Rewarding Learning

General Certificate of Secondary Education
2019

Technology and Design

Unit 2
Option C: Product Design

[GTY23]

FRIDAY 31 MAY, MORNING

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**.

Candidates must:

AO1 Recall, select and communicate their knowledge and understanding of Technology and Design in a range of contexts;

AO2 Apply skills knowledge and understanding, including quality standards in a variety of design contexts. Plan and carry out investigations and making tasks involving an appropriate range of tools, equipment, materials and processes; and

AO3 Analyse and evaluate evidence, design proposals and outcomes, make reasoned judgements and present conclusions and recommendations.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

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, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive Marking

Examiners 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. Examiners 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.

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.

Levels of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners 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 level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- ***Threshold performance*:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.

- ***Intermediate Performance*:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.

- ***High Performance*:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Marking calculations
In marking answers involving calculations, examiners should apply the "own figure rule" so that candidates are not penalised more than once for a computational error.

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 levels of response. The description for each level of response includes reference to the quality of written communication.

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

Level 1: Quality of written communication is limited.
Level 2: Quality of written communication is satisfactory.
Level 3: Quality of written communication is very good.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Level 1 (Limited): The level of accuracy of presentation, spelling, punctuation and grammar is limited. The candidate makes a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary.

Level 2 (Satisfactory): The level of accuracy of presentation, spelling, punctuation and grammar is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary.

Level 3 (Very Good): The level of accuracy of presentation, spelling, punctuation and grammar is very good. The candidate successfully selects and uses the most appropriate form and style of writing, supported with precise and accurate use of diagrams where appropriate. Organisation of relevant material is very good. There is very good use of appropriate specialist vocabulary.

			AVAILABLE MARKS
1	(a)	Ensure work is secured in lathe chuck Ensure that the work can rotate freely Ensure safety guard is in place **At least two from above plus one other suitable safety precaution** (3 × [1]) [3]	
	(b)	Any **two** from: • Reduces the need to dump waste in landfill sites • Saves the earth's precious resources • Saves on energy needed to extract/produce new raw material • Materials can be reused in the manufacture of other products • Some component parts can be reused • Some tools and equipment parts can be restored/overhauled for reuse **Correct alternative responses will be considered** (2 × [2]) [4]	
	(c) (i)	Mobile phone [1]	
	(ii)	Mobile phones are constantly updated and improved with new features [1]	9
2	(i)	Inception/Development [1] Introduction [1] Maturity [1] Decline [1] [4]	
	(ii)	Any **three** from: • Increased production takes place during this stage [1] costs are therefore reduced due to economies of scale [1] • Sales volume increases significantly during this period [1] profitability therefore begins to rise in line with sales [1] • Public awareness of product increases with sales [1] competition therefore begins to increase with some new businesses entering this market [1] • Competition leads to market saturation [1] market saturation therefore leads to price decreases [1] **Award [2] for a full response and [1] for a partial response** **Correct alternative responses will be considered** (3 × [2]) [6]	10
3	(a)	Any **three** from: • Robots can work in hazardous conditions [1] removing the need for humans to be exposed to unhealthy working environments [1] • Robots can work continuously [1] unlike humans who require rest [1] • Robots are precise/accurate [1] unlike humans who can make errors [1] • Although they have high initial costs they are cost effective [1] in the long term [1] • Robots do not require special environments [1] unlike humans who require heat/light/air [1] **Award [2] for a full response and [1] for a partial response** **Correct alternative responses will be considered** (3 × [2]) [6]	

				AVAILABLE MARKS
	(b)	Any **four** from: • Spraying/painting vehicles • Welding/spot welding • Space travel vehicles • Pick and place • Lawn mowers • Bomb disposal vehicles **Correct alternative responses will be considered** (4 × [1])	[4]	10
4	**(a)**	**(i)** Any **two** from: • Stability • It will successfully drain the citrus juice from the fruit into a container • Hygiene, it would appear to be easy to clean • Materials • Height **Correct alternative responses will be considered** (2 × [1])	[2]	
		(ii) Function follows form	[1]	
		(iii) Any **one** from: • The Juicy Salif citrus squeezer is a unique design • It is an exhibition piece • Expensive to produce/purchase	[1]	
	(b)	Any **five** from: • Contemporary design • Architect and designer • Influenced by fashion and novelty • Work features in a number of American and European museums • Industrial Designer – A wide variety of products are associated with the kitchen appliances company, Alessi • Winner of numerous design awards for his products • Honesty and Integrity should be at the core of design • Products should have longevity and durability **Correct alternative responses will be considered** (5 × [1])	[5]	9
5	**(a)**	Appropriate specification point with suitable explanation: Height, Length, Width, Material, Finish, Cost **Award [2] for a full response and [1] for a partial response** **Correct alternative responses will be considered**	[2]	
	(b)	Oak, Ash, Beech, Teak, Mahogany **Correct alternative responses will be considered**	[1]	
	(c)	Any **two** from: • Grain gives good appearance • Colour • Strength, in terms of stability if seasoned well • Close grained, does not split easily • Good working characteristics **Correct alternative responses will be considered** (2 × [1])	[2]	

