



Rewarding Learning

General Certificate of Secondary Education

Technology and Design

Unit 2:
Option C: Product Design

[GTY23]

Assessment

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses. The mark schemes should be read in conjunction with these general marking instructions.

Assessment objectives

Below are the assessment objectives for GCSE Technology and Design.

Students must:

- recall select and communicate their knowledge and understanding of technology and design in a range of contexts (AO1);
- apply skills, knowledge and understanding, in a variety of contexts and in designing and making products (AO2); and
- analyse and evaluate products, including their design and production (AO3).

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of an unanticipated answer, teachers are expected to use their professional judgement to assess the validity of answers. You must not draw inferences or interpret what you think the candidate has meant. Teachers should carefully read and consider every response.

Positive Marking

Teachers are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Teachers should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate. Teachers are encouraged to use the full range of marks available.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Bands of response

Tasks and questions requiring candidates to respond in extended writing are marked in terms of bands of response. In deciding which mark to award, teachers should look for the “best-fit”, bearing in mind that weakness in one area may be compensated for by strength in another.

In deciding which mark within a particular band to award to any response, teachers are expected to use their professional judgement. The following guidance is provided to assist teachers.

- **Level 1:** Response which merits inclusion in the band and should be awarded one mark.
- **Level 2:** Response which merits inclusion in the band and should be awarded two marks.
- **Level 3:** Response which merits inclusion in the band and should be awarded three marks.
- **Level 4:** Response which merits inclusion in the band and should be awarded four marks.

Marking calculations

In marking answers involving calculations, teachers should apply the “error carried forward rule” so that candidates are not penalised more than once for a computational error.

Award full marks if a candidate gives the correct answer but does not show the working out.

Quality of written communication

Quality of written communication is taken into account in assessing candidates’ responses to all tasks and questions that require them to respond in written form. These tasks and questions are marked on the basis of bands of response. The description for each band of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within bands of response as follows:

- Band 1: Quality of written communication is basic.
- Band 2: Quality of written communication is limited
- Band 3: Quality of written communication is satisfactory
- Band 4: Quality of written communication is good.
- Band 5: Quality of written communication is excellent.

In interpreting these band descriptions, teachers should refer to the more detailed guidance provided in question 8:

			AVAILABLE MARKS	
1	(a)	(i) X= British Standards Institute (BSI) Kitemark symbol [1] Y= Conformitè Européene (CE symbol) (European standards symbol) [1] (2 × [1])	[2]	9
	(ii)	Standards Symbols	[1]	
	(iii)	The symbols show that products have been independently tested to British and European Standards [1] They are labels [1] that are attached to products, packaging or goods [1] They reassure/confirm to consumers that a product has achieved a minimum quality standard [1] (4 × [1])	[4]	
	(b)	A risk assessment is a task/process/examination of the potential hazards [1] that may be involved when pupils are engaged in the workshop [1] (2 × [1]) Correct alternative responses should be considered	[2]	
2	(a)	(i) It means that it is cheaper to buy-in readymade batteries [1] rather than sub-contracting or making them [1] (2 × [1]) Correct alternative responses should be considered	[2]	9
	(ii)	Getting someone else/another company to manufacture and supply parts of the product. Correct alternative responses should be considered	[1]	
	(b)	(i) Acrylonitrile butadiene styrene [1] Acrylonitrile butadiene styrene is a thermoplastic [1] or ABS is easy to thermoform and machine [1] (2 × [1]) Correct alternative responses should be considered	[2]	
		(ii) The casings require specialised manufacturing equipment for their production. Correct alternative responses should be considered	[1]	
	(c)	Any three from: The laptop/computer consists of many separate components which require an ordered/logical assembly sequence [1] Different assembly points can focus on a specific stage [1] Each completed stage is moved on to the next stage [1] Semiskilled workers can be employed [1] Some stages can be automated, e.g. solder baths [1] Bought-in components and sub-contracted components can be delivered directly to specific stations in the assembly process [1] Quality control interventions can be made in line [1] (3 × [1]) Correct alternative responses should be considered	[3]	

