



GCE AS MARKING SCHEME

SUMMER 2025

**AS (NEW)
DESIGN AND TECHNOLOGY - PRODUCT DESIGN
2603U10-1**

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

GCE DESIGN & TECHNOLOGY

PRODUCT DESIGN - UNIT 1

SUMMER 2025 MARK SCHEME

Q1.	The images below show two different razors manufactured by the same company.			
		AO3	AO4	Mark
(a)	Explain why the designer has chosen to use the same blade connector in both razors.		✓	2
	<i>Marks should be awarded for explanations of why the designer has chosen to use the same blade connectors in both razors.</i> Response should refer to: • Interchangeable blades. • Manufacturer does not need to set up new production line for new razor blades. • Manufacturer has the tooling equipment already to produce standard parts. • Cost saving for manufacturer. • Customer friendly, the customer can purchase the one blade. Guidance to markers: <i>1 mark for each description.</i> <i>Incorrect/No answer.</i> <i>Each explanation.</i> Example <i>The designer knows that the manufacturer has tooling in place to produce the blades.</i>			0 1
	<i>The designer is reducing the cost of manufacture of the new razor by using the existing blade connection which are produced in bulk.</i> <i>The designer is making the razor customer friendly allowing the use of any existing blades.</i>			1 2

(b)	(i) Explain the benefits to the user of using an aluminium alloy for razor 2.		✓	2
	<i>The response must identify impact for the user only.</i> Response could refer to: Aluminium alloy • Non-corrosive. • Light weight metal • Modern aesthetic • Easy to clean and maintain. Guidance to markers: <i>Response must identify impact for user.</i> <i>Incorrect/No answer.</i> <i>Identification of a factor</i> Example <i>The aluminium handle has a very modern aesthetic and will appeal to many users.</i>			0 1
	<i>The user will find the aluminium handle is easier to keep clean and will not rust in a damp bathroom/cloakroom environment.</i>			1 2

	(ii) Discuss the impact for the manufacturer of using an aluminium alloy when producing razor 2.		✓	4
	<i>The response must identify impact for the manufacturer of using an aluminium alloy.</i> Response could refer to: Aluminium alloy • Easy metal to shape. • Expensive to set up. • Expensive material to use. • Non-corrosive. • Light weight metal. • Requires additional coating for finish. • The manufacturer is using a popular 'in trend' material. Guidance to markers: <i>Response must identify impact for manufacture.</i> <i>Incorrect/No answer</i> 0 <i>Identification of a factor</i> 1 Example <i>The production of the new aluminium handle will be expensive.</i> 1			
	<i>The manufacture of the new handle will be expensive; however, it will be easier to transport because of its lighter weight reducing costs.</i>			2
	<i>The new handle will be more expensive to produce because the raw material will cost more and the manufacturer will need to set up a new production line, but aluminium is an easier/faster metal to shape reducing cost.</i>			3
	<i>The use of a new raw material and setting up a new production line will increase the cost of production of the aluminium handle; however, the speed of production will be faster because aluminium is a malleable metal. The use of aluminium alloy which is a popular 'on trend' material will bring the razor to a new market segment.</i> If only advantages or disadvantages referred to in response max 2 marks.			4

Q2.	Bethan Gray collaborated with an exclusive watch manufacturer to revitalise an existing watch into the one shown below.			
		AO3	AO4	Mark
	Analyse how this partnership has benefitted both the designer and the manufacturer. <i>Marks will be awarded for the content of the answer and the quality of written communication.</i>	✓		8
	<i>The response must identify and refer to the link between the product and the designer in the discussion.</i> Quality of written communication will be assessed Response could refer to: - Increased exposure to the general public for the designer. - Access to a wider target market. - Increased 'status' for the company as it becomes linked to a current designer. - Increased sales for the manufacturer as a result of a potential new target market. - Increased income for manufacturer and the designer. - Raised profile for the designer. Guidance to markers: <i>Incorrect/ no response</i>			0
	Level 1 <i>The candidate has a simplistic knowledge of the issues associated with the question.</i> <i>Limited use of terminology and technical language.</i> <i>The candidate has limited knowledge of the potential benefits of a partnership between a large company and a designer.</i> <i>The candidate will express basic ideas clearly, if not always fluently. Answers may deviate from the question or not be relevant.</i> <i>Grammar, punctuation and spelling may be weak impacting on effective communication.</i>			1-2
	Level 2 <i>The candidate has a basic understanding of the issues associated with the question.</i> <i>Satisfactory use of terminology and technical language.</i> <i>The candidate has some general knowledge of the potential benefits of a partnership between a large company and a designer but not considered in detail.</i> <i>The candidate will express straightforward ideas clearly, if not always fluently. Answers may deviate from the question or be weakly presented.</i> <i>There may be some errors of grammar, punctuation and spelling but is still able to communicate the issues.</i>			3-4

