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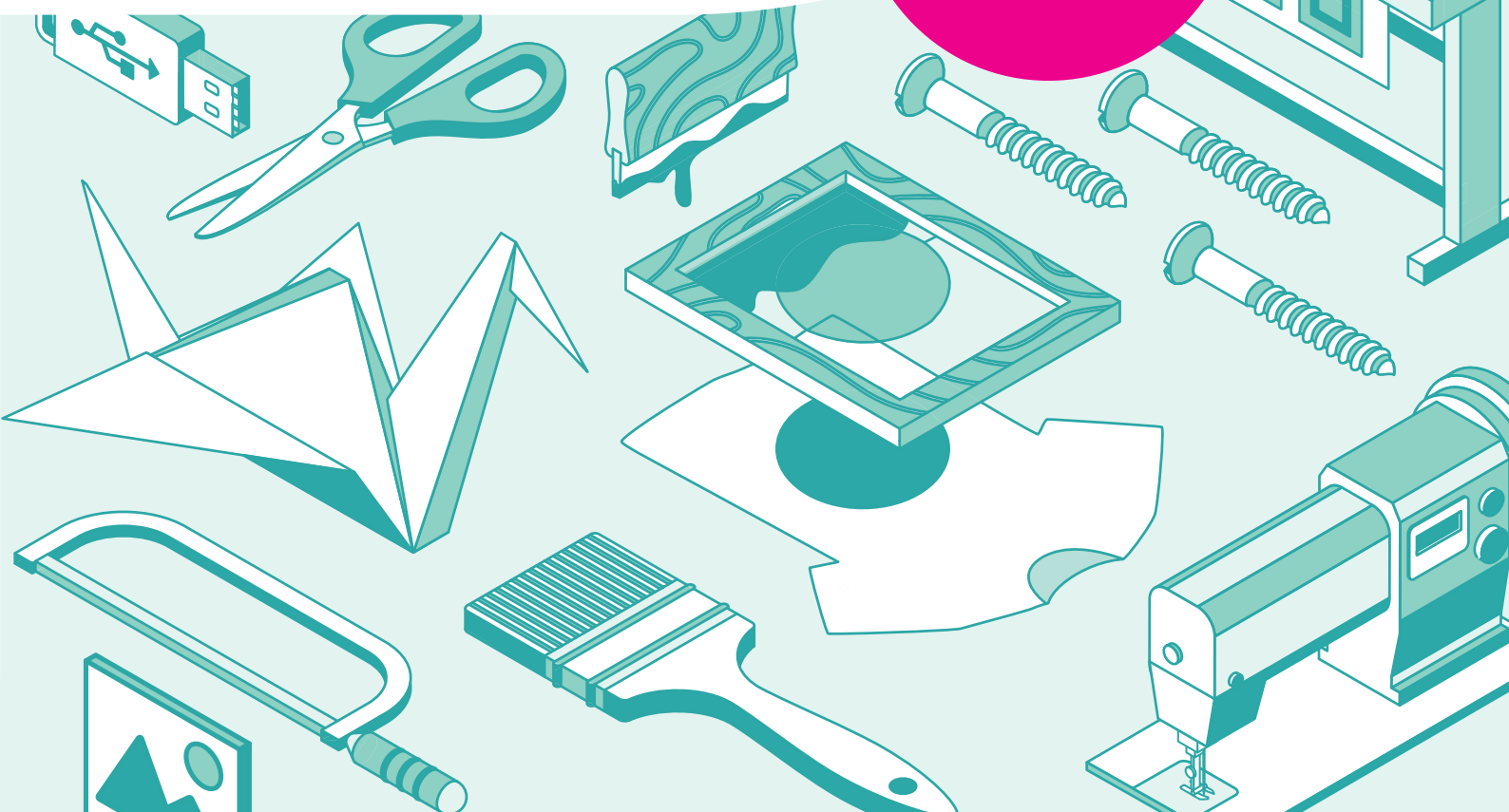
Clear**Revise**

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AQA GCSE **Design and Technology**

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WHAT MAKES THIS GUIDE SPECIAL?

This guide is your personal exam tutor. It offers you a complete walk-through of the specification and related questions in a convenient format.

The best way to ace an exam is to practise... but that doesn't mean just endlessly doing past exam papers.

Imagine you were going to run a 100-metre race. If you really wanted to win it, you'd need a coach. They would analyse how you run and give you advice and lots of little improvements that you could make to win. Of course, you'd do some practice runs, but without coaching, you would have little idea how to improve.

Section 1

1

Left pages

Study questions with model answers

Start on the **left-hand pages**. Left-hand pages coach you through each topic area on the specification. We show you some questions and model answers that would get full marks. We also give you exam tips on exactly what the examiner is looking for from the question or question type.

2

Right pages

Apply your understanding to related topics

Now it is your turn! Once you have finished looking at the model answers on the left, **right-hand pages** provide you with a set of similar exam questions on the same topic. You should do really well in these as you've just seen model responses and tips on related questions.

3

[1]



Learn from the mark schemes

Mark your work using the mark scheme provided at the bottom of each page.

By the end of Section 1, you will have gone through lots of model answers and had a go at questions on every topic in the entire specification.

If you still feel that a topic needs more work, just use the smile icons 😊 or make a note on the page so that you can look up the topic later or ask your teacher for help.

Section 2

Exam paper

Complete a full practice exam paper

Now is your chance to have a go at a real exam paper. You need to attempt 100 marks in 120 minutes, so allow yourself around 1 mark per minute, plus 20 minutes at the end for improving any sketches, adding annotation to diagrams and correcting those silly mistakes we all tend to make.

