



GCSE MARKING SCHEME

SUMMER 2022

**DESIGN AND TECHNOLOGY – COMPONENT 1
C600U10-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCSE DESIGN & TECHNOLOGY

COMPONENT 1

SUMMER 2022 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 and 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. 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.

Section A

Answer **all** questions

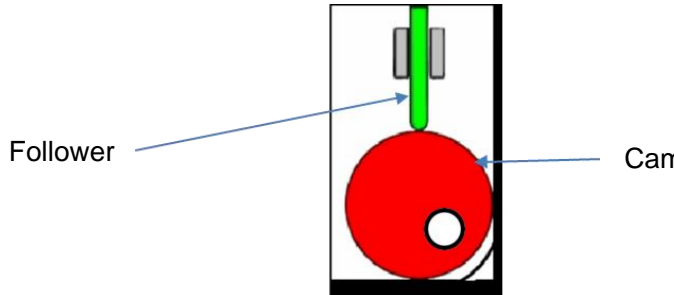
This question is about the lifecycle of products.

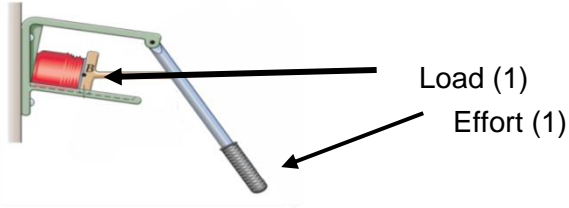
Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total												
1. (a) (i)	✓	2	<p>The table below shows a household's annual energy consumption. Complete the table above by calculating the missing figures. <i>Show all workings.</i></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%; text-align: center;">Energy</th> <th style="width: 33%; text-align: center;">kWh</th> <th style="width: 33%; text-align: center;">Cost</th> </tr> </thead> <tbody> <tr> <td>Electricity</td> <td style="text-align: center;">2,930</td> <td style="text-align: center;">£487</td> </tr> <tr> <td>Gas</td> <td style="text-align: center;">12,045</td> <td style="text-align: center;">£639</td> </tr> <tr> <td>Total</td> <td style="text-align: center;">14,975</td> <td style="text-align: center;">£1,126</td> </tr> </tbody> </table> <p>Award one mark for each correct answer.</p> <p>14,975 – 2,930 = 12,045 (1) £1,126 - £639 = £487 (1)</p> <p><i>Only acceptable response.</i></p>	Energy	kWh	Cost	Electricity	2,930	£487	Gas	12,045	£639	Total	14,975	£1,126	[2] AO4 1c [2]	2
Energy	kWh	Cost															
Electricity	2,930	£487															
Gas	12,045	£639															
Total	14,975	£1,126															

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(ii)	✓	2	<p>If the household installed solar panels, they would save a total of £210 per year. Calculate the saving as a percentage. Show all workings. [2]</p> <p>Award one mark for each correct step in the calculation.</p> <p>$\text{£}210/\text{£}1126 \times 100 (1) = 18.65\% (1)$ Accept: 18.7% and 19%</p> <p><i>Credit any appropriate approach to calculating the saving made.</i></p>	AO4 1c [2]	2
(b) (i)			<p>State the name of the label shown above. [1]</p> <p>Award one mark for the correct answer:</p> <ul style="list-style-type: none"> • Fairtrade (1) • Fairtrade Logo (1) • Fairtrade Mark (1) <p><i>Only acceptable responses.</i></p>	AO4 1a [1]	1

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(ii)			<p>Explain why this logo is important for ethical production. [3]</p> <p>Answers must be related to Fairtrade. 1 mark for each benefit/point made and 1 mark for an explanation. A maximum of 2 marks for identifying benefits without any explanation.</p> <p>For example: The Fairtrade label ensures:</p> <ul style="list-style-type: none"> • The product has been made from ethical sourced materials (1) • The workers/farmers are paid fairly for their part in product production (1) • The workers/farmers are fairly treated during product production (1) • Trading of product sales are fair – a better share of profits (1) • The lives of workers/farmers are improved (1) helping to reduced poverty (1) • Prevent exploitation of producers/workers (1) • Fair pay/profits (1) mean children of worker can attend school and have an education (2) <p><i>Credit any other appropriate response.</i></p>	AO4 1b [2] AO4 1c [1]	3
(iii)			<p>Describe why this logo appears on product packaging. [2]</p> <p>Answers must relate to the logo. 1 mark for a suitable reason and 1 mark for a description.</p> <p>For example: The logo is used to verify the product being sold has been manufactured/transported in a way that reduces CO² emissions/carbon foot.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 1a [1] AO4 1b [1]	2
				Total	10

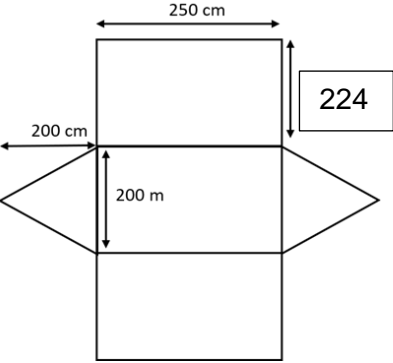
This question is about mechanical devices.

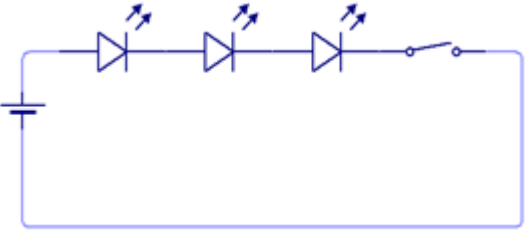
Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
2. (a) (i)	✓		<p>State the function of the Cams on the Automata Toy. [1]</p> <p>To create movement up and down. (1) Converts rotational motion into linear motion. (1) Caterpillar/worm will move up and down. (1)</p>	AO4 1a [1]	1
(ii)	✓		<p>Draw arrows to correctly identify the Cam and the Follower on the image below. [2]</p> <div style="text-align: center;">  </div> <p>One mark for each correctly identified answer. (2x1)</p>	AO4 1b [2]	2
(b)	✓		<p>The image below shows a pear-shaped Cam. Describe the motion produced by this mechanism. [2]</p> <p>Marks should only be awarded for describing the motion of a pear-shaped Cam, not other shaped Cams, for example, snail.</p> <p>For example: A pear-shaped cam creates a sudden rise and fall (1), followed by a long period where the follower does not move (1).</p> <p>For example: The follower remains motionless (for about) half of the cycle of the Cam (1) and during the second half, it rises and falls. (1)</p> <p><i>Credit any other appropriate response.</i></p>	AO4 1c [2]	2

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(c)	✓		<p>The image below shows a lever system used to crush aluminium cans ready for recycling. Draw arrows to correctly label the effort and load. [2]</p> <p>Award one mark for each correct answer.</p>  <p><i>Only acceptable responses.</i></p>	AO4 2c [2]	2
(d)			<p>Analyse the environmental benefits of consumers crushing and recycling aluminium cans. [3]</p> <p>Answers must relate to metal (aluminium) cans and/or recycling. 1 mark for each benefit (maximum of 2 marks for just stating two benefits); 1 mark for analysing the benefit suggested and 1 mark for justifying answer given. Two benefits with a sound explanation can also be awarded 3 marks.</p> <p>Environmental benefits could include:</p> <ul style="list-style-type: none"> • Crushing metal cans maximises recycling space in the home; • Aluminium is recyclable and doesn't affect strength of metal; • Aluminium can be recycled into a range of different products; • Metal cans are recycled by refuse collectors (no need to visit a recycling centre)/less ends up in landfill; • Recycling metal cans generates jobs/community services; • Recycling avoids the mining of resources. <p><i>Credit any other appropriate response.</i></p>	AO3 2a [3]	3
				Total	10

This question is about smart, composite and technical materials.

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
3. (a) (i)	✓		<p>The tent below is made from a range of modern materials.</p> <p>State the name of an appropriate composite material used to make the tent poles. [1]</p> <p>Award 1 mark for correct answer.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Fibreglass. (1) • Silicone fibre (1) • Carbon fibre (1) <p><i>Credit any other appropriate response that is an appropriate composite material.</i></p>	AO4 1b [1]	1
(ii)	✓		<p>Describe the properties of the composite material you have stated that make it suitable for its use as a tent pole. [3]</p> <p>1 mark for each appropriate property suitable for a tent pole. Three marks requires the addition of a clear description.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Good strength to weight ratio • Good wearing properties. • Good corrosion resistance. • Light weight • Flexible in one direction i.e. over its length not its cross section. <p><i>Credit any other appropriate response.</i></p>	AO4 1a [2] AO4 1c [1]	3

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total									
(b) (i)	✓	4	<p>The net of the tent is shown below. Calculate the surface area of the tent. <i>Show all workings.</i> [4]</p>  <p>Calculation:</p> <p> $250\text{cm} \times 224\text{cm} = 56,000 \text{ cm}^2$ (1) $56,000\text{cm}^2 \times 2 = 112,000 \text{ cm}^2$ (1) $250\text{cm} \times 200\text{cm} = 50,000 \text{ cm}^2$ (1) $200\text{cm} \times 200\text{cm} = 40,000 \text{ cm}^2$ (1) (two Triangles) Area = $202,000 \text{ cm}^2$ or The area of a triangle is $\frac{1}{2} \times b \times h$ $\frac{1}{2} \times 200 \times 200 = 20,000 \text{ cm}^2$ (1) $20,000 \times 2 = 40,000 \text{ cm}^2$ (1) $112000\text{cm}^2 + 50,000\text{cm}^2 + 40,000\text{cm}^2 = 202,000\text{cm}^2$ or $2,000\text{m}^2$ (1) </p> <p><i>Credit any appropriate approach to calculating the surface area of the tent.</i></p>	AO4 1b [3] AO4 1c [1]	4									
(ii)	✓		<p>The product shown below is a storage bag for the tent. It is made from microfibres. Put a tick (✓) in the grid below to indicate whether the following statements are true or false. [2]</p> <table border="1" data-bbox="479 1011 1527 1209"> <thead> <tr> <th data-bbox="479 1011 1176 1054">Statement</th> <th data-bbox="1176 1011 1346 1054">True</th> <th data-bbox="1346 1011 1527 1054">False</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 1054 1176 1131">Microfibres can be manufactured from natural and synthetic materials.</td> <td data-bbox="1176 1054 1346 1131">✓</td> <td data-bbox="1346 1054 1527 1131"></td> </tr> <tr> <td data-bbox="479 1131 1176 1209">Microfibres have excellent strength-to-weight ratio.</td> <td data-bbox="1176 1131 1346 1209">✓</td> <td data-bbox="1346 1131 1527 1209"></td> </tr> </tbody> </table> <p><i>Only accepted answers</i></p>	Statement	True	False	Microfibres can be manufactured from natural and synthetic materials.	✓		Microfibres have excellent strength-to-weight ratio.	✓		AO4 1b [1] AO4 2b [1]	2
Statement	True	False												
Microfibres can be manufactured from natural and synthetic materials.	✓													
Microfibres have excellent strength-to-weight ratio.	✓													

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(c)	✓		<p>The image below shows a head torch used for camping.</p> <p>Review the sketched diagram below which is a simplified version of the electrics used to power the light.</p> <p>Using standard circuit symbols for each component, produce a circuit diagram in the space below. [5]</p>  <p>Award a maximum of three marks for correctly using three different component symbols (3 x 1) Award 1 mark for joining component symbols Award 1 mark for correct LED orientation Note: the final diagram must look like a suitable circuit diagram to be awarded full marks.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 1b [1] AO4 1c [4]	5
				Total	15

This question is about materials.

