

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCSE

**Design and Technology:
Resistant Materials Technology
Unit 2: Knowledge and Understanding
of Resistant Materials Technology**

Sample Assessment Material

Time: 1 hour 30 minutes

Paper Reference

5RM02/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches it must be dark (HB or B). Coloured pens, pencils and highlighter pens must **not** be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL the questions.

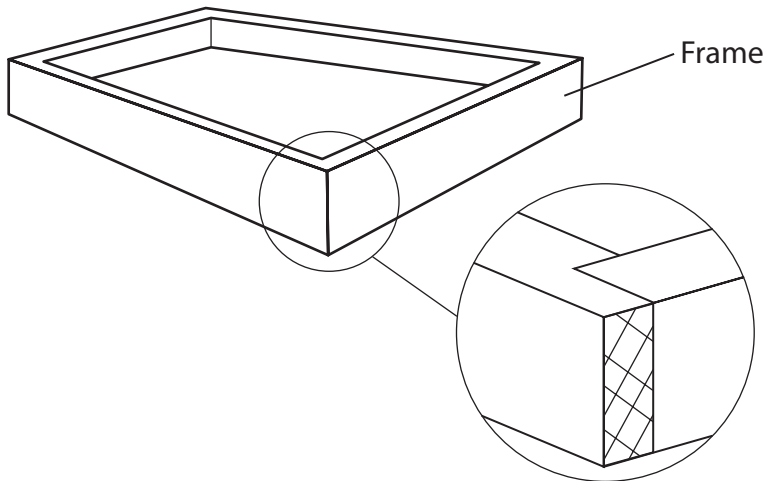
For each question 1 to 10, choose an answer A, B, C or D. Put a cross in the box indicating the answer you have chosen . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

1 Which **one** of the following is used as a measuring tool?

- A Try square
- B Centre punch
- C Micrometer
- D Scriber

(Total for Question 1 = 1 mark)

2 The frame below is joined at the corner with what type of joint?



- A Knock down fitting
- B Mortise and tenon
- C Dovetail
- D Rebate

(Total for Question 2 = 1 mark)

3 Which type of saw is best suited to cutting a curve in a piece of plywood?

- A Hacksaw
- B Coping saw
- C Tenon saw
- D Back saw

(Total for Question 3 = 1 mark)



4 Which **one** of the following is a manufactured board?

- A Plywood
- B Oak
- C Pine
- D Mahogany

(Total for Question 4 = 1 mark)

5 Which **one** of the following is a forming process?

- A Brazing
- B Drilling
- C Blow moulding
- D Painting

(Total for Question 5 = 1 mark)

6 Which **one** of the following is the most suitable adhesive to join MDF to MDF?

- A Epoxy resin
- B Tensol cement
- C PVA
- D Contact adhesive

(Total for Question 6 = 1 mark)

7 Which **one** of the following is a composite material?

- A Steel
- B Carbon fibre
- C Brass
- D ABS

(Total for Question 7 = 1 mark)



8 Batch production is for making:

- A an individual item
- B large quantities of an item
- C fixed quantities of an item
- D small quantities of an item

(Total for Question 8 = 1 mark)

9 Which **one** of the following surface finishing techniques can be used on metals?

- A Shellac
- B Stain
- C Varnish
- D Electroplating

(Total for Question 9 = 1 mark)

10 Case hardening is a heat treatment process.

The purpose of case hardening is to:

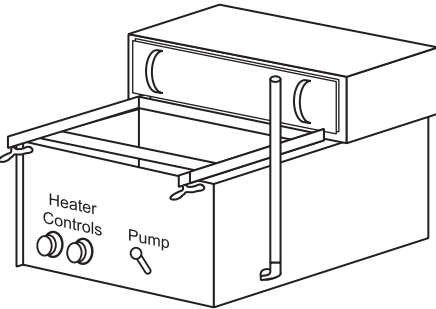
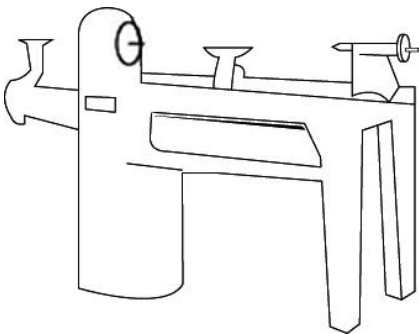
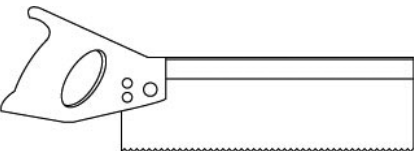
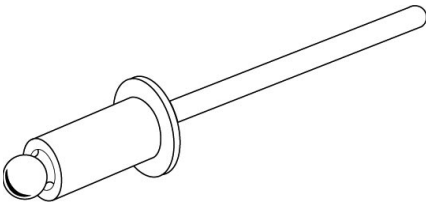
- A increase the brittleness of an item
- B make the outer surface harder than the inner core
- C give the material a uniform hardness throughout
- D make the inner core harder than the outer surface

(Total for Question 10 = 1 mark)



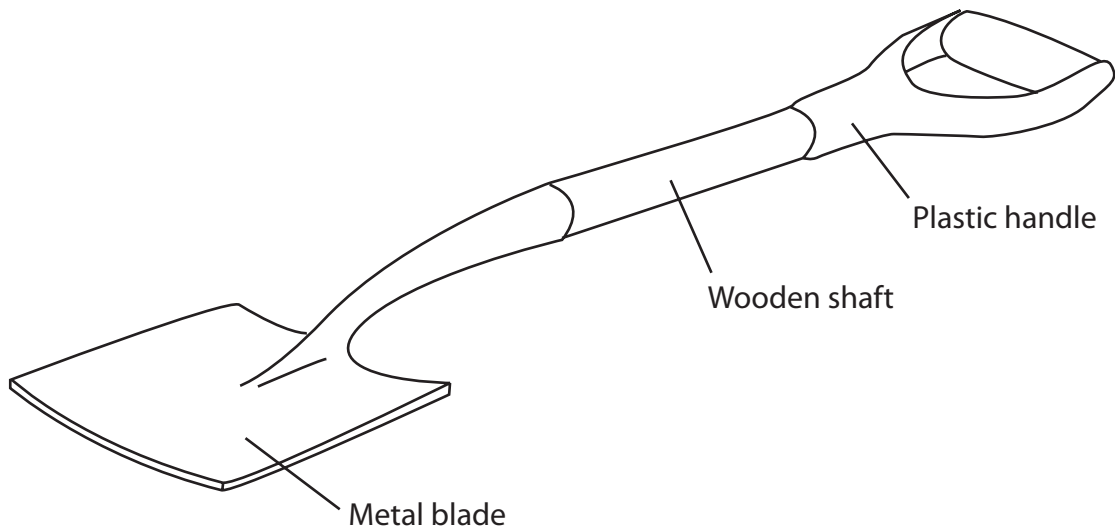
11 (a) The table below shows some tools, components and equipment.

Complete the table below by giving the missing names and uses.

Tools / Components / Equipment	Name	Use
	Vacuum forming machine	(1)
	Lathe	(1)
	(1)	Cutting straight lines / joints in wood
	(1)	Joining thin sheets of metal



(b) The drawing below shows a garden spade used for digging in a garden.



One property of the metal used for the blade is hardness.

Name **two** other properties the metal blade must have.

(2)

1

2

(c) Give **three** reasons why the metal for the blade must have the property of hardness.

(3)

1

2

3



(d) ABS has been used for the plastic handle.

Give **three** properties of ABS that make it suitable for the plastic handle.

(3)

1

2

3

(e) The garden spades are manufactured using CAM instead of manual processes.

Give **three** ways in which manufacturing using CAM will benefit the consumer.

(3)

1

2

3

(f) A lot of wood is wasted in the production of the shaft for the garden spade.

Describe **two** effects on the environment of wasting wood.

(4)

1

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2

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.....

