Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education

Technology and Design

Assessment Unit AS 1

assessing

Design and Materials

[STE11]

Assessment

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 teachers 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, teachers 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, teachers are expected to use their professional judgement to assess the validity of answers. You must not draw inferences or interpret what you think the candidate has meant.
Teachers should carefully read and consider every response.

Positive marking
Teachers 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. Teachers 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, teachers should apply the 'error carried forward' 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. Award full marks if a candidate gives the correct answer but does not show the working out.

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.

Bands of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of bands of response. In deciding which mark to award, teachers 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 **band** to award to any response, teachers are expected to use their professional judgement.

The following guidance is provided to assist teachers.

Level 1: Response which merits inclusion in the band and should be awarded one mark.
Level 2: Response which merits inclusion in the band and should be awarded two marks.

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 bands of response. The description for each band of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Band 1: Quality of written communication is basic.
Band 2: Quality of written communication is satisfactory.
Band 3: Quality of written communication is good.
Band 4: Quality of written communication is excellent.

In interpreting these band descriptions, teachers should refer to the more detailed guidance provided by question 6.

			AVAILABLE MARKS
1	(a)	The term elasticity refers to the ability of a material to flex, bend and be deformed [1] and return to its original shape once the forces are removed. [1] (2 × [1]) [2] Any **one** specific product which requires this property for example: • Fishing rod [1] • Dog ball thrower [1] (1 × [1]) [1] **Correct alternative responses should be given full credit.**	
	(b)	Toughness is the ability of a material to withstand sudden shocks or blows [1] whereas hardness is the ability of a material to resist indentation. [1] (2 × [1]) [2] **Correct alternative responses should be given full credit.**	5
2	(a)	Any **one** main reason why (HDPE) is used for milk, juice and water bottles for example: • Stiff material [1] • Can be sterilised [1] (1 × [1]) [1] **Correct alternative responses should be given full credit.**	
	(b)	Any **one** specific application for the use of acrylic for example: • Illuminated signs [1] • Rear car lights [1] (1 × [1]) [1] **Correct alternative responses should be given full credit.**	
	(c)	Any **two** main reasons why polystyrene is used for packaging for example: • Very tough [1] • Lightweight material suitable for packaging [1] • Can be easily shaped to meet specific requirements for packaging [1] (2 × [1]) [2] **Correct alternative responses should be given full credit.**	4

3 **(a)** An annotated sketch to include the following:
Punch, die, material and component.

AVAILABLE MARKS

Response band	Description	Mark band
When a response is not worthy of credit, a **[0]** mark should be awarded.		
1	Basic sketch lacking detail.	1
2	Both the sketch and the annotation are good. Most of the main elements of the blanking process are included.	2
3	Detailed annotated sketch with all the main elements of the blanking process included.	3

[3]

(b) Explanation of the rolling process – The pair of metal rollers rotate in opposite directions to one another [1] to allow a piece of metal to be reduced in cross sectional area or shaped through deformation as it passes through a gap in the rollers. [1]
(2 × [1]) [2] 5

Correct alternative responses should be given full credit.

4 **(a)** The term creativity refers to the use of imagination or original ideas [1] to create a product which is innovative and inspirational. [1]
(2 × [1]) [2]

Correct alternative responses should be given full credit.

(b) Any **two** main reasons why it is important for the company to focus on product review and testing for example:
- Product review will give them customer feedback which may help guide improvement. [1]
- Positive product reviews may help boost promotion and sales figures. [1]
- Testing will give them valuable information on the performance of the product which can also direct improvements. [1]

(2 × [1]) [2] 4

Correct alternative responses should be given full credit.

5 **(a)** Any **two** main specific properties associated with (PEEK) for example:

- Exceptional chemical wear [1]
- Excellent strength [1]
- Excellent dimensional stability over a wide range of temperatures [1]

(2 × [1]) [2]

Correct alternative responses should be given full credit.

(b) Any **one** specific application for the use of polyphenylsulfone (PPSU) for example:
- Plumbing fittings [1]
- Dental and surgical instrument handles [1]

(1 × [1]) [1]

Any **one** main specific property associated with (PPSU) which would make it suitable for an example such as plumbing fittings:

- Good resistance to heat [1]
- Excellent stability [1]

(1 × [1]) [1]

AVAILABLE MARKS

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Correct alternative responses should be given full credit.

6 Computer- integrated manufacture (CIM).

Bands of response

Tasks and questions requiring candidates to respond in extended writing are marked in terms of bands of response. In deciding which mark to award, teachers 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 band to award to any response, teachers are expected to use their professional judgement. The following guidance is provided to assist teachers.

Level 1: Response which merits inclusion in the band and should be awarded one mark.

Level 2: Response which merits inclusion in the band and should be awarded two marks.