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
4. (a)			<p>Describe the structure of each of the manufactured boards shown in the table below. 3 x [2]</p> <p>One mark for identifying a structural characteristic of <i>each</i> manufactured board (up to a maximum of three marks) and an additional mark for ensuring that <i>each</i> characteristic is described accurately. No marks to be awarded if candidate references cost/cheapest of the board in answer provided.</p> <p>Plywood – reference may be made to veneers laid at 90 degrees to each other and glued. Together plywood is made up of odd layers i.e. 3 ,5, 7, 9 etc.</p> <p>Chipboard – reference may be made to chipboard being made from wood chips bonded together with some form of resin, they may be different in size – the middle core chips are slight bigger and the size of the chips decreases as it gets to the edge. Could have laminated finish from wood finishes to plastic finishes.</p> <p>Medium Density Fibreboard – reference may be made that MDF is made from fine wood fibres compressed and bonded together (with resin). It is acceptable to state MDF has a flat, smooth surface and/or it is made from waste/recycled timber.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 1a [3] AO4 1b [3]	6
(b) (i)	✓		<p>The image below shows a selection of detergent bottles made from a thermoforming plastic. State the name of the most appropriate thermoforming plastic used to manufacture the bottles. [1]</p> <p>One mark for correct answer:</p> <ul style="list-style-type: none"> • Low-density polyethylene (LDPE) (1) • PET/PETE (1) • HTPE (1) <p><i>Credit any other appropriate response.</i></p>	AO4 1c [1]	1

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(ii)	✓		<p>Explain why a thermoforming plastic is suitable for the manufacture of the detergent bottles. [3]</p> <p>One mark for each reason/property suggested up to a maximum of two marks. Maximum marks can be awarded if reasons/properties given are explained/justified in relation to detergent bottles.</p> <p>For example: Thermoforming plastic is tough and flexible which ensures detergent bottles are easy to use as the product can be squeezed from the bottle. (3)</p> <p>Thermoforming plastic is tough and flexible which ensures the detergent in the bottle will not leak even if the bottle is dropped. (3)</p> <p>Other properties/benefits of thermoforming plastics:</p> <ul style="list-style-type: none"> • They can be re moulded/recycled (environmental) • They can be made any colour (safety) • They are chemical/water resistant <p><i>Credit any other appropriate response.</i></p>	AO4 1c [1] AO4 2b [2]	3
(c) (i)	✓		<p>Study the diagram above. Complete the following sentences below by inserting the correct words from the list provided. 3 x [1]</p> <p>One mark for each correctly chosen word.</p> <p>Knitted Woven Looped Weft Warp</p> <p>Woven fabrics are constructed using interlocking yarns. The yarns that run horizontally are called Weft yarns. The yarns that run vertically down the length of the fabric are called Warp yarns.</p> <p><i>Do not credit any other response.</i></p>	AO4 1c [3]	3

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(ii)	✓		<p>The ties shown in the images below are identical in design but differ in fibre content.</p> <p>Discuss the properties of silk and polyester that make them suitable fabrics for the ties. [3]</p> <p>One mark for each suitable property suggested up to a maximum of two marks. Maximum marks can be awarded if properties given are discussed with clarity.</p> <p>For example: Silk and polyester both have good (tensile) strength which means they won't tear or wear easily when worn. (3) Silk and polyester both have good elasticity which means they will not crease and look unsightly when worn. (3)</p> <p>Other similarities/properties:</p> <ul style="list-style-type: none"> • Both are durable • Both don't need ironing • Both are flammable • Both have high lustre • Both are easily dyed any colour • Both have good lustre • Both are light in weight • Silk has a smooth aesthetic which reflects light • Polyester is washable, silk is more commonly dry cleaned. <p>Also accept comments that relate to the fabric construction. For example: silk and polyester are both fine fibres (1) which means the woven fabric is fine/compact (1) and will drape well when worn (1).</p> <p><i>Credit any other appropriate response.</i></p>	AO4 2a [3]	3

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(d) (i)			<p>The size of the paper used to make the envelope is 297mm x 420mm. Circle the correct standard size used to make the envelope. [1]</p> <p style="text-align: center;">A3 A4 A5</p> <p>One mark for correct answer. <i>The only acceptable answer = A3</i></p>	AO4 1c [1]	1
(ii)	✓		<p>60% of the card is made from recycled paper. Describe one disadvantage of using recycled paper for this product. [3]</p> <p>One mark for a correct disadvantage given. Maximum marks should be awarded for a clear description of the disadvantage given. No additional marks should be awarded for more than one disadvantage unless it forms part of the description.</p> <p>Disadvantages of using recycled paper:</p> <ul style="list-style-type: none"> • Fibres get shorter which reduces the strength of the paper; • Short fibres mean there is less flexibility; • Water absorption increases (which doesn't benefit the function of the robot toy kit); • The quality of the paper is reduced; • Chemicals are used during the recycling process to remove ink. <p><i>Credit any other appropriate response.</i></p>	AO4 1c [3]	3
				Total	20

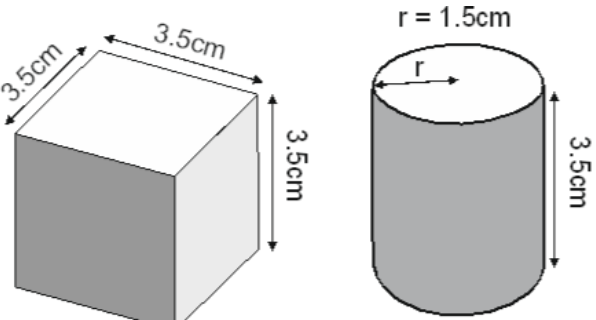
Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
5. (a) (i)			<p>Review the images below and select one CAM device when answering the questions (a) to (c). Place a tick (✓) in the box of your selected device.</p> <p>All the images above are examples of CAM devices. State the meaning of CAM. [1]</p> <p>One mark for correct meaning of CAM:</p> <p>Computer Aided Manufacture (1) Accept: Computer Aided Manufacturing (1)</p> <p><i>Only responses accepted.</i></p>	AO4 1a [1]	1
(ii)			<p>Explain the benefits of using your chosen CAM device when making products in school. [3]</p> <p>One mark for each benefit identified, awarding a maximum of two marks. Three marks to be awarded for two benefits that have been explained and can relate to a school environment.</p> <p>Benefits:</p> <ul style="list-style-type: none"> • Accuracy/precision can be achieved; • Consistency of outcome; • Faster than producing by hand; • Less waste of resources; • Minimal supervision required; • Machines can work continuously (in comparison to human fatigue); • In the case of the laser cutter/CNC Router – can process a range of different materials (1). This benefits a class of students who are making different products from different materials (1). <p><i>Credit any other appropriate response.</i></p>	AO4 1c [3]	3

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(b) (i)			<p>The CAM devices require input from a CAD software package.</p> <p>Give one example of a CAD software package that could be used with your chosen device. [1]</p> <p>One mark for correct response.</p> <p>Examples:</p> <ul style="list-style-type: none"> • CorelDraw • Prodesk Top • Google sketch-up • Adobe Illustrator • Solidworks • AutoCad • Photoshop • Fushion 360 • 2D Design • Tinkercad <p><i>Credit any other appropriate response.</i></p>	AO4 2a [1]	1

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(ii)			<p>Describe two disadvantages of using CAD in a school environment. [4]</p> <p>One mark for each disadvantage identified, awarding a maximum of two marks. Four marks to be awarded for two disadvantages that have been described and can relate to a school environment.</p> <p>Disadvantages:</p> <ul style="list-style-type: none"> • CAD programme may not be working/efficient; • CAD software may be out of date restricting creative design; • School computers may not be powerful enough to run the programme; • Software is expensive for a school to be able to purchase for student use; • Knowledge required to use the programme; • Time required to learn and develop the skills to use the programme effectively; • It may be quicker to sketch ideas with a pen/pencil that to draw using CAD (initial ideas). <p><i>Credit any other appropriate response.</i></p>	AO4 2a [2] AO4 2b [2]	4

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(c) (i)			<p>Explain a safety consideration when using your chosen CAM device. [2]</p> <p>One mark can be awarded for an appropriate safety consideration relating to CAM device(s). Two marks can only be awarded if the candidate explains why this safety consideration is important, for example, by identifying a hazard.</p> <ul style="list-style-type: none"> • Keep all hands away from moving parts (1) • Check the machine is plugged in correctly before switching on (1) • Check all power settings/threading of machine are correct (1) • Check extractor is working/switched on – dust is dangerous if inhaled/gathered in eye (and can cause fires if left to build up (2) • Extraction boxes need cleaning and filtering regularly (1) • Training has taken place before use (1) • Cables/electricity is supplied through a circuit breaker so if an electrical fault develops the electrical power will be cut off straight away and fire risk reduced/removed (2) • Devices are maintained/serviced regularly/annually (1) • Machines should never be left on their own when switched on and functioning (1) • Temperatures reached (210 to 250°C) in 3D printing thermoplastics are a scalding hazard (1) <p>Note: Candidates may make reference CAM devices today are very safe to use as they will not work unless the settings are correct, or guards/closures are in place. Credit can be awarded if this forms part of a students' response.</p> <p><i>Credit any other appropriate response.</i></p>	AO3 2b [2]	2

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(ii)			<p>Evaluate the use of your chosen CAM device when used in the development of a design.</p> <p>Two marks to be awarded for each point made if evaluated clearly (two needed), three points made with no clear evaluative comment can be awarded a maximum of three marks. Three points made with some sound evaluative reasons can be awarded maximum marks. Evaluative comments can be both positive and negative in nature.</p> <p>Responses may include:</p> <ul style="list-style-type: none"> • Problems in construction/aesthetics can be highlighted before production commences; • Views from target market can be gathered to ensure the product fulfils their needs; • Potential problems (e.g. accessibility of resources) are highlighted which can then be addressed/changed before production; • Could save costs (time/staffing/resources) if a product is not suitable, e.g. does not sell; • However, time is required, and this costs in resources and staffing. <p><i>Credit any other appropriate response.</i></p>	AO3 2b [4]	4

