



GCE A LEVEL MARKING SCHEME

SUMMER 2025

**A LEVEL
DESIGN AND TECHNOLOGY - UNIT 3
PRODUCT DESIGN
1603U30-1**

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 A LEVEL DESIGN AND TECHNOLOGY

UNIT 3 – PRODUCT DESIGN

SUMMER 2025 MARK SCHEME

Guidance for examiners

Positive marking

It should be remembered that learners are writing under examination conditions and credit should be given for what the learner writes, rather than adopting the approach of penalising him/her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Marks should not be deducted for a less than perfect answer if it satisfies the criteria of the mark scheme.

For questions that are objective or points-based the mark scheme should be applied precisely. Marks should be awarded as indicated and no further subdivision made.

Banded mark schemes

For band marked questions mark schemes are in two parts, the indicative content and the assessment grid.

The indicative content suggests the range of issues which may be included in the learner's answers. It can be used to assess the quality of the learner's response. Indicative content is **not** intended to be exhaustive, and learners **do not** have to include all the indicative content to reach the highest level of the mark scheme.

In order to reach the highest levels of the mark scheme a learner need not cover all of the points mentioned in the indicative content but must meet the requirements of the highest mark band. Where a response is not creditworthy, that it contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

In Design and Technology, each question addresses one assessment objective: either AO3 or AO4. The assessment grid sub-divides the total mark to allocate for a question. These are shown in bands in the mark scheme. For each question, descriptors will indicate the different skills and qualities at the appropriate level.

Examiners should first read and place a tick in the learner's answer/s to indicate the evidence that is being assessed in that question; the mark scheme can then be applied. This is done as a two-stage process.

Stage 1 – Deciding on the band

Beginning at the lowest band, examiners should look at the learner's answer and check whether it matches the descriptors for that band. If the descriptors at the lowest band are satisfied, examiners should move up to the next band and repeat this process for each band until the descriptors match the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the learner's response should be used to decide on the mark within the band. For instance, if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content.

Examiners should not seek to mark learners down as a result of small omissions in minor areas of an answer.

Stage 2 – Deciding on the mark

During standardising (marking conference), detailed advice from the Principal Examiner on the qualities of each mark band will be given. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a learner's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Question 1

The virtual reality (VR) headset below is currently manufactured using seven stations as shown in the factory workstation plan.

AO3

AO4

Mark

- (a) The manufacturer wants to introduce cell production to manufacture the virtual reality (VR) headset. Sketch a new factory workstation plan that utilises cell production.

✓

2

Answers that indicate an understanding of cell production should be awarded up to 2 marks based on:

Within cell production the workstations and equipment are arranged in a sequence that supports a smooth flow of materials and components through the production process.

Guidance to markers

Incorrect/no answer

0

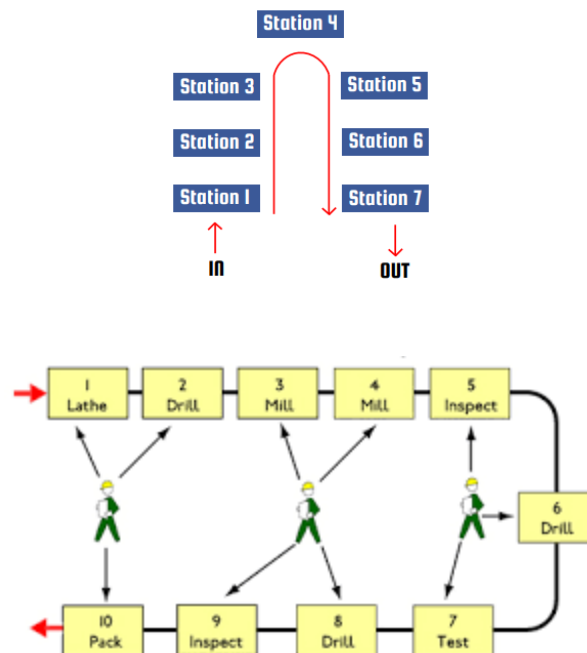
A production workstation plan given with some indication of an understanding of cell production.

1

A clear cell production workstation plan fully labelled.

2

Possible layouts:



Candidates could consider different shaped workshop layouts such as:

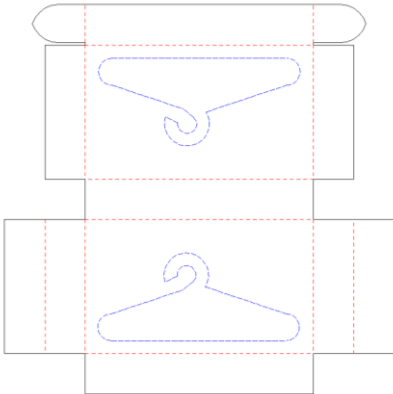
- Single row layouts
- Multi row layouts
- Semi-circular layouts
- Looped layouts

Accept any other appropriate responses.