When you take the paper, make sure you have a clear desk, turn off your phone and find somewhere quiet. Give yourself the same amount of time as a real exam.

Once you've completed the paper, the answers are in the back of the book for you to mark yourself. Good luck!



THE SCIENCE OF REVISION

'Low stakes' examination practice

Practising past examination questions is a powerful way to revise and improve your understanding of the subject. Mark schemes and professional guidance provide valuable information too. Without the added pressure of the big day and the stressful atmosphere that an exam hall may create, studying all of this in a calm atmosphere where the results don't matter to anyone but yourself, creates the most effective environment for the retrieval of information.

Retrieval of information

Retrieval practice encourages students to come up with answers to questions.¹ The closer the question is to one you might see in a real examination, the better. Also, the closer the environment in which a student revises is to the 'examination environment', the better. Research shows that students who had a test 2–7 days away did 30% better using retrieval practice than students who simply read, or repeatedly reread material. Students who were expected to teach the content to someone else after their revision period did better still.² What was found to be most interesting in other studies is that students using retrieval methods and testing for revision were also more resilient to the introduction of stress.³

Feedback and note-taking

The tips and advice included with each model answer constructively focus purely on how to get more out of each question or type of question. Every topic shows model questions and answers, along with advice from experienced teachers and opportunities for students to try further similar questions. Answers and tips are displayed on the same page allowing for immediate feedback.⁴ There is space for notes – use this if you need to. Making summarised points at the end of a revision session is the most effective way to use notes.⁴

Ebbinghaus' forgetting curve and spaced learning

Ebbinghaus' 140-year-old study examined the rate in which we forget things over time. The findings still hold true. However, the act of forgetting facts and techniques and relearning them is what cements things into the brain.⁵ Spacing out revision is more effective than cramming – we know that, but students should also know that the space between revisiting material should vary depending on how far away the examination is. A cyclical approach is required. An examination 12 months away necessitates revisiting covered material about once a month. A test in 30 days should have topics revisited every 3 days – intervals of roughly a tenth of the time available.⁶

Summary

Students: the more tests and past questions you do, in an environment as close to examination conditions as possible, the better you are likely to perform on the day. If you prefer to listen to music while you revise, tunes without lyrics will be far less detrimental to your memory and retention. Silence is most effective.⁵ If you choose to study with friends, choose carefully – effort is contagious.⁷

1. Roediger III, H. L., & Karpicke, J.D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, 17(3), 249–255.
2. Nestojko, J., Bui, D., Kornell, N. & Bjork, E. (2014). Expecting to teach enhances learning and organisation of knowledge in free recall of text passages. *Memory and Cognition*, 42(7), 1038–1048.
3. Smith, A. M., Floerke, V. A., & Thomas, A. K. (2016) Retrieval practice protects memory against acute stress. *Science*, 354(6315), 1046–1048.
4. Kluger, A & DeNisi, A. (1996). The effects of feedback interventions on performance. *Psychological bulletin*, 119(2), 254–284.
5. Perham, N., & Currie, H. (2014). Does listening to preferred music improve comprehension performance? *Applied Cognitive Psychology*, 28(2), 279–284.
6. Cepeda, N. J., Vul, E., Rohrer, D., Wixted, J. T. & Pashler, H. (2008). Spacing effects in learning a temporal ridgeline of optimal retention. *Psychological Science*, 19(11), 1095–1102.
7. Busch, B. & Watson, E. (2019). *The Science of Learning*, 1st ed. Routledge.

HOW TO FIX MISTAKES IN YOUR EXAM

We all make mistakes, and the chances are that you'll make one or two in the exam.

If you realise that you've made a mistake in an answer, it's no problem.

Cross the answer out so that it is obvious that it's a mistake.

Example 1 – Put a line through the incorrect answer:

1.1 Name **one** smart material [1]

~~Carbon fibre~~ Shape memory alloy (Nitinol)

Example 2 – Put a line through each incorrect word.

1.2 Explain how a cam and a follower work in a mechanism.
Name **one** specific cam in your answer. [3]

~~A cam is a component that rotates about an axis. They are different shapes e.g., pointy cam pear~~
~~shaped cam. As the cam rotates, the edge of the cam rotates lifts the follower up and down.~~

Example 3 – Put a cross through a section of writing.

1.3 Explain the term 'anthropometrics'. [2]

~~Anthropometrics is about the human body and our different organs. It is where we consider how different organs function in the body.~~

Anthropometrics is about the measurement of the human body and sizes of limbs like your hands (how wide they are) or legs (how long they are). Anthropometrics is not about the internal workings of the body.

That is biology.

But DON'T scrub out answers:

What is meant by product analysis? Give an example. [2]

~~Product analysis is the process of identifying the components of a product and their functions. For example, a car has an engine, wheels, and a steering wheel.~~

Exam tip

If you cross out an answer but don't write anything else, the examiner is allowed to mark it. But they can't mark it if they can't read it because you scrubbed it out.

SECTION A

3.1 CORE TECHNICAL PRINCIPLES

Information about the paper

Written exam: 2 hours

50% of the qualification

100 marks in total. There are 20 for Section A, 30 for Section B and 50 for Section C.

At least 15% of the exam will assess maths and at least 10% will assess science. All questions are mandatory.

All dimensions are in millimetres.



You will need:

A black pen (and some spares)

You may also use:

An HB pencil, ruler and other normal writing and drawing instruments

A calculator

A protractor

3.1.1

NEW AND EMERGING TECHNOLOGIES

INDUSTRY AND ENTERPRISE

① Start on the left hand page.