AVAILABLE MARKS

(d) **(i)** Calculation
480 + 20 = 500 mm per leg [1]
3000/500 = 6 legs per length [1]
6 × 8 = 48 Legs obtained [1] [3]

(ii) 6 legs per length with 20 mm waste per leg
= 120 mm waste per square section [1]
8 lengths x 120 mm waste
= 960 mm waste in total [1] [2]

(e) Sketch, design and construction

Response Type	Description	Mark Band
When a response is not worthy of credit, **[0]** should be awarded		
Limited	Candidates produce sketches which do not convey a clear solution and show limited ideas. The construction lacks detail. The level of annotation conveys limited information and lacks technical vocabulary and specialist terms.	**[1]–[3]**
Satisfactory	Candidates produce satisfactory sketches which convey some ideas of the solution. The construction details are generally satisfactory. The level of annotation is satisfactory and contains some technical vocabulary and specialist terms.	**[4]–[7]**
Very Good	Candidates produce very good sketches which clearly convey most or all of the design solution. The construction details are generally very good. The level of annotation and technical vocabulary and specialist terms is generally very good.	**[8]–[10]**

[10] 20

AVAILABLE MARKS

6 **(a)** **(i)** Percentage of motor bikes sold = 10% [1]

(ii)

Type of toy	% Sold	Number of toys sold
Bus	35	**630**
Car	20	**360**
Lorry	20	**360**
Taxi	15	**270**
Motor Bike	10	**180**

(5 × [1]) [5]

(iii) Cost per toy = £19.50

1% = 0.1950

15% = 0.1950 × 15

= £2.925 [1]

Profit = 2.925 × 1800 [1]

= £5265 [1]

or 19.50 × 1800 [1]

$= \frac{35\,100 \times 15\ [1]}{100}$

= £5265 [1]

[3]

(iv) 1% = 0.1950

12.5% = 0.1950 × 12.5

= £2.4375 [1]

Selling price = 2.4375 + 19.50 [1]

= £21.94 [1]

[3] 12

7 **(a)** So that the manufacturer can create a production process [1]
To enable components to be made to a specific size or tolerance [1]

Award [2] for a full response and [1] for a partial response
Other appropriate answers will be considered [2]

(b) **(i)** Gantt chart table
Other appropriate answers will be considered [1]

(ii) List the stages of the process [1] and timing [1]
Other appropriate answers will be considered [2]

(c) **(i)** Any **three** from:

- Specify the age range, e.g. the scooter is only suitable for children three years old and over
- The scooter has two wheels
- The height of the handle bar can be adjusted
- Easy to grip handle bars
- A stand for parking the scooter
- Scooter can be folded
- Rear mud guard
- High red gloss paint finish

Other appropriate answers will be considered
(3 × [1]) [3]

	AVAILABLE MARKS

(ii) Any **two** from:
- Different heights of children
- Accommodate a range of feet sizes of children
- Ability of a child to step on and off the platform
- Length and width of a child's hand
- Ability of a child's hand to grip the handle bars

Other appropriate answers will be considered

(2 × [1]) [2] 10

8 The design solution should show evidence of the following features:
- Good quality annotated sketches giving consideration to line, shape, form and proportion. The annotated sketches should clearly convey your design thinking.
- The portable fold away stool must be freestanding, strong, stable and capable of being easily stored.
- Identify and justify the choice and use of materials.
- Capable of supporting a child of playschool age.
- Be aesthetically pleasing.
- Include three key dimensions.
- Identify and justify the main manufacturing techniques used in the design's construction.

Overall general level indicators for the design:

Response Type	Description	Mark Band
When a response is not worthy of credit, **[0]** should be awarded		
Limited	Student makes an attempt to include some or all of the features listed. Student produce sketches which convey a solution and shows limited ideas. The level of annotation conveys limited information and lacks technical vocabulary and specialist terms. The accuracy of spelling, punctuation and grammar is limited.	**[1]–[7]**
Satisfactory	Student makes an attempt to include some or all of the features listed. Student produces satisfactory sketches which convey some ideas of the solution. The level of annotation is satisfactory and contains some technical vocabulary and specialist terms. The accuracy of spelling, punctuation and grammar is satisfactory.	**[8]–[14]**
Very Good	Student makes an attempt to include most or all of the features listed. Student produces very good sketches which clearly convey most or all of the design solution. The level of annotation and technical vocabulary and specialist terms is generally very good. The accuracy of spelling, punctuation and grammar is very good.	**[15]–[20]**

[20] 20

Total **100**