

AQA Product Design Practice Papers 2017



*Pre-release context for Section A:
'A children's day nursery'*



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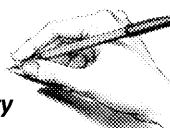
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Teacher's Introduction

In the run-up to the summer examinations, the importance of preparing for the examination becomes greater. With this in mind, the pack contains two practice examination papers covering the AQA GCSE Product Design (4555) specification – with Section A in each based on the summer 2017 pre-release design context:

- 'A children's day nursery'

Each paper follows the structure of a typical AQA examination paper and as such can be used either for a mock examination, using the full paper, or as revision material, by setting question(s) individually.

Alongside each question paper there is a mark scheme, which includes indicative answers for each question. Combining these together can provide students with an invaluable insight into what is required of them when they sit the examination during the summer.

This resource is intended only to supplement your teaching.

As with all pre-release material, it is the teacher's responsibility to decide in what way to assist their students. It's the teacher's responsibility to decide how this resource in particular can be used to fit into that assistance.

The resources here are provided as an interpretation of the preliminary material.

The author does not have any special knowledge of what to expect on any particular exam.

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AQA GCSE Design Technology Product Design – Unit 1 [45551]

Practice Paper 1

Pre-release Context: A child's day nursery

Time: 2 hours



Instructions

- Use black ink or black ballpoint pen. Use pencil and coloured pencils only for drawing.
- Fill in the box at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this answer book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 120.
- The question in Section A relates to the pre-release context.
- You are reminded of the need for good English and clear presentation in your answers.
- Quality of written communication will be assessed in Question 3(b).



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Section A

Answer **all** questions in the spaces provided

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Mark will be awarded for:

- a creative design
- choice of materials
- construction details and sizes
- surface decoration of the product, using colour and tone



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Section B

Answer **all** questions

Question 2 is about materials.

You are advised to spend about 18 minutes on this question.

- 2 a) For each type of paper and card listed below, describe its typical example of an application for which it is often used.

An example has been completed for you.

	Type	Characteristics	Material
	Foam board	Polystyrene surfaces covering polystyrene centre. Rigid.	Model
(i)	Cardstock paper		
(ii)	Corrugated cardboard		
(iii)	Layout paper		
(iv)	Duplex board		

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- 2 b) (i) State a standard component that is commonly used with paper. Give an example of what it is used for.

Component

Use

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- (ii) Explain why a manufacturer might buy pre-manufactured components.

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Question 3 is about anthropometric data.
You are advised to spend about 20 minutes on this question.

- 3 A designer is designing a suitcase similar to that shown below.



- 3 a) (i) State what is meant by 'anthropometric data'.

.....

- (ii) Give three examples of anthropometric data that could be used for a suitcase.

For each, explain how it could influence the design.

Anthropometric data	How it could influence the design

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- 3 a) (iii) When designing using anthropometric data, explain why the percentile is important.

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- b) Discuss how the questionnaire could be redesigned to reduce its impact on the validity of written communication (QWC) will be assessed in this question.

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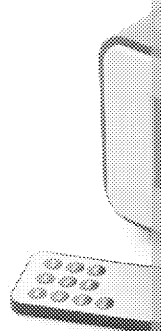
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Question 4 is about product evolution and manufacturing.
You are advised to spend about 16 minutes on this question.

- 4 Radios have evolved substantially over the years.



Vintage radio



Modern radio

- 4 a) Identify three features that have changed between the two designs.
For each, explain the reasons for the change.

Feature 1

Why it has changed

.....
.....

Feature 2

Why it has changed

.....
.....

Feature 3

Why it has changed

.....
.....



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4 b) Most modern commercial radios are made by the mass production

Explain the differences in the tools and equipment typically used for batch manufacture and mass production.

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Question 5 is about design and design schools.
You are advised to spend about 18 minutes on this question.

- 5 a) Explain what is meant by an 'iterative design process'.

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- b) Explain how a designer can protect their work from being copied by others.

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- c) Computer-aided design (CAD) software is often used to support the design process.

- (i) Give four examples of where CAD can be used in the design process.

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- 5 c) (ii) Explain one advantage and one disadvantage of using CAD to produce a product.

Advantage:

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Disadvantage:

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- d) Design movements can be very influential when designing a product.

- (i) Name two design movements.



2

- (ii) Compare the features of typical designs produced by the two named in (i) above.

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Question 6 is about packaging.
You are advised to spend about 19 minutes on this question.