Indicative content

Quality control:
Computers are used in an integrated way to select and carry out quality control checks on components or products. Feedback from the quality control checks can be used to make changes to the manufacturing process or inform or alert the department dealing with source suppliers of potential issues.

Manufacturing:
Computers are used in an integrated way in order to analyse a CAD drawing and create the control program in order to run machines such as laser cutters, routers, mills and lathes. In addition computers are used to monitor the manufacturing of components or product levels and make changes based on feedback.

Assembly:
Computers are used in an integrated way in order help select, move and position components for final assembly. In addition the CIM system can process feedback and help prevent continued mistakes by initiating corrective steps throughout the assembly stage.

Response band	Description	Mark band
When a response is not worthy of credit, a **[0]** mark should be awarded.		
Basic	Basic content.	1
	Basic use of a writing form and style. Basic information outlined with little or no use of technological vocabulary. Spelling, grammar, and punctuation are inaccurate.	2
Satisfactory	Satisfactory selection and use of a writing form and style to the content. The content is poorly organised with satisfactory information outlined for each area and little use is made of appropriate technological vocabulary. Spelling, grammar, and punctuation are inaccurate.	3
	Satisfactory selection and use of a writing form and style which is mostly appropriate to the content. The content is organised with information outlined for each area and some use is made of appropriate technological vocabulary. Spelling, grammar, and punctuation are mostly accurate.	4
Good	Good selection and use of a writing form and style which is appropriate to the content. The content is organised with good information outlined for each area and some use is made of appropriate technological vocabulary. Spelling, grammar, and punctuation are mostly accurate.	5
	Very good selection and use of a writing form and style which is appropriate to the content. The content is organised with very good information outlined for each area and use is made of appropriate technological vocabulary. Spelling, grammar, and punctuation are accurate.	6
Excellent	Excellent selection and use of a writing form and style appropriate to the content. The content is organised with excellent information outlined for each area and accurate use is made of appropriate technological vocabulary. Spelling, grammar, and punctuation are accurate.	7
	Excellent selection and use of a writing form and style appropriate to the content. The content is well-organised with excellent information outlined for each area and widespread and accurate use is made of appropriate technological vocabulary. Spelling, grammar, and punctuation are accurate.	8

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AVAILABLE MARKS

8

AVAILABLE MARKS

7 **(a)** A design could be based on the support rail cut along the line (A - A). A new top section of smaller diameter (to fit inside the bottom section) would have a ball and spring mechanism insert in each end. The bottom section would have a series of vertical holes drilled along each side. Once the top section is inserted the ball and spring mechanism could be pressed in by the adult to create a suitable height.

Response band		Mark band
When a response is not worthy of credit, a **[0]** mark should be awarded.		
1	Basic sketch lacking detail.	1
2	Sketch(es) and the annotation are limited. The design lacks detail showing: – how an adult can extend the length of the support rail quickly; and/or – to accommodate different heights.	2
3	Sketch(es) and annotation are satisfactory. The design shows: – how an adult can extend the length of the support rail quickly; and/or – to accommodate different heights.	3
4	Sketch(es) and annotation are good. The design shows: – how an adult can extend the length of the support rail quickly; and – to accommodate different heights.	4
5	Sketches and annotation are excellent. The design shows in detail: – how an adult can extend the length of the support rail quickly; and – to accommodate different heights.	5

[5]

Correct alternative responses should be given full credit.

(b) A design could be based on an injection moulded housing (picture frame) which would allow the 2 mm thick board to slide in from the top. This would facilitate quick insertion or removal. The end profile of the housing would be shaped to facilitate it being press fitted onto the tubular support rails and two self-tapping screws would be used to secure it to the rails at the required position.

Response band		Mark band
When a response is not worthy of credit, a **[0]** mark should be awarded.		
1	Basic sketch lacking detail.	1
2	Sketch(es) and the annotation are limited. The design lacks detail showing: – how the user could insert or remove a 2 mm thick promotional graphics board; and/or – how it can be securely and safely fastened to the support rail at the correct position.	2
3	Sketch(es) and annotation are satisfactory. The design shows: – how the user could insert or remove a 2 mm thick promotional graphics board; and/or – how it can be securely and safely fastened to the support rail at the correct position.	3
4	Sketch(es) and annotation are good. The design shows: – how the user could insert or remove a 2 mm thick promotional graphics board; and – how it can be securely and safely fastened to the support rail at the correct position.	4
5	Sketches and annotation are excellent. The design shows in detail: – how the user could insert or remove a 2 mm thick promotional graphics board; and – how it can be securely and safely fastened to the support rail at the correct position.	5

[5] 10

Correct alternative responses should be given full credit.

Total **40**

AVAILABLE MARKS