(b)	The foam model is produced in a multi-purpose school workshop using a range of tools and equipment. Explain the health and safety issues that should be considered when producing the foam model.		✓	5
	Response could refer to: At the workshop-based manufacturing process • Dust and small airborne particles. • Use of hand cutting tools. • Use of machine cutting tools. • Use of sanding/filing equipment. • Use of glues/adhesives. • Burns when using hot wire cutter. • Fumes when using hot wire cutters. Guidance to markers: <i>Incorrect/No answer.</i> <i>Simple limited response.</i> <i>A more developed response</i> <i>Expanded response.</i> <i>A broad and expanded response.</i> <i>A Broad and detailed response.</i> Example <i>Airborne dust and small particles would be the result of sanding the foam.</i>			0 1 2 3 4 5
	<i>Small particles and airborne dust will be a result of sanding; this will also be a result of cutting the foam with a saw.</i>			2
	<i>Using cutting, filing and sanding equipment will result in small particles of dust becoming airborne. The use of this equipment could also result in cuts and injury to the user or others in the workshop.</i>			3
	<i>When using cutting, filing and sanding equipment the user could potentially harm/injure themselves if they are not completing the task as guided. These tasks will also generate dust which is a hazard potentially causing breathing problems.</i>			4
	<i>The equipment used when forming the foam could result in the user cutting or burning themselves therefore, they will need to use all equipment in a safe manner as instructed. Suitable safety equipment will be required as this will protect individuals from potentially harmful dust and small particles of material, this will also protect from effects of spilling glues and adhesives during the making of the model.</i> Accept any other appropriate response.			5

Q4.	Computer Aided Design (CAD) and Computer Aided Manufacture (CAM) has an impact on designers and the way they work.			
		AO3	AO4	Mark
(a)	The CAD software shown above can run a simulation before using CAM. Explain two benefits of this prior to manufacture.		✓	2x2
	<i>Marks should be awarded for explaining the benefits of the simulation.</i> Response could refer to: • Allows the designer/student to establish a run time for the task. • Provides details of any manufacturing errors/overruns or clashes. • Changing tools / tool library. • Check / view speeds and feeds. • Waste / swarf / debris. • Possibly check safety / tool. • Saving on materials / costs. Guidance to markers: <i>Incorrect/No answer.</i> <i>Identification of benefit.</i> <i>Explanation of benefit.</i> Example <i>Simulation shows details of any manufacturing errors.</i>			0 1 2 1
	<i>Manufacturing errors can be identified before a product is made this will save on time and materials.</i> Accept any other appropriate response.			2

