



*Rewarding Learning*

**ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2023**

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## **Technology and Design**

**Assessment Unit AS 1**

*assessing*

**Design and Materials**

**[STE11]**

**FRIDAY 19 MAY, AFTERNOON**

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**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) The term factor of safety is the safety margin (factor) that a designer has allowed for in the design of a product [1] above the level of which it would normally be expected to withstand [1].  
Award [2] for a full explanation and [1] for a limited explanation. [2]

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

- (b) Any **two** reasons why common forms and sizes of material are used for example:
- More widely available than customised forms and sizes.[1]
  - It is cost effective to use common forms and sizes. [1]
  - The use of common forms and sizes is more suitable to standard processes and equipment. [1]
- [2]

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

- 2 (a) Any **one** application for the use of chipboard for example:
- Kitchen tops (which are laminated with melamine). [1]
  - Flooring. [1]
- Any **one** advantage of chipboard which would make it suitable for kitchen tops (which are laminated with melamine) for example:
- Chipboard is easy to use. [1]
  - It is relatively cheap. [1]
- [2]

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

- (b) Any **one** property of ash which would make it suitable for sports products for example:
- Flexible [1]
  - Durable [1]
- Any **one** working characteristic of ash which would make it suitable for sports products for example:
- Easy to work with [1]
  - Finishes well [1]
- [2]

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

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			AVAILABLE MARKS
3	<p>(a) Any <b>one</b> property of aluminium alloy which makes it suitable for a ladder for example:</p> <ul style="list-style-type: none"> <li>• Good strength [1]</li> <li>• Lightweight [1]</li> </ul> <p style="text-align: right;">[1]</p> <p><b>Correct alternative responses will be given full credit.</b></p> <p>(b) Any <b>one</b> property of mild steel which makes it suitable for nails, screws and bolts for example:</p> <ul style="list-style-type: none"> <li>• Tough [1]</li> <li>• Malleable [1]</li> </ul> <p style="text-align: right;">[1]</p> <p><b>Correct alternative responses will be given full credit.</b></p> <p>(c) A detailed explanation of the plastic coating process will include:</p> <p>The process involves degreased and clean metal being heated to approximately 180°C before the coating process [1].  The metal object is then submerged quickly into the fluidised powder and left for a few seconds, enabling the powder to stick [1].  The object is then returned to the oven to allow the coating to fuse and leave a smooth glossy coating [1].</p> <p>Award [3] for a detailed explanation, [2] for a good explanation and [1] for a limited explanation. <span style="float: right;">[3]</span></p> <p><b>Correct alternative responses will be given full credit.</b></p>	5	
4	<p>(a) Any <b>one</b> property of nylon which make it suitable for clothing for example:</p> <ul style="list-style-type: none"> <li>• Hardwearing [1]</li> <li>• Excellent toughness [1]</li> </ul> <p style="text-align: right;">[1]</p> <p><b>Correct alternative responses will be given full credit.</b></p> <p>(b) Any <b>one</b> application for the use of (ABS) for example:</p> <ul style="list-style-type: none"> <li>• Safety Helmet [1]</li> <li>• Toys [1]</li> </ul> <p style="text-align: right;">[1]</p> <p>Any <b>one</b> property which makes it suitable for a safety helmet for example:</p> <ul style="list-style-type: none"> <li>• Good impact resistance [1]</li> <li>• Lightweight [1]</li> </ul> <p style="text-align: right;">[1]</p> <p><b>Correct alternative responses will be given full credit.</b></p> <p>(c) Any <b>two</b> properties of graphene which could make it suitable for use in television screens.</p> <ul style="list-style-type: none"> <li>• A very lightweight material [1]</li> <li>• Excellent conductivity [1]</li> <li>• Low electricity consumption [1]</li> </ul> <p style="text-align: right;">[2]</p> <p><b>Correct alternative responses will be given full credit.</b></p>	5	

- 5 A detailed annotated sketch of a blow moulding process to include the following: Plastic powder, hopper heat element, mould, compressed air used to create profile.