3

- (i) Any **one** from:
Presentational drawings
Working drawings
CAD
Computer modelling [1]
Correct alternative responses should be considered
- (ii) It helps the designer to see/understand how something works/is made. [1]
- (iii) Any **two** from:
Freehand concept sketches are important because they enable the designer to focus spontaneously [1] to produce a broad range of ideas [1] at speed [1] with no specialist equipment required [1]
(2 × [1]) [2]
Correct alternative responses should be considered
- (iv) Any **two** from:
Annotation can communicate hidden design details [1]
Annotation is important as it can add clarity to sketches and drawings [1]
Annotation needs to be brief/succinct as too much written information can be overbearing and distract or cloud the focus which should be on the drawing, communication of ideas or sketch [1]
(2 × [1]) [2]
- (v) Anthropometric data is related to body measurements of the child [1]
Anthropometric data is used to help the design meet the ergonomic needs of the child – the child is comfortable when using the toy [1]
Correct alternative responses should be considered
- Consider the size of the child’s hand/body measurements to ensure the toy fulfills its function, e.g. size of hand inform size of handles/lever [1]
(3 × [1]) [3]
Correct alternative responses should be considered

AVAILABLE
MARKS

9

- 4 (a) (i) Any **two** from:
- The Unit has sharp edges producing a striking design [1]
 - The TV stand's aesthetics are a primary feature. The front incorporates a grooved design to form an attractive diagonal pattern across the face for a striking and decorative finish [1]
 - Materials: It is made from solid oak [1]
 - The TV stand has a natural look – possibly varnished or lacquered [1]
 - The proportions of length, breadth and height would suggest that this TV stand would hold very large TVs. [1]
 - Although it is referred to as a TV stand, it could be used as a stand-alone piece of furniture [1]
 - Has a storage facility [1]
- (2 × [1]) [2]
Correct alternative responses should be considered
- (ii) Form follows Function [1]
- (iii) Any **one** from:
- The Newman TV Stand is a unique design
 - It is made from expensive solid oak
 - Bethan supports local crafts people
 - It is a collaboration piece [1]
- (b) Any **five** from:
- Bethan Gray works mainly with luxurious natural materials – leather, marble, semi-precious stones and solid wood [1]
 - Bethan Gray has an extensive knowledge of craftsmanship and cutting-edge manufacturing technologies [1]
 - A lot of her work is a fusion of ideas through her collaboration with other designers and artists [1]
 - She designs best-selling collections and high-profile pieces for global retailers and brands [1]
 - Much of her work can be seen in some of the world's most prestigious stores, including Lane Crawford, Liberty and Harrods [1]
 - Bethan Gray merges traditional craft with modern, elegant and contemporary design [1]
 - Her love for and curiosity about the arts has resulted in extensive travel in India, Asia, the Middle East, Northern Africa, and South America to research other cultures [1]
 - She first came to prominence in 1998 when she was awarded the prestigious New Designers Prize [1]
 - She became Design Director in Habitat and this gave her a unique insight into global retail [1]
 - She is featured extensively in the media and has exhibited in London, Milan, Paris and New York [1]
 - Her work was recognised with the prestigious award of 'Best British Designer' in 2013/14 [1]
- (5 × [1]) [5]
Correct alternative responses should be considered