(b)	Explain how cell production would benefit the manufacturer.		✓	4
	<i>Answers that indicate an understanding of the manufacturer benefits of cell production should be awarded up to 4 marks based on:</i> • High productivity – A well-designed cell provides quick, efficient flow and high-quality production. • Closeness of cell members should improve communication. • More multi-skilled workers. • More adaptable to the future needs of a business. • Better motivation, arising from variety of work, team working and more responsibility. • Quality improvements as each cell has 'ownership' for quality on its area. • Productivity can be increased • Speed / efficiency increased • Product Lead-In time reduced Accept any other appropriate responses. Guidance to markers <i>Incorrect/no answer</i>			0
	<i>A benefit given with no explanation, for example:</i> A benefit of cell production is that workers become more multi-skilled			1
	<i>A number of benefits given with no explanations, for example:</i> A benefit of cell production is that workers become more multi-skilled, and the quality control of products can improve.			2
	<i>A number of benefits with some explanation, for example:</i> A benefit of cell production is that workers become more multi-skilled due to them working on different parts within the cells. It is also said that the quality control of products can improve, which results in less rejected products or errors / changes that need to be made.			3
	<i>More detailed benefits with full clear explanations, for example:</i> A benefit of cell production is that workers become more multi-skilled due to them working on different parts within the cells and learning from others within the cell teams. The manufacturer would have a more flexible, effective workforce. This results in less rejected products or errors / changes that need to be made.			4

(c)	Emerging digital technologies such as virtual reality (VR) and augmented reality (AR) are increasingly being utilised within the manufacturing industry. Discuss how emerging digital technologies could benefit the manufacturing industry.		✓	6
<i>Answers that indicate an understanding of the how the digital technologies could benefit the industry should be awarded up to 6 marks based on:</i> • It enables teams to take a simulated view of the product, port it into VR goggles and receive an immersive experience of how the product looks. • Reduces the need for physical prototypes. • VR and AR training programs can be accessed by the wider workforce with reduced travel. • Different types of training experiences within VR and AR environments to make mistakes without real-world consequences. • Maintenance of machinery and build instructions can use AR to walk through the processes in real time. • Can reduce risks in dangerous areas. Accept any other appropriate responses. Accept responses that relate to other emerging technologies such as AI Guidance to markers • Incorrect/no answer				0
• Candidate has a simplistic knowledge. • The use of terminology and technical language is basic. • Brief description of one to two benefits of VR and AR as new technologies.				1-2
• Candidate has some basic understanding of the issues associated with the question. • The use of terminology and technical language is variable. • Some detail discussion of three to four benefits of VR and AR as new technologies with some explanation and examples.				3-4
• The candidate has clear understanding of the issues associated with the question. • The use of terminology and technical language is mostly accurate. • More detailed discussion of three to four benefits of VR and AR as new technologies with more detailed knowledge and understanding evident; appropriate examples included.				5-6
			Total	12

Question 2

The cardboard packaging being developed below includes clothes hangers.		AO3	AO4	Mark
(a)	Describe the environmental impact of the cardboard packaging.		✓	2
<i>Answers that indicate an understanding of environmental impact of the cardboard should be awarded up to 2 marks based on:</i> • Reduction in the need to use polymers for coat hangers. • Cardboard is easily recycled after use. • Cardboard can be manufactured using recycled materials. • Cardboard degrades completely. Guidance to markers <i>Incorrect / no answer</i>				0
<i>Brief description, a simple fact, for example:</i> Cardboard can be easily recycled.				1
<i>More detailed description with understanding, for example:</i> When using cardboard for the product the remaining cardboard waste can be recycled easily, and the coat hangers reduce the need for polymers to be used for separate coat hangers. Accept any other appropriate responses.				2
(b)	As part of the development process, the designer plans to laser cut the prototype package. Draw a 2D net of the cardboard packaging that would need to be produced on a computer aided design (CAD) program, including all key features required. (Dimensions / scale not required)		✓	6
<i>Answers that clearly identify a 2D net and show an indication of the key features required should be awarded up to 6 marks based on:</i> 2D net key features: • Fold lines. • Tabs required to join. • Inclusion of coat hanger design cut-out / perforation • Use of different dotted lines or colours for cut-outs and fold lines. • Effective proportions Example nets:  Or				