Level 3	Detailed annotated sketch with all the main elements of the blow moulding process included.	[4]
Level 2	The annotated sketch is good with most of the main elements of the blow moulding process included.	[2]–[3]
Level 1	The annotated sketch is limited with only a few of the main elements of the blow moulding process included.	[1]
Level 0	The response is not worthy of any credit.	[0]

[4]

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

**6 Indicative Content**

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Product review and testing:  
e.g. Toaster

Product review takes place at the end of the design process. Once a prototype/product has been manufactured it is reviewed. Consumer reviews on for example the toaster (performance ergonomics and aesthetics) can be used in order to determine to what extent the prototype/product has fulfilled the specification.

In addition, product reviews can generate information on customer preferences for the toaster. Information gained from reviews can highlight the need for further modifications. In addition, it can provide information in order to compare the performance of the prototype/product against the original design specification or against other similar types of toasters on the market. Finally, it can give other customers who read the product reviews confidence in the performance of the product which can help generate sales.

Testing can also take place at the end of the design process and can be carried out before or alongside the product review. Specific tests on the toaster (electrical, insulation and component reliability) can be carried out to ascertain to what extent the product meets the criteria set out in the specification.

The importance of product review and testing is that it can generate data on the performance of a prototype or product. Information gained from tests can highlight the need for further changes or modifications in order to comply with regulations. In addition, it can provide valuable information in order to compare the performance of the prototype/product against its competitors or against the original design specification.

Very good selection and use of a writing form and style appropriate to the content. The product review and testing content is organised with excellent information outlined for each area and widespread and accurate use is made of appropriate technological vocabulary. The spelling, grammar and punctuation is accurate.	[6]–[8]
Good selection and use of a writing form and style which is mostly appropriate to the content. The product review and testing content is organised with good information outlined for each area and some use is made of appropriate technological vocabulary. The spelling, grammar and punctuation is mostly accurate.	[4]–[5]
Limited selection and use of a writing form and style to the content. The product review and testing content is poorly organised with basic information outlined for each area and little use is made of appropriate technological vocabulary. The spelling, grammar and punctuation is inaccurate.	[1]–[3]
The response is not worthy of any credit.	[0]

[8]

8

- 7 (a) A design could be based on a wooden housing (picture frame) which would allow the 2mm thick board to slide in from the top. This would facilitate quick removal. Wood screws would be used to secure the end profiles of the wooden housing to the side rails of the back support of the sun lounger.

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

Very good annotated sketch representing an appropriate design that would allow the user to quickly insert or remove a 2mm thick promotional graphics board. The design can be securely and safely fastened to the side rails at the correct position.	[4]–[5]
Both the sketch and the annotation are good. The design represents an improvement as it allows the user to insert or remove a 2mm thick promotional graphics board and can be securely and safely fastened to the side rails at the correct position. The design lacks the finesse appropriate for the product.	[3]
Limited sketch lacking detail and appropriate annotation. Difficulties in determining if the design would allow the user to insert or remove a 2mm thick promotional graphics board and if it can be securely and safely fastened to the side rails at the correct position.	[1]–[2]
The response is not worthy of any credit.	[0]

[5]

- (b) A design could be based on a circular tray with a lipped edge and a recessed base to seat the glass and a recessed base to seat a container for snacks. On the base of the tray a rectangular profile section with a threaded plastic hand grip would allow the user to slip the profile section over the arm rest and hand tighten the unit to the underneath side of the arm rest.

Very good annotated sketch of a design that will safely hold a drinks glass and a container for snacks and allows the user to quickly and safely secure the tray to the arm rest of the sun lounger without the use of hand tools.	[4]–[5]
Both the sketch and the annotation are good. The design represents an improvement as it can hold a drinks glass and a container for snacks and allows the user to quickly and safely secure the tray to the arm rest of the sun lounger without the use of hand tools. The design lacks the finesse appropriate for the product.	[3]
Limited sketch lacking detail and appropriate annotation. Difficulties in determining if the design will safely hold a drinks glass and a container for snacks and if the user can quickly and safely secure the tray to the arm rest of the sun lounger without the use of hand tools.	[1]–[2]
The response is not worthy of any credit.	[0]

[5]

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

**Total**

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10

**40**