- 01 Which **one** of the following statements best describes fair trade?
- A A business owned and managed by its workers
 - B A large number of people who raise money for a project
 - C An organisation that helps workers have decent work and pay conditions
 - D The use of digital and social media in advertising

② Left pages contain example questions with model answers. The answers will get full marks.



[1]

Exam tip

Aim to eliminate three of the answers to help confirm your choice. For example, answer **D** is the definition of virtual marketing.

Exam tip

The first 10 questions on the exam paper will be MCQs (Multiple Choice Questions).

For each question, completely fill in the circle alongside the appropriate answer.



If you want to change your answer you must cross out your original answer as shown.



If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown.



- 02 **Define** what is meant by the term 'automation'.

Automation allows for repetitive tasks to be carried out by machines rather than by humans.

[1]

Exam tip

Define based questions require you to specify the meaning of a key word.

Do you remember?

Enterprise means to identify business opportunities and make them commercially successful. Manufacturing businesses may use specific tools and equipment to produce their goods and arrange their production line and buildings to optimise efficiency.

Do you remember?

A cooperative is a company that is owned and managed by those that work there.
Crowdfunding may be used to raise money from the public for a new project.

③ Do you remember boxes may also contain other points on the specification which you need to revise before attempting the questions on the right.

4 Look at the right-hand page and have a go at some exam style questions on the same topic. The questions below are worth three marks, so you should be able to finish them in three minutes.

03 Which **one** of the following statements is an advantage of using robots?

- A** Can work in dangerous or harmful environments
- B** Cannot handle unexpected situations
- C** Expensive to set up
- D** Requires a specialist workforce to operate and maintain

[1]

04 A co-operative is:

- A** A joint venture between two enterprises
- B** A trade union
- C** An enterprise owned and run by its workforce
- D** An enterprise where everyone is paid the same wage

[1]

05 Define the term 'crowd funding'.

.....
.....

[1]

5 Cover the answers with a sheet of paper so that you're not tempted to cheat!

6 Mark yourself
Once you've finished the questions, mark them using the answers at the bottom of the page.

7 Are you confident?
Fill in one of the faces to show whether you feel you did well in the topic or if it needs more revision.

Total _____ / 3

Answers

- 03 A. Can work in dangerous or harmful environments.^[1]
- 04 C. An enterprise owned and run by its workforce.^[1]
- 05 Crowd funding involves many small investors putting in capital to fund a new project or business venture.^[1]

3.1.5

MECHANICAL DEVICES

LINKAGES AND ROTARY SYSTEMS

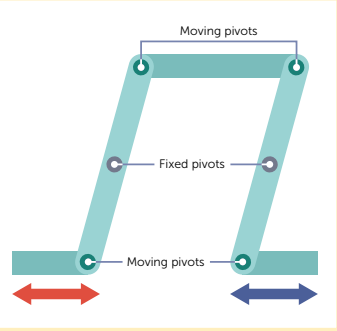
01 State which type of linkage would be used to change the direction of an input motion through 90°.

Bell crank.

[1]

Do you remember?

A push/pull mechanism will maintain the direction of movement.



Do you remember?

There are **four** main types of CAM:

- Circular or eccentric
- Pear
- Snail
- Heart shaped

[1]

02 Cams are used to convert rotary motion into different movements.

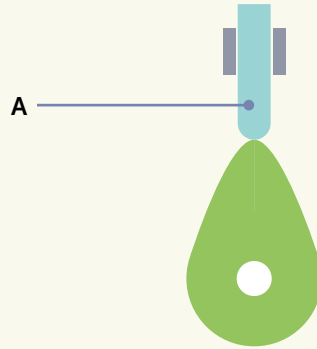


Figure 1

Figure 1 shows a cam and a component labelled A. Give the name of the component labelled A in Figure 1.

Follower.

03 Figure 2 shows a simple gear train.

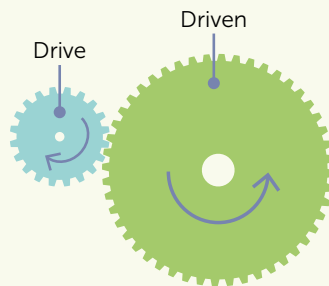


Figure 2

Calculate the velocity ratio (VR), if the drive gear has 20 teeth and the driven gear has 48 teeth.

Use the formula $VR = \frac{\text{number of teeth on driven gear}}{\text{number of teeth on drive gear}}$

$VR = 48 \div 20 = 2.4$

Exam tip

Always show your working to ensure that even if your answer is wrong, that you get marks for showing the correct method in working out your answer.

[2]

04 Explain **one** reason why toothed belts are used with toothed pulleys rather than V belts.

A toothed belt provides a physical connection with a toothed pulley and is therefore much less likely to slip when transferring rotational forces from one shaft to another.

[2]

- 05 The ironing board in **Figure 3** uses a linkage mechanism in its design.
Explain how the linkage helps in the function of the ironing board for the user.



Figure 3

.....

.....

.....

[3]

- 06 Study **Figure 4** of a pulley and belt system.

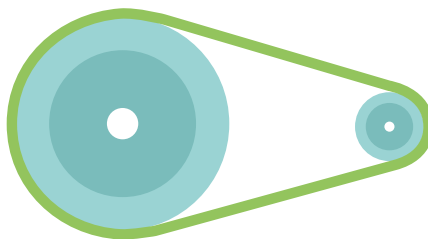


Figure 4

Left Pulley	Right Pulley
Diameter 210mm	Diameter 70mm

The pulley on the left rotates at 900 revolutions per minute (rpm).
Calculate how many revolutions per minute (rpm) the pulley on the right will turn.

