Qualification Accredited

OCR
Oxford Cambridge and RSA

GCSE (9-1)

Examiners' report

DESIGN AND TECHNOLOGY

J310

For first teaching in 2017

J310/01 Summer 2022 series

Version 1

Contents

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

Advance Information for Summer 2022 assessments

To support student revision, advance information was published about the focus of exams for Summer 2022 assessments. Advance information was available for most GCSE, AS and A Level subjects, Core Maths, FSMQ, and Cambridge Nationals Information Technologies. You can find more information on our website.

Paper 1 series overview

The paper consists of Section A (55 marks) and Section B (45 marks).

The paper was generally appropriate to all levels of ability. Most candidates attempted the majority of the questions. The paper was accessible to all candidates. There was no evidence to suggest that candidates did not have enough time to complete the questions.

There was a wide range or responses from the cohort which spanned the full ability range. Responses were generally encouraging and demonstrated a good understanding of the technical aspects of designing, making and sustainability.

The quality of sketching and drawing on the orthographic and manufacturing processes questions was good on the whole. Most candidates used a ruler for the orthographic drawing.

The quality of written communication was very variable. There were four questions on the paper requiring a longer written response. The two extended response questions, Question 5(d) and 6(b)* were the most well answered. Question 1(g)* was not answered well by the vast majority of candidates.

The mathematics questions were well answered on the whole. Many candidates had the relevant knowledge and understanding of the necessary calculations required. Often candidates missed crucial information which led to errors in their answers. By showing the working of calculations, some candidates were able to gain some marks for correct aspects of their work even when the final answer was incorrect.

The quality of handwriting across all papers showed a slight improvement over previous years although there were still some scripts where it was extremely difficult or impossible to make sense of some candidate responses.

Candidates who did well on this paper generally did the following:	Candidates who did less well on this paper generally did the following:
• read questions carefully and made sure they were answering the question • used examples where requested to illustrate points • used a ruler and sharp pencil for drawings and diagrams • showed working on mathematical questions • gave detailed answers and discussions.	• misinterpreted questions • gave short one word answers • did not show their working • drew freehand diagrams and drawings.

Section A overview

Section A consists of Questions 1 to 3 which predominantly cover core knowledge and understanding of the principles of design and technology through product analysis; demonstration of mathematical skills; core knowledge of design engineering and wider issues related to the principles of design and technology.

To do well in Section A candidates need to have a broad knowledge of the core principles across all material areas, but also be able to apply deeper understanding from their in-depth areas of learning.

Question 1 (a)

1 **Fig. 1** shows images of an electric scooter.

Question 1 (a) (ii)

(ii) Give **two** reasons why aluminium alloy is a suitable material for the frame and deck of the scooter.

1 .....

.....

2 .....

.....

[2]

There were many good responses with the vast majority of candidates able to give one or two reasons why aluminium alloy is suitable for the frame and deck of the scooter.

Other candidates needed to ensure the properties given related to the suitability for the frame and deck of the scooter.

Question 1 (c)

(c) A designer will consider the primary user and wider stakeholders when designing a product.

Identify **two** wider stakeholders the designer of the scooter will need to consider.

1 .....

2 .....

[2]

Many good responses were seen, with the majority of candidates able to give credit worthy responses.

Some candidates gave the primary users instead of two wider stakeholders.

Question 1 (d)

(d) Identify **two** pieces of anthropometric data the designer would have used when designing the scooter **and** state how each would have been used.

1 .....

.....

.....

2 .....

.....

.....

[4]

Many good responses were seen, with the majority of candidates able to give credit worthy responses and gain full marks.

Some candidates gave responses that identified anthropometric data but did not explain how these would be used when designing the scooter. Other candidates identified parts of the scooter that would have been designed using anthropometric data but did not identify what the anthropometric data was.

Question 1 (e)

(e) Explain **two** design features of the scooter that improve its usability.

1 .....

.....

2 .....

.....

[2]

Generally candidates answered this well and used features labelled on Fig. 1 such as the pull out stand.

Other candidate responses gave the design feature but did not fully explain how it improves the scooters usability. Some candidates identified and explained other design features such as how the mudguards protect the user from dirt and water and achieved both marks.

Question 1 (f)

(f) Electric scooter and bike hire schemes are increasingly popular in cities. The scooters and bikes can be hired using a smartphone app.

Explain **two** social and/or cultural impacts that the introduction of an electric scooter or bike hire scheme could have.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

There were some excellent responses from some candidates, mostly relating to the reduction in traffic, health and wellbeing of users and the increased danger to pedestrians.

Other candidates focused on the environmental impacts that the introduction of the scheme would bring rather than the social or cultural impacts.

Assessment for learning

When answering this type of question, candidates must read the question carefully to make sure they are clear on what the question is focusing on. The question in this case is asking for social or cultural impacts of the scheme.

Many candidates explained the environmental impacts such as less pollution and cleaner air. On its own this would not be enough to gain marks. However, the improvement to the environment from the reduction in emissions would in turn have a positive social impact as it would mean an improvement in people's health and wellbeing. Therefore candidates must make sure they expand enough in their response to make this point clearly.

Students should practise answering questions about social and cultural issues which designers must consider when designing products.

Question 1 (g)*

(g)* Discuss the impact on the environment of introducing electrically powered vehicles as methods of transport in city centres.