	Note: Candidates may / may not include the slots to combine the 2 hangers. Do not credit / penalise this. Guidance to markers • Incorrect/no answer • Candidate has a simplistic knowledge. • An attempt to create a 2D net for the packaging with most key features missing • Candidate has some basic understanding of the issues associated with the question. • A 2D net created with an understanding of some of the key features required. • The candidate has a clear understanding of the issues associated with the question. • Very detailed 2D net created with all key features included. • Response must include reference to the positioning and removing of the coat hangers.	0 1-2 3-4 5-6
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(c)	Explain the key stages to successfully laser cut the CAD drawing of the packaging net.		✓	4
	<i>Answers that indicate an understanding of how to laser cut the 2D drawing should be awarded up to 4 marks based on:</i> • The need to use different coloured vector lines for example: ○ Red to cut ○ Black to raster cut/engrave fold lines and part cut-out lines • Once drawing is created the design might need to be exported as a DXF file type. • Importing the DXF file to the laser cutter software. • Some laser cutters can link to CAD programs and files can be sent directly to the machine. • Setting up the speed and power settings for the different coloured lines. More power and less speed needed for the full cut lines. • Setting up height of the laser cutter bed suitable for the thickness of cardboard material. • Some machines have an auto focus feature to set the height for the thickness of the cardboard material. • Sending the file to the laser cutter once settings are confirmed and making sure extraction has been turned on. • Securing material down to prevent warping. Don't credit designing on a 2D program – needs to be about the file transfer and setting up laser cutter Guidance to markers <i>Incorrect/no answer</i>			0
	<i>A very basic explanation, for example:</i> The file will need to be exported from the 2D program and then sent to the laser cutter with different speed and power setting.			1
	<i>A basic explanation, for example:</i> The 2D file will need to be exported as a DXF. The laser cutter program will need to be set up for different speed and power settings required for different coloured lines.			2
	<i>A detailed explanation, for example:</i> The 2D file will need to be exported as a DXF or the file can be sent directly to the laser cutter. The laser cutter program will need to be set up for different speed and power settings required for different coloured lines. The laser will also need to be focussed for the thickness of the cardboard material.			3
	<i>A fully detailed explanation, for example:</i> Before exporting the file as a DXF or sending the file directly to the laser cutter the drawing will need to be set up with different colours for example red to cut and black to raster cut the fold lines. The laser cutter program will need to be set up for different speed and power settings required for different coloured lines. The laser will also need to be focussed for the thickness of the cardboard material. The file will need to be sent to the laser cutter once settings are confirmed, and extraction has been turned on to remove any fumes and chemicals. Accept any other appropriate responses.			4
			Total	12