.....

.....

.....

Total
/ 6
☹️ 😐 😊

[3]

Answers

05 The mechanism allows the board to collapse / fold flat^[1] which this makes it easier to store away in a smaller space^[1] when not in use.^[1] The mechanism will also allow for the board to be adjustable to different heights^[1] for different height people^[1] to fit better ergonomically.^[1]

06	1 mark	$210 / 70 = 3$
	1 mark	900×3
	1 mark	2700 rpm

3.1.6.2

MATERIAL PROPERTIES

01 Which **one** of the following is a physical property?

- A Density
- B Malleability
- C Toughness
- D Strength

Malleability

How a material bends or can be shaped.

Strength

How a material resists force without breaking.

[1]

02 Describe why children's toys need to be made from tough and durable materials.

Children can be rough when playing. Toys can get dropped and brittle parts may snap off.

Toys that are not tough may break easily and that would mean money is wasted on a poor-quality toy.

The child will also get upset that they can no longer play with their toy.

Children often chew their toys, so for safety reasons no one wants bits to break off that can be swallowed.

[2]

Exam tip

Describe questions require you to talk about the characteristics and features of something.

03 Figure 1 shows a lifejacket.

03.1 Name the physical property required in the life jacket below for it to work.

Exam tip

It is a good idea to clarify your answer, if possible, i.e., **low density**



Figure 1

Density / low density

[1]

Do you remember?

Material properties are more than just their physical appearance and form e.g., colour, conductivity, absorbency etc.

Material properties require you to know about how materials behave when being used in products and the forces and stresses they must work with.

See physical and working properties on **page 36**.

03.2 State why the physical property named in 03.1 is so important for the life jacket to work.

The life jacket needs to float and be buoyant so that a person in the water does not sink and drown. The main material needs to be less dense than water.

[1]

Exam tip

Try to add detail to your answer to make sure you get all available marks. This answer has two good points of clarification explaining why buoyancy is important and that the life jacket needs to use a material less dense than water.

04 Which of the following is a working property?

- A Absorbency
- B Density
- C Ductility
- D Fusibility

[1]

05 Figure 2 shows copper tracks on a Printed Circuit Board (PCB).

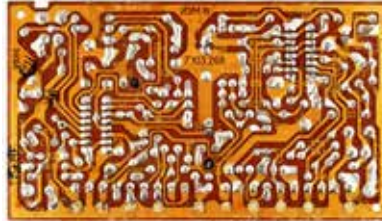


Figure 2

05.1 Name the physical property needed in the copper tracks.

Physical property:

.....

[2]

05.2 Explain why the physical property named in 05.1 is so important for the PCB to work.

.....
.....
.....

[2]

06 Explain why it is important for sportswear to be absorbent.

.....
.....
.....
.....

[3]

Total
____ / 8
☹️ 😐 😊

Answers

04 C. Ductility.^[1] The ability of a material to be stretched, drawn or pulled without breaking.

05.1 Electrical conductivity.^[2] Both words gain two marks. Conductivity only gets one mark.

05.2 The copper tracks need to have good electrical conductivity so the electrical current can flow from one component to another^[1] and make the circuit work.^[1] Copper has low resistance.^[1]

06 When exercising, athletes perspire^[1] and get hot.^[1] By having sportswear that is absorbent, sweat is drawn away from the body,^[1] making it more comfortable for the athlete when exercising.^[1] When sweat is drawn away from the body, it is called wicking which is a desirable property in sportswear,^[1] to keep the athlete cool.^[1]

PHYSICAL AND WORKING PROPERTIES

It is important to know the physical and working properties of a range of materials.

Physical properties

The physical properties of any material can be measured in their natural state.

Absorbency

The ability of a material to soak up or draw in heat, light or moisture.

Example: Cotton is more absorbent than acrylic.

Thermal conductivity

The measure of a material's ability to transfer heat.

Example: Copper is an excellent conductor of heat.

Electrical conductivity

The measure at which a material can transport electricity.

Example: Copper is a good conductor of electricity. Insulators such as plastic or rubber do not conduct electricity.

Density

The mass, per unit volume of any material. How solid is a material.

Example: Polystyrene has a low density, suitable for packaging. Lead has high density, suitable for weights.

Fusibility

The ability of a material to be converted from a solid to a fluid state by heat and combined with another material.

Example: Fusibility is a useful for metals and polymers to aid casting and welding.

Working properties

Working properties describe how a material responds when it is manipulated or worked.

Ductility

The ability of a material to be stretched, drawn or pulled without breaking.

Example: Copper is ductile so can be drawn out to make wire.

Hardness

The ability to withstand impact, wear, abrasion and indentation.

Example: Tungsten is hard, used for knives, drills and saws.

Malleability

The ability to be bent and shaped without cracking or splitting.

Example: Gold, copper, silver and lead can all be easily hammered into shape.

Elasticity

The ability to return to its original shape after stretching or compression.

Example: Lycra is used for sportswear to provide freedom of movement.

Strength

The ability to withstand a force such as pressure, compression, tension or shear.

Example: May be strong in one force and not another. Concrete is strong under compression, but not tension.

Toughness

The ability to absorb shock without fracturing.

Example: Kevlar® body armour absorbs impact.

SECTION B

3.2 SPECIALIST TECHNICAL PRINCIPLES

Information

At least 15% of the exam will assess maths and at least 10% will assess science.

There are 100 marks in total. 20 marks for Section A, 30 for Section B and 50 for Section C.

All questions are mandatory.

All dimensions are in millimetres.