Q	Science	Maths	Question or outline of question / Marking scheme	AO	Total
(d)	✓	4	<p>The CAD drawings below show two solid shapes that are to be 3D printed to form part of a child's toy puzzle. Calculate the volume of the cube and the cylinder shapes. <i>Round your answer to 2 decimal points. Show all workings.</i></p>  <p>Volume of cube:</p> <p>3.5cm (3.5cm x 3.5cm) (1) = 42.875cm³ is acceptable or 42.88cm³ (1)</p> <p>Volume of cylinder:</p> <p>Volume of cylinder = $\pi r^2 h$ $\pi \times 1.5^2 = 2.25\text{cm}^2$ (1) $3.142 \times 2.25\text{cm}^2 = 7.07\text{cm}^2$ (1) $7.07\text{cm}^2 \times 3.5\text{cm} = 24.74\text{cm}^3$ (1)</p> <p><i>Credit any appropriate approach to calculating the volume of the cube and cylinder.</i></p>	AO4 1a [1] AO4 1b [4] [5]	5
				Total	20

Question 6: Electronic systems, programmable components and mechanical devices

Q	Science	Maths	Electronic systems, programmable components and mechanical devices Question or outline of question / Marking scheme	AO	Total
6. (a) (i)			State the name of a component that could be used to turn on the child's mood light. [1] <i>Acceptable answers include: Switch or LDR (Light dependant resistor).</i> <i>Credit any other appropriate response.</i>	AO4 1a [1]	1
(ii)			The circuit board in the child's mood light is designed with a PIC chip. State a function of the PIC chip. [1] For example: To be programmed as a timer to change light sequence (1) The function of a PIC chip is to process the instructions in the programme (1) To carry out tasks in the programme (1) <i>Credit any other appropriate response.</i>	AO4 1b [1]	1
(iii)			Explain why a double-sided circuit board is used in the child's mood light. [2] Answers must relate to the benefits of using a double-sided circuit board in the mood light. 1 mark for one correct benefit and 1 mark for clear description. For example: The main benefit of double-sided boards is that you have an extra layer to add more components. This increases the flexibility of the design, enabling you to place more extra connections if needed. (2) <i>Responses could be based on:</i> <ul style="list-style-type: none"> • The use of more complex circuitry as there is more space; • Perfect for advanced electronics or demanding applications; • Reduces the size of the board needed; • Cost-saving which makes double sided PCBs less expensive. <i>Credit any other appropriate response.</i>	AO4 2b [2]	2

Q	Science	Maths	Electronic systems, programmable components and mechanical devices Question or outline of question / Marking scheme	AO	Total
(iv)			<p>The image below shows a piece of equipment used to attach the components to the circuit board in the child's mood light. State the name of this piece of equipment. [1]</p> <p><i>Only acceptable answer for this piece of equipment: Soldering Iron</i></p>	AO4 2c [1]	1
(v)			<p>The picture below shows a circuit board. Describe the process of joining the LED onto the circuit board. [4]</p> <p>Award up to 4 marks for answers that demonstrate a clear understanding of the logical stages needed to solder an LED to the circuit board.</p> <p><i>Responses could be based on:</i></p> <ul style="list-style-type: none"> • Clamping the circuit board in place; • Drilling two holes for the LED terminals; • Using wet and dry paper to clean the pads of the PCB where the LED will be soldered; • Placing the LED; • Using a multimeter to determine the polarity of the LED or to find the cathode on the LED; • Using a spacer to determine the height of the LED; • Orienting the LED in a specific direction to work properly; • Flipping the board over and bending the leads outward at a 45° angle to make a better connection with the copper pad and prevent the LED from falling out while soldering; • Turning on the soldering iron and letting it heat up; • Holding the soldering iron in place for 3-4 seconds in order to heat the pad and the lead; • Applying solder to the Joint until it looks like a volcano or cone shape; • Snipping the extra wire from leads. <p><i>Credit any other appropriate response.</i></p>	AO4 2c [4]	4

Q	Science	Maths	Electronic systems, programmable components and mechanical devices Question or outline of question / Marking scheme	AO	Total										
(b)		5	<p>A retailer tracked the sales of the child's mood light over a 4-month period. The table below displays the data collected.</p> <p>(i) In the space below draw and label a bar chart showing the data found in the table above.</p> <div data-bbox="479 475 1025 909" style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Bar chart of sales</p> <table border="1" style="display: none;"> <caption>Data for Bar Chart of Sales</caption> <thead> <tr> <th>Month</th> <th>Sales</th> </tr> </thead> <tbody> <tr> <td>December</td> <td>1500</td> </tr> <tr> <td>January</td> <td>2500</td> </tr> <tr> <td>February</td> <td>800</td> </tr> <tr> <td>March</td> <td>500</td> </tr> </tbody> </table> </div> <p style="text-align: right; margin-top: 10px;">[3]</p> <p>Award marks for accuracy of bar chart and correct labelling.</p> <p>Accurate axis labelling (1) Accurate scaling (1) Accurate drawing of bars (1)</p> <p><i>Credit any appropriate approach.</i></p>	Month	Sales	December	1500	January	2500	February	800	March	500	AO4 1b [3] AO4 1c [2]	5
Month	Sales														
December	1500														
January	2500														
February	800														
March	500														

Q	Science	Maths	Electronic systems, programmable components and mechanical devices Question or outline of question / Marking scheme	AO	Total															
(ii)			<p>The retailer pays 20% Value Added Tax (VAT) on all sales over a period of four months. Calculate how much VAT will need to be paid for the child's mood lights over that 4-month period. [2]</p> <p>Calculate total sales: $£1,500 + £2,500 + £750 + £500 = £5,250$ (1) Calculate VAT: $£5,250/100 \times 20 = £1,050$ (1)</p> <p><i>Credit any appropriate approach to calculating the 20% VAT.</i></p>																	
(c)			<p>Different electronic components use a wide range of materials, for example, silver, cadmium, ferric chloride and mercury. Analyse the impact recycling electronic components has on our ecological footprint. [5]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 799 1783 1353"> <thead> <tr> <th colspan="3" data-bbox="479 799 1783 842">AO3 2a 5 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 842 640 986">BAND 3</td> <td data-bbox="640 842 1653 986">A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of using electronic products on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.</td> <td data-bbox="1653 842 1783 986">4-5</td> </tr> <tr> <td data-bbox="479 986 640 1166">BAND 2</td> <td data-bbox="640 986 1653 1166">Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of using electronic products has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.</td> <td data-bbox="1653 986 1783 1166">2-3</td> </tr> <tr> <td data-bbox="479 1166 640 1310">BAND 1</td> <td data-bbox="640 1166 1653 1310">Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of using electronic products has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.</td> <td data-bbox="1653 1166 1783 1310">1</td> </tr> <tr> <td colspan="3" data-bbox="479 1310 1783 1353">Award 0 marks for incorrect or irrelevant answers</td> </tr> </tbody> </table>	AO3 2a 5 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of using electronic products on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of using electronic products has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3	BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of using electronic products has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1	Award 0 marks for incorrect or irrelevant answers			AO3 2a [5]	5
AO3 2a 5 marks																				
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of using electronic products on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5																		
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of using electronic products has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3																		
BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of using electronic products has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1																		
Award 0 marks for incorrect or irrelevant answers																				

Q	Science	Maths	Electronic systems, programmable components and mechanical devices Question or outline of question / Marking scheme	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the points identified below.</p> <p>The impact recycling electronic components has on our ecological footprint may be referenced in answers provided to include:</p> <p><u>Negative:</u></p> <ul style="list-style-type: none"> • Electronic products must be disposed of at an approved treatment facility. • e-waste – often contains high levels of hazardous or toxic substances; • The increase in e-waste which can be linked to technological innovation and the expansion of market chains, which result in products being replaced sooner; • If products are disposed of in normal waste they will go straight to landfill, where they will decompose and the hazardous materials will leak into the environment; • Hazardous materials, that leak from electronic products disposed of, get into the water system and potentially cause serious health problems for humans. <p><u>Positive:</u></p> <ul style="list-style-type: none"> • The Waste Electrical and Electronic Equipment (WEEE) directive requires all manufacturers and producers to take responsibility for what happens to their products at the end of their lives. <p><i>Credit any other appropriate response.</i></p>		

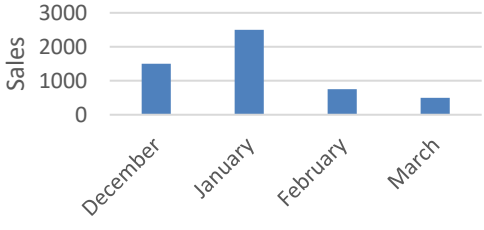
Q	Science	Maths	Electronic systems, programmable components and mechanical devices Question or outline of question / Marking scheme	AO	Total																
(d)			Evaluate why prototyping and modelling design ideas benefits both the designer and manufacturer when designing a child's mood light. [6] Band descriptors and mark allocations <table border="1" data-bbox="479 478 1675 1066"> <thead> <tr> <th colspan="3" data-bbox="479 478 1675 523">AO3 2b 6 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 523 640 699">BAND 3</td> <td data-bbox="640 523 1675 699">A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.</td> <td data-bbox="1675 523 1787 699">5-6</td> </tr> <tr> <td data-bbox="479 699 640 874">BAND 2</td> <td data-bbox="640 699 1675 874">Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.</td> <td data-bbox="1675 699 1787 874">3-4</td> </tr> <tr> <td data-bbox="479 874 640 1026">BAND 1</td> <td data-bbox="640 874 1675 1026">Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.</td> <td data-bbox="1675 874 1787 1026">1-2</td> </tr> <tr> <td colspan="3" data-bbox="479 1026 1675 1066">Award 0 marks for incorrect or irrelevant answers</td> <td data-bbox="1675 1026 1787 1066"></td> </tr> </tbody> </table>	AO3 2b 6 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4	BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2	Award 0 marks for incorrect or irrelevant answers				AO3 2b [6]	6
AO3 2b 6 marks																					
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6																			
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4																			
BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2																			
Award 0 marks for incorrect or irrelevant answers																					

Q	Science	Maths	Electronic systems, programmable components and mechanical devices Question or outline of question / Marking scheme	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the material listed below.</p> <p>Modelling/prototyping is when design ideas are tested or made to establish whether they are suitable for being developed and/or manufactured on a larger scale.</p> <p>Note: the disadvantages, if referred to, should reflect upon the benefits being evaluated.</p> <p><u>Advantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Explore and test ideas to identify issues which could be costly if manufactured without evaluation of success; • Gives opportunities to test and get feedback from clients to ensure manufacturing what they want; • Opportunities to discuss implementation problems with manufacturing plant; • Ability to manipulate design ideas which is not always possible with paper drawings; • Saves designers wasting time following a design idea that won't work; • Is tangible – the aesthetic of the product can be seen; • Can be used in user trails and user research. <p><u>Disadvantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Designers can easily make assumptions about how accurately a model represents reality; • It may not work/function like the final product needs to; • Might not be made of the same material – so won't reflect fully the function/purpose/aesthetic of the end product; • Time consuming to make; • Skill needed to produce accurately; • Can be costly (prototypes). <p><i>Credit any other appropriate response.</i></p>		
				Total	25

