Rewarding Learning

General Certificate of Secondary Education
2013

Technology and Design

Unit 3:
Product Design

[GTD31]

FRIDAY 7 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)

Material \ Property	Ferrous Metal	Non-ferrous Metal	Hardwood	Softwood	Thermosetting Plastic	Thermoplastic
Cedar				✓		
Aluminium		✓				
Epoxy Resin					✓	
Nylon						✓
Copper		✓				
Ash			✓			
High Carbon Steel	✓					

			AVAILABLE MARKS
		[7]	
(b)	High Carbon Steel.	[1]	8
2 (a)	Getting another company to deal with the task.	[1]	
(b)	Specialised task/specialist expertise required/cost effective/can fix some costs/reliability of the sub-contractor.	[1]	
(c)	• create a brand identity • be cheap to produce for volumes/cost effective • provide an aesthetically pleasing view or image of the product • be easy to open • be easy to handle • appeal to a wide range of consumers • be easy to store and transport • provide a leak free container for storing liquid • comply with food standards and protect the liquid from health hazards • for fizzy drinks, withstand internal pressurisation and prevent escape of bubbles Six clear specification points (6 × [1])	[6]	8
3 (a)	Slope of the steps, diameter of tubing, height of the handrail from the ground, parallel to the steps	[2]	
(b) (i)	Prevents corrosion	[1]	
(ii)	doesn't require paint	[1]	
(c)	Welding; Brazing	[1]	
(d)	Semi-permanent method, e.g. steel screws into an insert/plug; threaded plate; Suitable sketch	[3]	8

				AVAILABLE MARKS
4	**(a)**	Plastic frames: maintenance free, attractive, do not degrade Double glazing: reduce heat loss, reduce noise transmission, etc.	[2]	
	(b)	Quality assurance 1 The product should be suitable for its intended purpose 2 Mistakes should be eliminated, etc. Any appropriate description of the procedures used to attain standards (2 × [1])	[2]	
	(c)	The permissible limits of variation or manufactured within acceptable limits	[2]	
	(d)	It protects the consumer from producers making false claims about products	[2]	8
5	**(a)**	Advantage: No fumes/cleaner for environment or a warehouse Disadvantage: Stop for recharging/recharging station needed, etc. one off	[2]	
	(b)	Turning circle: Width of aisles/manoeuvrability, etc. one off Lifting height: High shelving can be used/good use of space, etc. one off (2 × [2])	[4]	
	(c)	Shape of seat for comfort/layout of controls for easy reach, etc. two off	[2]	8
6	**(a)**	Inception/Development	[1]	
		Introduction	[1]	
		Maturity	[1]	
		Decline	[1]	
	(b)	Characteristics associated with the growth stage of a product Costs are reduced due to economies of scale/increased production Sales volume increases significantly profitability begins to rise Public awareness of product increases Competition begins to increase with some new businesses entering this market Increased competition leads to price decreases Any **four** statements or similar (4 × [1])	[4]	8

AVAILABLE MARKS

7 (a) and (b)

Smart Materials	Use	Property
Biodegradable	• disposable food containers • fruit packaging • waste collection bags • agricultural mulch	• biodegradable
Thermochromic	• sensitive to temperature • changes colour when heated up or cooled down • simple thermistors • cup/kettle is hot	• indicate temperature • change colour affected by heat
Shape Memory Alloy (inc. Nitinol)	• muscle wire • actuators • aerospace • motor based systems	• remember their original shape • change mechanical and physical properties
Polymorph	• armatures • frames for models • motor mountings • torches • orthopaedic aids	• can be shaped and reshaped any number of times

(2 × [3]) [6]

(c) Smart materials have enabled designers to develop new designs for products that would not have been possible in the past. Often materials that have been developed for one purpose can have new uses. [2] 8

			AVAILABLE MARKS
8	• Hold the double sided menu securely and allow the contents of the menu to be read easily from both sides (2 × [2])	[4]	
	• Material(s) selection, justification and the economy of material(s) used (2 × [2])	[4]	
	• Allow easy access to change the menu	[4]	
	• Must be freestanding and stable to sit on a table (2 × [2])	[4]	
	• Must be an aesthetically pleasing design	[2]	
	• Good quality sketches with notes	[4]	
	• Necessary key dimensions (at least 4)	[2]	24
	Total		**80**