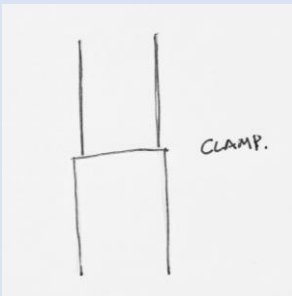
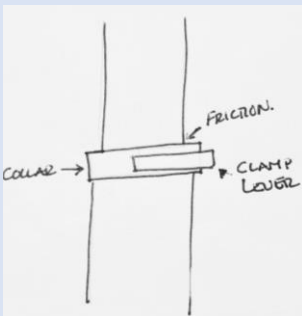
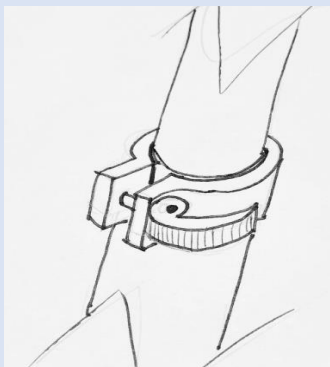
(b)	The image below shows the polymer clip design being tested using CAD simulation software. Describe the information provided for the designer by the CAD simulation and explain how this could be used in the development of the clip.		✓	4
	<i>Marks should be awarded for explaining the information provided by the simulation and any subsequent adjustments.</i> Response could refer to: • The colours identifying stress points in the clip. • Potential weaknesses in the clip. • Areas that may require reinforcement. • Identification of areas that could fail under repeated use/strain. Guidance to markers: <i>Incorrect/No answer.</i>			0
	<i>A basic response:</i> <i>The red areas on the clip are the areas of maximum stress.</i> <i>or</i> <i>the blue areas experience the least stress,</i> <i>or</i> <i>the stress increases the colours respond accordingly</i>			1
	<i>A more detailed response:</i> <i>The red areas on the clip are the areas of maximum stress.</i> <i>With this information the designer could identify possible weak points in the clip.</i>			2
	<i>A detailed response:</i> <i>The red areas on the clip are the areas of maximum stress.</i> <i>With this information the designer could identify possible weak points in the clip and either change the design or reinforce the clip.</i>			3
	<i>A fully detailed response:</i> <i>The red areas on the clip are the areas of maximum stress.</i> <i>With this information the designer could identify possible weak points in the clip and either change the design or reinforce the stressed areas of the clip.</i> <i>The material could be changed to compensate for the stressed areas of the clip.</i> Accept any other appropriate response.			4

Q5	The products shown below are manufactured from stainless steel using stamping and press forming processes.			
		AO3	AO4	Mark
	Evaluate the suitability of the materials and processes used to manufacture these products	✓		8
<i>The response must identify and refer to the suitability of the forming process for the products pictured.</i> Response could refer to: Materials • Resistant to corrosion. • Malleable, can be formed/shaped easily. • Durable. • Relatively poor conductor of heat. • Hard and tough material suitable for cutting food. • Ease of cleaning. • Hygienic material prevents bacteria/germs developing used for food preparation. • Strength of stainless steel will withstand forces without breaking. • Self-finished surface. • Limited range of colours. • Can be expensive compared with other materials. • Environmental impact compared producing the raw material. Process • Ease of mass production. • Suitable forming process for the container. • Suitable forming process for shaping a malleable material. • Increased structural strength of the finished products using this process. • Process utilises thin sheet material producing lighter products. • Ease of shaping/forming using this process. • Quality of surface finish depends on the form. • Expensive industrial process to setup. • Edges on the cutlery give the thin material strength but make it difficult to use/clean.				

	Guidance to markers: <i>The response must refer to both the process and materials. If only materials or process are referenced marks limited to 4 marks.</i> <i>Advantages and disadvantages must be evaluated.</i> <i>No answer or an incorrect answer.</i> <i>Little evaluation of relevant advantages and disadvantages regarding the suitability of the material and manufacturing process.</i> <i>Clear evaluation displaying an understanding of relevant advantages and disadvantages regarding the suitability of the material and manufacturing process.</i> <i>Simple evaluation of relevant advantages and disadvantages regarding the suitability of the material and manufacturing process.</i> <i>Detailed evaluation and understanding of relevant advantages and disadvantages regarding the suitability of the material and manufacturing process.</i>	0 1-2 3-4 5-6 7-8
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Q6	Rentable e-bikes are becoming an important part of a 'greener' environmentally sustainable urban landscape.	AO3	AO4	Mark
(a)	In the space below, design an innovative holder that will attach to the e-bike handlebar. The holder should allow users to safely use their smartphone whilst cycling in order to navigate to their destination using mapping 'Apps'.		✓	15
	Requirements: Marks will be awarded for: • A method of securely attaching the holder to the e-bike handlebar • A method of securely holding different sized smartphones • A method of adjusting the angle of the smartphone to suit different users Guidance to markers. <i>No indication of attachment.</i> <i>Simple attachment with no option to remove the holder.</i> <i>Appropriate attachment with options to remove.</i> <i>Effective Attachment with effective/secure options for removal.</i> <i>No method of holding smart phone shown.</i> <i>Basic, limited or ineffective method of holding different sized smart phones.</i> <i>Appropriate method of securely holding phone with some consideration of size of different phones.</i> <i>Fully Secure method of attaching the smart phone fully for a range of different sized phones.</i> <i>No method of user adjustment shown.</i> <i>Simple or basic method adjustment shown.</i> <i>Effective method of adjustment shown accessible to most users.</i> <i>Fully effective method of fully adjusting the phone for all potential users.</i>			5 5 5 0 1-2 3-4 5 0 1-2 3-4 5 0 1-2 3-4 5