Question 6: Paper and boards

Q	Science	Maths	<p style="text-align: center;">Paper and boards Question or outline of question / Marking scheme</p>	AO	Total
6. (a) (i)			<p>The pictures below are of a greetings cards manufactured from 180 gsm card.</p> <p>State one reason why 180 gsm is the most suitable weight for the greetings cards. [1]</p> <p><i>Acceptable answers can include reference to: Strength/Lightweight/Rigidity.</i></p>	AO4 1a [1]	1
(ii)			<p>State one reason why a 'duplex' printer is used to manufacture the greetings cards. [1]</p> <p>The function of a duplex printer is to print on both sides of the material (1)</p> <p><i>Credit any other appropriate response.</i></p>	AO4 1b [1]	1
(iii)			<p>Explain why registration marks are used when manufacturing greetings cards. [2]</p> <p>Up to 2 marks can be awarded for a clear explanation for the use of registration marks during construction.</p> <p>For example: Registration marks are there to line up the different printing colours. They make sure that every printing plate prints in exactly the right place preventing any blur.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 2b [2]	2

Q	Science	Maths	<p style="text-align: center;">Paper and boards Question or outline of question / Marking scheme</p>	AO	Total
(iv)			<p>The picture below shows a piece of equipment used to manufacture the greetings cards.</p> <p>State the name of this piece of equipment. [1]</p> <p><i>Only acceptable answer is:</i> Rotary Trimmer (accept Guillotine).</p>	AO4 2c [1]	1
(v)			<p>The greetings card has been constructed using a die cutting machine. Describe the process of die cutting the greetings card shown. [4]</p> <p>Award up to 4 marks for answers that demonstrate a clear understanding of what a die cutter is and how it can be used to produce different techniques.</p> <p><i>Responses could be based on:</i></p> <ol style="list-style-type: none"> 1. Ensure the die is in the correct location (1) 2. Place the material and die carefully between the plastic 'presses' (1) 3. Ensure that the pressure gauge is at the correct setting for the material being used or for the desired technique (1) 4. Using the machine roll the material between the two pressurised rollers (1) 5. Check the material to evaluate the success of the pass. (1) Repeat for second time if effect is unsatisfactory. 6. Remove any wastage, if material has been die cut, or carefully remove die if the material has been embossed (1) <p>Note: quality checks can be awarded marks, for example: alignment of material to machine (1); alignment of 'window'.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 2c [4]	4

Q	Science	Maths	<p style="text-align: center;">Paper and boards Question or outline of question / Marking scheme</p>	AO	Total										
(b)		5	<p>A retailer tracked the sales of the greeting cards over a 4-month period. The table below displays the data collected.</p> <table border="1" data-bbox="481 405 1081 614"> <thead> <tr> <th>Month</th> <th>Sales (£)</th> </tr> </thead> <tbody> <tr> <td>December</td> <td>1,500</td> </tr> <tr> <td>January</td> <td>2,500</td> </tr> <tr> <td>February</td> <td>750</td> </tr> <tr> <td>March</td> <td>500</td> </tr> </tbody> </table>	Month	Sales (£)	December	1,500	January	2,500	February	750	March	500	AO4 1b [3] AO4 1c [2]	5
Month	Sales (£)														
December	1,500														
January	2,500														
February	750														
March	500														
(i)			<p>In the space below, draw and label a bar chart showing the sales data found in the table above. [3]</p> <p>Award marks for accuracy of bar chart and correct labelling.</p> <p>Accurate axis labelling (1) Accurate scaling (1) Accurate drawing of bars (1)</p> <div data-bbox="481 922 1025 1305" style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Bar chart of sales</p>  <p>The bar chart displays the following data:</p> <table border="1" data-bbox="517 1011 999 1241"> <thead> <tr> <th>Month</th> <th>Sales (£)</th> </tr> </thead> <tbody> <tr> <td>December</td> <td>1,500</td> </tr> <tr> <td>January</td> <td>2,500</td> </tr> <tr> <td>February</td> <td>750</td> </tr> <tr> <td>March</td> <td>500</td> </tr> </tbody> </table> </div> <p><i>Credit any appropriate approach.</i></p>	Month	Sales (£)	December	1,500	January	2,500	February	750	March	500		
Month	Sales (£)														
December	1,500														
January	2,500														
February	750														
March	500														

Q	Science	Maths	<p align="center">Paper and boards Question or outline of question / Marking scheme</p>	AO	Total															
(ii)			<p>The retailer pays 20% Value Added Tax (VAT) on all sales. Calculate how much VAT will need to be paid for the greetings cards sales over the 4-month period. <i>Show all workings.</i> [2]</p> <p>Calculate total sales: £1,500 + £2,500 + £750 + £500 = £5,250 (1)</p> <p>Calculate VAT: £5,250/100 x 20 = £1,050 (1)</p> <p><i>Credit any appropriate approach to calculating the 20% VAT.</i></p>																	
(c)			<p>Wood and wood pulp are materials used to manufacture the greetings cards.</p> <p>Analyse the impact harvesting these materials has on our ecological footprint. [5]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="481 842 1785 1374"> <thead> <tr> <th colspan="3" data-bbox="481 842 1785 884">AO3 2a 5 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="481 884 640 1023">BAND 3</td> <td data-bbox="640 884 1639 1023">A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.</td> <td data-bbox="1639 884 1785 1023">4-5</td> </tr> <tr> <td data-bbox="481 1023 640 1193">BAND 2</td> <td data-bbox="640 1023 1639 1193">Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.</td> <td data-bbox="1639 1023 1785 1193">2-3</td> </tr> <tr> <td data-bbox="481 1193 640 1332">BAND 1</td> <td data-bbox="640 1193 1639 1332">Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.</td> <td data-bbox="1639 1193 1785 1332">1</td> </tr> <tr> <td colspan="3" data-bbox="481 1332 1785 1374">Award 0 marks for incorrect or irrelevant answers</td> </tr> </tbody> </table>	AO3 2a 5 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3	BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1	Award 0 marks for incorrect or irrelevant answers			AO3 2a [5]	5
AO3 2a 5 marks																				
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5																		
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3																		
BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint harvesting wood and wood pulp products has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1																		
Award 0 marks for incorrect or irrelevant answers																				

Q	Science	Maths	<p style="text-align: center;">Paper and boards Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the points identified below.</p> <p>Harvesting wood is seen in the main to have a negative impact on our ecological footprint, however, with modern approaches it can have a positive impact. Reasons for both include:</p> <p><u>Negative:</u></p> <ul style="list-style-type: none"> • Unregulated harvesting causes huge damage to sensitive eco systems; • Mechanised harvesting of both regulated and unregulated areas causes huge emission issues to the local areas; • Forests and woodlands are destroyed leaving some species of animals at risk of losing their habitats or leaving entire species critically endangered, due to the degradation of hunting grounds and the disruption of food chains; • Trees take carbon dioxide from the air and turn it into oxygen as they grow, removing trees without replanting means that carbon captured from soil and air becomes extremely difficult; • Removing large quantities of trees and plants also increases the risks of flooding to local areas; • There is currently very little or poor regulation of the harvesting of timber at critical times for wildlife mating seasons or around nest sites, even in developed countries that have renewable sites causing huge difficulties for many species of animals; • Trees take a long time to reach maturity, to be ready for harvest; • Bleaching of wood pulp, chemical spill off. <p><u>Positive:</u></p> <ul style="list-style-type: none"> • FSC sites are now the most commonly used sites for the harvesting of timbers for products sold in many parts of the world; • Consumer awareness has grown considerably leading to changes in regulation and attitudes; • The repurposing of brown field and former industrial sites for the growth of packaging materials has gained popularity in recent times, providing green spaces in the middle of large cities for people to enjoy for leisure activities. The use of such sites has risen by 66% over the last 10 yrs. thanks to the FSC; • Organisations like the FSC are planting more trees than they are cutting down to fill the void left by years of deforestation and over harvesting. <p>Candidates may refer to climate agreement or packaging regulations that state materials MUST come from a renewable source. This would be deemed an analytical comment and should be given credit.</p> <p><i>Credit any other appropriate response.</i></p>		

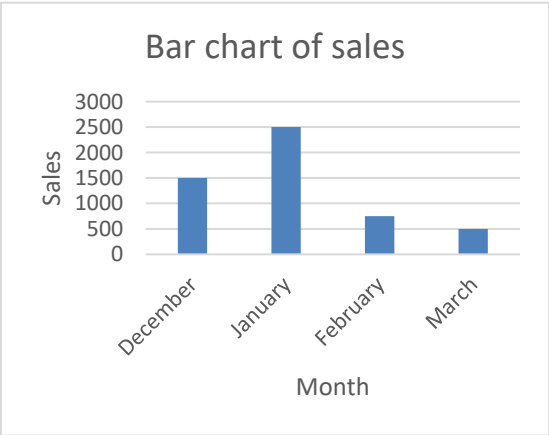
Q	Science	Maths	Paper and boards Question or outline of question / Marking scheme	AO	Total															
(d)			<p>Evaluate why prototyping and modelling design ideas benefits both the designer and the manufacturer when designing a greetings card. [6]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 478 1785 1066"> <thead> <tr> <th colspan="3" data-bbox="479 478 1785 523">AO3 2b 6 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 523 640 699">BAND 3</td> <td data-bbox="640 523 1653 699">A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.</td> <td data-bbox="1653 523 1785 699">5-6</td> </tr> <tr> <td data-bbox="479 699 640 874">BAND 2</td> <td data-bbox="640 699 1653 874">Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.</td> <td data-bbox="1653 699 1785 874">3-4</td> </tr> <tr> <td data-bbox="479 874 640 1026">BAND 1</td> <td data-bbox="640 874 1653 1026">Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.</td> <td data-bbox="1653 874 1785 1026">1-2</td> </tr> <tr> <td colspan="3" data-bbox="479 1026 1785 1066">Award 0 marks for incorrect or irrelevant answers</td> </tr> </tbody> </table>	AO3 2b 6 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4	BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2	Award 0 marks for incorrect or irrelevant answers			AO3 2b [6]	6
AO3 2b 6 marks																				
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6																		
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4																		
BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2																		
Award 0 marks for incorrect or irrelevant answers																				

Q	Science	Maths	<p style="text-align: center;">Paper and boards Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the material identified below.</p> <p>Modelling/prototyping is when design ideas are tested or made to establish whether they are suitable for being developed and/or manufactured on a larger scale.</p> <p>Note: the disadvantages, if referred to, should reflect upon the benefits being evaluated.</p> <p><u>Advantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Explore and test ideas to identify issues which could be costly if manufactured without evaluation of success; • Gives opportunities to test and get feedback from clients to ensure manufacturing what they want; • Opportunities to discuss implementation problems with manufacturing plant; • Ability to manipulate design ideas which is not always possible with paper drawings; • Saves designers wasting time following a design idea that won't work; • Is tangible – the aesthetic of the product can be seen; • Can be used in user trails and user research. <p><u>Disadvantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Designers can easily make assumptions about how accurately a model represents reality; • It may not work/function like the final product needs to; • Might not be made of the same material – so won't reflect fully the function/purpose/aesthetic of the end product; • Time consuming to make; • Skill needed to produce accurately; • Can be costly (prototypes). <p><i>Credit any other appropriate response.</i></p>		
				Total	25

