Rewarding Learning

General Certificate of Secondary Education
2014

Technology and Design

Unit 3: Product Design

[GTD31]

TUESDAY 3 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)	(i)	Reforming: Injection Moulding	
		(ii)	Deforming: Blow Moulding (2 × [1]) [2]	
	(b)	(i)	• Blow Moulding: Hollow parison (length of plastic) lowered into Split Mould • Mould closed and compressed air blown in • Plastic forced to sides of cavity • Plastic chilled and sets • Mould opens and component is ejected Any **three** suitable answers (3 × [1]) [3]	
		(ii)	• Pellets fed from a hopper into a screw mechanism • Rotating screw moves the pellets forward to heated section • Material heated to a plastic state • Material injected under pressure into a sealed mould to fill mould cavity • Mould opened and product is ejected Any **three** suitable answers (3 × [1]) [3]	8

		AVAILABLE MARKS
2	Applications/Uses	
	Circular Saw	
	• Used for through cutting • Cross cutting of wood • Cutting sheets of wood	
	Any **two** suitable answers (2 × [1]) [2]	
	Milling Machine	
	• Cuts grooves in metal/wood/plastic • Cuts slots in metal/wood/plastic • Cuts bevel edges in metal/wood/plastic • Cutting surface shapes on flat metal/plastic work pieces • Answers may focus on metal, wood or plastic	
	Any **two** suitable answers (2 × [1]) [2]	
	Planer	
	• Reduces the wood to the exact dimensions in thicknesses • Planes wood flat • Produces smooth edges	
	Any **two** suitable answers (2 × [1]) [2]	
	Lathe	
	• Turning, shaping round metal bar or wood • Can drill holes • Cut screw threads • Taper turn bar or wood • Knurling • Answers may focus on metal or wood cutting lathe	
	Any **two** suitable answers (2 × [1]) [2]	8

			AVAILABLE MARKS
3	**(a)**	To produce different properties or working characteristics [1]	
	(b)	• Strength • Lightness • Corrosion resistance • Rigidity • Durability or other suitable answers (Any 3 × [1]) [3]	
	(c)	Confirmation that the product meets the requirements of: British Standards or European legislation [2]	
	(d)	Width of ladder/Distance between rungs or other suitable answers [2]	8
4	**(a)**	Reference to creative work which can be treated as an asset or physical property/Reference to creations of the mind, e.g. inventions, literary and artistic work, designs used in commerce etc. [2]	
	(b)	Copyright: Applies to work that is recorded in some way, gives rights to literary, artistic, musical and dramatic work etc. [2] Trademarks: A name, word, slogan, design, symbol or something that identifies a product or organisation. When registered the trademark is protected. [2] Patents: Apply to industrial processes and inventions and protect against the unauthorised implementation of the invention. [2]	8

					AVAILABLE MARKS
5	(a)	(i)	• Reduced stock levels held • Reduced storage • Reduced capital outlay etc. (Any 2 × [1])	[2]	
		(ii)	• Can be used in different products • Reduces costs • Increases availability • Reduces maintenance costs etc. (Any 2 × [1])	[2]	
	(b)	(i)	To reduce corrosion	[1]	
		(ii)	Sheet	[1]	
		(iii)	Metal folding or press moulding	[2]	8

		AVAILABLE MARKS
6 **(a)** **(i)**	90.03 mm – 89.97 mm	
(ii)	50.02 mm – 49.98 mm (2 × [1]) [2]	
(b) **(i)**	Check a percentage of components to ensure manufacturing is within tolerance [2]	
(ii)	• Too much scrappage • Increase reliability • Reduce manufacturing costs • Use less material (Any one**)** [1]	
(iii)	• Improve output • Check accuracy of the machine • Increase the frequency of the sampling • Check the setup of the machine • Change machinery • Change or add additional checks to system (Any one) [1]	
(c)	Characteristics • The product is “Fit for purpose” • The product works as specified • Management of the quality of raw materials, assemblies, products and components, services related to production, and management, production and inspection processes. • Suitable quality is determined by product users, clients or customers. • The equipment used to manufacture the product, the training of staff, the selection of quality materials and the manufacturing processes are to the highest possible standard. • The customer has his/her say. [2]	8

				AVAILABLE MARKS
7	(a)	(i)	Conveys initial ideas clearly/clarity of ideas/Quick method of showing ideas/Shows ideas/Shows concepts for further development. (Any one) [1]	
		(ii)	To enhance the sketch/to add further clarity/to record thoughts on the sketch/to suggest points for development/to record design thinking as it happens. (Any one) [1]	
		(iii)	Advantages: Encourages succinct meaningful comments/Easier to read and view drawing/doesn't remove focus from sketch/ To focus on an aspect of the sketch/To provide additional information, e.g. on materials, processes, techniques etc./To highlight particular strengths or weaknesses/doesn't overcrowd the drawing page. (2 × [1]) [2]	
	(b)	(i)	Easy to simulate, faster, good quality image, easily modified, no physical materials required, cost effective, can be downloaded for manufacturing, or other suitable alternatives. (Any one) [1]	
		(ii)	Mock-up used at an early stage of the process. They focus on general space, size, look and give a general overview of the design idea. Generally a first 3D of the idea. Prototypes are an attempt to produce a working solution and would be considered when the designer feels that the drawings are at an advanced stage. A prototype allows the designer to view a full size solution. Several prototypes are often required in order to rectify or improve a product before a satisfactory solution is achieved. [3]	8
8	Sketch/sketches to show:			
	•		The height or angle of the lamp should be easily adjustable. [4]	
	•		Material(s) selection, justification and the economy of material(s) used. [4]	
	•		On/off switch and connected to a 9 volt battery which is accessible. [4]	
	•		Stability of lamp and ability to sit on a table/unit. [4]	
	•		That the lamp is aesthetically pleasing and functional. [4]	
	•		Good quality annotated sketches with a minimum of **three** overall dimensions. [4]	24
			Total	**80**