Your answer should consider life cycle assessment (LCA).

.....

.....

.....

.....

.....

..... **[8]**

The majority of candidates accessed marks for this question. Most candidates showed some understanding of the environmental impacts of the scheme but did not consider life cycle assessment in their response.

Higher achieving candidates explained the use of fossil fuels to generate electricity in their discussions and the damage done to the environment when sourcing, extracting and disposing of the materials needed to manufacture electric vehicles. Some candidate responses showed limited knowledge of life cycle assessment and focused on the sustainability of different materials and energy sources.

Exemplar 1 shows a typical response. It demonstrates a basic knowledge of sustainable and non-sustainable energy sources and touches on the environmental impact of each. There is reference to the extraction of lithium for the batteries but no description of how this impacts the environment. No other stages of the product lifecycle are mentioned or discussed. The information given is communicated in an unstructured way and shows a very limited understanding of sustainability or LCA stages.

Exemplar 1

Introducing electrically powered vehicles can have both a positive and negative impact on the environment. For example a tesla will run on electricity which can be generated renewably from solar panels or wind which is much better than burning fossil fuels as many cars do. Also when an electric car stops it uses minimal energy compared to a petrol or deisil vehicle that will continue to burn fossil fuels. When also an electric car is stopping it can also take back in energy converting the kinetic energy from the movement of the car back into electrical energy charging back up the car. This is particularly useful in city centres where there is a lot of stopping and starting.

However, much of the electricity used by electric cars is generated by a fossil fuel power plant which is arguably worse than just using an car battery a fossil fuel engine. The production of the battery is also very bad for the environment and is estimated to produce more carbon emissions than it saves due to the high amounts of energy needed to extract the lithium required for the batteries. However as time has passed better and more clean batteries are being produced that have a lesser impact on the environment. [8]

Assessment for learning

When answering this type of question, candidates must read the question carefully to make sure they are clear on what the question is focusing on. In this case the question is asking candidates to consider life cycle assessment (LCA).

The LCA relates to the product's impact on the environment during the stages of its life:

- sourcing and extraction of materials needed to make the product
- processing of materials into a useable form
- manufacture of the product
- transportation of the finished product to retailers (globalisation)
- use of the product
- disposal and/or recycling of the product.

Many candidates mentioned only the first and final stages of the lifecycle and did not explain or discuss any of the other stages.

Students should make sure they understand the stages involved in LCA and practise answering questions relating to the lifecycle of different products and the different environmental impacts they have depending on the materials and processes used.

Question 2 (a) (i)

2 **Fig. 2** shows a side table.

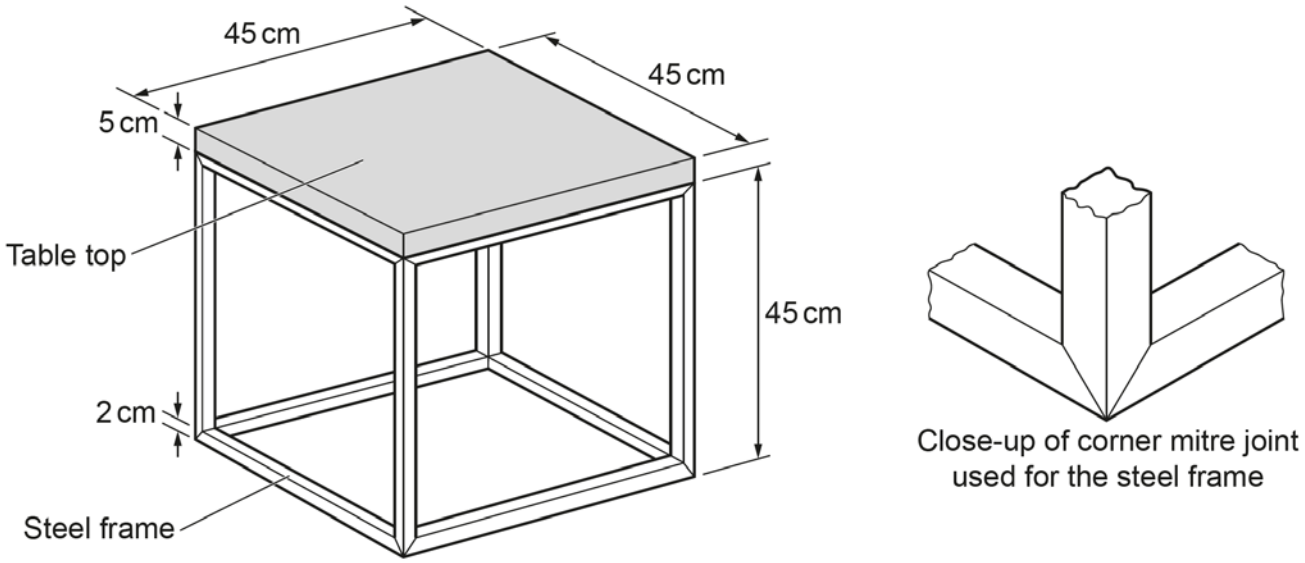


Fig. 2

(a) The frame of the side table is made from steel box section and constructed using a mitre joint at each corner.

(i) Calculate the length of steel box section needed to make **one** frame.

Length of steel ..... cm **[2]**

The majority of candidate responses were correct and given both marks.