Question 6: Natural and manufactured timbers

Q	Science	Maths	<p style="text-align: center;">Natural and manufactured timbers Question or outline of question / Marking scheme</p>	AO	Total
6. (a) (i)			<p>The picture below is of a child's toy made from natural timber.</p> <p>State the name of the component used to join the wheels to the toy. [1]</p> <p><i>Acceptable answers for component used to join the wheels to the toy: Dowel/Spindle/Axle.</i></p>	AO4 1a [1]	1
(ii)			<p>State the name of the machine used to create the animal's eye in the child's toy. [1]</p> <p><i>Only acceptable answer: Pillar Drill, Hand or Electric Drill, Portable/Rechargeable Power Drill, Press Drill.</i></p>	AO4 1b [1]	1
(iii)			<p>The child's toys have different finishes applied. Explain why a finish is used. [2]</p> <p>Up to 2 marks can be awarded for a clear explanation of staining the wood to create different coloured finishes on the wood or using a clear oil or varnish to give the wood a natural patina.</p> <p>For example: Different tints of colour can be achieved by staining the wood unless the natural colour is kept and then an oil or clear varnish would be added so as to keep the natural colour of the wood used.</p> <p>Stain and varnish are also available in one finish as well.</p> <p>Additionally:</p> <ul style="list-style-type: none"> • a finish will be applied to attract the target user, grabbing their attention; • a finish protects the toy and ensures ease of cleaning. <p><i>Credit any other appropriate response.</i></p>	AO4 2b [2]	2

Q	Science	Maths	<p style="text-align: center;">Natural and manufactured timbers Question or outline of question / Marking scheme</p>	AO	Total										
(iv)			<p>The image below shows a piece of equipment used to finish parts of the child's toy.</p> <p>State the name of this piece of equipment. [1]</p> <p><i>Only acceptable answer for this piece of equipment: Disc Sander. (Sanding Machine is acceptable)</i></p>	AO4 2c [1]	1										
(v)			<p>The wooden toy has been constructed using a rectangular timber block. Describe how to manufacture the body of the child's toy.</p> <p>Award up to 4 marks for answers that demonstrate a clear understanding of the stages needed to manufacture the main body of the natural timber toy.</p> <p><i>Responses could be based on:</i></p> <ol style="list-style-type: none"> 1. Create a template (by hand or through CAD) in order to mark out identical main body parts (1) 2. Mark out the main body of the toy using the template and a pencil (1) 3. Cut out the shape using a jig saw/scroll saw/band saw/coping saw (1) 4. Use a disc sander to finish external curves and hand sand the more intricate internal curves using hand sand/glass paper (1) 5. Drill the holes for the wheels and the eye of the animal using the pillar drill (1) 6. Sand down the surface of the main body in the direction of the grain using a variety of grades of sand/glass paper (1) 7. Apply a finish. (1) <p><i>Credit any other appropriate response.</i></p>	AO4 2c [4]	4										
(b)		5	<p>A retailer tracked the sales of the child's toy over a 4-month period. The table below displays the data collected.</p> <table border="1" data-bbox="481 1217 1081 1423"> <thead> <tr> <th>Sales (£)</th> <th>Month</th> </tr> </thead> <tbody> <tr> <td>1,500</td> <td>December</td> </tr> <tr> <td>2,500</td> <td>January</td> </tr> <tr> <td>750</td> <td>February</td> </tr> <tr> <td>500</td> <td>March</td> </tr> </tbody> </table>	Sales (£)	Month	1,500	December	2,500	January	750	February	500	March	AO4 1b [3] AO4 1c [2]	5
Sales (£)	Month														
1,500	December														
2,500	January														
750	February														
500	March														

Q	Science	Maths	<p style="text-align: center;">Natural and manufactured timbers Question or outline of question / Marking scheme</p>	AO	Total										
(i)			<p>In the space below draw and label a bar chart showing the sales data found in the table above. [3]</p> <p>Award marks for accuracy of bar chart and correct labelling.</p> <p>Accurate axis labelling (1) Accurate scaling (1) Accurate drawing of bars (1)</p> <p><u>Example below:</u></p> <div style="text-align: center;">  <table border="1" style="margin: 10px auto;"> <caption>Bar chart of sales</caption> <thead> <tr> <th>Month</th> <th>Sales</th> </tr> </thead> <tbody> <tr> <td>December</td> <td>1500</td> </tr> <tr> <td>January</td> <td>2500</td> </tr> <tr> <td>February</td> <td>750</td> </tr> <tr> <td>March</td> <td>500</td> </tr> </tbody> </table> </div> <p><i>Credit any appropriate approach.</i></p>	Month	Sales	December	1500	January	2500	February	750	March	500		
Month	Sales														
December	1500														
January	2500														
February	750														
March	500														

Q	Science	Maths	<p style="text-align: center;">Natural and manufactured timbers Question or outline of question / Marking scheme</p>	AO	Total																
(ii)			<p>The retailer pays 20% Value Added Tax (VAT) on all sales. Calculate how much VAT will need to be paid for the child's toy sales over the 4-month period. Show all workings. [2]</p> <p>Calculate total sales: $£1,500 + £2,500 + £750 + £500 = £5,250$ (1)</p> <p>Calculate VAT: $£5,250/100 \times 20 = £1,050$ (1)</p> <p><i>Credit any appropriate approach to calculating the 20% VAT. All workings should be shown in response.</i></p>																		
(c)			<p>Pine and oak are natural timbers used to manufacture the child's toy.</p> <p>Analyse the impact deforestation and converting natural timbers has on our ecological footprint. [5]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 810 1778 1374"> <thead> <tr> <th colspan="3" data-bbox="479 810 1778 852">AO3 2a 5 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 852 640 1023">BAND 3</td> <td data-bbox="640 852 1639 1023">A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.</td> <td data-bbox="1639 852 1778 1023" style="text-align: center;">4-5</td> </tr> <tr> <td data-bbox="479 1023 640 1193">BAND 2</td> <td data-bbox="640 1023 1639 1193">Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.</td> <td data-bbox="1639 1023 1778 1193" style="text-align: center;">2-3</td> </tr> <tr> <td data-bbox="479 1193 640 1334">BAND 1</td> <td data-bbox="640 1193 1639 1334">Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.</td> <td data-bbox="1639 1193 1778 1334" style="text-align: center;">1</td> </tr> <tr> <td colspan="3" data-bbox="479 1334 1639 1374">Award 0 marks for incorrect or irrelevant answers</td> <td data-bbox="1639 1334 1778 1374"></td> </tr> </tbody> </table>	AO3 2a 5 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3	BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1	Award 0 marks for incorrect or irrelevant answers				AO3 2a [5]	5
AO3 2a 5 marks																					
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5																			
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3																			
BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of cutting down and converting natural wood from trees has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1																			
Award 0 marks for incorrect or irrelevant answers																					

Q	Science	Maths	<p style="text-align: center;">Natural and manufactured timbers Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the points identified below.</p> <p>Cutting down and converting trees into planks of wood has a negative impact on our ecological footprint unless the wood comes from managed sources.</p> <p>These include:</p> <p><u>Negative:</u></p> <ul style="list-style-type: none"> • Hard wood trees such as oak take a very long time to grow compared to softwoods like pine; • Trees help produce carbon dioxide and help prevent global warming; • Converting tree trunks into planks involves using energy and nearly always involves transportation from the land to converting factory units; this can cause air pollution and use of non-renewable energy resources; • Deforestation cutting down trees has a negative impact upon the environment and climate change. <p><u>Positive:</u></p> <ul style="list-style-type: none"> • Managed wood sources are managed in such a way as when a tree is cut down it is replaced with a new one; • Fast growing softwood trees are mainly used as they take less time to grow creating their own lifecycle; • Waste wood is used to make other manmade boards; • The same land is used and not cleared leaving gaps in the landscape; • Converting factories are located at the source of the wood to avoid unnecessary transportation. <p><i>Credit any other appropriate response.</i></p>		

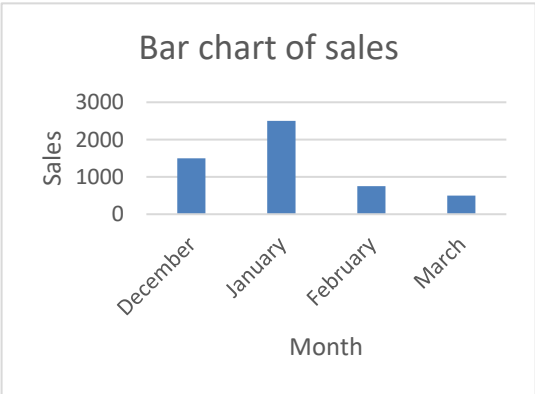
Q	Science	Maths	<p style="text-align: center;">Natural and manufactured timbers Question or outline of question / Marking scheme</p>	AO	Total															
(d)			<p>Evaluate why prototyping and modelling design ideas benefits both the designer and the manufacturer when designing a child’s toy. [6]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="481 478 1774 1066"> <thead> <tr> <th colspan="3" data-bbox="481 478 1774 523">AO3 2b 6 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="481 523 640 699">BAND 3</td> <td data-bbox="640 523 1639 699">A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.</td> <td data-bbox="1639 523 1774 699">5-6</td> </tr> <tr> <td data-bbox="481 699 640 874">BAND 2</td> <td data-bbox="640 699 1639 874">Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.</td> <td data-bbox="1639 699 1774 874">3-4</td> </tr> <tr> <td data-bbox="481 874 640 1026">BAND 1</td> <td data-bbox="640 874 1639 1026">Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.</td> <td data-bbox="1639 874 1774 1026">1-2</td> </tr> <tr> <td colspan="3" data-bbox="481 1026 1774 1066">Award 0 marks for incorrect or irrelevant answers</td> </tr> </tbody> </table>	AO3 2b 6 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4	BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2	Award 0 marks for incorrect or irrelevant answers			AO3 2b [6]	6
AO3 2b 6 marks																				
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6																		
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4																		
BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2																		
Award 0 marks for incorrect or irrelevant answers																				

Q	Science	Maths	<p style="text-align: center;">Natural and manufactured timbers Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive, and candidates are not expected to refer to all the material identified below.</p> <p>Modelling/prototyping is when design ideas are tested or made to establish whether they are suitable for being developed and/or manufactured on a larger scale.</p> <p>Note: the disadvantages, if referred to, should reflect upon the benefits being evaluated.</p> <p><u>Advantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Explore and test ideas to identify issues which could be costly if manufactured without evaluation of success; • Gives opportunities to test and get feedback from clients to ensure manufacturing what they want; • Opportunities to discuss implementation problems with manufacturing plant; • Ability to manipulate design ideas which is not always possible with paper drawings; • Saves designers wasting time following a design idea that won't work; • Is tangible – the aesthetic of the product can be seen; • Can be used in user trails and user research. <p><u>Disadvantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Designers can easily make assumptions about how accurately a model represents reality; • It may not work/function like the final product needs to; • Might not be made of the same material – so won't reflect fully the function/purpose/aesthetic of the end product; • Time consuming to make; • Skill needed to produce accurately; • Can be costly (prototypes). <p><i>Credit any other appropriate response.</i></p>		
				Total	25