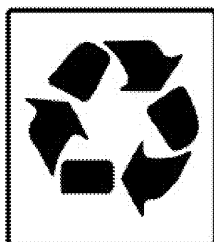
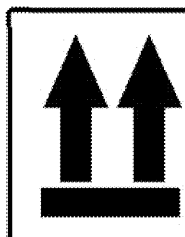
- 6 a) State five functions carried out by packaging.

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2
3
4
5

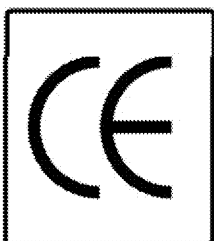
- 6 b) The following labels are printed on boxes.
State the meaning of each of the symbols shown.



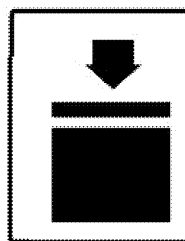
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Practice Paper 2

Pre-release Context: A child in a day nursery

Time: 2 hours



Instructions

- Use black ink or black ballpoint pen. Use pencil and coloured pencils only for drawing.
- Fill in the box at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this answer book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 120.
- The question in Section A relates to the pre-release context.
- You are reminded of the need for good English and clear presentation in your answers.
- Quality of written communication will be assessed in Question 6(b).



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Section A

Answer **all** questions in the spaces provided

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1. A children's day nursery has asked your school to design some storage used by the 'parents' to hold their artwork and any items they make.

Design specification

The boxes must be

- made from paper or board
- large enough for the children to comfortably fit inside
- able to be assembled easily
- attractive so that they are appealing to their pupils
- cost effectively produced

- a) Complete the table below. This gives details of the sources of information used in your research across designing the box.

The first line has been completed for you

Research topic	Source of information
Target Market	Interviewing the client (nursery)
Materials and components	
Manufacture	
Marketing	
Environmental impact	
Environmental impact	

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Marks will be awarded for:

- construction details
- scale
- surface treatment
- quality of the drawing



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Solid white board

Duplex board

Unrigid cardboard

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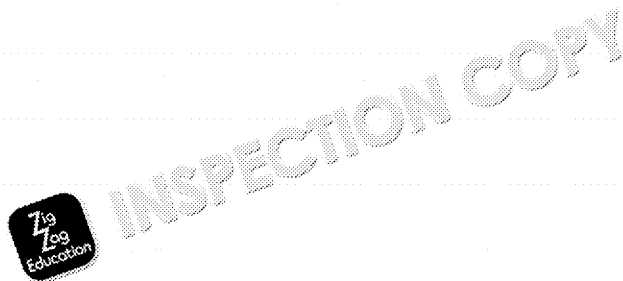
Section A content intentionally hidden from inspection copy

Blow-dry card

Display board

- d) The nursery has decided to use the material you used for making cutting out the model as using the die cutting process.

Describe how die cutting is used to cut shapes in paper and how



- e) Evaluate how well your final design meets the needs of the company



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Section B

Answer **all** questions

Question 2 is about health and safety.

You are advised to spend about 8 minutes on this question.

- 2 a) Explain why it is important to consider health and safety issues when

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.....

- b) Select one tool that you are familiar with from the following list. Circle

Sewing machine Pillar drill Electric food mixer Soldering iron

List **three** potential hazards of using the tool. For each, give a control measure to reduce the risk.

Hazard 1

.....

Control measure

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Hazard 2

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Control measure

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Hazard 3

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Control measure

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Question 3 is about manufacturing.

You are advised to spend about 30 minutes on this question.

- 3 Your school has been asked to organise and run a Christmas event for
Each class has been asked to make something for the event, using a list of products.

Choose one of the products from the list below by circling your choice.