Some candidates multiplied the length of each leg (45cm) by 8 instead of 12 and got an incorrect answer. Other candidates assumed butt joints on the legs even though mitre joints were clearly shown and subtracted the 2cm thickness from each leg length.

Question 2 (a) (ii)

(ii) The steel box section is available in one metre lengths.

Calculate how many one metre lengths are needed to make **one** table.

Number of one metre lengths ..... **[2]**

The vast majority of candidates who had answered Q2(a(i) correctly also gained marks on this question.

Other candidates divided their previous answer by 100 to convert centimetres into metres but did not round up their answer. Many candidates who answered Q2(a)(i) incorrectly were still able to achieve both marks on this question as the error was not carried forward.

Question 2 (b) (i)

(b) The table top is made from oak blocks glued together.

(i) Calculate the area of **one** table top.

State the unit for your answer.

Area of **one** table top ..... Unit ..... **[2]**

Many candidates worked out the area and gave the correct answer.

Some candidates misunderstood the question and worked out the volume of the table top by including the 5cm thickness in their calculations.

Question 2 (b) (ii)

(ii) The oak blocks are 200 mm long and 50 mm wide.

Calculate the minimum number of oak blocks needed to make **one** table top.

Minimum number of oak blocks ..... **[2]**

A variety of different calculation methods and sketches were seen on this question. Many candidates gave the correct answer. Other candidates mixed up units of measurement and got multiples of the correct answer.

Question 2 (d) (i)

Fig. 2 is repeated below.

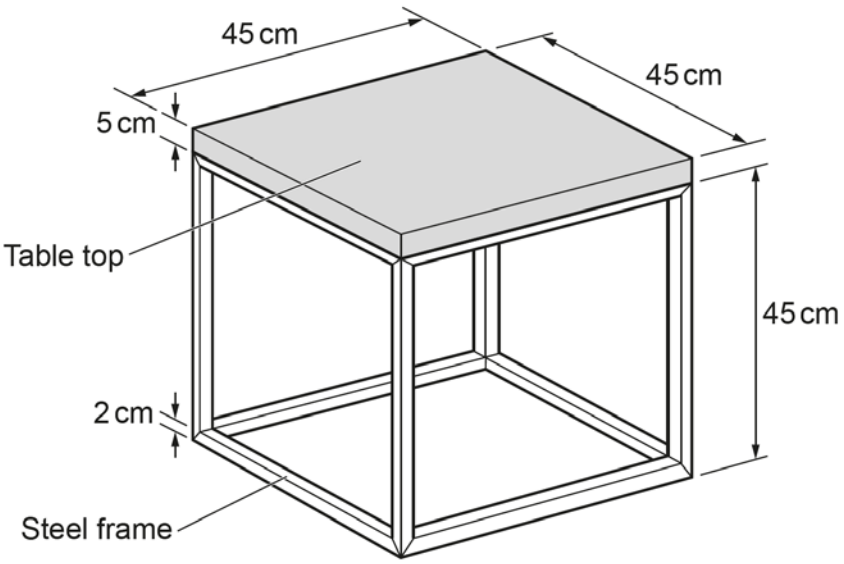


Fig. 2

(d) The side table shown in **Fig. 2** is packaged in a cardboard box.

(i) Calculate the minimum volume of the cardboard box needed to contain **one** side table.

State the unit for your answer.

Minimum volume ..... Unit ..... **[3]**

This question generally performed well. Most candidates were able to achieve the full 3 marks. Other candidates lost a mark because they did not include the 5cm table top thickness in their calculations but still multiplied the length, width and height together correctly and gave the correct unit of measurement.

Question 2 (d) (ii)

(ii) Give **one** reason why cardboard is a suitable material for this box.

.....

..... **[1]**

A wide range of correct responses were given by candidates.

Other candidates stated generic, one word properties of cardboard such as strong, light, cheap etc that did not give a reason why this made them suitable for the box.

Misconception

The question asks for a reason why cardboard is a suitable material for the box. Although this is only a 1 mark question, candidates have been given two lines for their response. Simply stating a property of cardboard does not answer the question (even though the property may be valid).

