Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Technology and Design

Assessment Unit AS 1

assessing

Design and Materials

[STE11]

MONDAY 14 MAY, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction

The main purpose of the mark scheme is to ensure that examinations are marked accurately, consistently and fairly. The mark scheme provides examiners with an indication of the nature and range of candidates' responses likely to be worthy of credit. It also sets out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCE Technology and Design.

Candidates should be able to:

AO1 Demonstrate specific knowledge and understanding, be able to apply that knowledge and understanding in combination with appropriate skills in their designing, communicate ideas and outcomes, and demonstrate strategies for evaluation.

AO2 Apply skills, knowledge and understanding of relevant materials to produce suitable and appropriate outcomes; communicate ideas and outcomes, and demonstrate strategies for evaluation.

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 17- or 18-year-old which is the age at which the majority of candidates sit their GCE 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 unanticipated answers, 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 17- or 18-year-old GCE 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.

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. To avoid a candidate being penalised, marks can be awarded where correct conclusions or inferences are made from their incorrect calculations.

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
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.

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 extended 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 basic.
Level 2: Quality of written communication is good.
Level 3: Quality of written communication is excellent.

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

Level 1 (Basic): The candidate makes only 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. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 (Good): The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Level 3 (Excellent): The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

			AVAILABLE MARKS
1	(a)	The term electrical conductivity refers to the movement of electricity through a piece of material. Good conductive materials allow electricity to pass through them whilst insulating material resists the flow of electricity. Award [2] for a full explanation and [1] for a limited explanation. [2] Any **one** specific application for example: • Copper wiring. [1] • Switch. [1] [1] **Correct alternative responses will be given full credit.**	
	(b)	The term thermal conductivity refers to the movement of heat through a piece of material. Heat transfer occurs at a lower rate across materials of low thermal conductivity than across materials of high thermal conductivity. Award [2] for a full explanation and [1] for a limited explanation. [2] Any **one** specific application for example: • Saucepans. [1] • Under floor heating system. [1] [1] **Correct alternative responses will be given full credit.**	6
2	(a)	Any **one** main property of PET which makes it suitable for fizzy drinks bottles for example: • Good resistance to pressure. [1] • Lightweight. [1] [1] **Correct alternative responses will be given full credit.**	
	(b)	Any **one** specific application for the use of PVC for example: • Pipes. [1] • Window frames. [1] [1] **Correct alternative responses will be given full credit.** Any **one** main characteristic of PVC which makes it suitable for the chosen application (e.g. window frames) for example: • Weather resistant. [1] • Available in a range of colours. [1] [1] **Correct alternative responses will be given full credit.**	3
3	(a)	Any **one** main property associated with Beech for example: • Tough. [1] • Strong. [1] [1] **Correct alternative responses will be given full credit.** Any **one** main working characteristic associated with Beech for example. • Easy to work with. [1] • Finishes well. [1] [1] **Correct alternative responses will be given full credit.**	

			AVAILABLE MARKS
	(b)	Any **two** specific properties of Mahogany for example: • Durable. [1] • Fairly strong. [1] • Relatively stable. [1] [2]	4
		Correct alternative responses will be given full credit.	
4	**(a)**	Any **one** main reason why the injection moulding process may be used to manufacture cases for example: • Capable of producing a product with good detail. [1] • Can produce a product with high degree of dimensional accuracy. [1] [1]	
		Correct alternative responses will be given full credit.	
	(b)	An annotated sketch to include the following elements of the injection moulding process – Granules, hopper, motor, screw thread, heater, split mould.	

