generated from: • wind • solar • tidal • hydro-electrical • biomass. Arguments for and against the selection of renewable energy.	How to choose appropriate energy sources.

Energy storage systems including batteries

Content	Potential links to maths and science
Kinetic pumped storage systems. Alkaline and re-chargeable batteries.	How to choose appropriate energy sources.

3.1.3 Developments in new materials

Students should be aware of developments in new materials.

Modern materials

Content	Potential links to maths and science
Developments made through the invention of new or improved processes eg Graphene, Metal foams and Titanium. Alterations to perform a particular function eg Coated metals, Liquid Crystal Displays (LCDs) and Nanomaterials.	Classification of the types of properties of a range of materials. Selecting appropriate materials. Extracting information from technical specifications.

Smart materials

Content	Potential links to maths and science
That materials can have one or more properties that can be significantly changed in a controlled fashion by external stimuli, such as stress, temperature, moisture, or PH eg shape memory alloys, thermochromic pigments and photochromic pigments	Classification of the types of properties of a range of materials. Selecting appropriate materials. Extracting information from technical specifications.

Composite materials

Content	Potential links to maths and science
That composite materials are produced by combining two or more different materials to create an enhanced material eg glass reinforced plastic (GRP) and carbonfibre reinforced plastic (CRP).	Classification of the types of properties of a range of materials. Selecting appropriate materials. Extracting information from technical specifications.

Technical textiles

Content	Potential links to maths and science
How fibres can be spun to make enhanced fabrics eg conductive fabrics, fire resistant fabrics, kevlar and microfibres incorporating micro encapsulation.	Classification of the types of properties of a range of materials. Selecting appropriate materials. Extracting information from technical specifications.

3.1.4 Systems approach to designing

Students should consider electronic systems including programmable components to provide functionality to products and processes, and enhance and customise their operation.

Inputs

Content	Potential links to maths and science
The use of light sensors, temperature sensors, pressure sensors and switches.	Extracting information from technical specifications. Component names, interaction and operation.

Processes

Content	Potential links to maths and science
The use of programming microcontrollers as counters, timers and for decision making, to provide functionality to products and processes.	Extracting information from technical specifications. Component names, interaction and operation.

Outputs

Content	Potential links to maths and science
The use of buzzers, speakers and lamps, to provide functionality to products and processes.	Extracting information from technical specifications. Component names, interaction and operation.

3.1.5 Mechanical devices

Different types of movement

Content	Potential links to maths and science
The functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements.	Visualise and represent 2D and 3D objects including 2D diagrams of mechanisms/ mechanical movement.

Changing magnitude and direction of force

Content	Potential links to maths and science
Levers: • first order • second order • third order Linkages: • bell cranks • push/pull. Rotary systems: • CAMs and followers • simple gear trains • pulleys and belts.	The action of forces and how levers and gears transmit and transform the effects of forces. Arithmetic and numerical computation eg use ratios. Use angular measures in degrees, visualise and represent 2D and 3D objects including 2D diagrams of mechanisms/ mechanical movement. Knowledge of the function of mechanical devices to produce different sorts of movement, changing the magnitude and direction of forces.

3.1.6 Materials and their working properties

Students should know and understand the categorisation of the types and properties of the following materials.

3.1.6.1 Material categories

Papers and boards

Content	Potential links to maths and science
Students should have an overview of the main categories and types of papers and boards: papers including: • bleed proof • cartridge paper • grid • layout paper • tracing paper boards including: • corrugated card • duplex board • foil lined board • foam core board • ink jet card • solid white board.	Classification of the types and properties of a range of materials. Physical properties of materials related to use and knowledge applied when designing and making.

Natural and manufactured timbers

Content	Potential links to maths and science
Students should have an overview of the main categories and types of natural and manufactured timbers: hardwoods including: • ash • beech • mahogany • oak • balsa softwoods including: • larch • pine • spruce manufactured boards including: • medium density fibreboard (MDF) • plywood • chipboard.	Classification of the types and properties of a range of materials. Physical properties of materials related to use and knowledge applied when designing and making.