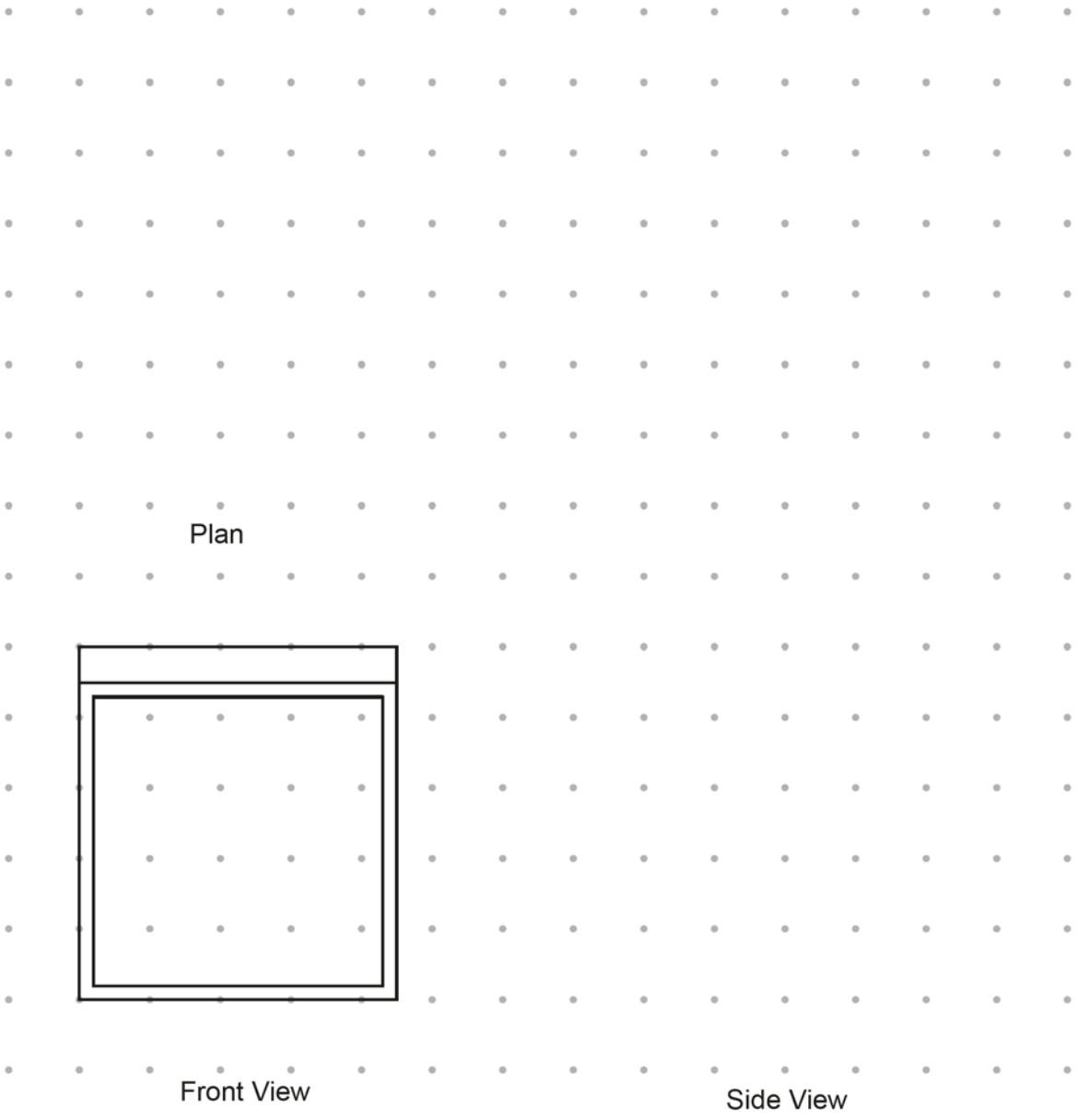
To gain the mark on this question candidates need to give the property but explain why this makes it suitable, e.g. 'cardboard is durable' would gain no marks. However by expanding on this: 'therefore it will be able to withstand any impacts or knocks during transportation,' the candidate would gain the mark.

Question 2 (e)

(e) Complete the working drawing to show the plan and side view of the side table shown in **Fig. 2**.

The front view has been done for you.

The grid points are 1 cm apart. Use the scale 1:10



[4]

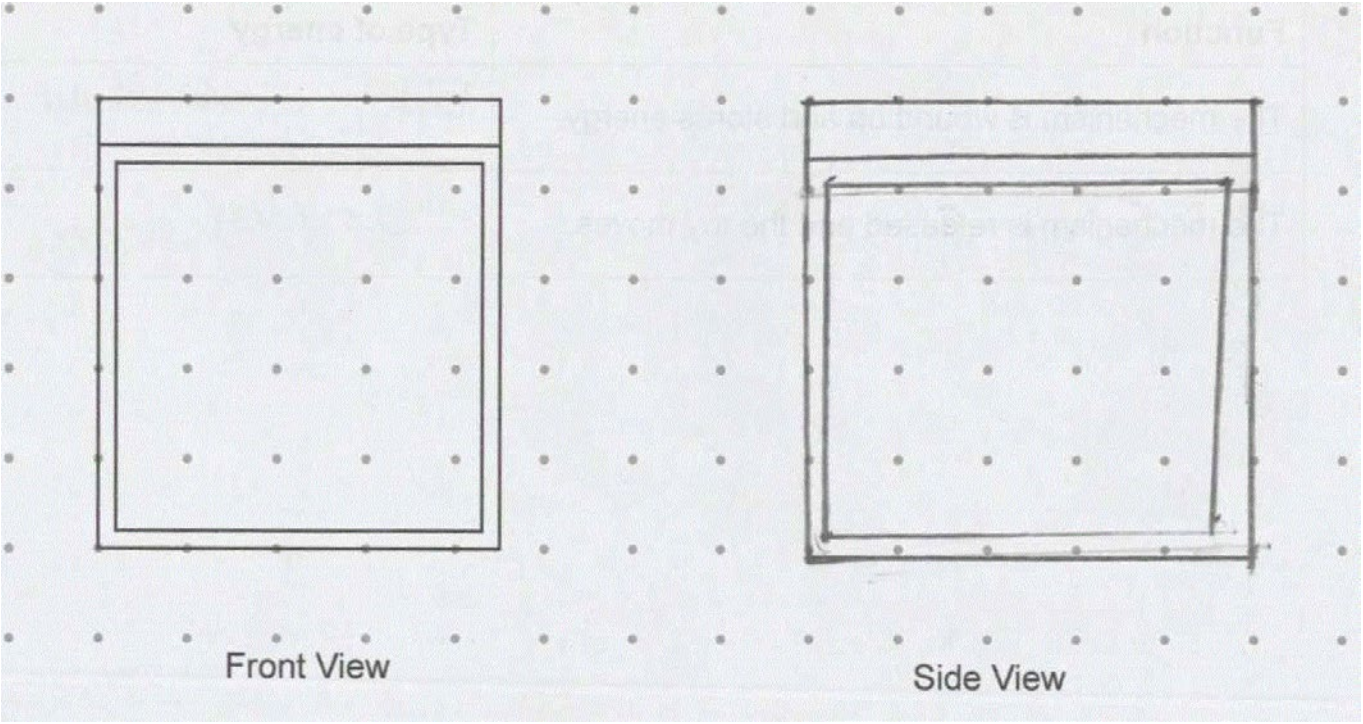
Most candidates were able to access marks and some very well drawn responses were seen.

