



Rewarding Learning

**General Certificate of Secondary Education
2015**

Technology and Design

Unit 3:
Product Design

[GTD31]

MONDAY 8 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.

- 1 (a) (i) Anthropometrics is the study of body measurements in relation to design products. [1]
- (ii) There is a wide range of body measurements in the population [1] so it is necessary to design products which have measurements that will suit or fit a wide range/majority of the population [1] that the product is designed for/targeted at. [1]
- An acceptable match for the greatest number of users in a targeted group. [3]
- (iii) Any **two** of the following or similar
- Specific factor 1:** Hand width
Influence: The maximum/minimum width of product for the consumer.
- Specific factor 2:** Length of hand
Influence: To enable the consumer to hold the product comfortably in the hand
- Specific factor 3:** Size of fingers
Influence: Will influence size of keys/keypad/screen pad
- Specific factor 4:** Grip diameter
Influence: Overall size of phone
(2 × [2]) [4]
- 2 (a) (i) **Tenon Saw**
Main Application: Sawing in straight line or cutting tenons.
Explanation: The strip of brass fitted to the back of the blade to keep it straight/stiff for accuracy when sawing/cutting. [2]
- (ii) **Coping Saw**
Main Application: To cut curved shapes.
Explanation: Its narrow blade enables it to turn during sawing/cutting.
Or Its blade can be set at/adjusted to any angle in the frame to aid the curved cutting process.
Or The depth of the frame aids internal/deep cuts. [2]
- (iii) **Ripsaw**
Main Application: Sawing/cutting with/along the grain of the wood.
Explanation: It has large teeth that cut with a chisel like action.
Or It has large teeth sharpened at right angles to the blade.
Or It is a coarse-toothed saw. [2]
- (b) To increase the speed of the drill bit. [1]
To transfer the rotary motion through 90° from hand/input to drill bit/output. [1]

AVAILABLE
MARKS

8

8

			AVAILABLE MARKS	
3	(a)	The designer and the client Commissioning the product. The development of the product's specification. Agree/confirm the intended user group for the product. Budget constraints/limitations. Features of the product. Timetable. Any two (2 × [1])	[2]	
	(b)	The client and the user Social/moral implications of the product. Benefits/attractions of the product. Impact of the product. Target groups for the product. Lifestyle implications. Any two (2 × [1])	[2]	
	(c)	The designer and the maker Production costs. Design modifications to suit manufacturing capability. Design modifications to suit production costs. Type of production required (Prototype, Batch, Mass). Time scale for production. Delivery implications. Packaging. Any two (2 × [1])	[2]	
	(d)	The designer and the user To test out ideas. To test prototypes. To discuss user trip outcomes. To offer advice from user perspective. To seek views of typical users. Possible environmental issues. Marketing the product. Undertake surveys. Any two (2 × [1])	[2]	8
4	(a)	A Split/mould B Screw thread C Heater D Plastic granules E Hopper	[5]	
	(b)	(i) Materials such as polystyrene, nylon, ABS, polypropylene and polythene can be used with injection moulding. Any one	[1]	
		(ii) Thermoplastics – can be heated and reheated; can be pressured in a mould; can be formed into different complex shapes; available in a range of colours; Any two (2 × [1])	[2]	8
5	(a)	Cost savings Environmental benefits Life of bulbs Any two (2 × [1])	[2]	
	(b)	The potential for long term use etc	[2]	
	(c)	Coal Oil Gas Any two (2 × [1])	[2]	
	(d)	Use renewable energy resources/Insulation	[2]	8

		AVAILABLE MARKS
6	(i) Stainless steel or aluminium	[1]
	(ii) High melting point Doesn't corrode Attractive Any two (2 × [1])	[2]
	(iii) Thermosetting	[1]
	(iv) Does not soften when heated Does not conduct heat Does not conduct electricity Any two (2 × [1])	[2]
	(v) Aesthetics/Stability when filled with water Ease of pouring/lifting/holding Any two (2 × [1])	[2]
		8
7	(a) A Lap Joint B Housing Joint C Dovetail Joint	[3]
	(b) Prototype: 1. A prototype can be physically handled by the designer, a design team and potential customers. 2. Making a prototype allows the designer/manufacturer to work out the method of construction/manufacture. 3. Making a prototype allows the manufacturer to determine the 'flow' of production on a production line, in a factory. 4. Design errors are often detected when making a prototype. (Any one)	[1]
	Mass Production: 1. The production of large quantities of a standardised article or unit (often using assembly line techniques). 2. Goods are standardised by means of precision-manufactured, interchangeable parts. 3. Is the name given to the method of producing goods in large quantities at low cost per unit. (Any one)	[1]
	Batch production: The manufacture of a set number of identical products in groups of 10, 100, 1000 etc. Can be used for repeat orders.	[1]
	(c) The manufacture could reduce the cost of the product by changing the dovetail joint to a simple lap joint, simplify the sizes of the material to stock sizes.	[2]
		8

- 8 The design must satisfy the following specification points:
- Hold up to **six** cups securely. Cups to be easily attached and removed from the holder [4]
 - Material(s) selection, justification and the economy of material(s) used [4]
 - The construction of the holder must be clearly shown [4]
 - Must be stable when resting on a kitchen worktop and holding one or more cups [4]
 - Must be aesthetically pleasing [2]
 - Include good quality sketches with notes and **three** key overall dimensions [6]

Total

AVAILABLE
MARKS

24

80