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(Total for Question 11 = 19 marks)



12 You have been asked to design a bird seed feeder for sale in garden centres.

The specification for the bird seed feeder is that it must:

- hold bird seed securely
- be easy to refill
- be held clear of the ground
- be securely fixed
- allow birds access to the food
- keep the bird seed dry
- be made from materials available in a school workshop
- be manufactured using processes available in a school workshop.

In the spaces opposite, use sketches and, where appropriate, brief notes to show **two different** design ideas for the bird seed feeder that meet the specification points above.

Candidates are reminded that if a pencil is used for diagrams/sketches it must be dark (HB or B).

Coloured pens, pencils and highlighter pens must **not** be used.

PLEASE DO NOT WRITE OR DRAW IN THIS SPACE.

PLEASE USE THE SPACES OPPOSITE FOR YOUR DESIGNS.



Design idea 1

(8)

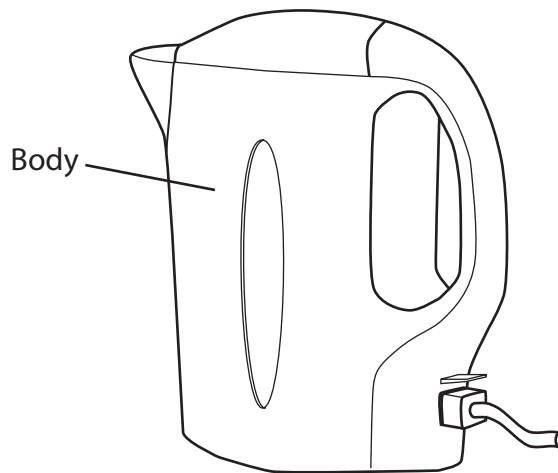
Design idea 2

(8)

(Total for Question 12 = 16 marks)



13 The drawing below shows an electric kettle.



(a) Give **two** properties of polystyrene which make it suitable for the body.

(2)

- 1
- 2

(b) The body is manufactured by injection moulding.

Describe **two** reasons why injection moulding is a suitable process to manufacture the body.

(4)

- 1
-
-
-
- 2
-
-



(c) Explain why the kettle is successful in meeting the following specification points:

(i) be held without burning the user's hands

(2)

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(ii) pour the water without spilling.

(2)

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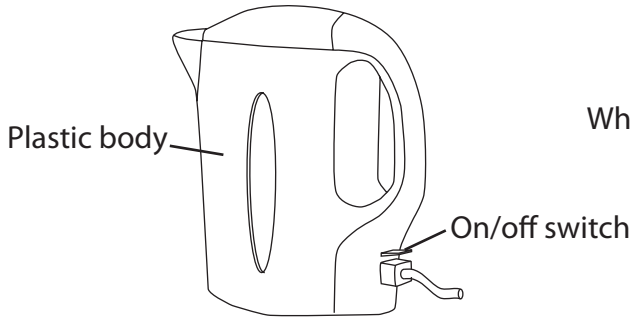
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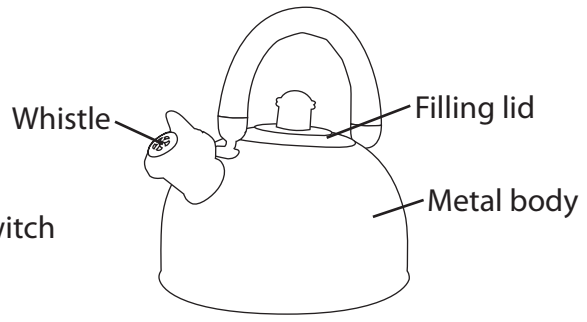
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* (d) The drawings below show two different types of kettle.



Kettle A – electric kettle



Kettle B – camper's whistling kettle

Evaluate kettle A compared with kettle B.