Metals and alloys

Content	Potential links to maths and science
Students should have an overview of the main categories and types of metals and alloys: ferrous metals including: • low carbon steel • cast Iron • high carbon/tool steel non ferrous metals including: • aluminum • copper • tin • zinc alloys including: • brass • stainless steel • high speed steel.	Classification of the types and properties of a range of materials. Physical properties of materials related to use and knowledge applied when designing and making.

Polymers

Content	Potential links to maths and science
Students should have an overview of the main categories and types of polymers: thermoforming including: • acrylic (PMMA) • high impact polystyrene (HIPS • high density polythene (HDPE) • polypropylene (PP) • polyvinyl chloride (PVC) • polyethylene terephthalate (PET) thermosetting including: • epoxy resin (ER) • melamine-formaldehyde (MF) • phenol formaldehyde (PF) • polyester resin (PR) • urea–formaldehyde (UF).	Classification of the types and properties of a range of materials. Physical properties of materials related to use and knowledge applied when designing and making.

Textiles

Content	Potential links to maths and science
Students should have an overview of the main categories and types of textiles: natural fibres including: • cotton • wool • silk synthetic fibres including: • polyester • polyamide (nylon) • elastane (lycra) blended and mixed fibres including: • cotton/polyester woven including: • plain weave non-woven including: • bonded fabrics • felted fabrics knitted textiles including: • knitted fabrics.	Classification of the types and properties of a range of materials. Physical properties of materials related to use and knowledge applied when designing and making.

3.1.6.2 Material properties

Students should have an understanding of the working and physical properties of the materials in Material categories (page 16).

Material properties

Content	Potential links to maths and science
In relation to the main categories outlined above (not the specific materials identified), students should know and understand physical properties such as: • absorbency (resistance to moisture) • density • fusibility • electrical and thermal conductivity. In relation to the main categories outlined above (not the specific materials identified), students should know and understand working properties such as: • strength • hardness • toughness • malleability • ductility and elasticity.	Scientific vocabulary eg metals/non-metals and physical and chemical differences between them eg types and properties across a range of materials. Using materials eg composition of some important alloys eg selection of an alloy for enhanced durability in a particular design situation.

3.2 Specialist technical principles

In addition to the core technical principles, all students should develop an in-depth knowledge and understanding of the following specialist technical principles:

- selection of materials or components
- forces and stresses
- ecological and social footprint
- sources and origins
- using and working with materials
- stock forms, types and sizes
- scales of production
- specialist techniques and processes
- surface treatments and finishes.

Each specialist technical principle should be delivered through **at least one** material category **or** system. Not all of the principles outlined above relate to every material category or system, but all must be taught.

The categories through which the principles can be delivered are:

- papers and boards
- timber based materials
- metal based materials
- polymers
- textile based materials
- electronic and mechanical systems.

3.2.1 Selection of materials or components

In relation to **at least one** material category or system, students should be able to select materials and components considering the factors listed below.

Content	Potential links to maths and science
Functionality: application of use, ease of working. Aesthetics: surface finish, texture and colour. Environmental factors: recyclable or reused materials. Availability: ease of sourcing and purchase. Cost: bulk buying. Social factors: social responsibility. Cultural factors: sensitive to cultural influences. Ethical factors: purchased from ethical sources such as FSC.	Calculation of material costs. Selection and use of materials considering end of life disposal.

3.2.2 Forces and stresses

In relation to **at least one** material category or system, students should know and understand the impact of forces and stresses and the way in which materials can be reinforced and stiffened.

Materials and objects can be manipulated to resist and work with forces and stresses

Content	Potential links to maths and science
Tension, compression, bending, torsion and shear.	Changing the magnitude and direction of forces.

Materials can be enhanced to resist and work with forces and stresses to improve functionality

Content	Potential links to maths and science
How materials can be reinforced, stiffened or made more flexible: eg lamination, bending, folding, webbing, fabric interfacing.	