- 5 (a) (i) Any **one** from:
Stainless Steel
Aluminium alloy
Coated Steel [1]
- (ii) Press Forming [1]/Press Moulding [1] [1]
- (iii) Any **two** from:
 - Tapered to ease muffin release [1]
 - Grooved to produce muffin design [1]
 - Recess shapes are separated to enable muffins to rise [1]
(2 × [1]) [2]
Correct alternative responses should be considered
- (iv) Any **two** from:
Thermal conductivity/It is a good conductor of heat[1]
High melting point/It can be used at a high temperature[1]
Corrosion resistant/will not rust[1]
Stiff/Rigid material [1]
(2 × [1]) [2]
Correct alternative responses should be considered
- (b) (i) Calculation:
 $2400 / 390 = 6$ whole trays
 $1200 / 290 = 4$ whole trays [1]
Total = $6 \times 4 = 24$ trays [1] [2]
Award full marks if a candidate gives the correct answer but does not show the working out.
- (ii) 24 muffin trays \times $\pounds 2.75 = \pounds 66.00$ [1]
 $\pounds 66.00 - \pounds 25.00 = \pounds 41.00$ profit per sheet of material [1]
Award full marks if a candidate gives the correct answer but does not show the working out.
- Apply the error carried forward rule if required in this question. [2]
- (c) Bands of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of bands of response. In deciding which mark to award, teachers should look for the “best-fit”, bearing in mind that weakness in one area may be compensated for by strength in another.
- In deciding which mark within a particular band to award to any response, teachers are expected to use their professional judgement. The following guidance is provided to assist teachers.
- Level 1:** Response which merits inclusion in the band and should be awarded one mark.
- Level 2:** Response which satisfies the band description and should be awarded two marks.
- Possible solutions could focus on:**
- Long lever lifter
 - Tweezer type action
 - Scissor type action
 - Tong type handle
 - Two handled hook approach

The design features are:

- The handle can be easily attached and removed from the tray
- The handle can lift the tray
- Handle Insulation

**AVAILABLE
MARKS**

Response Type	Response Band	Description	Mark to Award
When a response is not worthy of credit, a [0] mark should be awarded.			
Basic	1-2	The candidate attempts to produce a handle design. The quality of sketch(es) is basic. Annotation is basic and lacking in technical vocabulary and specialist terms.	1
		The candidate produces a basic handle design. The design attempts to consider at least 1 of the design features. The quality of sketch(es) is basic. Annotation is basic and lacks the use of technical vocabulary and specialist terms.	2
Limited	3-4	The candidate produces a limited handle design. The design considers at least 1 of the design features. The quality of sketch(es) is limited. Annotation is limited and lacks the use of technical vocabulary and specialist terms.	3
		The candidate produces a limited handle design. The design considers at least 2 of the design features. The quality of sketch(es) is limited. Annotation is limited but uses some technical vocabulary and specialist terms.	4
Satisfactory	5-6	The candidate produces a satisfactory handle design. The design considers at least 2 of the design features. The sketch(es) is satisfactory. Annotation is satisfactory and uses some technical vocabulary and specialist terms.	5
		The candidate produces a satisfactory handle design. The design incorporates at least 2 of the design features. The sketch(es) is satisfactory. Annotation is satisfactory and generally uses technical vocabulary and specialist terms.	6
Good	7-8	The candidate produces a good handle design. The design incorporates 2 or 3 of the design features. Good clear sketch(es) linked to good annotation generally using technical vocabulary and specialist terms.	7
		The candidate produces a very good handle design. The design incorporates at least 3 of the design features with some detail. Very good clear sketches linked to good annotation generally using technical vocabulary and specialist terms.	8
Excellent	9-10	The candidate produces an excellent handle design. The design fully incorporates all the design features. Excellent clear sketch(es) and annotation using technical vocabulary and specialist terms.	9
		The candidate produces an excellent handle design. The design fully incorporates all the design features showing excellent detail and clarity. Excellent clear sketch(es) with excellent annotation which makes full use of technical vocabulary and specialist terms.	10

[10]