Question 6: Ferrous and non-ferrous metals

Q	Science	Maths	<p style="text-align: center;">Ferrous and non-ferrous metals Question or outline of question / Marking scheme</p>	AO	Total
6. (a) (i)			<p>The pictures below are of a child's toy made from machined aluminium.</p> <p>State the name of the component used to attach the wheels of the child's toy.</p> <p><i>Acceptable answer for component used to attach the wheels of the toy: Allen Key Bolt or Bolt.</i></p>	AO4 1a [1]	1
(ii)			<p>State the name of the machine used to create the axle holes in the wheels of the child's toy.</p> <p><i>Acceptable answer: Pillar Drill or Lathe. (Hand or Electric Drill is acceptable).</i></p>	AO4 1b [1]	1
(iii)			<p>The child's toys have different finishes applied. Explain why a finish is used.</p> <p>A finish is applied to the child's toy for the following reasons:</p> <p>To protect the finish of the body or wheels of the car to extend the life of the product. To protect from possible corrosion, children often spill liquids over toys. To allow a manufacture to have a range of car bodies with different colours to increase sales. Add colour as a finish to attract target user.</p> <p><i>Students could mention any of the following 3 methods of colouring aluminium:</i></p> <ol style="list-style-type: none"> 1. Spray Painting: The coloured finish is added in two parts as a primer base coat followed by a top-coat of gloss, satin or matt finishes. Primer is added to allow the top-coat to adhere to the surface. 2. Electrolytic Colouring: After anodizing, the metal is immersed in a bath containing an inorganic metal salt. Current is applied which deposits the metal salt in the base of the pores. The resulting colour is dependent on the metal used and the processing conditions (the range of colours can be expanded by overdyeing the organic dyes). 3. Polishing: The natural aluminium can be polished using a buffing wheel as a natural finish. 	AO4 2b [2]	2

Q	Science	Maths	<p style="text-align: center;">Ferrous and non-ferrous metals Question or outline of question / Marking scheme</p>	AO	Total										
(iv)			<p>The image below shows a piece of equipment used to finish some parts of the child's toy.</p> <p>State the name of this piece of equipment. [1]</p> <p><i>Only acceptable answer for this piece of equipment:</i> Buffer/Buffering wheel/Polishing/Polisher wheel.</p>	AO4 2c [1]	1										
(v)			<p>The child's toy car wheels have been machined from an aluminium round bar. Describe how to manufacture the wheels of the toy.</p> <p>Award up to 4 marks for answers that demonstrate a clear understanding of the stages needed to manufacture the wheels of the car.</p> <p><i>Responses could be based on:</i></p> <ol style="list-style-type: none"> 1. Using a centre lathe turn the aluminium bar/rod down to the required diameter of the wheel (1) 2. Turn grooves for tyre tread into aluminium bar (1) 3. Centre drill the hole in the centre of the wheel on the lathe using the tailstock (1) 4. Shape the axle of the wheel using the lathe (1) 5. Part off the wheel part ready to use (1) 6. Surface finish the wheel before attaching to the car-body. Polish or buffing (1) <p><i>Credit any other appropriate response.</i></p>	AO4 2c [4]	4										
(b)		5	<p>A retailer tracked the sales of the child's toy over a 4-month period. The table below displays the data collected.</p> <table border="1" data-bbox="479 1137 1079 1347"> <thead> <tr> <th>Sales (£)</th> <th>Month</th> </tr> </thead> <tbody> <tr> <td>1,500</td> <td>December</td> </tr> <tr> <td>2,500</td> <td>January</td> </tr> <tr> <td>750</td> <td>February</td> </tr> <tr> <td>500</td> <td>March</td> </tr> </tbody> </table>	Sales (£)	Month	1,500	December	2,500	January	750	February	500	March	AO4 1b [3] AO4 1c [2]	5
Sales (£)	Month														
1,500	December														
2,500	January														
750	February														
500	March														

Q	Science	Maths	Ferrous and non-ferrous metals Question or outline of question / Marking scheme	AO	Total										
(i)			<p>In the space below, draw and label a bar chart showing the sales data found in the table above. [3]</p> <p>Award marks for accuracy of bar chart and correct labelling.</p> <p>Accurate axis labelling (1) Accurate scaling (1) Accurate drawing of bars (1)</p> <p>Example below:</p>  <table border="1" data-bbox="479 624 1012 1019"> <caption>Bar chart of sales</caption> <thead> <tr> <th>Month</th> <th>Sales</th> </tr> </thead> <tbody> <tr> <td>December</td> <td>1500</td> </tr> <tr> <td>January</td> <td>2500</td> </tr> <tr> <td>February</td> <td>750</td> </tr> <tr> <td>March</td> <td>500</td> </tr> </tbody> </table>	Month	Sales	December	1500	January	2500	February	750	March	500		
Month	Sales														
December	1500														
January	2500														
February	750														
March	500														
(ii)			<p>The retailer pays 20% Value Added Tax (VAT) on all sales. Calculate how much VAT will need to be paid for the child's toy sales over the 4-month period. <i>Show all workings.</i> [2]</p> <p>Calculate total sales: $£1,500 + £2,500 + £750 + £500 = £5,250$ (1)</p> <p>Calculate VAT: $£5,250/100 \times 20 = £1,050$ (1)</p> <p><i>Credit any appropriate approach to calculating the 20% VAT. All workings should be shown in response.</i></p>												

Q	Science	Maths	<p align="center">Ferrous and non-ferrous metals Question or outline of question / Marking scheme</p>	AO	Total																
(c)			<p>Raw aluminium comes from mining an ore which is then processed into the material used to manufacture the child's toy.</p> <p>Analyse the impact mining aluminium has on our ecological footprint.</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 539 1783 1129"> <thead> <tr> <th colspan="3" data-bbox="479 539 1783 584">AO3 2a 5 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 584 640 762">BAND 3</td> <td data-bbox="640 584 1664 762">A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.</td> <td data-bbox="1664 584 1783 762">4-5</td> </tr> <tr> <td data-bbox="479 762 640 941">BAND 2</td> <td data-bbox="640 762 1664 941">Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.</td> <td data-bbox="1664 762 1783 941">2-3</td> </tr> <tr> <td data-bbox="479 941 640 1086">BAND 1</td> <td data-bbox="640 941 1664 1086">Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.</td> <td data-bbox="1664 941 1783 1086">1</td> </tr> <tr> <td colspan="3" data-bbox="479 1086 1664 1129">Award 0 marks for incorrect or irrelevant answers</td> <td data-bbox="1664 1086 1783 1129"></td> </tr> </tbody> </table>	AO3 2a 5 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3	BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1	Award 0 marks for incorrect or irrelevant answers				AO3 2a [5]	5
AO3 2a 5 marks																					
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5																			
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3																			
BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint of quarrying and extracting the aluminium ore from bauxite using electrolysis has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1																			
Award 0 marks for incorrect or irrelevant answers																					

Q	Science	Maths	<p style="text-align: center;">Ferrous and non-ferrous metals Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the points identified below.</p> <p>These include:</p> <p><u>Negative:</u></p> <ul style="list-style-type: none"> • It takes a lot of energy to quarry the rock that aluminium is extracted from (electrolysis); • The mined rocks or bauxite that contain aluminium have to be transported from the quarry to the place where the aluminium will be extracted; • It takes a lot more energy to extract the aluminium from the bauxite to use; • The extracted aluminium also has to be converted into bars, sections, tubes or sheets to be used; this takes even more energy; • The aluminium is then transported to make products; • Global transport increases global carbon footprint. <p>Credit recycling only if referenced to the reduction of mining raw materials.</p> <p><u>Positive:</u></p> <ul style="list-style-type: none"> • Aluminium is 100% recyclable and can be reused to make alternative products; • Money can be saved if the material is recycled rather than obtained from its natural source; • Factories are located near or at the source of the aluminium to avoid unnecessary transportation. <p><i>Credit any other appropriate response.</i></p>		

Q	Science	Maths	<p align="center">Ferrous and non-ferrous metals Question or outline of question / Marking scheme</p>	AO	Total																
(d)			<p>Evaluate why prototyping and modelling design ideas benefits both the designer and the manufacturer when designing the child's toy.</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 472 1783 1059"> <thead> <tr> <th colspan="3" data-bbox="479 472 1783 517">AO3 2b 6 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 517 640 692">BAND 3</td> <td data-bbox="640 517 1664 692">A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.</td> <td data-bbox="1664 517 1783 692">5-6</td> </tr> <tr> <td data-bbox="479 692 640 868">BAND 2</td> <td data-bbox="640 692 1664 868">Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.</td> <td data-bbox="1664 692 1783 868">3-4</td> </tr> <tr> <td data-bbox="479 868 640 1018">BAND 1</td> <td data-bbox="640 868 1664 1018">Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.</td> <td data-bbox="1664 868 1783 1018">1-2</td> </tr> <tr> <td colspan="3" data-bbox="479 1018 1664 1059">Award 0 marks for incorrect or irrelevant answers</td> <td data-bbox="1664 1018 1783 1059"></td> </tr> </tbody> </table>	AO3 2b 6 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4	BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2	Award 0 marks for incorrect or irrelevant answers				AO3 2b [6]	6
AO3 2b 6 marks																					
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6																			
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4																			
BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2																			
Award 0 marks for incorrect or irrelevant answers																					

Q	Science	Maths	<p align="center">Ferrous and non-ferrous metals Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the material identified below.</p> <p>Modelling/prototyping is when design ideas are tested or made to establish whether they are suitable for being developed and/or manufactured on a larger scale.</p> <p>Note: the disadvantages, if referred to, should reflect upon benefits being evaluated.</p> <p><u>Advantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Explore and test ideas to identify issues which could be costly if manufactured without evaluation of success • Gives opportunities to test and get feedback from clients to ensure manufacturing what they want; • Opportunities to discuss implementation problems with manufacturing plant; • Ability to manipulate design ideas which is not always possible with paper drawings; • Saves designers wasting time following a design idea that won't work; • Is tangible – the aesthetic of the product can be seen; • Can be used in user trails and user research. <p><u>Disadvantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Designers can easily make assumptions about how accurately a model represents reality; • It may not work/function like the final product needs to; • Might not be made of the same material – so won't reflect fully the function/purpose/aesthetic of the end product; • Time consuming to make; • Skill needed to produce accurately; • Can be costly (prototypes). <p><i>Credit any other appropriate response.</i></p>		
				Total	25