3.2.3 Ecological and social footprint

In relation to **at least one** material category or system, students should have a knowledge and understanding of the ecological and social footprint left by designers.

Ecological issues in the design and manufacture of products

Content	Potential links to maths and science
Deforestation, mining, drilling and farming. Mileage of product from raw material source, manufacture, distribution, user location and final disposal. That carbon is produced during the manufacture of products.	Selecting appropriate materials. Understanding of how to choose appropriate energy sources.

The six Rs

Content	Potential links to maths and science
Reduce, refuse, re-use, repair, recycle and rethink.	

Social issues in the design and manufacture of products

Content	Potential links to maths and science
Safe working conditions; reducing oceanic/ atmospheric pollution and reducing the detrimental (negative) impact on others.	Ethical factors and the social footprint of materials used in products.

3.2.4 Sources and origins

In relation to **at least one** material category, students should know and understand the sources and origins of materials.

Content	Potential links to maths and science
Primary sources of materials and the main processes involved in converting into workable forms for at least one material area. • Paper and board (how cellulose fibres are derived from wood and grasses and converted into paper). • Timber based materials (Seasoning, conversion and creation of manufactured timbers). • Metal based materials (extraction and refining). • Polymers (refining crude oil, fractional distillation and cracking). • Textile based materials (obtaining raw material from animal, chemical and vegetable sources, processing and spinning).	Life cycle assessment and recycling ie the basic principles in carrying out a life cycle assessment of a material.

3.2.5 Using and working with materials

In relation to **at least one** material category or system, students should know and understand in addition to material properties (page 15), the factors listed below.

Properties of materials

Content	Potential links to maths and science
Students must know and understand how different properties of materials and components are used in commercial products, how properties influence use and how properties affect performance. Students must know and understand the physical and mechanical properties relevant to commercial products in their chosen area as follows: • Papers and boards (flyers/leaflets and card based food packaging). • Timber based materials (traditional timber children's toys and flat pack furniture). • Metal based materials (cooking utensils and hand tools). • Polymers (polymer seating and electrical fittings). • Textile based materials (sportswear and furnishings). • Electronic and mechanical systems (motor vehicles and domestic appliances).	How physical and working properties are selected related and used in commercial products when designing and making.

The modification of properties for specific purposes

Content	Potential links to maths and science
• Additives to prevent moisture transfer (paper and boards). • Seasoning to reduce moisture content of timbers (timber based materials). • Annealing to soften material to improve malleability (metal based materials). • Stabilisers to resist UV degradation (polymers). • Flame retardants reduce combustion and fire hazards (textile based materials). • Photosensitive PCB board in PCB manufacture and anodizing aluminium to improve surface hardness (electronic and mechanical systems).	

How to shape and form using cutting, abrasion and addition

Content	Potential links to maths and science
• Papers and boards (how to cut, crease, score, fold and perforate card). • Timber based materials (how to cut, drill, chisel, sand and plane). • Metal based materials (how to cut, drill, turn, mill, cast, bronze and weld). • Polymers (how to cut, drill, cast, deform, print and weld). • Textile based materials (how to sew, pleat, gather, quilt and pipe). • Electronic and mechanical systems (how to cut, drill and solder).	

3.2.6 Stock forms, types and sizes

In relation to **at least one** material category or system, students should know and understand the different stock forms types and sizes in order to calculate and determine the quantity of materials or components required.