Many candidates were able to draw the plan and side view correctly and gain full marks.

Other candidates did not draw the plan or drew an isometric view of the table instead. Some candidates projected the side view to the correct heights but drew the width incorrectly and lost a mark.

The quality of drawing was generally good. The best candidate responses used a ruler and projected lines to construct the missing views.

Exemplar 2



Exemplar 2 shows a mid level response. The candidate has used a ruler and sharp pencil to complete the drawing. They have drawn the table to the correct height, with correct leg widths and table top thickness which has gained them 2 of the 3 marks for the side view. However, they have drawn the side view half a square too wide.

Question 3 (a) (i)

3 **Fig. 3** shows a wind-up bath toy.

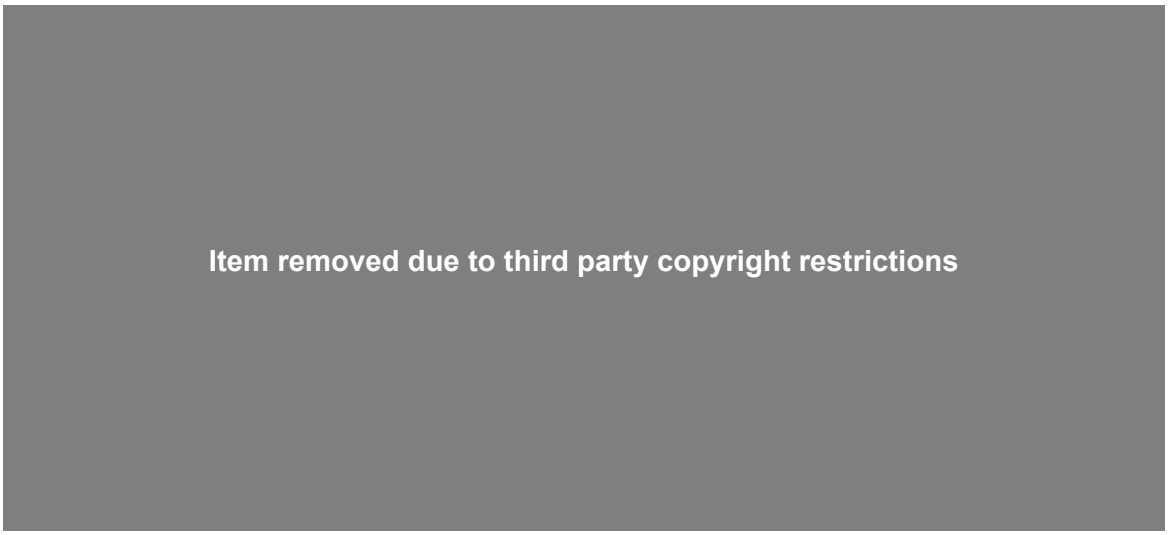


Fig. 3

(a) The wind-up bath toy uses a clockwork mechanism to create movement.

(i) In the table, identify the type of energy for the function described.

Function	Type of energy
The mechanism is wound up and stores energy.	
The mechanism is released and the toy moves.	

[2]

This question was generally answered well. Many candidates gained at least 1 mark on the question. More candidates answered the second part correctly than the first.

Question 3 (a) (ii)

(ii) The wind-up bath toy uses different motions to move in the water.

The different motions are shown by the arrows on the diagrams below.

Label the diagrams to identify each type of motion.

.....

.....

.....

[3]

This question was generally answered well. Many candidates lost a mark for giving 'reciprocating' instead of 'oscillating' for the legs.

Question 3 (b)

(b) **Fig. 4** shows the clockwork mechanism used in the wind-up bath toy.

