Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2025

Technology and Design

Assessment Unit AS 1

assessing

Design and Materials

[STE11]

MONDAY 12 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)**	Any **one** physical property for example: • Mass. • Grain Density. • Thermal Conductivity. • Resistivity. • Colour. • Magnetism. • Transparency. • Melting Point. • Boiling Point. • Reflectivity. • Weight. • Density. • Electrical Conductivity. [1] **All relevant, valid responses will be given credit.**	
	(b)	Any **one** mechanical property for example: • Strength. • Elasticity. • Hardness. • Brittleness. • Toughness. • Durability. • Ductility. • Malleability. • Flexibility. • Plasticity. [1] **All relevant, valid responses will be given credit.**	
	(c)	Reference to scale of production e.g. mass, batch [1] Reference to selection of material e.g. material availability, cost, material properties etc. [1] [2] **All relevant, valid responses will be given credit.**	4
2	**(a)**	The difference between ferrous and non-ferrous metals is that ferrous metals contain iron whilst non-ferrous metals do not. **Or** Ferrous metals rust whereas non-ferrous metals do not rust. [1] **All relevant, valid responses will be given credit.**	

(b) Any **two** main properties of stainless steel which make it suitable for cutlery for example:

- Corrosion resistant.
- Very durable.
- Malleability.
- Resistant to rusting.
- Resistant to wear and tear.
- Hardness - resists scratching and indentation from use.
- Toughness.
- Strong.
- Resists stains.
- Aesthetic properties.
- Non-toxic.
- Hygienic.
- Food safe.
- Chemical Resistance.

[2 × 1] [2]

All relevant, valid responses will be given credit.

(c) Any **one** specific application of copper for example:

- Piping.
- Circuit boards.
- Roofing.
- Saucepans.
- Radiators [1]

All relevant, valid responses will be given credit.

Any **one** main property of copper which makes it suitable for the chosen application:

- Good thermal conductivity.
- Good ductility.
- Good electrical conductivity.
- Easy to solder.
- Corrosion resistant. [1]

All relevant, valid responses will be given credit.

AVAILABLE MARKS

5

			AVAILABLE MARKS
3	(a)	Workshop machine manufacturing process - drilling. **One** main associated risk for example: • material may rotate with the drill bit at some stage and result in injury to the user. • fragments could potentially be propelled from the material and get into the user's eyes. • Clothing or hair could get caught in the machine. • Finger could get caught in a bandsaw blade [1] Any **one** method used to minimise the risk of material rotating with the drill bit and resulting in injury to the user for example: • ensure that the material is securely clamped. • appropriate guards should be in place. • Receive appropriate training [1] **All relevant, valid responses will be given credit.**	
	(b)	Synthetic resins improve aesthetics **or** improve durability **or** improve water resistance. [1] Transparent so the initial appearance is enhanced **or** improves hardness, toughness or longevity **or** seals the grain, preventing ingress of moisture. [1] [2] **All relevant, valid responses will be given credit.**	4
4	(a)	**One** main reason why the injection moulding process may be used to manufacture children's toys for example: • capable of producing a toy with good detail. • can produce a toy with high degree of dimensional accuracy. • Identical product produced each time. • Permits mass production. • High quality surface finish • Repeatability [1] **All relevant, valid responses will be given credit.**	
	(b)	An annotated sketch likely to include the following elements of the injection moulding process – Granules, hopper, motor, screw thread, heater and split mould. Detailed annotated sketch with the main elements of the injection moulding process covered. [4] Both the sketch and the annotation are good. Most of the main elements of the injection moulding process are covered. [2]–[3] Limited sketch lacking detail and appropriate annotation. Only a few of the main elements of the injection moulding process are covered. [1] The response is not worthy of any credit. [0] A series of sketches acceptable [4]	5

5 For example – Washing machines

AVAILABLE MARKS

Stock control:

To control stock levels of components, materials and manufactured products for washing machines. [1] To provide feedback to outsourced suppliers when levels of materials or components are low and initiate a forward order. [1] [2]

All relevant, valid responses will be given credit.

Quality control:

To select and carry out quality control checks on components for the washing machine. [1] Data from the quality control checks can be used to make changes to the manufacturing process or
alert suppliers of potential issues. [1] [2] 4

All relevant, valid responses will be given credit.