You will need:

A black pen (and some spares)

You may also use:

An HB pencil, ruler and other normal writing and drawing instruments

A calculator

A protractor

Exam tip

In Section B of the exam paper, you will have to answer some questions in relation to **at least one** material area that you have specialised in and studied in more depth and detail in class.

For each question, you may choose the material area you feel most comfortable writing about to demonstrate your knowledge, even if it isn't your specialist area.

3.2.3

ECOLOGICAL AND SOCIAL FOOTPRINT

Exam tip

Don't forget to make sure you focus on key words and do a quick mini plan to help you arrange your answer as this question is for 8 marks.

- 01 Consumers are being encouraged by manufactures and wider society to recycle, re-use and repair.
- Analyse and evaluate the issues a consumer will consider in buying and using products they need and want. Give examples in your answer.

Exam tip

Analyse questions require you to set out the main characteristics and features of a context given in the question.

Evaluate questions require you to offer your own opinion and make judgements e.g., good and bad points about a given context.

Do you remember?

In section A of the exam paper, you have to know about sustainability and the environment. You can use your knowledge and understanding of these topics here too.

The six Rs should be considered in related responses: reduce, refuse, re-use, repair, recycle and rethink.

Society increasingly encourages consumers to recycle products at the end of their life and to recycle the packaging they came in to save resources, especially finite resources. Consumers are continually reminded that recycling saves energy, meaning fossil fuels do not need to be burned to generate energy for transporting new raw materials to a factory for processing into stock forms.

Consumers can be told by some manufactures how some products can be reused e.g., by refilling a kitchen surface spray bottle from a refill pouch. A refill pouch only uses polymers whereas the trigger spray bottle uses different materials such as steel to make the spring inside the trigger. These are also difficult to separate and recycle when the bottle is finished. Often it is still working perfectly well and not at the end of its life.

Customers are increasingly encouraged to repair items e.g. clothing or repairing a phone screen by buying a replacement one. This is not only better for the environment, but is more economical than buying a replacement phone.

[8]

Analyse

Evaluate

Example

TIMBERS

01 **Table 1** shows a range of materials.

Choose **one** of the materials in the table below:

Cartridge paper	Pine	Steel	PVC	Denim
-----------------	------	-------	-----	-------

Table 1

My chosen material is: *Pine*.

01.1 Name a specific source of your chosen material.

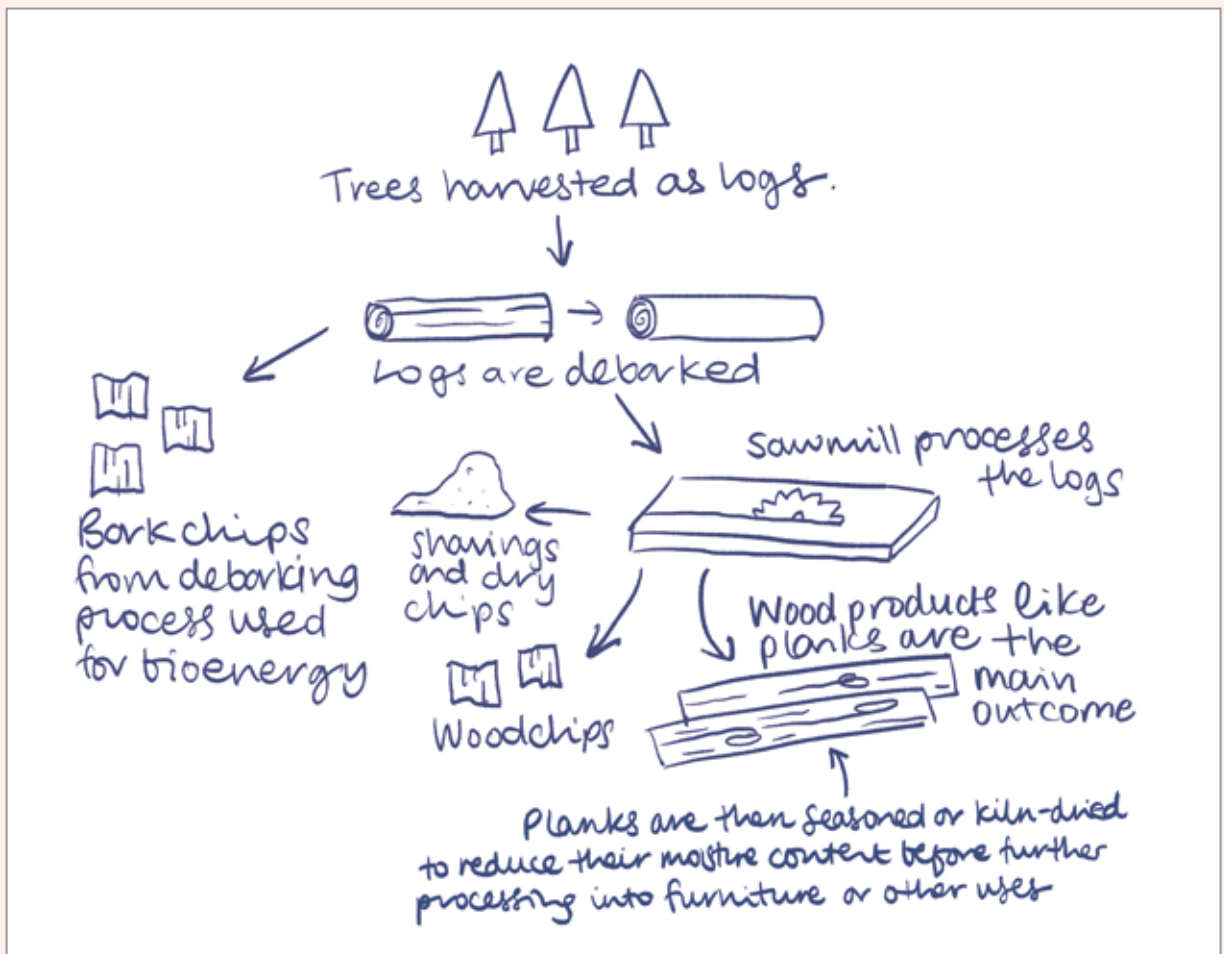
Trees and forests.