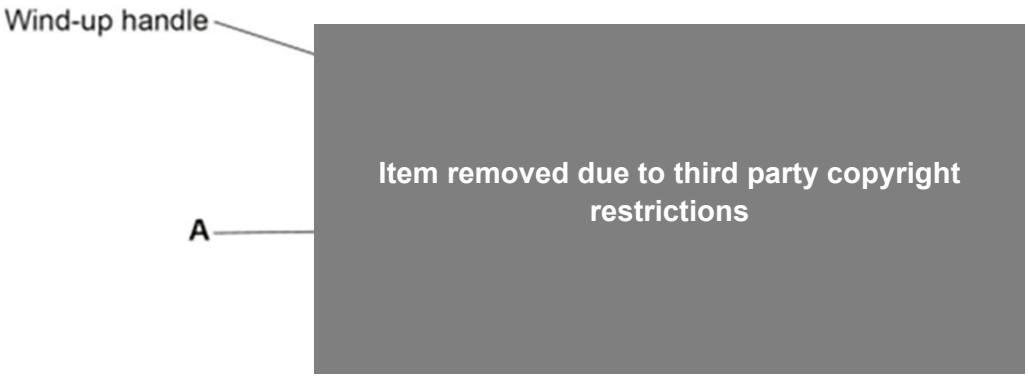


Fig. 4

Identify the mechanism labelled **A** in **Fig. 4** and describe how it works.

.....

..... **[2]**

There were a wide range of responses for this question. The majority of candidates were able to identify the mechanism. 'Cog' was a common answer which was allowed in the mark scheme. Fewer candidates were able to describe how the mechanism worked correctly.

Question 3 (c)

(c) A cam and follower are part of the mechanism that moves the feet of the wind-up bath toy.

Describe how a cam and follower works.

You can use sketches and notes to support your answer.

.....

.....

.....

.....

[2]

There were a small number of good responses to this question where candidates used notes and sketches to describe and show how a cam and follower works. Many candidates drew or described gear trains rather than cams and followers.

Question 3 (d)

(d) The designer of the wind-up bath toy wants to improve the toy's functionality and appeal.

Explain how **one** smart or modern material could be used by the designer to improve the toy.

.....

.....

.....

.....

.....

..... **[3]**

There was a wide range of responses for this question. Only a small proportion of candidates achieved full marks. Many candidates suggested alternative materials to plastic for the duck such as rubber or carbon fibre which are not modern or smart materials. Other candidates suggested adding a speaker to the duck to create sound. The best responses described thermochromic or hydrochronic coatings and how these would change colour in reaction to heat or moisture and improve the child's enjoyment.

Question 3 (e)

(e) Give **two** reasons a wind-up bath toy might be chosen over a battery-powered one.

1 .....

.....

2 .....

.....

[2]

Many candidates achieved at least 1 mark. The most common correct response was the unnecessity of changing or purchasing new batteries. Many incorrect responses focussed on the possibility of electrocution if the batteries got wet.

Section B overview

Section B consists of Question 4 covering core and Questions 5 and 6 covering in depth knowledge and understanding.

Question 4 ensures a balanced coverage of core knowledge and understanding across the paper and gives candidates a fresh opportunity to answer more accessible questions.

Questions 5 and 6 focus on a specific product. Candidates must choose one product from the insert and answer both of the questions in relation to this product.

The timber crate was the most popular choice of product chosen by a significant margin.

To do well in Section B candidates must have an in depth knowledge of at least one specific material area (papers and boards, timbers, metals, polymers, fibres and fabrics, design engineering). Those with deeper understanding of more than one of these categories will have more choice in the product they can respond with, but must stay with the same product for the remainder of the questions.

Question 4 (b)

(b) Many online and in-store retailers are introducing initiatives to improve their sustainability or reduce their carbon footprint.

An example of this is a retailer using wool instead of polystyrene to insulate storage containers for frozen and chilled foods.

Give **two** other examples of how retailers can improve their sustainability or reduce their carbon footprint.

1 .....

.....

2 .....

.....

[2]

Approximately half of candidates achieved full marks on this question.

Many candidate responses were quite vague and did not give a specific enough example to be awarded the mark.

Exemplar 3

1 Use raw materials that do not require lots of energy to source.

2 Recycle when they can.

Exemplar 3 shows a candidate response that is not specific enough to be awarded the marks. For the first answer, the candidate has given an example that relates to the sourcing and extraction of materials. This is not a process the retailer would necessarily be involved in or have any influence over unless they were part of an extremely large company or organisation. The response does not give an example of specific material or process. The second response is very vague and far too vague to be awarded any marks.

Assessment for learning

In the question, the example given is very specific. It gives a specific material that can be used to replace another and the purpose for which they are used. To achieve both marks, candidates need to give examples of specific ways that retailers could improve their sustainability or reduce their carbon footprint.

Question 4 (c)

(c) High value items of clothing are often protected using security tags, as shown in **Image B**.

The security tag uses an electronic sensor.

Describe how a simple electronic sensor circuit works.

.....

.....

..... **[2]**

Most candidates demonstrated some knowledge of how a simple electronic sensor circuit works. Many candidates described the input and output parts of the circuit. Others were able to describe how an electronic signal is sent to trigger the output.

Question 4 (d)

(d) **Image C** shows inside a modern retail store.

Explain why colour is an important consideration in retail design.

.....

.....

.....

.....

..... **[3]**

The majority of candidates achieved at least 1 mark on this question. Most candidates were able to explain that certain colours make items look or stand out better attracting customers attention.

Other candidates explained how colours have certain meanings and can evoke particular feelings or emotions which can influence customers.

Some candidates gave responses relating to gender stereotypes and colours that are used for specific products rather than the retail environment

Question 5 (a)

5 Study and use the images and information about your chosen product given in the **Insert**.

(a) Show the step-by-step stages that have been used to **commercially manufacture** your chosen product. These stages may include marking out, wasting, forming, assembly and finish.