Content	Potential links to maths and science
Commercially available types and sizes of materials and components. Papers and boards: • sheet, roll and ply • sold by size eg A3, thickness, weight and colour • standard components eg fasteners, seals and bindings • cartridge paper and corrugated card. Timber based materials: • planks, boards and standard moldings • sold by length, width, thickness and diameter • standard components eg woodscrews, hinges, KD fittings. Metal based materials: • sheet, rod, bar and tube • sold by length, width, thickness and diameter • standard components eg rivets, machine screws, nuts, and bolts. Polymers: • sheet, rod, powder, granules, foam and films • sold by length, width, gauge and diameter • standard components eg screws, nuts and bolts, hinges. Textile based materials: • yarns and fabrics • sold by roll size, width, weight and ply • standard components eg zips, press studs, velcro. Electrical and mechanical components: • sold by quantity, volt and current rating • standard components eg E12 resistor series, dual in line IC packages (DIL), microcontrollers (PIC).	Calculation of material quantities and sizes. Calculate surface area and volume eg material requirements for a specific use. Efficient material use, pattern spacing, nesting and minimising waste.

3.2.7 Scales of production

In relation to **at least one** material category or system, students should be able to select materials and components considering scales of production and referencing the processes listed in Specialist Techniques and processes. (page 25)

Content	Potential links to maths and science
How products are produced in different volumes. The reasons why different manufacturing methods are used for different production volumes: • prototype • batch • mass • continuous.	

3.2.8 Specialist techniques and processes

In relation to **at least one** material category or system, students should know and understand the factors listed below.

The use of production aids

Content	Potential links to maths and science
How to use measurement/reference points, templates, jigs and patterns where suitable.	Scaling of drawings, working to datums. Material quantities required.

Tools, equipment and processes

Content	Potential links to maths and science
A range of tools, equipment and processes that can be used to shape, fabricate, construct and assemble high quality prototypes, as appropriate to the materials and/or components being used including: wastage, such as: • die cutting • perforation • turning • sawing • milling • drilling • cutting and shearing addition, such as: • brazing • welding • lamination • soldering • 3D printing • batik • sewing • bonding • printing deforming and reforming such as: • vacuum forming • creasing • pressing • drape forming • bending • folding • blow moulding • casting • injection moulding • extrusion.	

How materials are cut shaped and formed to a tolerance

Content	Potential links to maths and science
The manufacture to minimum and maximum measurements.	Extracting information on tolerances and using it to control quality and make a prototype.

Commercial processes

Content	Potential links to maths and science
• Papers and boards (offset lithography and die cutting). • Timber based materials (routing and turning). • Metal based materials (milling and casting). • Polymers (injection molding and extrusion). • Textile based materials (weaving, dying and printing). • Electrical and mechanical systems (pick and place assembly and flow soldering).	

The application and use of Quality Control to include measurable and quantitative systems used during manufacture

Content	Potential links to maths and science
• Papers and boards (registration marks). • Timber based materials (dimensional accuracy using go/no go fixture). • Metal based materials (dimensional accuracy using a depth stop). • Polymers (dimensional accuracy by selecting correct laser settings). • Textile based materials (dimensional accuracy checking a repeating print against an original sample). • Electrical and mechanical systems (UV exposure, developing and etching times in PCB manufacture).	

3.2.9 Surface treatments and finishes

In relation to **at least one** material category or system, students should have knowledge and understanding of surface treatments and finishes.

Content	Potential links to maths and science
The preparation and application of treatments and finishes to enhance functional and aesthetic properties. • Papers and boards (printing, embossing and UV varnishing). • Timber based materials (painting, varnishing and tanalising). • Metal based materials (dip coating, powder coating and galvanizing). • Polymers (polishing, printing and vinyl decals). • Textile based materials (printing, dyes and stain protection). • Electronic and mechanical systems (PCB lacquering, and lubrication).	Surface treatments to inhibit corrosion and oxidation.

3.3 Designing and making principles

Students should know and understand that all design and technology activities take place within a wide range of contexts.

They should also understand how the prototypes they develop must satisfy wants or needs and be fit for their intended use. For example, the home, school, work or leisure.