[1]

01.2 In the box below, use notes and sketches to explain how your chosen material is converted from its primary source into a usable form.

Exam tip

Make sure that you do what the question says and use notes and sketches in your answer for a possible maximum mark.



[6]

SECTION C

3.3 DESIGNING AND MAKING PRINCIPLES

Information

At least 15% of the exam will assess maths and at least 10% will assess science.

There are 100 marks in total. 20 marks for Section A, 30 for Section B and 50 for Section C.

All questions are mandatory.

All dimensions are in millimetres.



You will need:

A black pen (and some spares)

You may also use:

An HB pencil, ruler and other normal writing and drawing instruments

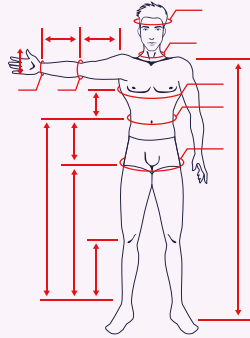
A calculator

A protractor

3.3.1

PRIMARY AND SECONDARY DATA

- 01 Give the name of the research data show in the diagram below.



Research data shown is: **Anthropometric data.**

[1]

Exam tip

This is a simple right or wrong answer. Look at the key word.

Do you remember?

You also need to know about ergonomics (the process of designing products and workplaces around people) and how percentiles are used with this sort of data. Most products are designed to fit anyone that falls between the 5th and 95th percentiles in terms of measurements.

- 02 Define the term 'secondary data' used in research.
Give an example in your answer.

Secondary data is information that has been created by other people that you can use without having to collect and gather it yourself. An example of secondary data is product reviews in magazines and online.

[3]

Exam tip

Don't forget your example!

- 03 Discuss how focus groups are used in the development of prototypes.

A focus groups is a group of people brought together to answer questions as part of market research to help identify needs and wants in the design of a prototype or product. A focus group is made up of people identified with similar interests or experience to help with market research in a specific problem area. Focus groups are asked questions, but they also have the opportunity to talk about a design problem with each other or possibly test mock-ups and prototype solutions.

[4]

Do you remember?

This type of question is likely to use three mark bands: 3–4 marks, 1–2 marks, 0 marks.

04 Define the term 'primary data' used in research.
Give an example in your answer.

.....

.....

.....

.....

.....

[3]

05 Explain how interviews can be used to inform your design ideas.

.....

.....

.....

.....

.....

[3]

Total
/ 6
  

Answers

04 One mark for a relevant example and ...

2 marks	One point clarified in detail or two simple points of explanation.
1 mark	One simple point of explanation.
0 marks	No attempt or nothing worthy of credit.

Indicative content:

- Primary data is research that you personally collect^[1] and is not gathered from a third party^[1] or published source.^[1]
- Examples include, interviews, observations and taking your own measurements.

05

3 marks	Two points of explanation with one clarified in detail.
2 marks	One point clarified in detail or two simple points of explanation.
1 mark	One simple point of explanation.
0 marks	No attempt or nothing worthy of credit.

Indicative content:

- You can find out the needs and wants of potential customers by speaking to them and asking general or focused questions.^[1]
- You can find out the opinions of people who want or need the product.^[1]
- Interviews and questioning can identify a gap in the market^[1]
- It can help to gather culturally sensitive feedback when trading internationally.^[1]
- Interviews allow potential clients to provide lots of information that could be recorded or filmed for later analysis.^[1]

PRACTICE PAPER

Information about the practice paper

Before attempting the paper, go through the previous section of the book and revise any sections that you aren't confident about. Use the face icons at the end of each topic to reflect on your level of understanding and make your own judgement of what needs more revision.

Now to the paper.

Section A of the paper is worth 20 marks.

- These consist of 10 multiple choice answer questions and a further 10 marks of short answer questions.

Section B of the paper is worth 30 marks.

- Several short answer questions and one extended answer question worth 8 marks.

Section C of the paper is worth 50 marks.

- A mixture of short and extended responses including a drawing question.
- You should do this paper under exam conditions.
 - Aim to make the desk you sit at look as similar to that in the exam room.
 - Turn off your mobile phone, music and remove all other distractions.
 - Let everyone in the house know that you can't be disturbed for 2 hours whilst you do the paper.



You will need:

A black pen (and some spares)

HB pencil may be used for graphs and diagrams only.

Please write clearly, in **BLOCK CAPITALS** and black ink

Centre number Candidate number

First name(s)

Last name

Date attempted Time allowed: **2 hours**

GCSE DESIGN AND TECHNOLOGY

Unit 1 Written Paper

PRACTICE PAPER

MATERIALS

For this paper you must have:

- normal writing and drawing instruments
- a calculator
- a protractor.

INSTRUCTIONS

Write in black ink

Write your answer to each question in the space provided.

Answer **all** the questions.

INFORMATION

The total mark for this paper is **100**.

There are 20 marks for Section A, 30 marks for Section B and 50 marks for Section C.

The marks for each question are shown in brackets [].

This paper has 18 pages.

ADVICE

- Read each question carefully before you start to answer.

