



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2019**

Technology and Design

Assessment Unit AS 1

assessing

Design and Materials

[STE11]

THURSDAY 16 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.

- 1 (a) A design brief is a statement which puts the problem into context, indicates the requirements but does not impose unnecessary constraints or propose any solutions.
Award [2] for a full explanation and [1] for a limited explanation. [2]

Correct alternative responses will be given full credit.

- (b) Explanation – The purpose of undertaking design development work is to explore the potential limits in a concept in terms of how feasible, how attractive, or how functional an initial design concept may be.
Award [2] for a full explanation and [1] for a limited explanation. [2]

Correct alternative responses will be given full credit.

- 2 (a) Any **one** main specific property of pine which make it suitable for floorboards for example:
- Durability [1]
 - Lightweight [1] [1]

Correct alternative responses will be given full credit.

- (b) Any one main working characteristic of pine which would make it suitable to be used for floorboards for example:
- Easily machined and processed [1]
 - Stable material [1] [1]

- (c) The main purpose of using a stain as a finish on floorboards would be to change the colour of the board whilst still allowing the grain to be visible. [1]
- The main purpose of using an oil as a finish on floorboards would be to provide a water-resistant finish. [1]

Correct alternative responses will be given full credit.

- 3 (a) The difference between ferrous and non-ferrous metals is that ferrous metals contain iron whilst non-ferrous metals do not. [1]

Correct alternative responses will be given full credit.

- (b) Any **one** main property of mild steel which makes it suitable for screws, nuts and bolts for example:
- Tough [1]
 - Ductile [1] [1]

Correct alternative responses will be given full credit.

(c) **One** specific application for brass for example:

- Musical instruments [1] [1]

One main property of brass which makes it suitable for musical instruments for example:

- Good acoustic qualities [1]
- Corrosion resistant [1] [1]

Correct alternative responses will be given full credit.

4 (a) Any **one** main reason why rotational moulding is the preferred manufacturing process to produce traffic cones for example:

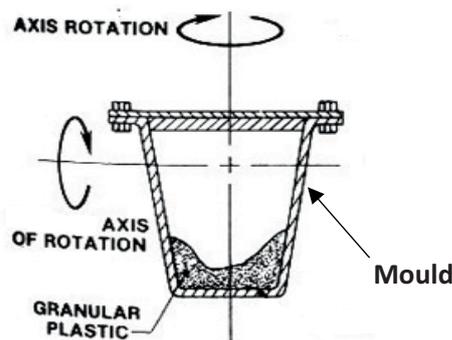
- Produces a consistent hollow profile
- Produces high quality finish [1]

Correct alternative responses will be given full credit.

(b) An annotated sketch to include the following elements of the rotational moulding process, – mould, plastic granules, axis of rotation.

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

Rotational Moulding



[4]

Correct alternative responses will be given full credit.

5 (a) Any **one** specific characteristic associated with solid modelling for example:

- Solid Modelling allows you to construct a 3D solid model using different design features
- Solid Modelling gives the user a clear insight into what the product will look like when manufactured via computer based pictorial views. [1]

Correct alternative responses will be given full credit.

(b) Any **two** main advantages of using CAM for companies manufacturing plastic toys for example:

- Modifications to toy designs can be made without expensive retooling costs. [1]
 - Repeat products can be quickly downloaded. [1]
 - CAM can save on time and labour. [1]
- (2 × [1]) [2]

Correct alternative responses will be given full credit.

(c) Explanation

Companies manufacturing plastic toys could use CIM for stock control by using computers in an integrated way to monitor material, component or product levels and provide feedback. This will initiate re-ordering when stocks are low and initiate procedures if levels are too high.

Award [2] marks for a full explanation and [1] for a limited explanation. [2]

Correct alternative responses will be given full credit.

6 The risks associated with one common manufacturing machine-based process and one common hand manufacturing process within the school workshop.

Indicative content

Example 1

The use of the pedestal drill to drill holes in metal. The risk associated with drilling metal is that the material may rotate with the drill bit at some stage and result in injury to the user. In addition metal fragments could potentially be propelled from the material and get into the user's eyes. Metal can get very warm when drilling and could potentially burn the user. Serious injury to the user can be caused if loose clothing or hair becomes entangled with the revolving parts of the drill.

Example 2

The use of a wood chisel to reshape wood. The risk associated with using a wood chisel is that injury can occur if the cutting edge of the chisel comes in contact with the skin. In addition wood fragments could potentially get into the user's eyes.

The methods used to minimise the risks associated with one common manufacturing machine-based process and one common hand manufacturing process within the school workshop.

Indicative content

Example 1

Using the pedestal drill to drill holes in metal – To minimise the risk of the material rotating with the drill bit ensure that the metal is securely clamped and an appropriate speed for the drill bit is selected. Guards should be in place and the user should wear a face shield to protect themselves from metal fragments.

Gloves should be worn to protect the user from the warm metal. Appropriate workshop clothing should be worn with ties tucked in and long hair tied back to prevent any entanglement with the revolving parts of the drill.

Example 2

The use of a wood chisel to reshape wood. To minimise the risks associated with using a wood chisel it is important to ensure that it is kept sharp. A dull chisel is a dangerous chisel, as it will require more effort to push the chisel through the wood. The work piece should always be clamped in a vice and one should never hold the work with one hand while chiselling with the other. Finally when using the chisel always cut with the blade pointing away from your body and keep your hands behind the cutting edge. Wear safety glasses and use the right size of chisel for the work.

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 excellent with relevant points outlined for each area and use is made of appropriate technological vocabulary. The writing is legible and 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 good with relevant points outlined for each area and some use is made of appropriate technological vocabulary. The writing is legible and the spelling, grammar and punctuation are mostly accurate.	[4]–[5]
Limited selection and use of a writing form and style to the content. The content is limited with relevant points outlined for each area and little use is made of appropriate technological vocabulary. The writing is barely legible and the spelling, grammar and punctuation are inaccurate.	[1]–[3]
The response is not worthy of any credit.	[0]

[8]

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MARKS

- 7 (a) Answer could be based on a wall-mounted bracket with a protruding ring to enable the hairdryer housing to be inserted while not in use.

Detailed annotated sketch of a wall mounted bracket which uses the minimal amount of materials to securely hold the hairdryer while not in use.	[4]	
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. Difficulty in determining if the design is wall mounted, uses the minimal amount of material and would securely hold the hairdryer while not in use.	[1]	
The response is not worthy of any credit.	[0]	[4]

Explanation on how the design could be considered cost effective to produce may be centred on the selection of material or manufacturing processes.

Award [2] for a full explanation and [1] for a limited explanation. [2]

Correct alternative responses will be given full credit.

- (b) A design could be based on a ball and spring mechanism. A small series of holes could be drilled around the circumference of the body of the hair dryer and a ball and spring mechanism inserted in the attachment. This would allow the user to quickly remove or insert the attachment.

Detailed annotated sketch representing an appropriate design that would not only prevent the attachment from falling out from the body of the hairdryer but would allow the user to quickly remove or insert the attachment.	[4]	
Both the sketch and the annotation are good. The design represents an improvement as it prevents the attachment from falling out from the body of the hairdryer and allows the user to remove or insert the attachment. The design lacks the finesse appropriate for the product.	[2]-[3]	
Limited sketch lacking detail and appropriate annotation. Difficulties in determining if the design would not only prevent the attachment from falling out from the body of the hairdryer but would allow the user to quickly remove or insert the attachment.	[1]	
The response is not worthy of any credit.	[0]	

Correct alternative responses will be given full credit. [4]

Total

40

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