(6)

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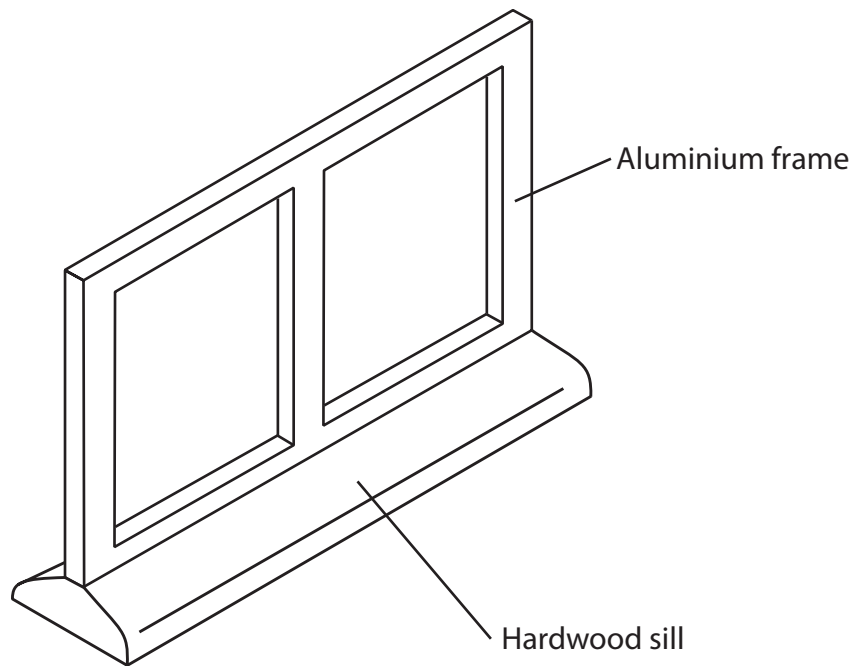
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(Total for Question 13 = 16 marks)



14 The window frame below is made from aluminium, a non-ferrous metal.



(a) Give **two** properties of aluminium that make it suitable for making the window frame.

For each property, justify your answer.

(4)

Property 1

Justification

Property 2

Justification



(b) One feature of non ferrous metals is that they are generally much softer than ferrous metals.

Give **two** other features of non ferrous metals.

(2)

1

2

(c) The hardwood sill has been made from mahogany.

Explain **two** advantages of using mahogany rather than pine, a softwood, for the sill.

(4)

1

.....

2

.....

(d) During transportation, the window frame has to be carefully wrapped and packaged.

Give **three** advantages to the environment of reducing product wrapping and packaging.

(3)

1

2

3



* (e) Consumers are becoming more environmentally aware.

Discuss the ways in which manufacturers can alter packaging to reduce its environmental impact.

(6)

Dotted lines for writing.

(Total for Question 14 = 19 marks)

TOTAL FOR PAPER = 80 MARKS



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Mark Scheme

Sample Assessment Material

GCSE

GCSE Design & Technology: Resistant Materials Technology (5RM02/01)

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1.	C	(1)

Question Number	Answer	Mark
2.	D	(1)

Question Number	Answer	Mark
3.	B	(1)

Question Number	Answer	Mark
4.	A	(1)

Question Number	Answer	Mark
5.	C	(1)

Question Number	Answer	Mark
6.	C	(1)

Question Number	Answer	Mark
7.	B	(1)

Question Number	Answer	Mark
8.	C	(1)

Question Number	Answer	Mark
9.	D	(1)

Question Number	Answer	Mark
10.	B	(1)

Question Number	Answer	Mark
11.(a)	Vacuum forming machine	Making product cases / hollow shells / heating / forming / shaping / moulding plastic (1)
	Lathe	Turning round / cylindrical objects / making / shaping wood round (1)
	Tenon saw/back saw/dovetail saw/saw (1) <i>(Only answers)</i>	Cutting straight lines / joints in wood
	Pop rivet / rivet (1) <i>(Only answers)</i>	Joining thin sheets of metal
	4 x 1	(4)

