OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

GENERAL CERTIFICATE OF SECONDARY EDUCATION

DESIGN AND TECHNOLOGY: RESISTANT MATERIALS **J306**

Unit A565 Sustainability and technical aspects of designing and making

Candidates answer on the question paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Duration: 1 hour 30 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions in Section A **and** Section B.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.
- Do not write in Bar Codes.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with an asterisk (*).
- The number of marks for each question is given in brackets **[ ]** at the end of the question or part question.
- Dimensions are in millimetres unless stated otherwise.
- The total number of marks for this paper is **80**.
- This document consists of **16** pages. Any blank pages are indicated.

For Examiner's Use		
	Max	**Mark**
1	**1**	
2	**1**	
3	**1**	
4	**1**	
5	**1**	
6	**1**	
7	**1**	
8	**1**	
9	**1**	
10	**1**	
11	**1**	
12	**1**	
13	**1**	
14	**1**	
15	**1**	
16	**20**	
17	**15**	
18	**15**	
19	**15**	
TOTAL	**80**	

Turn over

Section A

Answer **all** questions**.**

On Questions 1 – 5 circle your answer

1 Which of the following is a renewable energy resource?

(a) Gas

(b) Oil

(c) Solar

(d) Coal **[1]**

2 The final stage of a life cycle assessment of a product is

(a) Disposal of the product

(b) Transporting the product

(c) Rethinking the product

(d) Using the product **[1]**

3 Anthropometrics is the name given to the measurement of :

(a) A product

(b) Production

(c) Sales

(d) People **[1]**

4 An example of a sustainable resistant material is:

(a) Pine

(b) Acrylic

(c) Aluminium

(d) Gold **[1]**

5 An example of a material that will deteriorate if left outside without a suitable surface treatment is

(a) Polyvinylchloride (PVC)

(b) Mild steel

(c) Nylon

(d) Stainless steel **[1]**

6 State the meaning of the symbol shown

.....**[1]**

7 State the meaning of the term ‘reforestation’:

.....**[1]**

8 What do the letters COSHH stand for?

.....**[1]**

9 State the meaning of the term ‘eco footprint’

.....**[1]**

10 Name the group of materials whose properties can change due to changes in pressure, force, light or temperature.

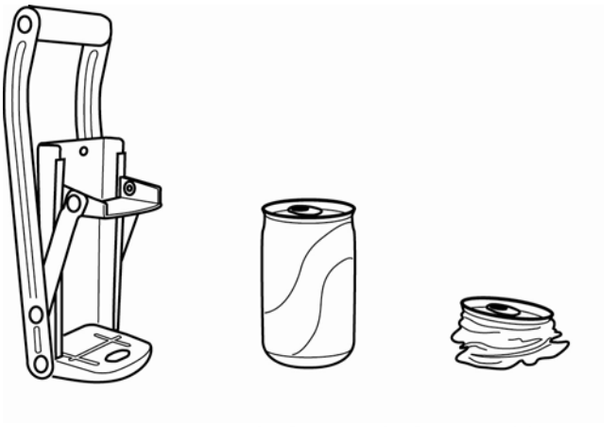
.....**[1]**

Decide whether the statement is **true** or **false**.

Tick (✓) the box to show your answer.

		True	False	
11	Grinding up thermoplastic products and remoulding them into new products is an example of primary recycling	☐	☐	**[1]**
12	Biodegradable means that a product will rot naturally in the environment	☐	☐	**[1]**
13	The recycling of aluminium drinks cans uses more energy than making new aluminium	☐	☐	**[1]**
14	Cultural issues are when designers consider ways in which people behave and relate to each other	☐	☐	**[1]**
15	Ergonomics is how products interact with people	☐	☐	**[1]**

16 Fig.1 shows a can crusher.



can before and after crushing

Fig. 1

(a) Explain what is meant by the term product analysis.