Final mark / 100 = %

SECTION A

01 What raw textile material is sourced from the creature in **Figure 1**?

[1]



Figure 1

- A Cotton
- B Leather
- C Silk
- D Wool

02 Identify the smart material that changes colour under UV light.

[1]

- A Graphene
- B Photochromic pigment
- C Shape memory alloy
- D Thermochromic pigment

03 Which form of energy generation uses a structure as shown in **Figure 2**?

[1]



Figure 2

- A Biomass
- B Hydroelectric
- C Solar
- D Wind

PRACTICE PAPER ANSWERS

Section A

- 01 C – Silk [1]
 02 B – Photochromic pigment [1]
 03 B – Hydroelectric [1]
 04 B – Cast iron [1]
 05 D – Pine [1]
 06 A – First [1]
 07 C – Light up [1]
 08 D – Will bend without breaking [1]
 09 C – 84 [1]
 10 A – Crowd funding [1]

- 11 One mark for any of: concrete, glass reinforced plastic (GRP), carbon fibre reinforced plastic (CRP), plywood, MDF. Accept any other correct response. [1]

- 12 [4]

3–4 marks	Detailed explanation of kinetic pumped energy storage systems and why it is used.
1–2 marks	Limited understanding of kinetic pumped energy storage systems.
0 marks	No attempt or nothing worthy of credit.

Indicative content:

- Two reservoirs are connected by a hydroelectric system.
- Water falls past turbine blades by gravity when water is released from the top reservoir. It then collects in the lower reservoir.
- The turbine blades turn, generating electricity in a generator.
- At night, when electricity is cheaper and more readily available, water is pumped back up to the top ready for the next surge in demand.
- If there is a sudden need for electricity during the day, then power can be generated immediately and added to the national grid.

Accept other correct responses.

- 13 [3]

1 mark	$2.2 \times 6 = 13.2 \text{ m}^2$ required
1 mark	$13.2 \times 1.1 = 14.52$
1 mark	14.52 rounded up to 15 m^2

NB: Award all three marks if answer is correct even if no method/working is shown.

- 14 [2]

2 marks	Two simple points of explanation or one clarified in detail.
1 mark	A single brief explanation point.
0 marks	No attempt or nothing worthy of credit.

Indicative content:

- Small improvements made to a product regularly over time.
- Something manufacturers do to try and stay ahead of the competition.
- Improvements to make production more cost effective and efficient.
- An element of the just-in-time / kaizen way of working to maximise efficiency

Accept other correct responses.

EXAMINATION TIPS

When you practice examination questions, work out your approximate grade using the following table. This table has been produced using a rounded average of past examination series for this GCSE. Be aware that boundaries vary by a few percentage points either side of those shown.

Grade	9	8	7	6	5	4	3	2	1
Boundary	83%	76%	69%	60%	52%	43%	32%	21%	10%

1. Be aware of command words at the back of the specification. If 'describe' or 'explain' questions are given you need to expand your answers. To help you justify your responses, aim to include words such as BECAUSE... or SO... in every answer because this forces you to justify your point, so you get additional marks. See how well it works!
2. Explain questions such as "explain why this is the most appropriate..." do not require just a list of benefits. Instead you should identify the benefits and then expand each one, applying them to the scenario or context.
3. Full answers should be given to questions – not just key words. Make your answers match the context of the question. Where you are asked to give examples, always do so. Access to the higher marks will be difficult without examples.
4. Avoid simple one-word answers. Adjectives such as cheap, strong or quick are unlikely to gain marks unless these are justified. For example, "robots save money on wages" is not a strong answer. It would better to explain that "once the initial investment has been made, robots do not need to be paid wages but will require maintenance by more highly skilled workers".
5. Always include notes and sketches where you are asked to do so in a question. Support your drawings by using annotations and labels. Include detail such as processes and the use of any relevant tools or equipment.
6. Questions involving mathematics should be read carefully before attempting your answer. Misreading the question is a common way to lose marks on these question types. Show your working at every stage as marks can still be awarded even if the final answer is not correct.
7. Always give answers using the correct units, e.g. mm or kg, and to the correct number of decimal places.
8. In drawing questions, look out for key features such as holes or hidden detail and incorporate them into your responses using the appropriate line styles and techniques.
9. You are required to study at least one material area. However, not all material areas provide enough scope to answer all questions that may appear in an exam, particularly with electronic and mechanical systems. For this reason, it is recommended that you study more than one material area. This gives you more knowledge and understanding to draw from and apply to a greater range of questions.
10. 15% of the marks in the paper will test mathematics skills. You can check the full maths requirements in the most up to date version of the specification. This can be downloaded from www.aqa.org.uk.
11. Attempt every question, even if you are unsure of the question or the answer. Have a go. You might just get a mark or two, but you'll be guaranteed zero marks if you don't attempt a question at all.
12. Time your practice attempts in this book and in the examination based on roughly one mark per minute. A 4-mark question should therefore be given 4 minutes to complete. The real paper is 100 marks in 120 minutes. This will allow you 1 mark per minute with 20 minutes to check through things at the end.

Good luck!