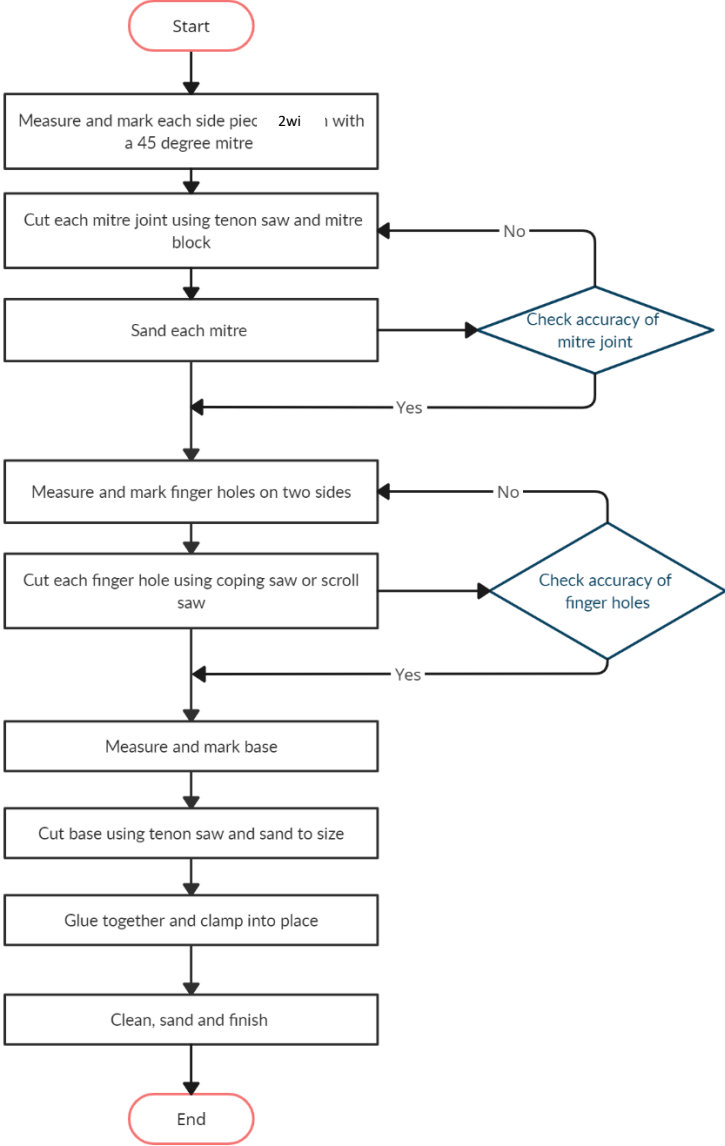
Question 3

Designers use a range of strategies and team working skills including brainstorming idea generation as shown below.		AO3	AO4	Mark
(a)	Explain the strengths and weakness of using a team approach when generating initial ideas.		✓	4
<i>Answers that discuss the positives and negatives when using team brainstorming techniques should be awarded up to 4 marks based on:</i> Strengths: - Brainstorming allows you and/or groups or teams of people to think critically about ideas and solutions. - One idea inspires the next. Ideas can be inspired by others. - Encourages creative thought and to think creatively out of the box. - Strengthens problem-based solutions. - Generates more ideas in a short period of time. Weaknesses: - Disagreements can happen. Some people are less enthusiastic than others about the opportunity to participate. - It could allow people to dominate the conversation and group ideas. - Some people might prefer hiding in the background and relying on others to come up with the bulk of the ideas. - Some ideas may not have potential or be rejected quickly. Accept any other appropriate responses. Guidance to markers <i>Incorrect/no answer</i>				0
<i>A very basic explanation, for example:</i> The benefit of brainstorming is that a range of ideas can be generated quickly.				1
<i>A basic explanation, for example:</i> The benefit of brainstorming is that a range of ideas can be generated quickly, and a negative is that it can sometimes lead to arguments amongst group members.				2
<i>A detailed explanation of positives and negatives, for example:</i> Brainstorming can benefit the generation of a range of ideas through members of a group working together effectively and thinking creatively to produce a range of innovative ideas. On the other hand, a negative is that that it can sometimes lead to arguments amongst group members.				3
<i>A fully detailed explanation of positives and negatives, for example:</i> Brainstorming can benefit the generation of a range of ideas through members of a group working together effectively and thinking creatively to produce a range of innovative ideas where one idea inspires the next. On the other hand, a negative is that that it can sometimes lead to arguments amongst group members with disagreements happening leading to some people less enthusiastic than others about the opportunity to participate. <i>Both Strengths and weaknesses need to be discussed for 3-4 marks.</i>				4

(b)	Explain, using examples, why annotation is important when generating initial design ideas.		✓	4
	<i>Answers that indicate an understanding of annotation should be awarded up to 4 marks based on:</i> • Measurements. • Aesthetics. • Costs. • Materials and properties. • Manufacturing and construction methods. • Finishes. • Environmental aspects. • Target market/customers. • Safety aspects. • Function. • If it has met the specification points. • Importance to communicate ideas to clients, target market or manufacturers. • Important to communicate planning, decision-making and problem-solving. Guidance to markers <i>Incorrect/no answer</i>			0
	<i>A basic description with no explanation, for example:</i> One thing that would need to be annotated would be the sizes and measurements of the product.			1
	<i>A description and brief explanation, for example:</i> Key aspects that would need to be annotated would be the sizes and construction of the product; this is important as you will be able to show how parts can be joined together.			2
	<i>A detailed explanation of why annotation is important with some examples given, for example:</i> The designer would need to annotate as it is important to communicate your ideas to the target market. Some things that would need to be annotated include if the idea meets certain specification points fully or not because this would allow the designer to explore the feasibility of the idea.			3
	<i>A fully detailed explanation of why annotation is important with relevant examples given, for example:</i> Using annotations such as labelling materials and components can demonstrate evidence of planning, decision-making and problem-solving. Key features that would need to be annotated include if the idea meets certain specification points fully or not because this would allow the designer to explore the feasibility of the idea. Accept any other appropriate responses.			4
		Total		8