Question 6: Thermosetting and thermoforming plastics

Q	Science	Maths	Thermosetting and thermoforming plastics Question or outline of question / Marking scheme	AO	Total
6. (a) (i)			The pictures below show a public bench manufactured from recycled plastic products. State the name of the fixture used to assemble the public bench. [1] <i>Only acceptable answers:</i> Machine screw or, Self-tapping screw, Bolt, Rivet. (Do not accept nail).	AO4 1a [1]	1
(ii)			The public bench has been manufactured from recycled HDPE (High-density polyethylene) plastic. State the name of a product that could have been recycled to make the public bench. [1] For example: milk bottles, carrier bags, cleaning product containers, toys, dustbins/wheelie bins, plastic chairs/slides, detergent bottles. <i>Credit any other appropriate response.</i>	AO4 1b [1]	1
(iii)			Explain why HDPE is an appropriate plastic to use in the manufacture of the public bench. [2] Up to 2 marks can be awarded for a clear explanation as to why HDPE is appropriate. For example: HDPE is a very hard-wearing plastic that does not break down under exposure to sunlight or sudden temperature changes. or HDPE is both recyclable and reusable/remoulded and is the best plastic to use when manufacturing products that need to be durable and weather resistant. Credit any suitable material property. <i>Credit any other appropriate response.</i>	AO4 2b [2]	2

Q	Science	Maths	Thermosetting and thermoforming plastics Question or outline of question / Marking scheme	AO	Total
(iv)			<p>The image below shows a machine used to create holes in the public bench. State the name of the machine. [1]</p> <p>Only acceptable answer is Pillar Drill/Drilling Machine/Press Drill.</p>	AO4 2c [1]	1
(v)			<p>The picture below shows the leg of the public bench assembled. Describe the joining process. [4]</p> <p>Award up to 4 marks for answers that demonstrate a clear understanding of the stages needed to join the leg of the public bench. Responses given by the candidate may relate to answer provided in 6(a)(i).</p> <p><i>Responses could be based on:</i></p> <ol style="list-style-type: none"> 1. Place both the uprights and the cross section together and mark the holes (1) 2. Drill a clearance hole in the upright section (1) 3. Allowing a small tolerance (1) 4. Drill a pilot hole in the cross section (1) 5. Place the sections together to check holes are correct. (1) 6. Countersink the top of the clearance hole (1) 7. Insert fixing and tighten up the joint (1) <p><i>Alternative response could be based on:</i></p> <ol style="list-style-type: none"> 1. Place both uprights and the cross section together and mark the holes (1) 2. Drill a clearance hole in the upright section (1) 3. Drill a pilot hole in the upright section (1) 4. Countersink/Drill the top of the clearance hole for screw/bolt (1) 5. Place the sections together to check alignment and clamp together with a vice/clamp (1) 6. Insert fixing and tighten up the joint with an appropriate tool [Screwdriver, Spanner] (1) <p>Note: any mention of tolerances (1), suitable drill bit sizes (1), suitable fixing sizes e.g. M6-8 (1), self-tapping screw (1), setting depth (1) and quality checks can be awarded marks.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 2c [4]	4

Q	Science	Maths	Thermosetting and thermoforming plastics Question or outline of question / Marking scheme	AO	Total										
(b)		5	A retailer tracked the sales of the public bench over a 4-month period. The table below displays the data collected. <table border="1" data-bbox="481 395 1041 609" style="margin-left: 20px;"> <thead> <tr> <th>Sales (£)</th> <th>Month</th> </tr> </thead> <tbody> <tr> <td>1 500</td> <td>December</td> </tr> <tr> <td>2 500</td> <td>January</td> </tr> <tr> <td>750</td> <td>February</td> </tr> <tr> <td>500</td> <td>March</td> </tr> </tbody> </table>	Sales (£)	Month	1 500	December	2 500	January	750	February	500	March	AO4 1b [3] AO4 1c [2]	5
Sales (£)	Month														
1 500	December														
2 500	January														
750	February														
500	March														
(i)			<p>In the space below, draw and label a bar chart showing the sales data found in the table above. [3]</p> <p>Award marks for accuracy of bar chart and correct labelling.</p> <p>Accurate axis labelling (1) Accurate scaling (1) Accurate drawing of bars (1)</p> <div data-bbox="481 917 1025 1353" style="text-align: center;"> <p>Bar chart of sales</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Month</th> <th>Sales (£)</th> </tr> </thead> <tbody> <tr> <td>December</td> <td>1500</td> </tr> <tr> <td>January</td> <td>2500</td> </tr> <tr> <td>February</td> <td>750</td> </tr> <tr> <td>March</td> <td>500</td> </tr> </tbody> </table> </div> <p><i>Credit any appropriate approach.</i></p>	Month	Sales (£)	December	1500	January	2500	February	750	March	500		
Month	Sales (£)														
December	1500														
January	2500														
February	750														
March	500														

Q	Science	Maths	Thermosetting and thermoforming plastics Question or outline of question / Marking scheme	AO	Total															
(ii)			<p>The retailer pays 20% Value Added Tax (VAT) on all sales. Calculate how much VAT will need to be paid for the public bench sales over the 4-month period. <i>Show all workings.</i> [2]</p> <p>Calculate total sales: $£1,500 + £2,500 + £750 + £500 = £5,250$ (1)</p> <p>Calculate VAT: $£10,250/100 \times 20 = £1,050$ (1)</p> <p><i>Credit any appropriate approach to calculating the 20% VAT.</i></p>																	
(c)			<p>The plastic used to make the public bench comes from recycled plastics. This has an impact on our environment.</p> <p>Analyse the impact recycled plastics have on our ecological footprint. [5]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 890 1778 1377"> <thead> <tr> <th colspan="3" data-bbox="479 890 1778 935">AO3 2a 5 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 935 640 1078">BAND 3</td> <td data-bbox="640 935 1675 1078">A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.</td> <td data-bbox="1675 935 1778 1078">4-5</td> </tr> <tr> <td data-bbox="479 1078 640 1222">BAND 2</td> <td data-bbox="640 1078 1675 1222">Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.</td> <td data-bbox="1675 1078 1778 1222">2-3</td> </tr> <tr> <td data-bbox="479 1222 640 1334">BAND 1</td> <td data-bbox="640 1222 1675 1334">Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.</td> <td data-bbox="1675 1222 1778 1334">1</td> </tr> <tr> <td colspan="3" data-bbox="479 1334 1778 1377">Award 0 marks for incorrect or irrelevant answers</td> </tr> </tbody> </table>	AO3 2a 5 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3	BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1	Award 0 marks for incorrect or irrelevant answers			AO3 2a [5]	5
AO3 2a 5 marks																				
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5																		
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3																		
BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint recycling plastics has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1																		
Award 0 marks for incorrect or irrelevant answers																				

Q	Science	Maths	Thermosetting and thermoforming plastics Question or outline of question / Marking scheme	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the points identified below.</p> <p>These include:</p> <p><u>Negative:</u></p> <ul style="list-style-type: none"> • The collection of discarded plastic with lots of waste not making it to the recycling centre; • The vehicles used for collection are heavy pollutants particularly during low-speed collections; • Not all plastics collected can or will be recycled. The percentage of plastics recycled is still very low; • The act of recycling creates lots of pollution, with many harmful gases created escaping into the atmosphere; • Plastics are broken down during recycling and inevitably escape in the form of micro plastics into the outside world and water courses. <p><u>Positive:</u></p> <ul style="list-style-type: none"> • Repurposing of plastic stops the whole product ending up in landfill; • Recycling products into ‘plastic lumber’ reduces the need to harvest natural timber; • Some recycled plastics can replace other resources and fossil fuels such as oil. <p>Whilst it is preferable candidates are able to identify both positive and negative issues surrounding recycling plastics, some candidates may refer to recycling as only being positive and not present an argument about the negative issues surrounding the topic. However, should the candidate’s response contain plenty of detail and analytical comment about the positive aspects of recycling, then this should be given credit.</p> <p><i>Credit any other appropriate response.</i></p>		

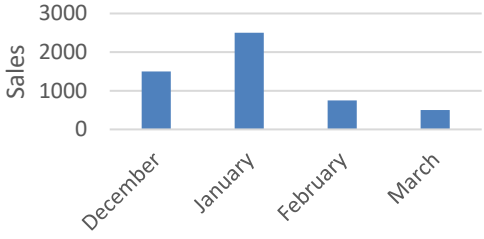
Q	Science	Maths	Thermosetting and thermoforming plastics Question or outline of question / Marking scheme	AO	Total															
(d)			<p>Evaluate why prototyping and modelling design ideas benefit both the designer and the manufacturer when designing a public bench. [6]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 466 1771 1054"> <thead> <tr> <th colspan="3" data-bbox="479 466 1771 507">AO3 2b 6 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 507 640 687">BAND 3</td> <td data-bbox="640 507 1639 687">A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.</td> <td data-bbox="1639 507 1771 687">5-6</td> </tr> <tr> <td data-bbox="479 687 640 868">BAND 2</td> <td data-bbox="640 687 1639 868">Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly substantiated judgements in a response which is generally well structured.</td> <td data-bbox="1639 687 1771 868">3-4</td> </tr> <tr> <td data-bbox="479 868 640 1011">BAND 1</td> <td data-bbox="640 868 1639 1011">Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.</td> <td data-bbox="1639 868 1771 1011">1-2</td> </tr> <tr> <td colspan="3" data-bbox="479 1011 1771 1054">Award 0 marks for incorrect or irrelevant answers</td> </tr> </tbody> </table>	AO3 2b 6 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly substantiated judgements in a response which is generally well structured.	3-4	BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2	Award 0 marks for incorrect or irrelevant answers			AO3 2b [6]	6
AO3 2b 6 marks																				
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6																		
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly substantiated judgements in a response which is generally well structured.	3-4																		
BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2																		
Award 0 marks for incorrect or irrelevant answers																				

Q	Science	Maths	Thermosetting and thermoforming plastics Question or outline of question / Marking scheme	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive, and candidates are not expected to refer to all the material identified below.</p> <p>Modelling/prototyping is when design ideas are tested or made to establish whether they are suitable for being developed and/or manufactured on a larger scale.</p> <p>Note: the disadvantages, if referred to, should reflect upon the benefits being evaluated.</p> <p><u>Advantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Explore and test ideas to identify issues which could be costly if manufactured without evaluation of success; • Gives opportunities to test and get feedback from clients to ensure manufacturing what they want; • Opportunities to discuss implementation problems with manufacturing plant; • Ability to manipulate design ideas which is not always possible with paper drawings; • Saves designers wasting time following a design idea that won't work; • Is tangible – the aesthetic of the product can be seen; • Can be used in user trails and user research. <p><u>Disadvantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Designers can easily make assumptions about how accurately a model represents reality; • It may not work/function like the final product needs to; • Might not be made of the same material – so won't reflect fully the function/purpose/aesthetic of the end product; • Time consuming to make; • Skill needed to produce accurately; • Can be costly (prototypes). <p><i>Credit any other appropriate response.</i></p>		
				Total	25