Decorated cakes

Lighting

Candles

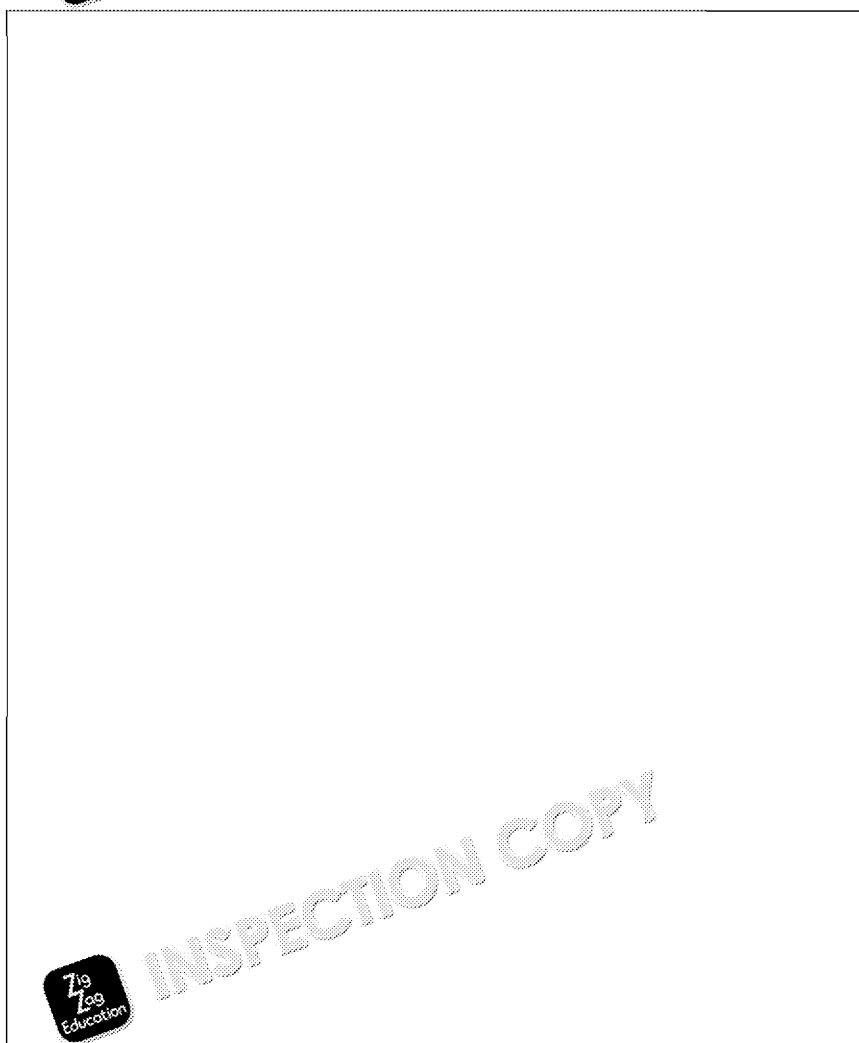
Ornaments to hang from a tree

Ceramic car

You have been asked to design the product that your class will make. Your product must have a feature relevant to Christmas and should be suitable to be manufactured.

- a) Use notes and/or sketches to show your product in the box below.

You are also asked to describe how the product will be manufactured.



- b) (i) Name a suitable main material for your product.

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- 3 b) (ii) Explain why the material you have chosen is suitable for your

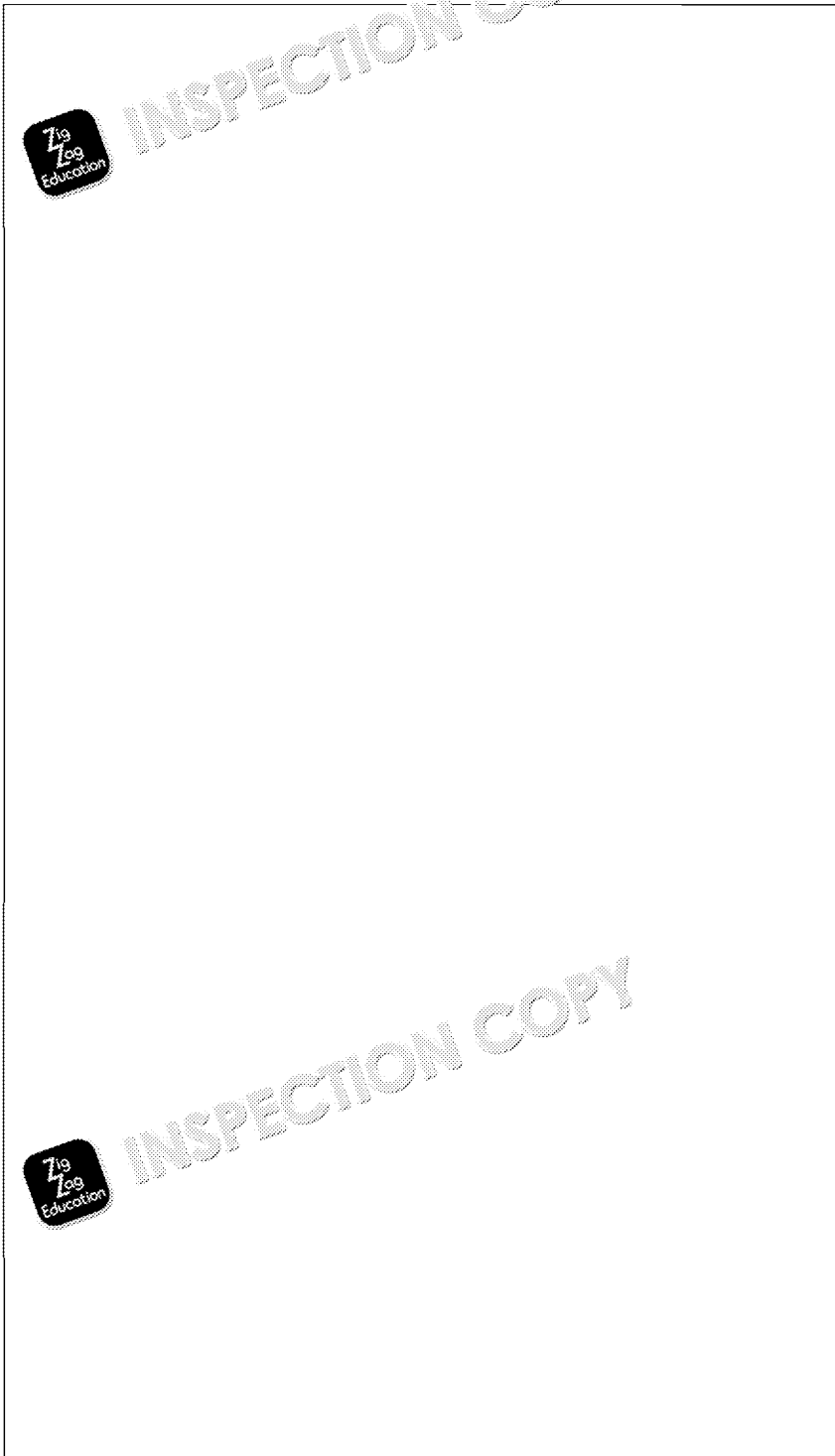
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- c) In the box below and on the following page, produce a flow chart to be made. You should include quality control points where needed.