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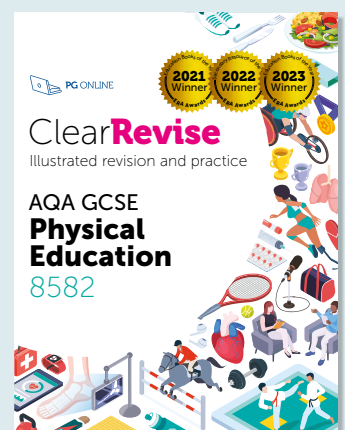
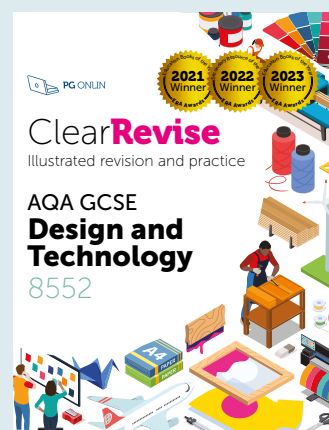
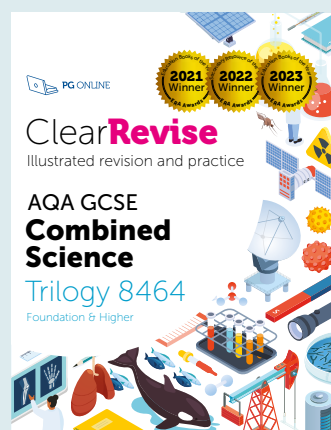
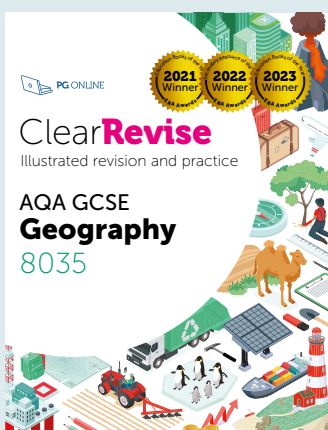
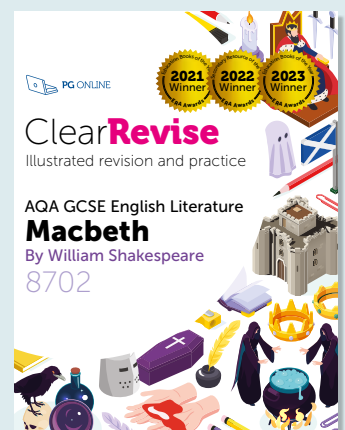
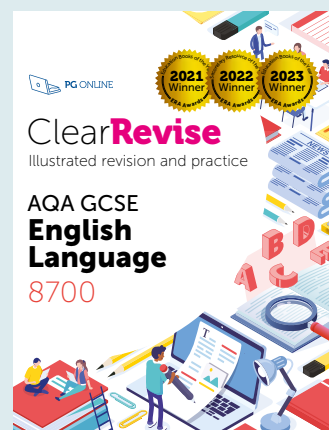
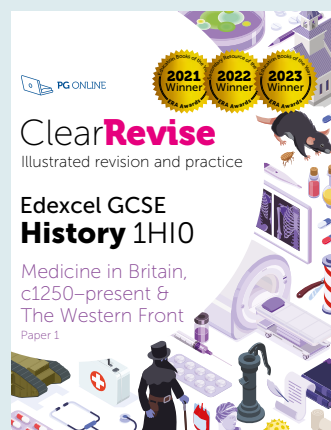
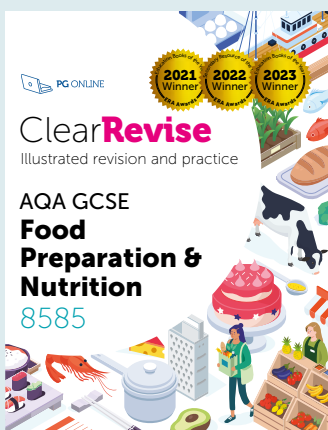
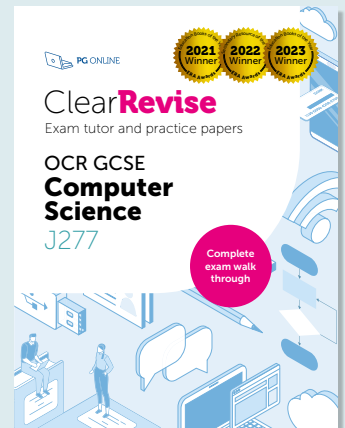
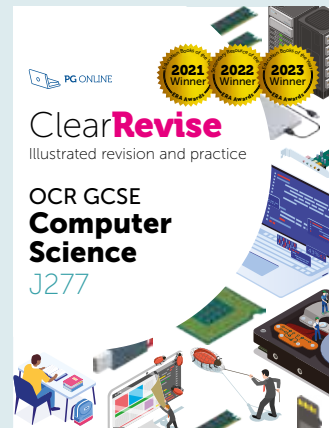
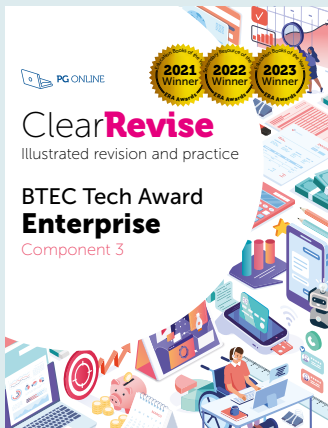
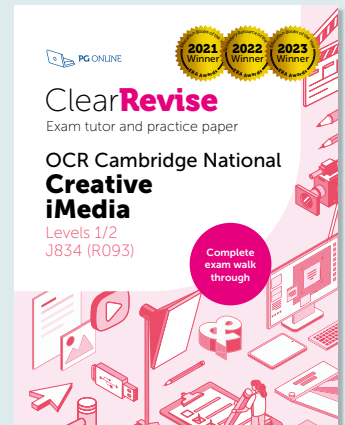
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Lastly, there is a complete exam paper written in the same style as the AQA exam paper to try. It follows exactly the same format and length as the real exam, providing a realistic experience and a great opportunity to show how much you've progressed.