They will need to demonstrate and apply knowledge and understanding of designing and making principles in relation to the following areas:

- investigation, primary and secondary data
- environmental, social and economic challenge
- the work of others
- design strategies
- communication of design ideas
- prototype development
- selection of materials and components
- tolerances
- material management
- specialist tools and equipment
- specialist techniques and processes

3.3.1 Investigation, primary and secondary data

Use primary and secondary data to understand client and/or user needs

Content	Potential links to maths and science
How the following techniques are used and applied: • market research, interviews and human factors including ergonomics • focus groups and product analysis and evaluation • the use of anthropometric data and percentiles.	Analysing responses to user questionnaires. Frequency tables and information on design decisions. Presentation of client survey responses. Percentiles ranges used in anthropometrics and/or ergonomics.

How to write a design brief and produce a design and manufacturing specification

Content	Potential links to maths and science
Students should consider their own needs, wants and interests and those of others.	

Carry out investigations in order to identfy problems and needs

Content	Potential links to maths and science
Why a designer considers alterations to a brief and modifying the brief as required.	Comparative chart of performance criteria as for existing products to help evaluate them.

3.3.2 Environmental, social and economic challenge

Content	Potential links to maths and science
The environment, social and economic challenges that influence design and making. How the following might present opportunities and constraints that influence the processes of designing and making: • deforestation • possible increase in carbon dioxide levels leading to potential global warming • the need for fair trade.	Selection of materials based on ethical factors and social and environmental footprints.

3.3.3 The work of others

Content	Potential links to maths and science
Students should investigate, analyse and evaluate the work of past and present designers and companies to inform their own designing. Students should investigate the work of a minimum of two of the following designers: • Harry Beck • Marcel Breuer • Coco Chanel • Norman Foster • Sir Alec Issigonis • William Morris • Alexander McQueen • Mary Quant • Louis Comfort Tiffany • Raymond Templer • Marcel Breuer • Gerrit Reitveld • Charles Rennie Macintosh • Aldo Rossi • Ettore Sottsass • Philippe Starck • Vivienne Westwood. Students should investigate the work of a minimum of two of the following companies: • Alessi • Apple • Braun • Dyson • Gap • Primark • Under Armour • Zara.	

3.3.4 Design strategies

Generate imaginative and creative design ideas using a range of different design strategies

Content	Potential links to maths and science
How different strategies can be applied, including: • collaboration • user centered design • a systems approach • iterative design • avoiding design fixation.	

Explore and develop their own ideas

Content	Potential links to maths and science
How this can be done using an iterative process including: • sketching • modelling • testing • evaluation of their work to improve outcomes.	Measurement and marking out of component parts for models.

3.3.5 Communication of design ideas

Content	Potential links to maths and science
Develop, communicate, record and justify design ideas using a range of appropriate techniques such as: • freehand sketching, isometric and perspective • 2D and 3D drawings • system and schematic diagrams • annotated drawings that explain detailed development or the conceptual stages of designing • exploded diagrams to show constructional detail or assembly • working drawings: 3rd angle orthographic, using conventions, dimensions and drawn to scale • audio and visual recordings in support of aspects of designing: eg interviews with client or users • mathematical modelling • computer based tools • modelling: working directly with materials and components, eg card modelling, producing a toile when designing garments, constructing a circuit using breadboard.	Scaling drawings.

3.3.6 Prototype development

Content	Potential links to maths and science
Design and develop prototypes in response to client wants and needs. Note the term prototype can be used to describe either a product or system. How the development of prototypes: • satisfy the requirements of the brief • respond to client wants and needs • demonstrate innovation • are functional • consider aesthetics • are potentially marketable. Students should know and understand how to evaluate prototypes and be able to: • reflect critically, responding to feedback when evaluating their own prototypes • suggest modifications to improve them through inception and manufacture • assess if prototypes are fit for purpose.	A presentation of data; tabulate responses and findings.

In relation to at least one of the following material categories students must develop and apply an in-depth knowledge and understanding of sections Selection of materials and components (page 33) to Specialist techniques and processes (page 35)

- papers and boards
- timber based materials
- metal based materials
- polymers
- textile based materials
- electronic and mechanical systems.