Question 6: Fibres and textiles

Q	Science	Maths	<p style="text-align: center;">Fibres and textiles Question or outline of question / Marking scheme</p>	AO	Total
6. (a) (i)			<p>The picture below is of a skirt made from a blend of wool and silk.</p> <p>State the name of the component used to fasten the skirt. [1]</p> <p><i>Only acceptable answer for component fastening: zip</i></p>	AO4 1a [1]	1
(ii)			<p>The skirt is constructed using darts. State the function of a dart. [1]</p> <p>The function of a dart is to give shape (1) to a piece of fabric so that it can fit the contours of the body.</p> <p><i>Do not accept answers that describe how to sew a dart or what it may look like. This question is about the function of the dart.</i></p> <p><i>Credit any other appropriate response.</i></p>	AO4 1b [1]	1
(iii)			<p>The skirt's waistband is interfaced. Explain why interfacing is used in clothing construction. [2]</p> <p>Up to 2 marks can be awarded for a clear explanation as to why interfacing is used in clothing construction.</p> <p>For example: Interfacing is attached to the main fabric to give it support or structure. It would prevent the waistband from creasing and losing its form.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 2b [2]	2

Q	Science	Maths	<p style="text-align: center;">Fibres and textiles Question or outline of question / Marking scheme</p>	AO	Total
(iv)			<p>The image below shows a piece of equipment used to edge finish the skirt's seams. State the name of the piece of equipment.</p> <p><i>Only acceptable answer for this piece of equipment: overlocker</i></p>	AO4 2c [1]	1
(v)			<p>The picture below shows how the skirt's plain seams could be edge finished with bias binding. Describe how to manufacture the seam.</p> <p>Award up to 4 marks for answers that demonstrate a clear understanding of the stages needed to manufacture the seam and its edge finish. A maximum of 3 marks can be awarded if bias binding, as the edge finish, has not been referred to in the answer provided.</p> <p><i>Responses could be based on:</i></p> <ol style="list-style-type: none"> 1. Place right sides of the fabric together (1) 2. Stitch fabric together using a running stitch (1) 3. Ensure seam allowance is 1.5cm (1) 4. Using an iron press seam allowances open (so they lie flat) (1) 5. Fold bias binding in half or press with an iron (1) or open bias binding up stitching one side to one edge of seam (1). Repeat for second side of seam. 6. Tack/stitch bias binding in place (using a running stitch or slip stitching) (1) 7. Press all with an iron (1) <p>Note: any mention of trimming loose threads (1), tucking under bias binding ends (1), matching thread colour to fabric (1), although quality checks can be awarded marks.</p> <p><i>Credit any other appropriate response.</i></p>	AO4 2c [4]	4

Q	Science	Maths	<p style="text-align: center;">Fibres and textiles Question or outline of question / Marking scheme</p>	AO	Total										
(b)		5	<p>A retailer tracked the sales of the skirt over a 4-month period. The table below displays the data collected.</p> <table border="1" data-bbox="481 405 1041 622"> <thead> <tr> <th>Sales (£)</th> <th>Month</th> </tr> </thead> <tbody> <tr> <td>1 500</td> <td>December</td> </tr> <tr> <td>2 500</td> <td>January</td> </tr> <tr> <td>750</td> <td>February</td> </tr> <tr> <td>500</td> <td>March</td> </tr> </tbody> </table>	Sales (£)	Month	1 500	December	2 500	January	750	February	500	March	AO4 1b [3] AO4 1c [2]	5
Sales (£)	Month														
1 500	December														
2 500	January														
750	February														
500	March														
(i)			<p>In the space below, draw and label a bar chart showing the sales data found in the table above. [3]</p> <p>Award marks for accuracy of bar chart and correct labelling.</p> <p>Accurate axis labelling (1) Accurate scaling (1) Accurate drawing of bars (1)</p> <div data-bbox="481 930 1025 1329" style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Bar chart of sales</p>  <table border="1" data-bbox="517 1018 999 1257"> <caption>Data for Bar chart of sales</caption> <thead> <tr> <th>Month</th> <th>Sales (£)</th> </tr> </thead> <tbody> <tr> <td>December</td> <td>1 500</td> </tr> <tr> <td>January</td> <td>2 500</td> </tr> <tr> <td>February</td> <td>750</td> </tr> <tr> <td>March</td> <td>500</td> </tr> </tbody> </table> </div> <p><i>Credit any appropriate approach</i></p>	Month	Sales (£)	December	1 500	January	2 500	February	750	March	500		
Month	Sales (£)														
December	1 500														
January	2 500														
February	750														
March	500														

Q	Science	Maths	<p style="text-align: center;">Fibres and textiles Question or outline of question / Marking scheme</p>	AO	Total																
(ii)			<p>The retailer pays 20% Value Added Tax (VAT) on all sales. Calculate how much VAT will need to be paid for the skirt sales over the 4-month period. <i>Show all workings.</i> [2]</p> <p>Calculate total sales: $£1,500 + £2,500 + £750 + £500 = £5,250$ (1)</p> <p>Calculate VAT: $£5,250/100 \times 20 = £1,050$ (1)</p> <p><i>Credit any appropriate approach to calculating the 20% VAT.</i></p>																		
(c)			<p>Wool and silk are natural protein fibres and were used for the fabric of the skirt.</p> <p>Analyse the impact farming these fibres has on our ecological footprint. [5]</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="481 858 1767 1390"> <thead> <tr> <th colspan="3" data-bbox="481 858 1767 900">AO3 2a 5 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="481 900 640 1038">BAND 3</td> <td data-bbox="640 900 1630 1038">A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.</td> <td data-bbox="1630 900 1767 1038" style="text-align: center;">4-5</td> </tr> <tr> <td data-bbox="481 1038 640 1209">BAND 2</td> <td data-bbox="640 1038 1630 1209">Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.</td> <td data-bbox="1630 1038 1767 1209" style="text-align: center;">2-3</td> </tr> <tr> <td data-bbox="481 1209 640 1348">BAND 1</td> <td data-bbox="640 1209 1630 1348">Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.</td> <td data-bbox="1630 1209 1767 1348" style="text-align: center;">1</td> </tr> <tr> <td colspan="3" data-bbox="481 1348 1630 1390">Award 0 marks for incorrect or irrelevant answers</td> <td data-bbox="1630 1348 1767 1390"></td> </tr> </tbody> </table>	AO3 2a 5 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3	BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1	Award 0 marks for incorrect or irrelevant answers				AO3 2a [5]	5
AO3 2a 5 marks																					
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	4-5																			
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	2-3																			
BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the ecological footprint farming natural protein fibres has on the planet. There will be limited evidence of relevant examples or a logical chain of reasoning.	1																			
Award 0 marks for incorrect or irrelevant answers																					

Q	Science	Maths	<p style="text-align: center;">Fibres and textiles Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the points identified below.</p> <p>Farming wool and silk has both positive and negative impact on our ecological footprint. These include:</p> <p><u>Negative:</u></p> <ul style="list-style-type: none"> • Land can be damaged by sheep – in constant use and over grazing; • Sheep are treated with insecticides (to control hair damaging mites) and these contaminate the soil and water sources; • Sheep – due to large numbers – produce large amounts of the greenhouse gas methane; • Silk is mainly produced in commercial farms that destroy the pupae/moth so the silk thread remains continuous in length. This method of farming has been criticised by welfare activists and vegetarians as being cruel; • Processing – cleaning/bleaching/dying – needs enormous amounts of water which can be released back into the environment as a contaminate; • Processing of fibres nearly always involves transportation from farm to processing units which causes air pollution, use of non-renewable energy resources and packaging. <p><u>Positive:</u></p> <ul style="list-style-type: none"> • Livestock that produce wool are free to roam on land that is unsuitable for crop growth, maintaining and fertilising the land; • Wool and silk are biodegradable in comparison to synthetic fibres, and they don't use non-renewable resources for their 'growth' or 'production'; • Silk is a renewable resource and if organic silk worms are left to naturally follow their own lifecycle. <p>Candidates may refer to wool and silk as being more ecologically sound than synthetic fibres (e.g. polyester and nylon which use non renewable resources (fossil fuels). This would be deemed an analytical comment and should be given credit.</p> <p><i>Credit any other appropriate response.</i></p>		

Q	Science	Maths	<p style="text-align: center;">Fibres and textiles Question or outline of question / Marking scheme</p>	AO	Total																
(d)			<p>Evaluate why prototyping and modelling design ideas benefit both the designer and the manufacturer when designing a skirt.</p> <p>Band descriptors and mark allocations</p> <table border="1" data-bbox="479 478 1767 1066"> <thead> <tr> <th colspan="3" data-bbox="479 478 1767 523">AO3 2b 6 marks</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 523 640 699">BAND 3</td> <td data-bbox="640 523 1630 699">A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.</td> <td data-bbox="1630 523 1767 699" style="text-align: center;">5-6</td> </tr> <tr> <td data-bbox="479 699 640 874">BAND 2</td> <td data-bbox="640 699 1630 874">Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.</td> <td data-bbox="1630 699 1767 874" style="text-align: center;">3-4</td> </tr> <tr> <td data-bbox="479 874 640 1023">BAND 1</td> <td data-bbox="640 874 1630 1023">Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.</td> <td data-bbox="1630 874 1767 1023" style="text-align: center;">1-2</td> </tr> <tr> <td colspan="3" data-bbox="479 1023 1630 1066">Award 0 marks for incorrect or irrelevant answers</td> <td data-bbox="1630 1023 1767 1066"></td> </tr> </tbody> </table>	AO3 2b 6 marks			BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6	BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4	BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2	Award 0 marks for incorrect or irrelevant answers				AO3 2b [6]	6
AO3 2b 6 marks																					
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	5-6																			
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	3-4																			
BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate why prototyping design ideas benefits both the designer and the manufacturer. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	1-2																			
Award 0 marks for incorrect or irrelevant answers																					

Q	Science	Maths	<p style="text-align: center;">Fibres and textiles Question or outline of question / Marking scheme</p>	AO	Total
			<p>Indicative content</p> <p>This content is not prescriptive and candidates are not expected to refer to all the material identified below.</p> <p>Modelling/prototyping is when design ideas are tested or made to establish whether they are suitable for being developed and/or manufactured on a larger scale.</p> <p>Note: the disadvantages, if referred to, should reflect upon the benefits being evaluated.</p> <p><u>Advantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Explore and test ideas to identify issues which could be costly if manufactured without evaluation of success; • Gives opportunities to test and get feedback from clients to ensure manufacturing what they want; • Opportunities to discuss implementation problems with manufacturing plant; • Ability to manipulate design ideas which is not always possible with paper drawings; • Saves designers wasting time following a design idea that won't work; • Is tangible – handle/drape and aesthetic of the product can be seen; • Can be used in user trails and user research. <p><u>Disadvantages of prototyping/modelling:</u></p> <ul style="list-style-type: none"> • Designers can easily make assumptions about how accurately a model represents reality • It may not work/function like the final product needs to; • Might not be made of the same material – so won't reflect fully the function/purpose/aesthetic of the end product; • Time consuming to make; • Skill needed to produce accurately; • Can be costly (prototypes). <p><i>Credit any other appropriate response.</i></p>		
				Total	25