Question 4

The drinks coasters below have been manufactured using bamboo.		AO3	AO4	Mark
(a)	Each drinks coaster is 100mm x 100mm x 10mm. The bamboo is available in two different sizes: Pre-cut to size: 100mm x 100mm x 10mm = £3.00 each Bamboo Sheet: 520mm x 520mm x 10mm = £35 each Calculate the difference in material cost when using one bamboo sheet compared to the pre-cut to size.		✓	4
<i>Answers that indicate an understanding of the savings in material cost if the larger sheet material was used should be awarded up to 4 marks based on:</i> • Calculation of how many can be manufactured from 520mm x 520mm sheet: $5 \times 5 = 25$ (Allowance for waste cutting) • Calculate the cost of 25 if buying individual 100mm x 100mm size: $25 \times 3 = £75$ • Calculate the difference in cost between larger sheet and individuals: $75 - 35 = £40$ total saving in material costs Or • Calculation of how many can be manufactured from 520mm x 520mm sheet: $5 \times 5 = 25$ (Allowance for waste cutting) • Calculate the cost of 25 if buying larger sheet 520mm x 520mm size: $35/25 = £1.40$ • Calculate the savings in cost per coaster: $3 - 1.40 = £1.60$ saving for each • Calculate the total savings in cost: $1.60 \times 25 = £40$ total saving in material costs Guidance to markers <i>Incorrect/no answer</i>				0
<i>Calculation of how many can be manufactured from larger sheet:</i>				1
+ <i>Calculation of the cost of 25:</i>				2
+ <i>Calculation of the difference in cost:</i>				3
+ <i>Correct calculations and showing workings:</i>				4

(b)	Using the information provided, create a production flow chart including quality control for the manufacturing process of the coaster holder by hand in a school workshop.		✓	8
	<i>Answers that indicate an understanding of the manufacturing process of the coaster holder using hand tools should be awarded up to 8 marks based on:</i>  <pre> graph TD Start([Start]) --> Step1[Measure and mark each side piece with a 45 degree mitre] Step1 --> Step2[Cut each mitre joint using tenon saw and mitre block] Step2 --> Step3[Sand each mitre] Step3 --> Check1{Check accuracy of mitre joint} Check1 -- No --> Step2 Check1 -- Yes --> Step4[Measure and mark finger holes on two sides] Step4 --> Step5[Cut each finger hole using coping saw or scroll saw] Step5 --> Check2{Check accuracy of finger holes} Check2 -- No --> Step4 Check2 -- Yes --> Step6[Measure and mark base] Step6 --> Step7[Cut base using tenon saw and sand to size] Step7 --> Step8[Glue together and clamp into place] Step8 --> Step9[Clean, sand and finish] Step9 --> End([End]) </pre> Accept any other appropriate methods / stages / order. Maximum of 4 marks if production process is correct but not in flow chart.			

	Guidance to markers	
	Incorrect/no answer	0
	- Candidate has a simplistic knowledge. - A basic attempt to produce a flow chart with a few correct manufacturing details. - No identification of quality control checks.	1-2
	- Candidate has some basic understanding of the issues associated with the question. - A basic production method given to manufacture the coaster holder. - No identification of quality control checks.	3-4
	- The candidate has clear understanding of the issues associated with the question. - Uses correct production flow chart shapes. - A detailed production method given to manufacture the coaster holder. - Some attempt to identify quality control checks.	5-6
	- The candidate demonstrates very clear understanding of the issues associated with the question. - Uses correct production flow chart shapes. - Full and detailed method of manufacturing including mitre joints. - Inclusion of quality control checks and alternative routes if not met.	7-8
Total		12

Question 5

A new band saw has been installed in a school's Design and Technology workshop.		AO3	AO4	Mark
(a)	Discuss the health and safety considerations that need to be in place before the band saw can be certified for use.		✓	8
<i>Answers that discuss health and safety considerations should be awarded up to 8 marks based on:</i> • Extraction needs to be connected. • No floor markings around the band saw to create a safe working area. • No mandatory PPE signage around the machine. • Machine locks need to be in place for the top door • Machine needs to be bolted to the floor. • Machine will need to be signed off and certified for use. • Training will need to be provided before use. Only authorised personal should use. • Risk assessments needs to be undertaken. • COSHH testing. • Suitable guards can be installed. • Suitable PPE needs to be available, eye protection and ear protection. • Machine secured to the floor. • Blade fitted correctly and aligned. Accept any other appropriate responses. Guidance to markers • Incorrect/no answer				0
• Candidate has a simplistic knowledge. • The use of terminology and technical language is basic. • Brief discussion of one to two H&S considerations; little understanding evident; basic examples.				1-2
• Candidate has some basic understanding of the issues associated with the question. • The use of terminology and technical language is variable. • Some detail discussion of three to four H&S considerations with some explanation and examples.				3-4
• The candidate has clear understanding of the issues associated with the question. • The use of terminology and technical language is mostly accurate. • More detailed discussion of three to four H&S considerations with more detailed knowledge and understanding evident; appropriate examples included.				5-6
• The candidate demonstrates very clear understanding of the issues associated with the question. • Uses correct terminology and technical language. • Full and detailed discussion of three to four H&S considerations with full and detailed explanation with highly relevant exemplars included.				7-8