You must include details of:

- specific materials, tools and components that would be used during commercial manufacturing
- the processes, techniques or skills that would be used
- any digital technology used as appropriate
- features of any jigs, formers, moulds or templates and how they are used.

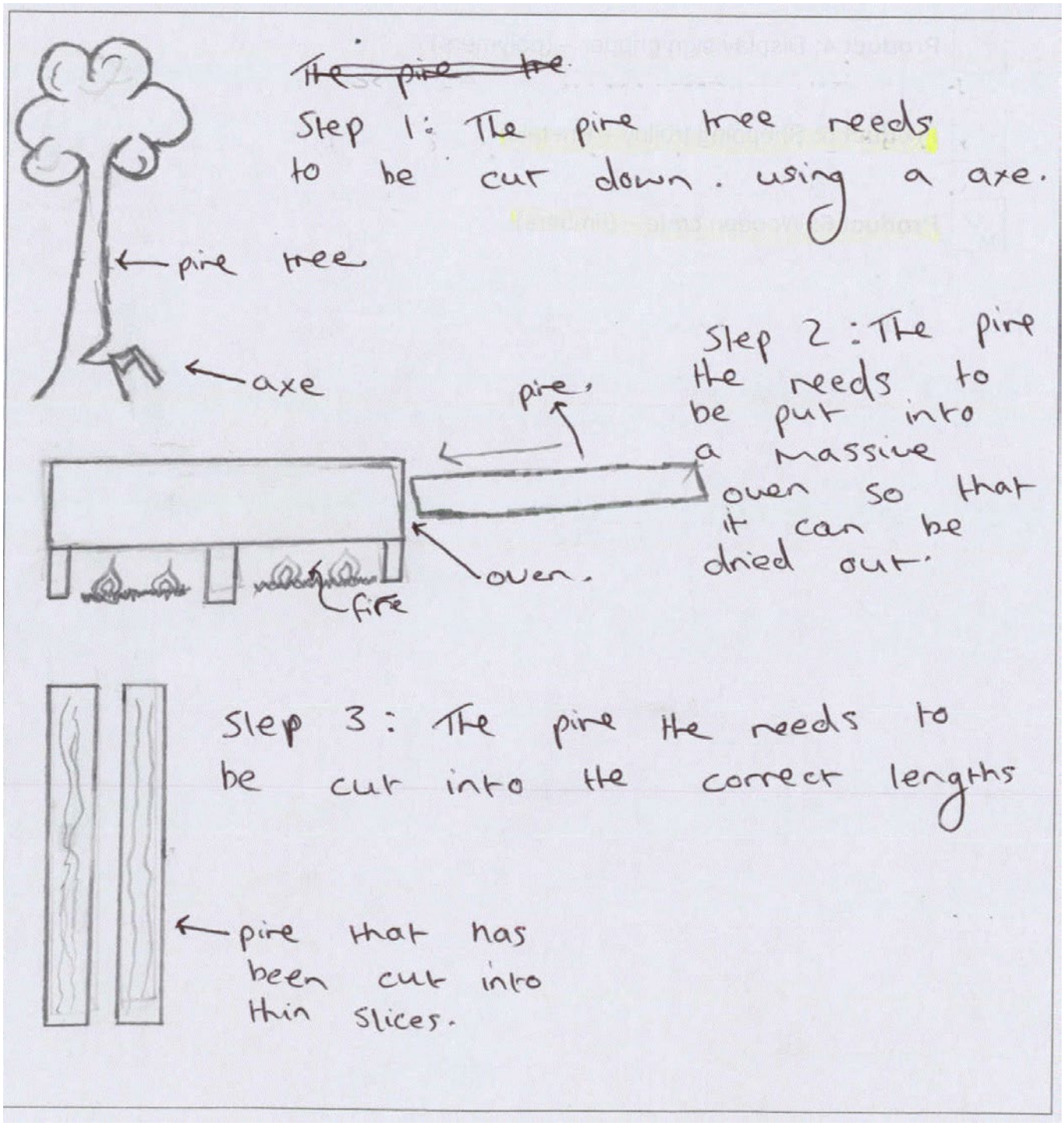
You can use sketches and notes to support your answer. **[12]**

There were a small number of excellent responses to this question where candidates used notes and sketches to give detailed descriptions of how their chosen product would be commercially manufactured.

The majority of responses described processes that would be used when making the product in small numbers in a school workshop environment. While many of these were detailed and clear, they had little or no reference to any quantity production techniques such as jigs, templates etc. and were unable to achieve marks in the higher mark bands.

Some candidates made reference to production lines or commercial manufacturing methods but did not describe how these could be applied to the manufacture of their chosen product.

Exemplar 4



Exemplar 4 is a Level 1 response. The candidate has initially focused on the extraction and processing of materials rather than the manufacture of the product. In the second part of the response the candidate has begun to describe the manufacture of the product but has described how the product would be produced in single or low numbers in a workshop. There is not enough attention paid to the details of construction given on the insert and a different method of constructing the product than the one described is given.

Misconception

Many candidate responses focused too heavily on the extraction and processing of materials needed to make the product rather than the manufacturing process. At the manufacturing stage of a product, the raw materials have already been sourced, extracted and processed into a useable stock form. In the question, bullet points are given to guide candidates on what their response should include.