(b)	Discuss the social, moral and environmental issues of introducing rentable e-bikes in urban locations.		✓	6
	<i>The response must discuss the social, moral and environmental issues of E-bikes in urban environments.</i> Response could refer to: Environmental • Positive impact upon the urban environment i.e. reduction in smoke/harmful emissions from vehicles. • Positive impact upon the environment as a whole, reduced CO2 emission. • Reduced noise pollution. • Cost of implementing a scheme • Repairing damaged/vandalised bikes Social • Improved health/fitness for urban population. • Antisocial riding by user. • Increased accidents in pedestrian areas. • Vandalism/theft of the bikes or parts of the bikes Moral • Lack of accessibility for all members of society (Elderly, less able and those with no access to funds excluded from using them) Guidance to markers. <i>The response must refer to all issues.</i> <i>This will not assess QWC.</i> <i>If only one issue referred to max 3 marks.</i> <i>Advantages and disadvantages must be evaluated.</i> <i>No answer or an incorrect answer.</i> <i>Little discussion of relevant: social, moral and environmental issues regarding the use of e-bikes.</i> <i>Simple balanced discussion of relevant: social, moral and environmental issues regarding the use of e-bikes.</i> <i>Detailed effective and balanced discussion of relevant: social, moral and environmental issues regarding the use of e-bikes.</i> Accept any other appropriate response			0 1-2 3-4 5-6

(c)	For users of different heights to safely ride the e-bikes, the seat will require quick and easy adjustment. Using notes and sketches, design a method of easily adjusting the seat.		✓	6
Marks awarded for:				
A simple well annotated the drawing showing how the handlebars can be adjusted. Drawing can be either 2D or 3D.				
Guidance to markers:				
<i>Incorrect/No answer.</i>				
<i>Identification/explanation of key elements of the proposal.</i>				
Explanation with no Sketch max 3 marks Sketch with no explanation max 3 marks				
Example				
<i>A clamp will hold the handlebars.</i>				
				
<i>A clamp could be used to hold the handlebars using friction</i>				
				
				
Simple collar using friction to hold the handlebar stem in place. The cam lock when released will allow the handlebars to be adjusted in height.				

The cam lock when released will allow the handlebars to be adjusted to the height of the user, this will allow for maximum flexibility.	4
Simple collar using friction to hold the handlebar stem in place. The cam lock when released will allow the handlebars to be adjusted to the height of the user, this will allow for maximum flexibility.	5
Simple collar using friction to hold the handlebar stem in place. The cam lock when released will allow the handlebars to be adjusted to the height of the user, this will allow for maximum flexibility.	6