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..... **[3]**

(b) Disassembly is a good way of learning about a product. List **four** pieces of information that could be found from disassembly of the can crusher.

1.....

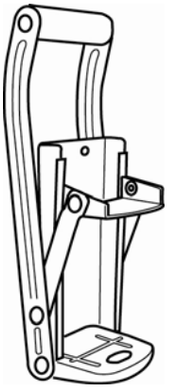
2.....

3.....

4..... **[4]**

(c) When the can crusher is being used it often falls over.

Produce an annotated sketch to show how the design could be developed to improve the can crusher when in use.



[3]

(d) Explain **two** reasons why the consumer would consider the can crusher to be an environmentally friendly product.

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..... **[4]**

(e)* Discuss why the properties of aluminium products and plastics products make them suitable for recycling.
Marks will be awarded for the quality of written communication in your answer.

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.... **[6]**

Section B

Answer **all** questions

17 Fig. 2 shows an incomplete design for a wall-mounted kitchen roll holder. The metal rod is made from aluminium.

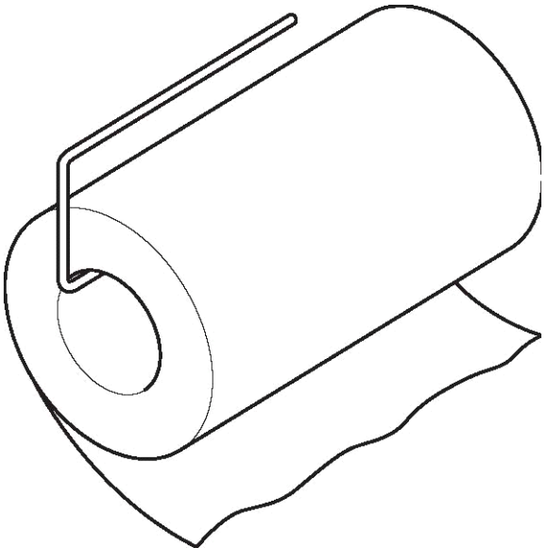

Fig 2

(a) The aluminium rod is normally self-finished. Explain the term self-finished.

.....

..... **[1]**

(b) Other than paint, name **one** form of coloured, decorative finish that could be applied to aluminium.

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..... **[1]**

(c) Describe how you would produce **one** of the bends in the aluminium rod.

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..... **[3]**

(d) Using sketches and notes show how the kitchen roll holder could be wall-mounted, include details of materials and any fittings used.

[4]

(e) The aluminium rod could be replaced with stainless steel rod. Name **two** properties of stainless steel and explain why these properties make it more suitable than aluminium for the kitchen roll holder.

1.....

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2.....

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..... **[4]**

Fig. 3 shows two types of kitchen roll holder.

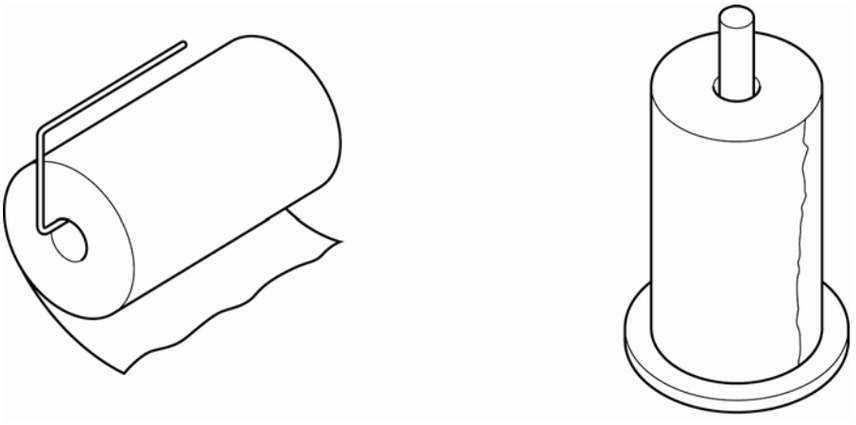

Fig. 3

wall-mounted freestanding

(f) Give **two** reasons why consumers may prefer to purchase a wall-mounted kitchen roll holder rather than a freestanding kitchen roll holder.