6 Incorporating four distinctly different aspects of ergonomics and four distinctly different aspects of safety.

AVAILABLE MARKS

Indicative content

Bicycle helmet

Ergonomics
The helmet has a significant number of vents for optimal air circulation to maintain the comfort of the user. The chin strap pad provides extra comfort to the user when secured in position. The adjustable dial at the back of the helmet allows the user to adjust the size of the helmet to fit a range of head sizes.
The chin strap can be adjusted in length to ensure that when fitted, it is taut, comfortable and suitable for different users.
The visor deflects wind and improves eye comfort.
The insect screen reduces potential irritation and so improves comfort.
The padding accommodates different head shapes and so improves comfort.
The shiny finish and rounded surface allows air to flow over it and reduces unwanted drag.

Excellent selection and use of a writing form and style appropriate to the content. The content relating to the ergonomics of the bicycle helmet is organised with excellent information outlined for each area. Widespread and accurate use is made of appropriate technological vocabulary.	[4]
Good selection and use of a writing form and style which is mostly appropriate to the content. The content relating to the ergonomics of the bicycle helmet is organised with good information outlined for each area. Good use is made of appropriate technological vocabulary.	[2]–[3]
Basic selection and use of a writing form and style which is vaguely appropriate to the content. The content relating to the ergonomics of the bicycle helmet is poorly organised with basic information outlined for each area. Little use is made of appropriate technological vocabulary.	[1]
The response is not worthy of any credit.	[0]

All relevant, valid responses will be given credit.

User Safety

AVAILABLE MARKS

The ABS material selected for the outer shell is tough and has good impact resistance providing good protection to the user in the event of an accident. The reflective film on the helmet improves the visibility of the cyclist in dark conditions. The design of the helmet regarding the profile, allows for suitable protection to the head whilst ensuring good peripheral vision during use. The light indicator on the back of the helmet with the three function settings can provide a range of options which can help motorists to see the cyclist from a greater distance, in different conditions, thus improving safety.
The visor reduces glare and so improves vision.
The insect screen prevents ingress of insects and so reduces distraction.

Excellent selection and use of a writing form and style appropriate to the content. The content relating to the safety of the bicycle helmet is organised with excellent information outlined for each area. Widespread and accurate use is made of appropriate technological vocabulary.	[4]
Good selection and use of a writing form and style which is mostly appropriate to the content. The content relating to the safety of the bicycle helmet is organised with good information outlined for each area. Good use is made of appropriate technological vocabulary.	[2]–[3]
Basic selection and use of a writing form and style which is vaguely appropriate to the content. The content relating to the safety of the bicycle helmet is poorly organised with basic information outlined for each area. Little use is made of appropriate technological vocabulary.	[1]
The response is not worthy of any credit.	[0]

[8] 8

All relevant, valid responses will be given credit.

		AVAILABLE MARKS
7	**(a)** Appropriate dimensions Appropriate means of connection to the wall Minimises use of materials Effective design Appropriate metal Appropriate method of manufacture	

Excellent sketches and annotation of an appropriate design that would hold the hand soap bottle in place, minimise the use of materials and securely attach the bracket to the wall.	[4]
Good sketches and annotation of a design. The design represents an improvement but has limitations on how it holds the hand soap bottle in place; if it minimises the use of materials or how securely the bracket is attached to the wall.	[2]-[3]
Basic sketches and annotation of a design. Difficulties in determining if the design would hold the hand soap bottle in place or would minimise the use of materials or would securely attach the bracket to the wall.	[1]
The response is not worthy of any credit.	[0]

Suitable metal for the holder (stainless steel). [1]
Suitable manufacturing process for the holder (blanking and folding). [1]

All relevant, valid responses will be given credit.

(b) Bottle is secured
The bottle can be quickly removed
Appropriate dimensions
Effective design

Excellent sketches and annotation of an appropriate design that would prevent customers from removing the bottle of hand soap from the wall mounted bracket, whilst ensuring the staff with the use of a hand tool can quickly remove and replace the bottle.	[4]
Good sketches and annotation of a design. The design represents an improvement but has limitations in preventing customers from removing the bottle of hand soap from the wall mounted bracket or ensuring the staff with the use of a hand tool could quickly remove and replace the bottle.	[2]-[3]
Basic sketches and annotation of a design. Difficulties in determining if the design would prevent customers from removing the bottle of hand soap from the wall mounted bracket or ensuring the staff with the use of a hand tool can quickly remove and replace the bottle.	[1]
The response is not worthy of any credit.	[0]

Marks should not be awarded for repetitive sketches which do not show any design thinking.

All relevant, valid responses will be given credit. [10] 10

Total **40**