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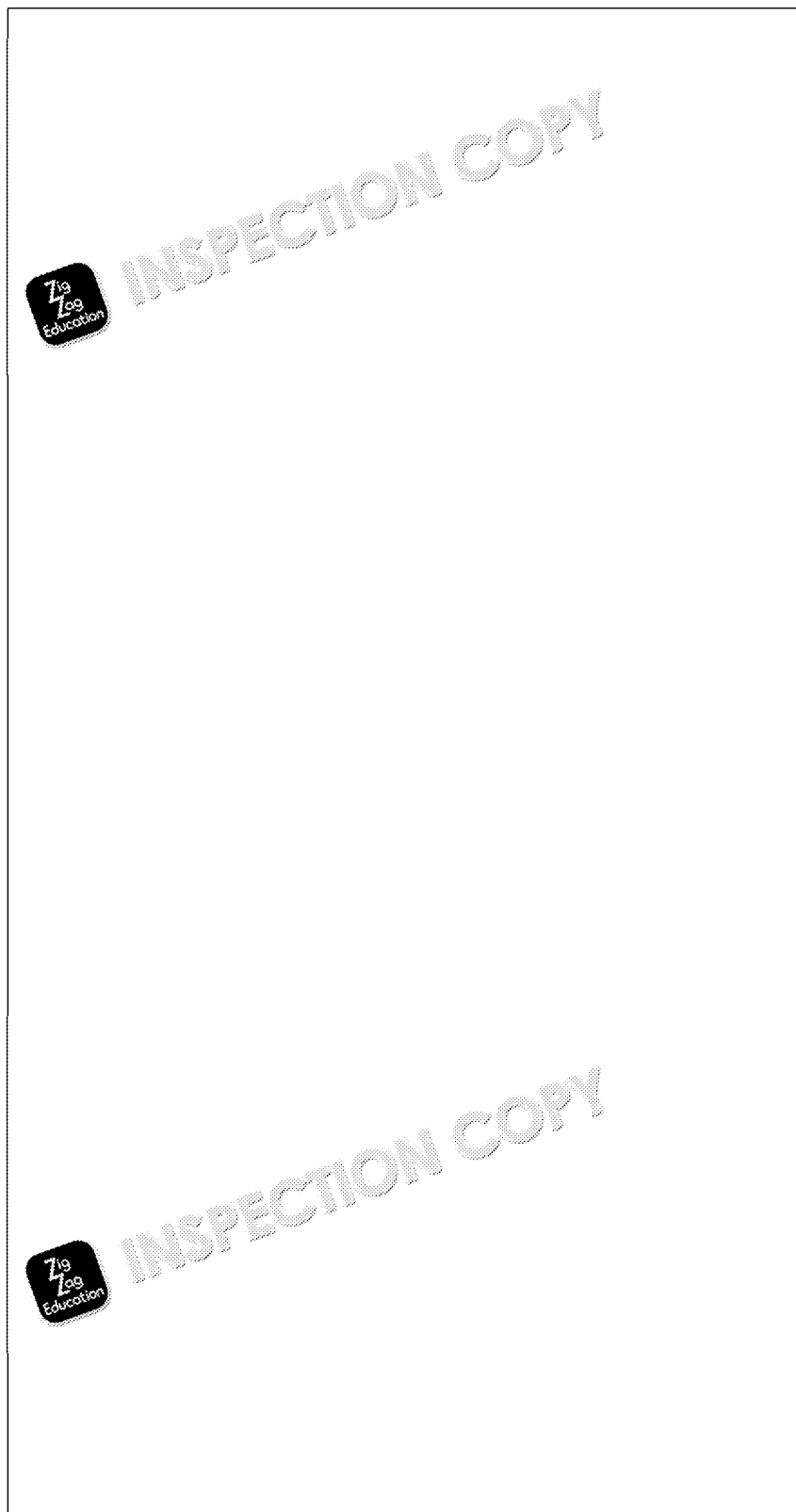