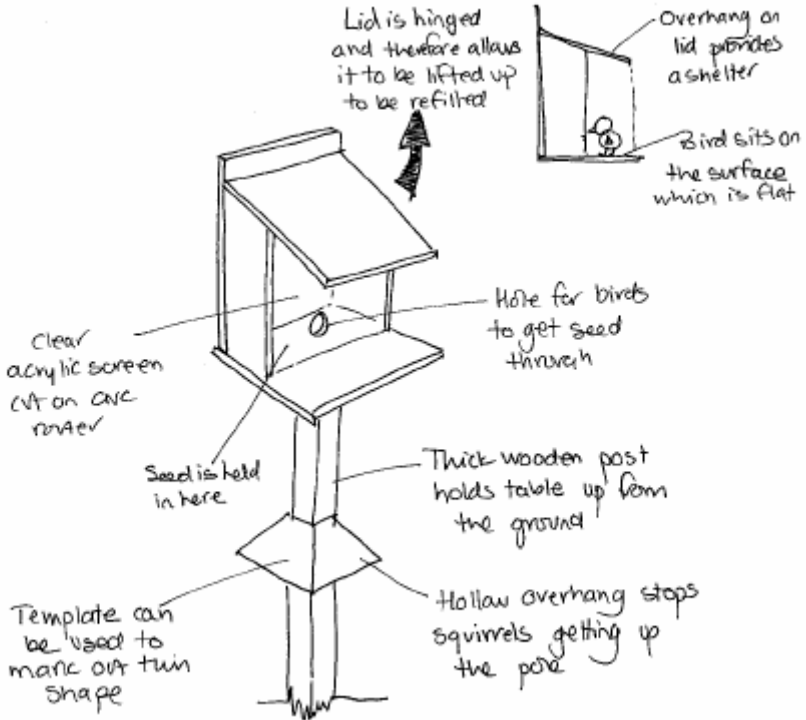
Question Number	Answer	Mark
11.(b)	<p>Two properties named from:</p> <ul style="list-style-type: none"> • Toughness (1) • Durability (1) • Good compressive strength (1) • Will not corrode / rust (1) • Malleability (1) <p><i>(Do not accept strong / hard / sharp / strength)</i></p>	(2)
	2 x 1	

Question Number	Answer	Mark
11.(c)	<p>Three reasons given from:</p> <ul style="list-style-type: none"> • Cut through roots/soil (1) • Will not damage cutting edge / will keep edge (1) • Will not bend / break when levered / bent backwards / snap (1) • Can take the pressure / force of a foot being pressed on it (1) • Will not wear away / get damaged (1) 	(3)
	3 x 1	

Question Number	Answer	Mark
11.(d)	<p>Three properties named from:</p> <ul style="list-style-type: none"> • Plasticity (1) • Durability (1) • Lightweight (1) • Electrical insulator (1) • Weatherproof / waterproof / will not rust / corrode (1) • Toughness (1) <p><i>(Do not accept strong / strength)</i></p> <p style="text-align: right;">3 x 1</p>	(3)

Question Number	Answer	Mark
11.(e)	<p>Three ways given from:</p> <ul style="list-style-type: none"> • More consistent finish (1) • Cheaper (1) • Identical / consistent products / less likely to have faults / greater accuracy (1) • In built QC control checks / safer products (1) • Products more readily available (1) <p style="text-align: right;">3 x 1</p>	(3)

Question Number	Answer	Mark
11.(f)	<p>Two effects described from:</p> <ul style="list-style-type: none"> • Deforestation (1) gives rise to soil erosion / flooding / changing landscapes / loss of species / animals / habitats (1) • Imbalance of greenhouse gases / changes to CO2 (1) can give rise to global warming (1) • Disposal (1) of waste wood means burning / landfill (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