20

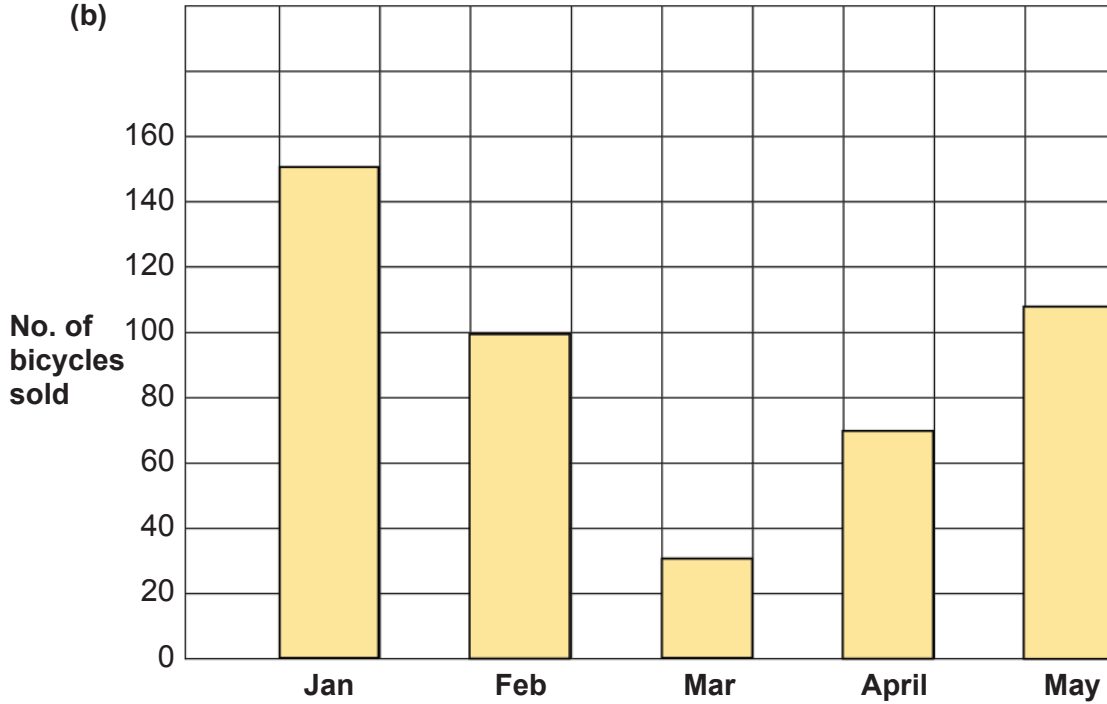
- 6 (a) Percentage difference: $150 - 30 = 120$ [1]
 $120/460 \times 100$ [1]
 $= 26.08\%$ [1] can accept 26% [1]
or
 January = $150/460 \times 100 = 32.6\%$ [1]
 March = $30/460 \times 100 = 6.52\%$ [1]
 $= 26.08\%$ [1] can accept 26% [1]

Award full marks if a candidate gives the correct answer but does not show the working out.

Apply the error carried forward rule if required in this question.
 (3 × [1])

[3]

(b)



Height and label for each column (3 × [1])
 Spacing between columns (3 × [1])
 (6 × [1])

[6]

- (c) Cost per bicycle = £250
 Profit per bicycle 45% = $250/100 \times 45 = £112.50$ [1]
 $= 460 \times 112.50$ [1]
 Total Profit = £51750 [1]

OR

$460 \times 250 = 115000$ [1]
 $115000/100 \times 45$ [1]
 $= £51750$ [1]

Award full marks if a candidate gives the correct answer but does not show the working out.

(3 × [1])

[3]

12

7 (a) Any **one** of the following:

(i) **Mobile phone**

- **Feature:** Camera [1]
- **Explanation:** Consumers expect multi use devices [1] for convenience [1]
- **Feature:** Internet/App enabled [1]
- **Explanation:** Able to access the internet/apps [1] no need to use a computer [1]

(3 × [1]) [3]

Correct alternative responses should be considered

(ii) **Cordless Phone**

- **Feature:** Cordless [1]
- **Explanation:** The phone has no cable [1] And can be used a short distance from its base [1]
- **Feature:** Feature: The dial/number buttons [1]
- **Explanation:** Series of dial/number buttons [1] allowing the user to call someone [1]

Note: Features **must** be different for each phone.

(3 × [1]) [3]

Correct alternative responses should be considered

(b) Any **two** from:

(i) Use of:

- Interviews [1]
- Questionnaires [1]
- Surveys [1]
- The Internet [1]

(2 × [1]) [2]

Correct alternative responses should be considered

(ii) The description should match the selected method

Interviews: One to one interview series, of questions about the product, [1] normally recorded [1]

Questionnaires: Considered questions to gather statistical results[1] from a large number of people [1]

Survey: A survey is a research method used for collecting data from a predefined group of respondents [1] carried out through a range of methods, e.g. telephone, Internet, face to face [1]

The Internet: Internet research includes use of images,statistics government data [1] to refine understanding [1]

(2 × [1]) [2]

Correct alternative responses should be considered

- (c) • The overall shape of most mobile phones is a plain rectangle however, this enables the manufacturers to produce larger screens or displays
- The large rectangle screen enables quality images of photos and movies to be displayed

(2 × [1]) [2]

Correct alternative responses should be considered

8 The design solution should show evidence of the following features:

Bands of response

Tasks and questions requiring candidates to respond in extended writing are marked in terms of bands of response. In deciding which mark to award, teachers should look for the “best-fit”, bearing in mind that weakness in one area may be compensated for by strength in another.