3.3.7 Selection of materials and components

Content	Potential links to maths and science
Appropriate materials and components to make a prototype. How to select and use materials and components appropriate to the task considering: • functional need • cost • availability.	SI units; identify appropriate commercially available stock forms and select appropriately. Composition of some important alloys; selecting appropriate metal alloys as required.

3.3.8 Tolerances

Content	Potential links to maths and science
Work accurately using tolerances. How a range of materials are cut, shaped and formed to designated tolerances. Why tolerances are applied during making activities.	SI units eg accurate use of appropriate tolerances +/- 2mm, resistor tolerance and seam allowance.

3.3.9 Material management

Cut materials efficiently and minimise waste

Content	Potential links to maths and science
The importance of planning the cutting and shaping of material to minimise waste eg nesting of shapes and parts to be cut from material stock forms. How additional material may be removed by a cutting method or required for seam allowance, joint overlap etc.	Expression in decimal and standard form eg calculation of required materials. Calculate surface area and volume eg material requirements. Angular measures eg measurement and marking out. SI units eg measurement of materials and components using standard units as appropriate. The use of reference datum points and co-ordinates.

Use appropriate marking out methods, data points and coordinates

Content	Potential links to maths and science
The value of using measurement and marking out to create an accurate and quality prototype. The use of data points and coordinates including the use of reference points, lines and surfaces, templates, jigs and/or patterns	Use angular measures eg tessellation of component parts. Calculating material area eg working out the quantity of materials required. SI units eg accurate use of appropriate units of measurement to calculate material requirements.

3.3.10 Specialist tools and equipment

Content	Potential links to maths and science
How to select and use specialist tools and equipment, including hand tools, machinery, digital design & manufacture, appropriate for the material and/or task to complete quality outcomes. How to use them safely to protect themselves and others from harm.	

3.3.11 Specialist techniques and processes

Content	Potential links to maths and science
How to select and use specialist techniques and processes appropriate for the material and/or task and use them to the required level of accuracy in order to complete quality outcomes. How to use them safely to shape, fabricate and construct a high quality prototype, including techniques such as wastage, addition, deforming and reforming.	

Surface treatments and finishes

Content	Potential links to maths and science
Students should know and understand that surface treatments and finishes are applied for functional and aesthetic purposes. How to prepare a material for a treatment or finish. How to apply an appropriate surface treatment or finish.	Corrosion and oxidation eg how corrosion and/or oxidation affects different materials, how they can be protected through different surface treatments and finishes.

AQA
Realising potential

Command words

Command words are the words and phrases used in exams and other assessment tasks that tell students how they should answer the question.

The following command words are taken from Ofqual's official list of command words and their meanings that are relevant to this subject. In addition, where necessary, we have included our own command words and their meanings to complement Ofqual's list.

Analyse

Separate information into components to identify their characteristics (AO3)

Apply

Put into effect in a recognised way (AO4)

Argue

Present a reasoned case (AO3)

Calculate

Work out the value of something (AO4)

Compare

Identify similarities and differences (AO3)

Complete

Finish a task by adding to given information (AO4)

Consider

Review and respond to given information (AO3)

Contrast

Identify differences (AO3)

Define

Specify meaning (AO4)

Describe

Set out characteristics (AO4)

Discuss

Present key points about different ideas or strengths and weaknesses of an idea (AO3)

Evaluate

Judge from available evidence (AO3)

Examine

Investigate closely (AO3)

Explain

Set out purpose or reasons (AO4)

Give

Produce an answer from recall (AO4)

How (far)

Work out the correct answer (AO4)

Identify

Name or otherwise characterise (AO4)

Justify

Support a case with evidence (AO3)

Name

Give the correct title or term (AO4)

Outline

Set out main characteristics (AO4)

Repeat (the pattern)

Maths specific; repeat a given pattern (AO4)

State

Express clearly and briefly (AO4)

What (is)

Give the correct information (AO4)

Which

Select or give the correct information (AO4)