- 3 d) Students will manufacture the product in teams. Each team will make batches of 20.

In the box below, draw a layout to show how the production of your product will be organised.

Marks will be awarded for:

- identification of tools and equipment
- layout and order of the processes



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Question 4 is about design and the environment.
You are advised to spend about 12 minutes on this question.

- 4 A designer has been asked to design a replacement for the bench shown in the photograph below for commuters at a train station.



- a) The design brief states that the design must consider the six Rs.

Choose four words from the list below.

Reuse

Recycle

Reduce

Rethink

Repair

Refuse

Explain how each of these four words might affect the design of the bench.

Word 1

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Word 2

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Word 3

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Word 4

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- 4 b) (i) Explain what is meant by anthropometric data when designing

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- (ii) Give **two** examples of where anthropometric data could be used in seating.

1

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2

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Question 5 is about manufacturing systems.
You are advised to spend about 20 minutes on this question.

- 5 a) For each of the following types of production, give an example of a product that is typically used to make:

Production Type	Example of typical product
One-off	
Batch	
Mass	

- 5 b) (i) Give **one** advantage and **one** disadvantage of using CAD/CAM equipment to make a product.

Advantage

.....

Disadvantage

.....

- (ii) State three advantages of using CAD/CAM equipment to make a product.

1

2

3

- c) (i) State what is meant by 'just-in-time' production.

.....

- (ii) Give **one** advantage and **one** disadvantage of 'just-in-time' production.

Advantage

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Disadvantage

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- 5 d) Explain, using examples, how the use of quality circles may improve

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Question 6 is about design.
You are advised to spend about 19 minutes on this question.

6 a) For each of the following design schools, give three typical characteristics.

(i) *Arts and Crafts*

1

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2

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3



(ii) *Art Deco*

1

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2

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(iii) *Modernism*

1

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Practice Paper 1 – Mark Scheme

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			THE PRODUCT SPECIFIED, e.g. I should be brightly coloured (1); white is suitable (1); I should be made from a polymer which has a low density (1); I should be light (1); I should be easy to use (1).
(b)	Creativity		
	1 mark		A creative original design
	2 marks		A design that has two or more original features
	3 marks		A design that is a simple but novel idea (1) (1) (1)
	Materials		
	4 marks		Identifying the materials specified used in the design
	3 marks		Identifying two or more of the materials used in the design
	2 marks		Identifying one material used in the design by recalling its name and use in the design (1) (1)
	Construction and assembly		
	3 marks		Identifying all of the joining processes needed
	2 marks		Identifying two or more of the processes needed
	1 mark		Identifying the process needed to make the design
	Size		
	2 marks		Identifying two or more sizes
	1 mark		Identifying one size
	Decoration		
	3 marks		A design on all sides used a pattern detailed with a variety of tools provided
	2 marks		Decorate a spoke holder of colour to give some detail
	1 mark		Paint a spoke holder of colour to give simple detail

(c) (i) For each criterion, award 1 mark for each simple part made or part made and explained up to a maximum of 4 marks each).