In deciding which mark within a particular band to award to any response, teachers are expected to use their professional judgement. The following guidance is provided to assist teachers.

For the following sections:

- Ease of entry and exit for the sparrows.
- Allow for easy internal cleaning.
- Ease of attachment and removal from the wall of a house or other building.
- Be aesthetically pleasing and have appropriate outdoor finish.
- Identify and justify the choice and thickness of materials.
- Include three key dimensions.

Level 1: Response which merits inclusion in the band and should be awarded one mark.

Level 2: Response which satisfies the band description and should be awarded two marks.

- Good quality annotated sketches giving consideration to line, shape, form and proportion
- Identify and justify the main manufacturing techniques used in the design’s construction.

Level 1: Response which merits inclusion in the band and should be awarded one mark.

Level 2: Response which satisfies the band description and should be awarded two marks.

Level 3: Response which satisfies the band description and should be awarded three marks.

Level 4: Response which satisfies the band description and should be awarded four marks.

AVAILABLE
MARKS

Design features	Response band	Mark band description	Mark to award
When a response is not worthy of credit, a [0] mark should be awarded			
Good quality annotated sketches giving consideration to line, shape, form and proportion	[1]–[4]	Basic sketch conveying little detail. Basic annotation.	[1]
		Limited sketch conveying some detail. Limited annotation using limited technical vocabulary and limited specialist terms.	[2]
		Satisfactory sketch conveying most information. Satisfactory annotation using some technical vocabulary and some specialist terms.	[3]
		Good sketch giving consideration to all of the information. Good annotation using technical vocabulary and specialist terms.	[4]
Ease of entry and exit for the sparrows	[1]–[2]	Inappropriate position of the hole/no reference to size of bird or diameter of the hole	[1]
		Position of hole and reference to the diameter of the hole in relation to the size of the bird	[2]
Allow for easy internal cleaning	[1]–[2]	Reference to a section of the box that can be removed/open for access.	[1]
		Reference to a section of the box that can be opened/ removed and ease of opening/removal	[2]
Ease of attachment and removal from the wall of a house or other building.	[1]–[2]	Reference to attachment to a wall or a building.	[1]
		Reference to attachment to a wall or a building and which shows ease of attachment and removal.	[2]
Be aesthetically pleasing and have appropriate outdoor finish.	[1]–[2]	Unrefined solution little consideration given to aesthetics and finish.	[1]
		Refined solution consideration given to aesthetics and suggested finish.	[2]
Identify and justify the choice and thickness of materials.	[1]–[2]	Reference to choice of material with little consideration and justification given to the size and thickness of materials used. Limited use of technical vocabulary and limited specialist terms.	[1]
		Reference to choice of an appropriate material with consideration and justification given to size and thickness of materials used. Good use of technical vocabulary and specialist terms.	[2]
Identify and justify the main manufacturing techniques used in the design's construction.	[1]–[4]	Basic detail of main manufacturing techniques shown/ discussed. Basic annotation.	[1]
		Limited detail of main manufacturing techniques shown/ discussed. Limited annotation using limited technical vocabulary and limited specialist terms.	[2]
		Satisfactory detail of main appropriate manufacturing techniques shown/discussed. Satisfactory annotation using some technical vocabulary and some specialist terms.	[3]
		Good detail of main appropriate manufacturing techniques shown/discussed. Good annotation using technical vocabulary and specialist terms.	[4]
Include three key dimensions.	[1]–[2]	Reference to three key dimensions.	[1]
		Reference to three key dimensions which are appropriate/ realistic.	[2]

	AVAILABLE MARKS
[20]	20
Total marks	100