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..... **[2]**

18 Fig. 4 shows details of a sit-on toy made mainly from plywood. The sit-on toy is supplied as a flat-pack for self-assembly.

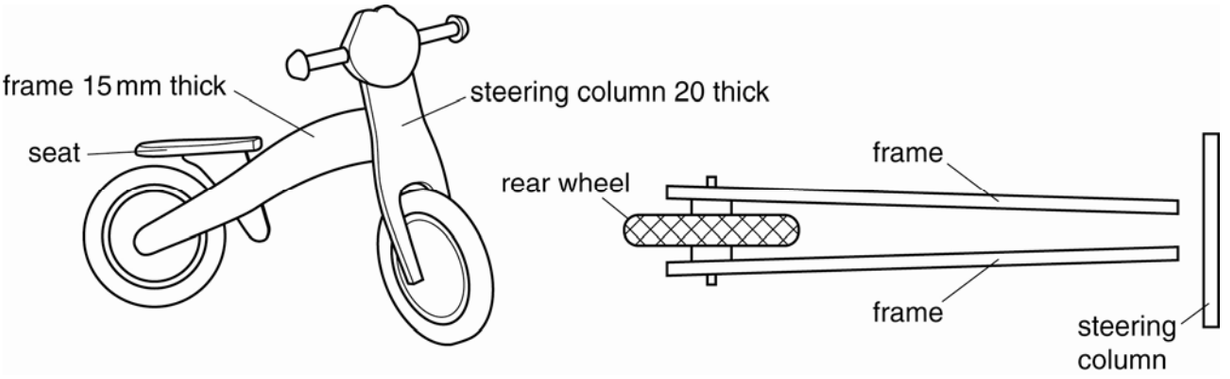

Fig. 4

(a) Give **two** advantages other than cost, of using plywood rather than solid wood for the sit-on toy.

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..... **[2]**

(b) The toy is supplied as a flat-pack for self-assembly. Using sketches and notes, design a joint to allow the steering column to be connected to the frames, while allowing the toy to be steered. Name the tools that would be needed by the consumer to carry out this part of the construction.

[5]

(c)* Explain why it is important to consider the physical and aesthetic properties of materials when designing toys for children.
Marks will be awarded for the quality of written communication in your answer.

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.... **[6]**

(d) Name **two** quality control operations that would be carried out on the sit-on toy during its construction.

