Rewarding Learning

General Certificate of Secondary Education
2016

Technology and Design

Unit 3: Product Design

[GTD31]

MONDAY 6 JUNE, AFTERNOON

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, 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)**	Health Issues/Healthy lifestyle/Fitness/Developments in cycle laneways or paths/Promotion of cycling by public bodies/Growth of cycle clubs/Modern sporting events/Green Issues or other appropriate considerations (2 × [1])	[2]	
	(b)	Reasons		
		From Fig. 1		
		(i) A racing bicycle would have a lightweight frame The bicycle is designed for high speed There are no mudguards to help reduce weight The handlebars are bent to help streamline the rider/Racing Handlebars A water bottle is provided (3 × [1])	[3]	
		From Fig. 2		
		(ii) It has a basket on the front to carry items as required It has straight handlebars for comfort/enable the rider to sit upright It has mudguards to prevent the wheels from throwing up rain It has no crossbar making it easy to dismount and for frequent stops It has front and rear lights It has a bell It has a rear carrier frame (3 × [1])	[3]	8
2	**(a)**	Metal Centre Lathe	[1]	
	(b)	Easy to machine; doesn't rust; can be highly polished; attractive finish; durable; weight/light. (Any **two**) (2 × [1])	[4]	
	(c)	**(i)** Brass; copper; bronze	[1]	
		(ii) Different colour from aluminium; heavier/weight; or different answer to **(b)**	[1]	
	(d)	Fast production; easy to make and save changes; saves time and money; less waste material; less workforce needed; designs can be down loaded directly onto the CNC machine; all parts identical;	[1]	8

					AVAILABLE MARKS
3	**(a)**	**(i)**	Risk of damage to outer cover – risk of shock Risk of tripping Loose connections – electrical hazard (2 × [1])	[2]	
		(ii)	Confirms that product meets UK or EU safety standards	[1]	
	(b)		Non corrosive; easily shaped; range of colours; attractive lightweight; electrical insulator (2 × [1])	[2]	
	(c)		Gantt Chart	[1]	
	(d)		BATCH Reason: Low capital outlay Flexible – can be stopped if not selling Good when demand is hard to forecast, etc. Any one **or** MASS Reason: Large number can be made cheaply Large number can be made quickly High degree of accuracy, etc. Any one (Batch or Mass (2 × [1])	[2]	8

			AVAILABLE MARKS
4	(i)	**Market Pull:** Market or consumer forces/demands for new or improved products/The growth in consumer demand for a product. [2] **Technology Push:** Advances in technology which stimulate new products or designs. Developments in new materials or manufacturing processes which stimulate new products or designs. Continuous product development in response to developments in the electronics industry and manufacturing [2]	
	(ii)	**Market Pull Influence:** Consumer appetite for new products in the fashion industry (clothes/accessories/cosmetics/footwear) influences and pulls the development for new designs or products. Car manufacturing company produces and launches a new vehicle in responses to similar product from a competitor or similar response for a suitable product. [2]	
	(iii)	**Technology Push Influence:** Mobile phones or laptops are continually being developed in response to developments in the electronics industry and manufacturing processes. Development of Apps for mobile phones or laptops are continually being developed in response to developments in the electronics industry and manufacturing processes or similar response for another suitable product. [2]	8

AVAILABLE MARKS

5 **(a)**

Type of material	Name of material
Non ferrous alloy	Aluminium alloy/Brass
Hardwood	Mahogany/Beech
Non ferrous metal	Copper/Aluminium
Ferrous Alloy	Stainless steel/Mild steel
Softwood	Pine/Redwood

[5]

(b) **(i)** **Hardwood Product:** Doors, window frames, skirting boards, etc.

(ii) **Ferrous Alloy Product:** Sink, cutlery, washing machine casing, dish washer, etc.

(iii) **Non ferrous Alloy Product:** Door handle, kettle, sauce pan, etc. [3] 8

6 **(a)** **(i)** Veneer refers to thin slices of wood, usually thinner than 3 mm, typically glued onto manufactured boards [1]

(ii) Blockboard, plywood [1]

(b) Cheaper than solid wood; available in large sheet form; easy to machine and cut; veneer is aesthetically pleasing, readily available; iron on edging can be used.
(Any **two**)
(2 × [1]) [2]

(c)
- ☐ Mortise and Tenon Joint
- ☑ Lap Joint
- ☐ Housing Joint
- ☐ Dovetail Joint [1]

(d) Good clear Sketch to show a suitable method [3] 8

			AVAILABLE MARKS
7	(i)	Brainstorming or Thought Shower Morphological Analysis Disassembly of an existing product (Any **two**) (2 × [1]) [2]	
	(ii)	**Brainstorming or Thought Shower:** Rapid fire responses are asked for Usually a team effort Quantity of responses are encouraged All responses are jotted down or noted No responses should be dismissed or judged during this process Each response given further consideration and developed or rejected later (three key statements in response) (3 × [1]) **Morphological Analysis:** Identify the idea Select attributes or parameters List variations Try different combinations Expand the combinations and consider the examined solutions (three key statements in response) (3 × [1]) **Disassembly of an existing product:** Sometimes linked to reverse engineering Select a product Strip the product into its constituent parts (or reverse the manufacturing process) Examine each component part Consider how each part could be improved Consider possible improvements in the manufacture of the product (three key statements in response) (3 × [1]) (any 2 × [3]) [6]	8

		AVAILABLE MARKS
8	The design must satisfy the following specification points:	
	• The phone must be held securely and should be easily attached and removed from the holder [4]	
	• The material(s) selection, justification and the economy of material(s) used need to be specified [4]	
	• The method of construction of the holder must be clearly shown [4]	
	• The holder must be stable and capable of holding the phone in the position shown. There must be easy excess and clearance for the lead when connected to the charging point on the phone [4]	
	• The holder must be an aesthetically pleasing and the screen should be easy to read when located in the holder. [2]	
	• The solution should show good quality sketch(es) with notes including **three** key dimensions [6]	24
	Total	**80**