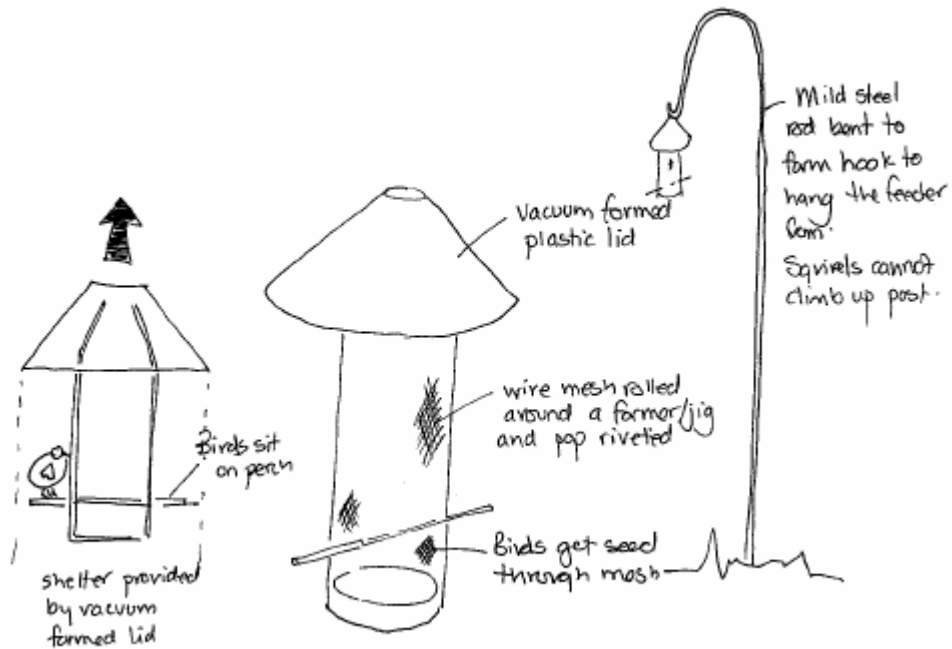
Question Number	Answer	Mark
12.	<p>Design idea 1</p> <p>Candidates may answer any specification point in either graphical form or by annotation.</p> <p>No marks are awarded for the quality of graphical communication.</p> <ul style="list-style-type: none"> • identify how the bird seed is held securely (1): held in tray / container • be easy to refill (1): lid comes off / lifts up / hinges / access to tray/container • be held clear of the ground (1): post / wall fixing / hanging from a tree • be securely fixed (1): will not fall down / rawl plugs / screws / mirror plates / nail / hook / set into ground / wide base area / chain • must allow birds access to the bird seed (1): wire mesh / holes in container • must keep the bird seed dry (1): lid / roof / shelter • be made from materials available in a school workshop (1): specifically named material (not wood / metal / plastic) • be manufactured using processes available in a school workshop (1): named process <p>Example of candidate response:</p> 	(8)

8 x 1

Design idea 2

Marks for design idea 2 can only be awarded where specification points are resolved differently than in design idea 1.

Example of candidate response:



8 x 1

(8)

Question Number	Answer	Mark
13.(a)	<p>Two properties given from:</p> <ul style="list-style-type: none"> • plasticity / easily shaped (1) • durability (1) • will not melt / melting point higher than boiling water (1) • waterproof (1) • electrical insulator (1) • good insulator of heat (1) • good resistance to corrosion (1) <p><i>(Do not accept strong / cheap)</i></p> <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13.(b)	<p>Two reasons described from:</p> <ul style="list-style-type: none"> • hollow shape (1) which can be achieved with a complex mould (1) • automated process (1) which makes it suitable for high volume production (1) • variable cross section (1) which can be achieved by this process / mould (1) • no overhangs / undercut shapes (1) which means it can be easily released from the mould (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
13.(c)(i)	<p>One reason explained from:</p> <ul style="list-style-type: none"> • The handle is on the opposite side of the pouring spout (1) therefore the user will not be affected by any steam / splashes when pouring / no need to touch body (1) • The material is a poor conductor of heat (1) and therefore will not burn / conduct heat through to the user's hands (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13.(c)(ii)	<p>One reason explained from:</p> <ul style="list-style-type: none"> • A shaped pouring spout (1) allows the user a good aim when pouring the hot water (1) • Ergonomic consideration given to the weight and balance as the kettle is moved and tilted (1) so as to make it as easy as possible for the user (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13.(d) QWC	Evaluation to address the following issues:	
	Kettle A	Kettle B
	You can see at a glance how much water is inside the kettle	You cannot see how much water there is inside
	Automatically turns itself off when it has reached boiling point	Whistles when the water has reached boiling point but it will not turn itself off
	Plastic material which is a good insulator of heat and therefore unlikely to burn yourself	Metal body which could burn you if you touched it when it was hot
	Many component parts make it expensive to make	Handle is directly in line with spout so you might get burned / scalded with the steam when pouring
	Easier to fill due to the shape of the spout	Smaller volume which means you are unlikely to boil too much which is wasteful of energy
		Needs no electric which you might not have when camping
		(6)
Level	Mark	Descriptor
	0	No rewardable material
Level 1	1 - 2	Candidate identifies the area(s) of comparison with no development OR identifies and develops one area. Shows limited understanding of the comparison. Writing communicates ideas using everyday language but the response lacks clarity and organisation. The student spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3 - 4	Candidate identifies some areas of comparison with associated development showing some understanding of the comparison. Writing communicates ideas using D&T terms accurately and showing some direction and control in the organising of material. The student uses some of the rules of grammar appropriately and spells and punctuates with some accuracy, although some spelling errors may still be found.
Level 3	5 - 6	Candidate identifies a range of areas of comparison with associated developments showing a detailed understanding of the comparison. Writing communicates ideas effectively, using a range of appropriately selected D&T terms and organising information clearly and coherently. The student spells, punctuates and uses the rules of grammar with considerable accuracy.