Level 3	Detailed annotated sketch with all the main elements of the injection moulding process covered.	[4]
Level 2	Both the sketch and the annotation are good. Some of the main elements of the injection moulding process covered.	[2]–[3]
Level 1	Limited sketch lacking detail and appropriate annotation. Only a few of the main elements of the injection moulding process covered.	[1]
Level 0	The response is not worthy of any credit.	[0]

[4] 5

5	**(a)**	A thermochromic material is a material which changes colour at a specific temperature whereas a photochromic material is a material that undergoes colour change induced by exposure to different lighting conditions. Award [2] for a full explanation and [1] for a limited explanation. [2]	
		Correct alternative responses will be given full credit.	
	(b)	Any **two** main properties of graphene which make it suitable for use in phones for example: • Excellent conductivity. [1] • High level of durability. [1] • Excellent strength. [1] [2]	4
		Correct alternative responses will be given full credit.	

6 **Two** different ways in which virtual imaging and rapid prototyping may assist.

AVAILABLE MARKS

Indicative content

- Virtual imaging – Any **two** for example:
  1. Virtual images can be manipulated on-screen.
  2. Virtual imaging provides a quick interaction with the client which can speed up the process saving time and money.
  3. Virtual imaging provides a sense of realism which can aid development.

- Rapid prototyping – Any **two** for example:
  1. Rapid prototyping allows designers to realise their concepts beyond virtual visualisation. This enables one to understand the look and feel of the design and help justify changes in the development.
  2. Rapid prototyping ensures that one has the physical model in hand. This can help develop the product quickly as it is possible to get instant feedback from customers.
  3. The materials available for rapid prototyping closely resemble the properties of the actual product making it possible to perform physical tests easily. This can identify flaws and aid development.

Correct alternative responses will be given full credit.

Detailed selection and use of a writing form and style appropriate to the content. The content is organised with two relevant points outlined for each area and use is made of appropriate technological vocabulary. The spelling, grammar and punctuation are accurate.	[6]–[8]
Good selection and use of a writing form and style which is mostly appropriate to the content. The content is organised with two relevant points outlined for each area and limited use made of appropriate technological vocabulary. The spelling, grammar and punctuation are mostly accurate.	[4]–[5]
Limited selection and use of a writing form and style appropriate to the content. The content is poorly organised with a very limited number of relevant points outlined for each area and little use is made of appropriate technological vocabulary. The spelling, grammar and punctuation are inaccurate.	[1]–[3]
The response is not worthy of any credit.	[0]

[8] 8

AVAILABLE MARKS

7 **(a)** A design could be based on a proportional sized (relative to the warning triangle) textured composite mat to provide stability. Adjustable straps with quick release buckles could be used to secure the warning triangle to eyelets on the mat.

Detailed annotated sketch of a design which represents greater stability to the warning triangle when in use. The design would prevent the warning triangle from blowing over, it is compact, lightweight and allows the user to quickly attach it to the legs of the warning triangle.	[4]–[5]
Both the sketch and the annotation are good. The idea represents an improvement but lacks the finesse appropriate for the product.	[2]–[3]
Limited sketch lacking detail and appropriate annotation. Difficulties in determining if the design would prevent the warning triangle from blowing over and if it is compact, lightweight and allows the user to quickly attach it to the legs of the warning triangle	[1]
The response is not worthy of any credit.	[0]

[5]

Correct alternative responses will be given full credit.

(b) A design could be based on two acrylic clips which could be riveted onto the opposite sides of the sections allowing the high visibility vest to be folded up and slotted into the back of the warning triangle.

Detailed annotated sketch representing an appropriate means of holding the high visibility vest to the back of the warning triangle. An appropriate means of attaching the design to the acrylic section is provided.	[4]–[5]
Both the sketch and the annotation are good. The idea and the means of attachment represent an improvement but lack the finesse appropriate for the product.	[2]–[3]
Limited sketch lacking detail and appropriate annotation. Difficulties in determining if the means of holding the high visibility vest to the back of the warning triangle is appropriate and if the means of attaching the design to the acrylic section is appropriate.	[1]
The response is not worthy of any credit.	[0]

[5] 10

Correct alternative responses will be given full credit. **Total** **40**