Students should make sure they understand the stages involved in the manufacture of products and the common processes used in commercial manufacture using the specific materials. They should practise answering questions relating to the commercial manufacture of different products using different materials.

Questions in this section of the paper can touch on any manufacturing method, stage or scale of production. Candidates are required to know and understand the methods used for manufacturing products at different scales of production along with the processes used for larger scales of production. This in-depth knowledge should then be applied to the context of the product in the question.

Candidates should not just rely on their experience of making the product in their NEA.

Assessment for learning

Commercial manufacturing methods and scales of production for each material area are covered in depth in each respective section of the Design and Technology textbook.

Educational visits to local manufacturing companies are a good way of giving candidates first-hand experience of manufacturing a product. Numerous online videos are also a good source of learning where this is not possible.

Question 5 (b)

(b) Explain **two** reasons why jigs, formers, moulds, templates and/or digital technology would be used during the manufacturing process of your chosen product.

1 .....

.....

.....

2 .....

.....

.....

[4]

Some candidates were able to state basic reasons why jigs, formers, moulds, templates and digital technology would be used in the manufacture of the product. Most common responses were to make sure that products are produced quicker or accurate and/or consistent. Fewer candidates were able to describe how jigs, formers, moulds, templates and digital technology would be used in the manufacture of their specific product.

Many candidates described the use of CAD/CAM to manufacture products but did not always relate the methods described to the product chosen.

Question 5 (c)

(c) Explain how the form, structure or components in your chosen product help it achieve its functionality.

.....

.....

..... **[2]**

There was a range of responses depending on the chosen product. Some showed a clear understanding of how form, structure or components used help a product achieve its function. Some responses focused on the strength of the materials rather than the form, structure or components used.

Question 5 (d)

(d) Explain how **one** of the materials/components used in your chosen product is sourced and converted into a usable form for manufacturing.

Material/component: .....

.....

.....

.....

.....

..... **[6]**

There were a small number of excellent responses to this question where candidates gave detailed explanations of how the materials/components in their chosen product are sourced and converted into a useable form. These came from a variety of different material areas and it was clear that some candidates had studied this area of the specification thoroughly.

The majority of candidate responses described where the materials would be extracted from but many descriptions lacked detail of the methods used. The main parts of the conversion stages were usually covered but some areas did not provide sufficient explanation of how the conversion processes are carried out.

Question 6 (a)

6 (a) Branding is important in a retail environment.

Explain **two** reasons why companies choose to brand products.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

The majority of candidates were able to access the marks available. Many gave responses relating to brand recognition and loyalty resulting in sales increasing.

Other responses demonstrated a broader knowledge of branding and described celebrity endorsements and the effects on sales.

Many responses that did not gain marks focused on copyright, stating that branding prevented other companies from copying their products.

The best responses gave two different reasons why branding is used by companies using examples that they had experience of to support and substantiate their answers.

Question 6 (b)*

(b)* New and emerging technologies are being used in shops, retail outlets and online shopping.

Discuss the effect of new and emerging technologies on a customer's shopping experience.

Use examples to support your answer. **[8]**

Some excellent responses were given by some candidates with some detailed descriptions of various new and emerging technologies used in retail. Many responses described the use of online shopping, virtual clothing try-on, self-service checkouts and the use of delivery drones.

Examples such as the Amazon shop with no checkout, digital payment methods, supermarket self-service screens and online shopping were used in many candidate discussions.

The best responses described and gave examples of new and emerging technologies and discussed the benefits and drawbacks of each on consumers of different ages and backgrounds.

Copyright information

Supporting you

Post-results services

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the OCR website.

Keep up-to-date

We send a weekly roundup to tell you about important updates. You can also sign up for your subject specific updates.
If you haven't already, sign up here.

OCR Professional Development

Attend one of our popular CPD courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

Please find details for all our courses on the relevant subject page on our website or visit OCR professional development.

Signed up for ExamBuilder?

ExamBuilder is the question builder platform for a range of our GCSE, A Level, Cambridge Nationals and Cambridge Technicals qualifications. Find out more.

ExamBuilder is **free for all OCR centres** with an Interchange account and gives you unlimited users per centre. We need an Interchange username to validate the identity of your centre's first user account for ExamBuilder.

If you do not have an Interchange account please contact your centre administrator (usually the Exams Officer) to request a username, or nominate an existing Interchange user in your department.

Active Results

Review students' exam performance with our free online results analysis tool. It is available for all GCSEs, AS and A Levels and Cambridge Nationals.

It allows you to:

- review and run analysis reports on exam performance
- analyse results at question and/or topic level
- compare your centre with OCR national averages
- identify trends across the centre
- facilitate effective planning and delivery of courses
- identify areas of the curriculum where students excel or struggle
- help pinpoint strengths and weaknesses of students and teaching departments.

Find out more.

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on
01223 553998

Alternatively, you can email us on
support@ocr.org.uk

For more information visit
ocr.org.uk/qualifications/resource-finder
ocr.org.uk
/ocrexams
/ocrexams
/company/ocr
/ocrexams

We really value your feedback

Click to send us an autogenerated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email address will not be used or shared for any marketing purposes.


I like this


I dislike this

Please note – web links are correct at date of publication but other websites may change over time. If you have any problems with a link you may want to navigate to that organisation's website for a direct search.