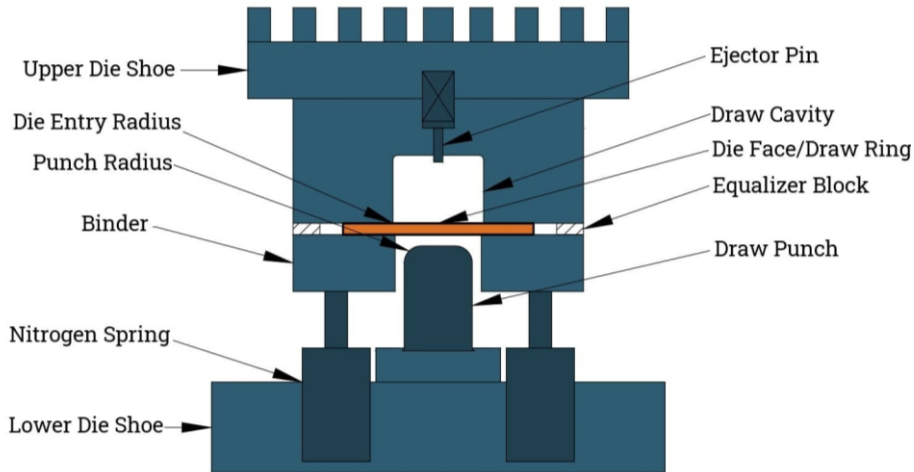
(b)	State the meaning of the signs shown below and explain how they impact on the user.		✓	2x [2]
	<i>Answers that indicate an understanding of safety signs should be awarded up to 2 x [2] marks based on:</i>			
	Guidance to markers			
	Sign 1:			
	<i>Incorrect/no answer</i>			0
	<i>Naming sign, for example:</i> Danger electrical hazard/High voltage.			1
	<i>Named sign plus explanation of impact, for example:</i> Electrical hazard sign will allow users to understand that there are electrical hazards that could be of potential harm if the electrical workings are touched.			2
	Sign 2:			
	<i>Incorrect/no answer</i>			0
	<i>Naming sign, for example:</i> Harmful/irritant.			1
	<i>Named sign plus explanation of impact, for example:</i> Harmful/irritant sign will allow users to understand that there is a need to take care when handling the product and appropriate PPE may be needed such as gloves when handling the substance.			2
			Total	12