			Partly clear but clear:
			<ul style="list-style-type: none"> What does the new part produce do? How well does it perform / meet with the need? References to colour in the specification (1) (1) (1)



2	(a)	(i)	Award up to 2 marks for colour finishes and 1 mark for a suitable material; Tough (1); lightly textured (1); light cream colour (1). Drawing or painting (1).
		(ii)	Two or more layers of card with a fluted inner section (1); often recycled (1); suitable for packaging (1).
		(iii)	White (1); translucent (1). Working drawings or tracing (1).
		(iv)	White surfaces with grey fibres between (1); tough (1); lightly textured (1); suitable for packaging (1).
	(b)	(i)	Award 1 mark for a suitable component and 1 mark for its use; e.g. rivets or sticky tape (1), used to join paper products together (1).

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		(ii)	<p>Answers may include the following points:</p> <ul style="list-style-type: none"> It is more cost-effective to buy these parts than to invest in the them. Suppliers can get economies of scale by making the same product in large quantities. The parts are of more consistent quality than if they were made in small quantities. It is cheaper and quicker to buy them than the cost and time of making them. <p>Award marks as follows:</p> <p>1 mark Limited or simplistic statement which mentions only one point.</p> <p>2 marks Sound response mentioning two points briefly or one point with additional explanation and a basic point.</p> <p>3 marks Concise, detailed response that includes three basic points with additional explanation and a basic point.</p> <p>4 marks Concise, detailed response that includes two points with additional explanation.</p>
3	(a)	(i)	Award 1 mark for measurements of the human body or its capabilities.
		(ii)	<p>Award 1 mark each for up to three relevant pieces of data and 1 mark for explanation of its influence, e.g. grip diameter (1) to determine the size of the handle; finger size (1) to determine the size of keys (1); lifting ability (1) to determine the weight of the suitcase (1); heights (1) to determine the length of the handle.</p>
		(iii)	<p>Award marks as follows:</p> <p>1 mark Limited or simplistic statement, e.g. referring in general to the needs of the majority of users.</p> <p>2 marks Sound description of the 5th to 95th percentile.</p> <p>3 marks Detailed description of the 5th to 95th percentile explanation by designers to ensure that products are ergonomic for the majority of users.</p>
	b		<p>Award marks for any of the following points up to a maximum of 6 marks:</p> <ul style="list-style-type: none"> Use of recycled materials (1) Use of single materials (1) so can be easily recycled without disassembly (1) Use of polymers made from natural materials (1), rather than fossil fuels (1) Reduce amount of materials required (1), e.g. by reducing wall thickness (1) or eliminating attachments (1) By designing it so that parts that break can be easily replaced (1), e.g. handle or wheels (1) Any other relevant point (1) <p>Add marks for QWC as follows:</p> <p>4 marks Excellent QWC with no obvious errors</p> <p>3 marks Good coverage with very few grammatical errors</p> <p>2 marks Coverage but with some obvious errors</p> <p>1 mark Poor coverage and significant errors present</p>
4	(a)		<p>Award 1 mark each for three features and 1 mark each for three explanations: remote control (1), reduction in size (1), change in materials used (1); due to developments in microelectronics (1); new materials (1); changes in shape due to increased consideration of ergonomics (1) and fashion/market pull (1).</p>