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..... **[2]**

19 Fig. 5 shows views of a glass mirror with a front and back made from MDF

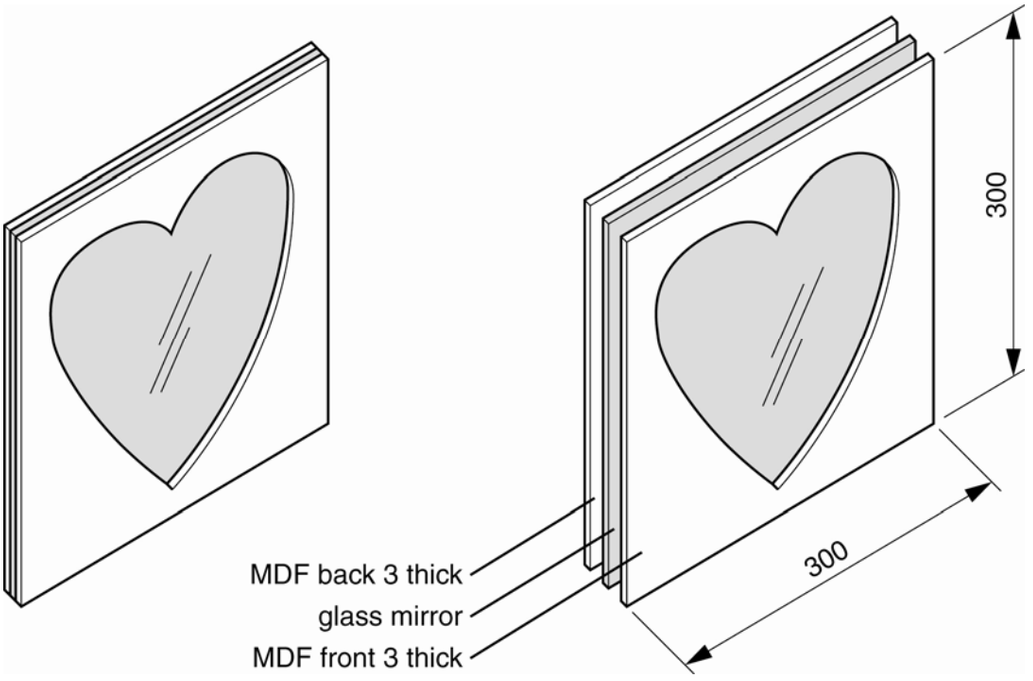

Fig. 5

(a) Complete the table below by describing the processes used to produce the heart shape in the MDF front.

Stage	Processes	Tools / items of equipment
1		Template
2		Saw tooth bit
3		Coping saw
4		Half-round file

[4]

(b) Give **one** reason why the MDF front would be finished with paint rather than clear varnish.

.....

..... **[1]**

The glass mirror will be fixed to the MDF by means of epoxy resin adhesive [glue].

(c) **(i)** Describe how the epoxy resin adhesive would be prepared.

.....

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..... **[2]**

(ii) Describe how the glass mirror and MDF would be held together while the epoxy resin adhesive sets.

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..... **[2]**

(d) Use sketches and notes to design a fitting that could be attached to the MDF back so that the mirror could be fixed to a wall.

[3]

(e) Name **one** computer application that could be used to cut the heart shape in the MDF front (**fig.5**).

.....

..... **[1]**

(f) Name **two** alternative materials that could be used for the back of the mirror.

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..... **[2]**

END OF QUESTION PAPER

OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

Sample Assessment Material

DESIGN AND TECHNOLOGY: RESISTANT MATERIALS

A565 Sustainability and technical aspects of designing and making

MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 80

DRAFT

This document consists of 11 pages

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to scoris and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

TRADITIONAL

Before the Standardisation meeting you must mark at least 10 scripts from several centres. For this preliminary marking you should use **pencil** and follow the **mark scheme**. Bring these **marked scripts** to the meeting.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the scoris 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the scoris messaging system, or by email.

5. Work crossed out:
   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.

7. There is a NR (No Response) option. Award NR (No Response)
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in anyway relate to the question (e.g. 'can't do', 'don't know')
   - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question

   Note: Award 0 marks - for an attempt that earns no credit (including copying out the question)

8. The scoris **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
   If you have any questions or comments for your team leader, use the phone, the scoris messaging system, or e-mail.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:
    a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
    b. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

Section A

Question			Answers	Marks	Guidance
1			(c) Solar	1	
2			(a) Disposal of the product	1	
3			(d) People	1	
4			(a) Pine	1	
5			(b) Mild steel	1	
6			Recyclable aluminium	1	
7			The restocking of existing forests and woodlands	1	
8			Control of Substances Hazardous to Health	1	
9			The measurement of human actions on the environment	1	
10			Smart or modern materials	1	
11			False	1	
12			True	1	
13			False	1	
14			True	1	
15			True	1	
			Total	15	