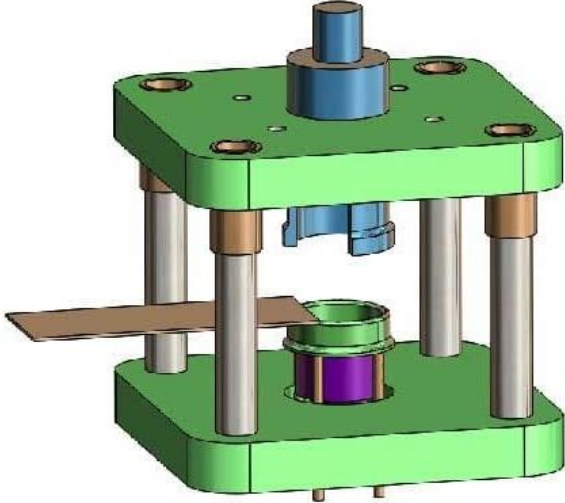
Question 6

Computer-integrated manufacturing (CIM) is employed during high volume production such as Lego bricks shown below.		AO3	AO4	Mark
	Evaluate the advantages and disadvantages to the manufacturer using computer-integrated manufacturing (CIM).	✓		10
<i>Answers that indicate an understanding of the positives and negatives of using CIM should be awarded up to 10 marks based on:</i> Positives: • Greater control of the production process, meaning that it can be fully automated. • Flexible production thanks to the use of CNC machinery which can be re-programmed. • The amount of products produced can be directly linked to the demand, this means that there is no waste and minimal storage costs. • Improved productivity as production times are consistent. • Increased reliability and productivity of repetitive tasks. • Reduced manufacturing times. • Monitoring of system at all times to improve reliability of production. • Inventory control the CIM process is responsible for tracking the materials, products produced and distribution. • Less cost of labour. Negatives: • Extremely high set-up costs as the machinery costs a lot. • Has negative effects on employment. • Maintenance costs of machinery can be high. • Initial training costs and time for employers. • Down time due to machine faults. • Difficult to use on complicated products. Accept any other appropriate responses. Guidance to markers <i>Both positives and negatives need to be evaluated for the higher band marks.</i>				
	• Incorrect/no answer			0
	• Candidate has a simplistic knowledge. • The use of terminology and technical language is basic. • Brief description of the advantages and disadvantages of CIM; little understanding evident; basic or no examples.			1-2
	• Candidate has some basic understanding of the issues associated with the question. • The use of terminology and technical language is variable. • Some detail with some understanding of the advantages and disadvantages of CIM which have been briefly explained.			3-4
	• The candidate has a clear understanding of the issues associated with the question. • The use of terminology and technical language is mostly accurate. • More detailed evaluation of the advantages and disadvantages of CIM with clear knowledge and understanding evident; appropriate examples included to aid evaluation.			5-6

	• The candidate has a very clear understanding of the issues associated with the question. • The use of terminology and technical language is accurate. • More detailed evaluation of the advantages and disadvantages of CIM with detailed knowledge and understanding evident; detailed examples included to aid evaluation.	7-8
	• The candidate demonstrates an excellent understanding of the issues associated with the question. • Uses correct terminology and technical language including types of materials and processes. • Full and detailed evidence of appraisal, and understanding of the advantages and disadvantages of CIM with full and detailed evaluation with highly relevant exemplars included.	9-10
Total		10

Question 7

Temporary fixings such as nuts and bolts are used to join materials together.		AO3	AO4	Mark
(a)	Explain the purpose of the washer when using nuts and bolts.		✓	2
<i>Answers that indicate an understanding of the purpose of the washer should be awarded up to 2 marks based on:</i> • Load Distribution • Spacing • Vibration Absorption • Protection from damage to material Accept any other appropriate responses. Guidance to markers <i>Incorrect/no answer</i>				0
<i>Brief description of purpose, little detail, for example:</i> The washer is needed to spread the load.				1
<i>More detailed explanation of purpose with clear understanding, for example:</i> The main reason for the using washers is to spread the load distribution. The washer can protect from damage to the material after driving the threaded fastener into the material.				2
(b)	Using notes and sketches explain the metal stamping process used to manufacture flat washers.		✓	6
<i>Answers that indicate an understanding of stamping process when manufacturing a flat washer should be awarded up to 6 marks based on:</i> 				0

		
Guidance to markers		
	Incorrect/no answer	0
	- Candidate has a simplistic knowledge. - An attempt to show the metal stamping process with simplistic sketches and limited notes.	1-2
	- Candidate has some basic understanding of the issues associated with the question. - A clear sketch showing the stamping process with some annotation to help explain the process.	3-4
	- The candidate has a clear understanding of the issues associated with the question. - Fully annotated sketch and explanation notes of the process of stamping the washers from blank metal. Accept any other appropriate responses (such as pressing).	5-6
Total		8

Question 8

The children's seesaw below has been manufactured using metals supplied in stock form.		AO3	AO4	Mark
(a)	Identify two different metal stock forms that have been used.		✓	2
	<i>Answers that identify two stock forms should be awarded up to 2 marks based on:</i> Possible stock forms: • Round tube • Flat bar/Sheet metal • Round bar/Metal rods Guidance to markers <i>Incorrect/no answer</i>			0
	<i>Identification of one stock form</i>			1
	<i>Identification of two stock forms</i>			2
(b)	Explain why plastic coating is an appropriate finish for the children's seesaw.		✓	6
	<i>Answers that indicate an understanding of why powder coating is used should be awarded up to 6 marks based on:</i> • The coating provides a durable finish which will help the product last longer. • Plastic coating will protect the frame from oxidising (rusting). • Better than traditional painted finishes. • The plastic coating is less likely to chip than paint finishes. • More than one coat can be added to increase protection. • A wide range of colours are available to suit the needs of the target market. • Plastic coated finishes can be used outside and can resist UV light so they do not fade. • Epoxy powder coating can be acceptable for a response. • Can make edges of the metal more rounded and safer for the user. Accept any other appropriate responses. Guidance to markers • Incorrect/no answer			0
	• Candidate has a simplistic knowledge. • Basic descriptions of plastic coating benefits.			1-2
	• Candidate has some basic understanding of the issues associated with the question. • A range of reasons of why it is suitable. • Some attempt to explain the properties and characteristics that plastic coating provides to the product.			3-4
	• The candidate has a clear understanding of the issues associated with the question. • Detailed explanations of the properties and characteristics that plastic coating provides. The candidate has a clear understanding of the issues associated with the question. • Very detailed range of reasons of why it is suitable. • Detailed explanations of the properties and characteristics that plastic coating provides.			5-6
		Total		8