Question Number	Answer	Mark
14(a)	<p>Two properties and linked justification from:</p> <ul style="list-style-type: none"> • Property: Lightweight (1) • Justification: which means it is not too heavy for the window fitter (1) • Property: Low melting point (1) • Justification: which means it is relatively cheap to heat when being extruded into shape (1) • Property: Good strength to weight ratio (1) • Justification: which means it quite light yet still relatively strong (1) <p><i>(Do not accept strong / cheap / easy to work)</i></p> <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
14(b)	<p>Two features given from:</p> <ul style="list-style-type: none"> • Can be recycled (1) • They are not magnetic (1) • They will not will rust / they do not contain iron (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
14(c)	<p>Two advantages explained from:</p> <ul style="list-style-type: none"> • Slower growing / more dense (1) therefore it will last longer (1) • Less prone to warping (1) which means it will look better / provide a tighter seal (1) • Pine contains knots / resin which will spoil the paintwork / aesthetics (1) which means it will need to be re-painted more often (1) • A harder / tougher material (1) therefore better resistance to wear / more durable (1) • Does not rot as fast as pine (1) therefore does not need replacing as often (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
14(d)	<p>Three advantages given from:</p> <ul style="list-style-type: none"> • Less raw material required / resources are conserved (1) • Less waste packaging is disposed of / landfill sites will decrease / last longer (1) • Incineration / processing pollution is reduced (1) • Less manufacturing / transportation pollution (1) • Less waste packaging for recycling (1) • Less energy used due to the reduction of product wrapping / packaging required (1) <p style="text-align: right;">3 x 1</p>	(3)

Question Number	Answer	Mark
14(e) QWC	<p>Indicative content Discussion to address the following issues:</p> <ul style="list-style-type: none"> • Reduce the layers / size of packaging which will reduce the amount that needs to be thrown out • Use biodegradable materials which will break down quicker / will reduce the amount of space required in landfill • Use recycled materials / better for the environment • Disposal of chemical waste / plastics means less pollution in rivers / harm to animals • Use sustainable energy sources / forms at the factory during the manufacture of packaging • Reduce energy consumption / reduce carbon footprint 	(6)

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1 - 2	Candidate identifies the issues with no development OR identifies and develops one area. Shows limited understanding of the issues. Writing communicates ideas using everyday language but the response lacks clarity and organisation. The candidate spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3 - 4	Candidate identifies some issues with associated developments showing some understanding of the issues. Writing communicates ideas using D&T terms accurately and showing some direction and control in the organising of material. The candidate uses some of the rules of grammar appropriately and spells and punctuates with some accuracy, although some spelling errors may still be found.
Level 3	5 - 6	Candidate identifies a range of issues with associated developments showing a detailed understanding of the issues. Writing communicates ideas effectively, using a range of appropriately selected D&T terms and organising information clearly and coherently. The candidate spells, punctuates and uses the rules of grammar with considerable accuracy.