Question			Answers	Marks	Guidance
16	(a)		Max three marks for an accurate explanation, one mark each: To examine a product in detail to understand how and how well the product works. Looking at a product Mention of investigating how the product works or materials or sizes or standard components or method of construction or finish	3	
	(b)		Any four pieces of information, one mark each: • How the mechanism works • Materials component are made from • Method of construction used for each component • How the components are assembled • Fixings used • Finish used	4	
	(c)		• Base is extended backwards. (1) • Base is extended sideways. (1) • Attachment to base. (1)	3	
	(d)		Any two reasons, max two marks for each reason: Can be operated by hand, does not need any other energy source, cheap and simple construction, durable, needs no maintenance (2) Reduces volume of recyclable material, allowing more to be stored/ transported therefore saving fuel/reducing carbon footprint (2) Takes up little space, easy to use and therefore more likely to be used thus cans more likely to be recycled leading to less reliance on smelting 'new' aluminium thus saving significant energy (2).	4	

	(e)		• Plastics use up oil which might otherwise be used for more important products such as heating fuel for hospitals • Plastics generally do not degrade when dumped, aluminium will oxidise • Plastics can be melted, but can burn with evolution of toxic fumes • Aluminium containers can be more easily sterilised than plastic ones, so – once made – do not need to be melted for recycling • If plastics are properly sorted they require very little energy to re-mould	**6**	**Level 3 (5-6 marks)** Thorough discussion showing clear understanding the recycling properties of both materials. Specialist terms will be used appropriately and correctly. Answers will be clear and presented in a structured format. The candidate will demonstrate the accurate use of grammar, punctuation and spelling. **Level 2 (3-4 marks)** Adequate discussion showing an understanding of the recycling properties of both materials. There will be some use of specialist terms. Answers will be reasonably clear and presented in a mainly structured format. There will be occasional errors of grammar, punctuation and spelling. **Level 1 (1-2 marks)** Basic discussion showing some understanding of the recycling properties of both materials. There will be little or no use of specialist terms. Answers will be ambiguous and disorganised and there will be errors of grammar and punctuation. Spelling will be intrusive. 0 marks = no response or no response worthy of credit.
			Total	**20**	

Section B

Question			Answers	Marks	Guidance
17	(a)		One mark for an accurate explanation: Self-finished means that metal needs no applied finish. Can be polished to produce attractive finish.	1	
	(b)		One mark for an accurate form of finish: Anodising Powder coating	1	
	(c)		Rod held in vice. (1) Use of vice or former/bar to achieve shape. (1) Appropriate force: hammer and scrapwood, mallet. (1) Use a jog or former (1)	3	Maximum marks available for detailed description using a jig or former without a vice.
	(d)		Some sort of block/bracket into which rod fits. (1) Kitchen roll prevented from falling off. (1) Block/bracket capable of fixing to wall. (1) Details of materials / fittings used. (1)	4	
	(e)		Any two properties with explanation: Harder than aluminium, so will not wear away over time. Will not bend in use, so will withstand heavier handling than Aluminium. Smoother surface, so more hygienic, easier to clean. Does not rust or corrode.	4	One mark for each property and one mark for the explanation.
	(f)		Any two reasons, one mark each: Space saving, neater appearance, out of the way, will not get knocked over, easier to use.	2	
			Total	15	

Question			Answers	Marks	Guidance
18	(a)		Any two advantages, one mark each: No grain direction, more stable, greater structural strength Machines well, accepts a durable stained finish.	2	
	(b)		Method of joining includes use of a bracket/block with corresponding fitting into which a pin or similar can be inserted to allow for steering. Bracket/block with corresponding fitting. (0-3) Method of achieving steering movement. (0-1) Named tools. (1)	5	
	(c*)		Weak materials will fail quickly and may harm the child Strong materials tend to be heavy, so design must ensure strength is not compromised by too slender a structure Strong materials are more durable so will stand up to hard knocks “Ugly” materials will not attract the purchaser (parent/guardian) and will put off the child Materials that cannot be formed into smooth shapes will form unattractive toys and will not be played with.	6	**Level 3 (5-6 marks)** Shows detailed understanding of properties of materials for use in toys. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar. **Level 2 (3-4 marks)** Shows some understanding properties of materials for use in toys. There will be some use of specialist terms although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar. **Level 1 (1-2 marks)** Shows limited understanding of properties of materials for use in toys. There will be little or no use of specialist terms. Answers may be ambiguous or disorganized. Errors of grammar, punctuation and spelling may be intrusive. 0 marks = no response or no response worthy of credit.