4	(b)	<p>Award marks as indicated, up to a maximum of 10 marks:</p> <p>One-off manufacture:</p> <ul style="list-style-type: none">Just one product made at a time (1); as every product made this way (1) often uses flexible machines (1); labour-intensive (1) <p>Batch manufacture:</p> <ul style="list-style-type: none">Small number of identical products manufactured in a group (1); templates often used to aid production (1). Uses manual processes (1) as time to programme CAM machines is saved by time across the batch as a whole (1). <p>Mass production:</p> <ul style="list-style-type: none">Very large number of products produced, with all products identical (1); a production line (1) with high use of CAM equipment (1). Work requires less skill than for smaller-volume production (1). Expensive to initiate (1); cost of equipment/machinery (1).						
5	(a)	Design methodology based on cyclic process of design – make – evaluate – change and improvements are made progressively by testing different iterations.						
	(b)	 <p>Two of the following automatically given copyright (1); designers can also patent a registered design (1). If anyone copies work that is copied from a registered design they can be sued (1).</p>						
	(c) (i)	Award 1 mark for each suitable example up to a maximum of 4 marks: design ideas (1), developing 3D models (1), virtual modelling (1), creating drawings (1), outputting files to CAM equipment (1).						
	(ii)	Award 1 mark each for stating an advantage and disadvantage, and for the explanation, e.g. allows changes to be made quickly to design (1); cost OR the need to create new drawings (1); allows virtual modelling of making a prototype (1); software much be purchased (1) which can be quite expensive (1); virtual models may give inaccurate results (1); simulations and do not use the actual material that the product will be made from (1).						
	(d) (i)	Award 1 mark each for two of: Arts and Crafts Movement, Art Nouveau, Bauhaus, Modernism, De Stijl, Memphis, Post Modernism						
	(ii)	<p>Points that may be included in the answer include:</p> <ul style="list-style-type: none">Arts and Crafts – Made by traditional craft techniques, expensive, inspired by organic shapes and patterns found in nature.Art Deco – Much use of geometric shapes, bright and bold, also inspired by Egyptian art.Art Nouveau – Based on organic lines of climbing plants and flowers.Bauhaus – form follows function; minimalist design focusing on geometric, useful, designed for mass production.De Stijl – Only essential colour and form used, geometric design, primary colours.Memphis – Inspired by historic forms, bright, gaudy colours, use of unconventional materials.Modernism – Ergonomics, appropriate materials, little decoration, geometric shapes suitable for mass-produce.Postmodernism – Unintentional or haphazard appearance, anti-functional.  <p>Award marks as follows:</p> <table><tr><td>3 marks</td><td>Stating some characteristics of the two design schools.</td></tr><tr><td>4–6 marks</td><td>Stating the characteristics of both design schools and contrasting features of some characteristics.</td></tr><tr><td>7–9 marks</td><td>Comparing multiple features of both design schools and reasons for the differences.</td></tr></table>	3 marks	Stating some characteristics of the two design schools.	4–6 marks	Stating the characteristics of both design schools and contrasting features of some characteristics.	7–9 marks	Comparing multiple features of both design schools and reasons for the differences.
3 marks	Stating some characteristics of the two design schools.							
4–6 marks	Stating the characteristics of both design schools and contrasting features of some characteristics.							
7–9 marks	Comparing multiple features of both design schools and reasons for the differences.							
6	(a)	Award 1 mark each for five of: protect, inform, contain, transport, present.						
	(b)	Clockwise from the top - award 1 mark each for: keep dry, this way up, keep Britain tidy, conformité européenne / European standard, recycle.						

Practice Paper 2 – Mark Scheme

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3	(a)	<p>Award marks as follows:</p> <p>5–6 marks: Detailed solution including a relevant feature relating to the design, suitable for batch manufacturing.</p> <p>3–4 marks: Solution has some detail, including a relevant feature, but might not be fully suitable for batch manufacturing.</p> <p>1–2 marks: Design lacks detail, not feasible or unsuitable for batch manufacturing.</p>
	(b) (i)	Award 1 mark for naming a specific material (not a material type), e.g. polypropylene, self-raising flour.
	(ii)	Award 2 marks if the reason shows good understanding of the work of the material. Award 1 mark if the reason is vague and lacking in understanding of the properties of the material.
	(c)	<p>Add up the marks as follows, with a maximum of 4 marks for each category.</p> <p>Manufacturing</p> <p>4 marks: All main stages of manufacture listed correctly and in correct order.</p> <p>3 marks: Most main stages of manufacture listed and correct order.</p> <p>2 marks: Some main stages of manufacture identified, but insufficiently detailed and in wrong order.</p> <p>1 mark: A few stages of manufacture identified, or information in wrong order.</p> <p>Quality control</p> <p>4 marks: Appropriate quality control measures identified and in place.</p> <p>3 marks: Appropriate quality control measures identified but not in correct place.</p> <p>2 marks: Some appropriate quality control measures identified, or some measures incorrect for the material.</p> <p>1 mark: Some quality control measures identified but incorrect.</p> <p>Flowchart</p> <p>4 marks: Process sequence indicated by arrows, flow chart used throughout, includes feedback loops for decisions.</p> <p>3 marks: Process sequence indicated by arrows, flow chart used throughout.</p> <p>2 marks: Process sequence indicated by arrows, some flow chart correctly used.</p> <p>1 mark: Process sequence indicated by arrows, but flow chart not used.</p>
	(d)	<p>Award marks as follows:</p> <p>8–10 marks: A well-planned layout in a feasible order of processes, clear with no gaps or omissions. Correctly named tools and major stages of manufacture. Appropriate division of labour for scale of production.</p> <p>5–7 marks: A generally correct layout and sequence of manufacture, but may be some omissions. Correctly named tools and major stages of manufacture. Division of labour is feasible but disproportionate for some tasks. Suitable for the scale of production.</p> <p>2–4 marks: Only part of the layout or process superficially detailed. The quantity being produced. Some tools and equipment named. Division of labour may not be feasible or not considered.</p> <p>0–1 marks: Limited or no response.</p>