Question 9

The manufacturer of aerospace parts is considering two different locations for a new manufacturing site, one in the United Kingdom and one in a developing country.		AO3	AO4	Mark
	Discuss the important factors the manufacturer should consider when deciding on the location of the new manufacturing site.		✓	8
<i>Answers that indicate an understanding of global manufacturing should be awarded up to 8 marks based on:</i> • Availability and location of raw materials and components that could affect the cost of manufacturing. • The availability and price of land or factory space to set up production facilities. • The availability of skilled labour or non-skilled cheap labour. • Public perception including ethics and exploitation including environmental, social and legislation issues related with both options. • Political issues within each country and issues of trade agreements and tariffs on manufacturing. • Incentives and grants provide by each country. • Transportation and shipping costs. • Health and Safety legislation and employment law. • Loss of UK jobs and effect on UK financial markets. • Language barriers. Accept any other appropriate responses. Guidance to markers • Incorrect/no answer				
• Candidate has a simplistic knowledge. • The use of terminology and technical language is basic. • Brief description of one to two considerations to take into account; little understanding evident; basic examples.				1-2
• Candidate has some basic understanding of the issues associated with the question. • The use of terminology and technical language is variable. • Some detail discussion of three to four considerations to take into account with little explanation and examples.				3-4
• The candidate has clear understanding of the issues associated with the question. • The use of terminology and technical language is mostly accurate. • More detailed discussion of three to four considerations to take into account with more detailed knowledge and understanding evident; appropriate examples included.				5-6
• The candidate demonstrates very clear understanding of the issues associated with the question. • Uses correct terminology and technical language. • Full and detailed discussion of at least three considerations to take into account with full and detailed explanation with highly relevant exemplars included. • Structured comparison between the two country options.				7-8
			Total	8

Question 10

The Right to Repair Regulations, 2021 was introduced to increase producer responsibility and give customers the right to repair products.

Analyse the impact of this on the development of new products. Marks will be awarded for the content of the answer and the quality of written communication.

AO3**AO4****Mark**

✓

10

Candidates should demonstrate knowledge and understanding of sustainability factors and apply it to the importance of repairing products to be awarded up to 10 marks based on:

- Aim to increase manufacturer responsibility, reduce energy usage and electrical waste, and enable consumers to identify the most energy efficient products on the market when purchasing.
- Gives consumers the ability to repair electrical products as the designers and manufacturers need to ensure products are made to be repairable by trained professionals or by the consumer themselves.
- An important part of repair is to extend the life of certain categories of products such as washing machines, tumble driers, dishwashers, refrigerators, and TV's by making spare parts readily available.
- It reduces the "throw away" consumer.
- It promotes circular economy of products.
- It encourages sustainable consumption.
- Ensures that waste is prevented.
- It can benefit the sales and reputation of products and brands.

Accept any other appropriate responses.

Guidance to markers

- Incorrect / no answer

0

- Limited understanding and application of knowledge and understanding of circular economy.
- There is limited evidence of relevant examples.
- Quality of Written Communication is limited, presenting material with limited coherence, many errors of grammar, punctuation and spelling.

1-3

- Generally good understanding and application of knowledge and understanding of the question.
- There is a line of reasoning which is generally coherent and relevant.
- Quality of Written Communication is basic, presenting occasional appropriate material with some coherence, some errors of grammar, punctuation and spelling.

4-6

- Very good understanding and application of knowledge and understanding of the importance of repairing products and how it links with the social, environmental and economic future of products.
- There is a sustained line of reasoning which is generally coherent, relevant and substantiated.
- Quality of Written Communication is good, presenting mainly appropriate material in a coherent manner, few errors of grammar, punctuation and spelling.

7-8

	• Excellent understanding and application of knowledge and understanding of the importance of repairing products and how it links with the social, environmental and economic future of products. • There is a sustained line of reasoning which is coherent, relevant and substantiated. • Quality of Written Communication is excellent, presenting wholly appropriate material in a coherent and logical manner, hardly any errors of grammar, punctuation and spelling.	9-10
Total		10