	(d)		Any two quality control operations, one mark each: Visually check surface finish for blemishes “Dry fit” parts before assembly to ensure they will fit correctly Manually check for sharp edges, rough corners, splinters Check components for correct sizes, colours	**2**	
			Total	**15**	

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>19</td><td>(a)</td><td></td><td>
<table>
<tr><td>Stage</td><td>Processes</td><td>Tools/items of equipment</td></tr>
<tr><td>1</td><td>Mark out shape, draw shape</td><td>Template</td></tr>
<tr><td>2</td><td>Drill hole /cut hole</td><td>Saw tooth bit</td></tr>
<tr><td>3</td><td>Cut out shape</td><td>Coping saw</td></tr>
<tr><td>4</td><td>Smooth cut edges</td><td>Half-round file</td></tr>
</table>
4 x 1
</td><td>4</td><td>Not cut heart shape

Accept any reference to smoothing /filing edges</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Clear varnish would not hide the unattractive MDF surface.
Add colour, cover the MDF, make more attractive, aesthetically pleasing.</td><td>1</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Hardener and resin in separate tubes. (1)
Mix (equal) amounts. (1)</td><td>2</td><td>Reference to two parts = 1 mark
Mix together= 1 mark</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>The joint requires pressure: use of weights, vice, cramps. (1)
Use of scrap wood /method of accurate positioning. (1)
Use of adhesive tape/ elastic bands</td><td>2</td><td>Look for detail in whole answer for maximum 2 marks.</td></tr>
<tr><td></td><td>(d)</td><td></td><td>Fitting: solid wood block/sheet metal bracket or plate. (0-2)
Method of attachment the fitting to the back (1)
(do not accept screws or pins for attachment)</td><td>3</td><td>Use of string with pins, screws, hooks, eyes
keyhole slot=1 max (upside down=0)
Use of drilled hole = max 1
Do not accept hinges</td></tr>
<tr><td></td><td>(e)</td><td></td><td>Any one computer application, one mark each:
Milling machine, router, machining centre, laser cutter</td><td>1</td><td></td></tr>
<tr><td></td><td>(f)</td><td></td><td>Any two alternative materials, one mark each:
Aluminium sheet (1mm max), acrylic, mirrored acrylic, thin (3-5mm) plywood,</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>15</td><td></td></tr>
</table>

Assessment Objective Grid

GCSE Design & Technology: Resistant Materials					
		Recall, select and communicate	Apply knowledge, understanding and skills	Analyse and evaluate	
Question		A01	A02	A03	Mark
1		1			**1**
2		1			**1**
3		1			**1**
4		1			**1**
5		1			**1**
6		1			**1**
7		1			**1**
8		1			**1**
9		1			**1**
10		1			**1**
11		1			**1**
12		1			**1**
13		1			**1**
14		1			**1**
15		1			**1**
16 a		3			**3**
16 b		4			**4**
16 c		1	2		**3**
16 d		2	1	1	**4**
16 e*		2	2	2	**6**
17 a		1			**1**
17 b		1			**1**
17 c		2	1		**3**
17 d		1	1	2	**4**
17 e		2	2		**4**
17 f		2			**2**
18 a		2			**2**
18 b		1	2	2	**5**
18 c*		2	1	3	**6**
18 d		2			**2**
19 a		4			**4**
19 b		1			**1**
19 c		1	1	2	**4**
19 d		1	1	1	**3**
19 e		1			**1**
19 f		1		1	**2**
Total		**52**	**14**	**14**	**80**