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4	(a)	<p>Award 1 mark each for a simple or limited statement that defines the product.</p> <p>Award a further 1 mark each for a clear explanation that relates to the product.</p> <p>Examples of definitions:</p> <ul style="list-style-type: none">• Rethink – reviewing the function or functions of the product and what is actually needed (1); e.g. reviewing the need for seating or centring a seat (1).• Reduce – redesigning the product so that less material or energy is used in its manufacture and use (1); e.g. removing the seat back, having discrete materials rather than continuous material (1).• Refuse – not using a product, material or process if it is not the best for the environment (1); e.g. using sustainably sourced wood instead of synthetic materials (1).• Repair – extending the life of the product, by designing it to allow for easy maintenance (1); e.g. designing the bench easy to clean.• Reuse – re-designing the product so that its parts or components can be used for other products without modification (1); e.g. reusing legs from one product to make another (1).• Recycle – ensuring that the materials used to make the product can be reprocessed and used to make other products (1); e.g. using recycled plastic (1).						
	(b) (i)	<p>Award 1 mark for a simple statement, such as measurements of the product, award a second mark for a statement relating to its use in design, safety or ensuring a design is easy to use.</p>						
	(ii)	<p>Award one mark each for stating two features, e.g. width of the seat that must be supported (1), height of the seat (1).</p>						
5	(a)	<p>Award 1 mark each for three appropriate examples.</p>						
	(b) (i)	<p>Advantage: can produce shapes that are too complicated for humans to achieve (1); disadvantage: cost of equipment (1).</p>						
	(ii)	<p>Award 1 mark each for three of the following, compared to manual labour:</p> <ul style="list-style-type: none">• Greater accuracy (1)• Repeatability (1)• Faster cutting speeds (1)• Any other appropriate response (1)						
	(c) (i)	<p>Only enough stock, materials or components purchased to cover immediate needs (1).</p>						
	(ii)	<p>Advantage: Reduces cost of storage and overstocking (1) OR allows design to be changed quickly (1)</p> <p>Disadvantage: Production can be disrupted when supply fails (1)</p>						
	(d)	<p>Points that could be included in the answer include:</p> <ul style="list-style-type: none">• Quality circles are groups of employees• They meet to consider ways of improving quality or resolving problems within the organisation• Most participants are shop floor workers• They use their practical understanding to analyse the problem and propose practical solutions• Shop floor workers are normally responsible for implementing the recommendations themselves• Examples of typical recommendations <p>Award marks as follows:</p> <table><tr><td>1–3 marks</td><td>For describing the function and make-up of a quality circle</td></tr><tr><td>4–6 marks</td><td>For describing quality circles and explaining in general terms how actions can result in improvements in product quality</td></tr><tr><td>7–9 marks</td><td>For describing quality circles in detail and explaining how actions can result in improvements in product quality, supported by examples.</td></tr></table>	1–3 marks	For describing the function and make-up of a quality circle	4–6 marks	For describing quality circles and explaining in general terms how actions can result in improvements in product quality	7–9 marks	For describing quality circles in detail and explaining how actions can result in improvements in product quality, supported by examples.
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6	(a)	(i)	Made by traditional craft techniques (1), expensive materials (1), in shapes and patterns found in nature (1).								
		(ii)	Much use of geometric shapes (1), bright and bold (1), sometimes in Egyptian art (1).								
		(iii)	Award marks as follows, up to a maximum of 3 marks: ergonomic design (1), appropriate materials (1), little decoration (1), often geometric shapes (1), mass-produce (1).								
	(b)		<p>Award marks as indicated:</p> <ul style="list-style-type: none"> • Geometry can be used to minimise waste during manufacture (1). Symmetry (or asymmetry) (1) can be used to increase the appeal of a product to the consumer (1). • Mathematics can be used to calculate the properties required (1), choice of material (1) and critical dimensions such as the wall thickness (1). • Allow 1 mark for a relevant example given. • Any other relevant point. <p>Award marks for QWC as follows:</p> <table border="0"> <tr> <td>4 marks</td> <td>Excellent QWC with no obvious errors</td> </tr> <tr> <td>3 marks</td> <td>Good coverage with very few grammatical errors</td> </tr> <tr> <td>2 marks</td> <td>Coverage but with some obvious errors</td> </tr> <tr> <td>1 mark</td> <td>Poor coverage and significant errors present</td> </tr> </table>	4 marks	Excellent QWC with no obvious errors	3 marks	Good coverage with very few grammatical errors	2 marks	Coverage but with some obvious errors	1 mark	Poor coverage and significant errors present
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