		AO3	AO4	Mark
(d)	The hand grips are the point of contact and control for the user of the e-bikes.	✓		13
(i)	Explain the properties required for a material that could be used to manufacture the handle grips. [4] <i>Marks should be awarded for justification of the properties required for the handle grip material.</i> Response should refer to: • Comfortable to hold, individuals will be holding the grips to control the e-bike. • Easy to shape, the manufacturer will want the material to be easy to shape because this will speed up producing the e-bike. • Easy to clean/hygienic material, the e-bike will need to be easy to clean because many users will use them. • Weather resistant, the e-bike will be used outside all year so the grips will need to resist poor weather conditions allowing. • Tensile strength Guidance to markers: <i>Incorrect/No answer.</i> <i>Stating a property.</i> <i>Stating a property with justification.</i> Example <i>The grips on the e-bike will need to be comfortable to hold.</i>			0 1 2 1
	<i>The grips on the e-bike will need to be comfortable to hold because this is the point of control for the scooter and will be held by the user while they are using the e-bike allowing for safe/effective control.</i>			2
(ii)	Describe a suitable manufacturing process that could be used to manufacture handle grips in high volume. [3] <i>Marks should be awarded for describing a suitable manufacturing process.</i> Guidance to markers. <i>Incorrect/No answer.</i> <i>Naming a process</i> <i>Simple explanation of process</i> <i>More detailed explanation of process</i> Example <i>Injection moulding, blow moulding</i>			0 1 2 3 1
	<i>Injection moulding is a suitable manufacturing process using heat to form a plastic material.</i> <i>Blow moulding makes hollow shapes that could have grips to be put on as grips.</i>			2
	<i>Injection moulding is a suitable manufacturing method using an injection process, heat, pressure and a mould/former to shape a plastic material.</i>			3

	<i>Blow moulding could create a hollow shape with grips. The plastic is heated and lowered into a mould; air is blow with into the plastic to make it fill the mould. Then it is removed and excess material trimmed off.</i> Accept any other appropriate response.	
(e)	Discuss how the performance and aesthetics of the e-bike could be improved through the use of modern materials. [6] <i>Marks should be awarded for explanation of improved performance and aesthetics.</i> • New lighter materials i.e. carbon fibre make the e-bike lighter and will increase the battery range. • Shapes and forms of the frame/components can be changed using moulds for aesthetic and functional reasons. • Lifespan of the e-bike could be lengthened with the use of stronger materials. • Improved resistance to weather conditions. • Improved resistance to vandalism. • Improved control of the e-bike. • Increased range with new battery and motor developments. Guidance to markers. <i>Incorrect/No answer.</i> <i>Stating a benefit.</i> <i>Stating a benefit with explanation.</i> <i>A simple list of benefits with no explanation will only achieve max 3 marks.</i> <i>More than one benefit for a material can be credited.</i>	0 1 2

	Example	
	Simple response The manufacturer could use a lighter material i.e. Carbon Fibre.	1
	The manufacturer could use a lighter material i.e. Carbon Fibre. This will allow the e-bike to be ridden further on a charge.	2
	The manufacturer could use a lighter material i.e. Carbon Fibre. This will allow the e-bike to be ridden further on a charge. Carbon fibre will also allow the designer to create new and imaginative forms for the frame and components of the e-bike.	3
	The manufacturer could use a lighter material i.e. Carbon Fibre. This will allow the e-bike to be ridden further on a charge. Carbon fibre will also allow the designer to create new and imaginative forms for the frame and components of the e-bike. The designer could use a smart material/pigment to change the colour of the e-bike when in use.	4
	The manufacturer could use a lighter material i.e. Carbon Fibre, metal foams This will allow the e-bike to be ridden further on a charge. Carbon fibre will also allow the designer to create new and imaginative forms for the frame and components of the e-bike and metal foams will make the bike more durable and resistant to damage/vandalism. The designer could use a smart material/pigment to change the colour of the e-bike when in use.	5
	The manufacturer could use a lighter material i.e. Carbon Fibre, metal foams This will allow the e-bike to be ridden further on a charge. Carbon fibre will also allow the designer to create new and imaginative forms for the frame and components of the bike and metal foams will make the e-bike more durable and resistant to damage/vandalism. The designer could use a smart material/pigment to change the colour of the e-bike when in use, this may provide a novelty/innovative aesthetic that could encourage people to use the e-bike. Accept any other appropriate response.	6