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Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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

Thursday 16 June 2016 – Morning
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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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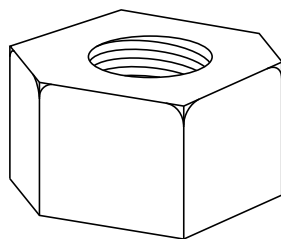


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Answer ALL questions.

Some questions must be answered with a cross in a box ☒. 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 type of component is shown below?



- A Screw
- B Bolt
- C Washer
- D Nut

(Total for Question 1 = 1 mark)

2 Which **one** of the following materials is a composite?

- A Glass reinforced plastic (GRP)
- B Mild steel
- C Polyvinyl chloride
- D Brass

(Total for Question 2 = 1 mark)

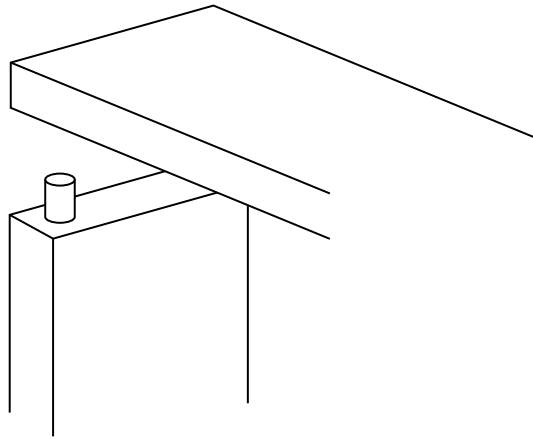
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3 Which type of joint is shown below?



- A Mortise and tenon
- B Rebate
- C Butt
- D Dowel

(Total for Question 3 = 1 mark)

4 A smart material that can 'remember' its original cold-formed shape is known as what kind of smart material?

- A Reactive glass
- B Photochromic paint
- C Shape memory alloy (SMA)
- D Carbon nanotubes

(Total for Question 4 = 1 mark)

5 Which **two** materials are alloyed to make brass?

- A Iron and carbon
- B Copper and zinc
- C Zinc and iron
- D Iron and copper

(Total for Question 5 = 1 mark)



6 Which **one** of the following adhesives is best suited to joining a large flat sheet of aluminium to a large flat sheet of MDF?

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

(Total for Question 6 = 1 mark)

7 Which **one** of the following processes would be used to manufacture the pencil sharpener?



- A Vacuum forming
- B Blow moulding
- C Injection moulding
- D Laminating

(Total for Question 7 = 1 mark)

8 What was the primary aim of the Kyoto Protocol agreement?

- A To make sure designers were tolerant to different cultures
- B To reduce the amount of products being thrown away
- C To reduce greenhouse gas emissions
- D To make more products 'offshore' in developing countries

(Total for Question 8 = 1 mark)



9 A material that returns to its original shape once a deforming force has been removed is said to have which property?

- A Elasticity
- B Plasticity
- C Ductility
- D Malleability

(Total for Question 9 = 1 mark)

10 Which process is being described below?

A piece of mild steel is heated and then placed into carbon powder to cool. This process is repeated several times. It is finally heated and then quenched in water.

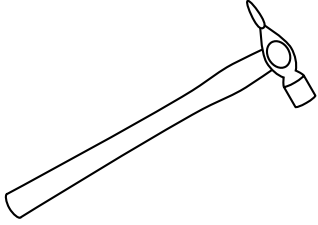
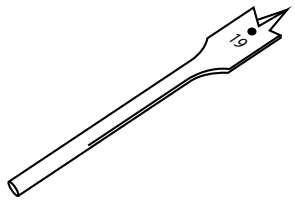
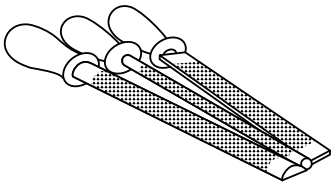
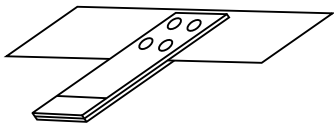
- A Hardening
- B Tempering
- C Annealing
- D Case hardening

(Total for Question 10 = 1 mark)



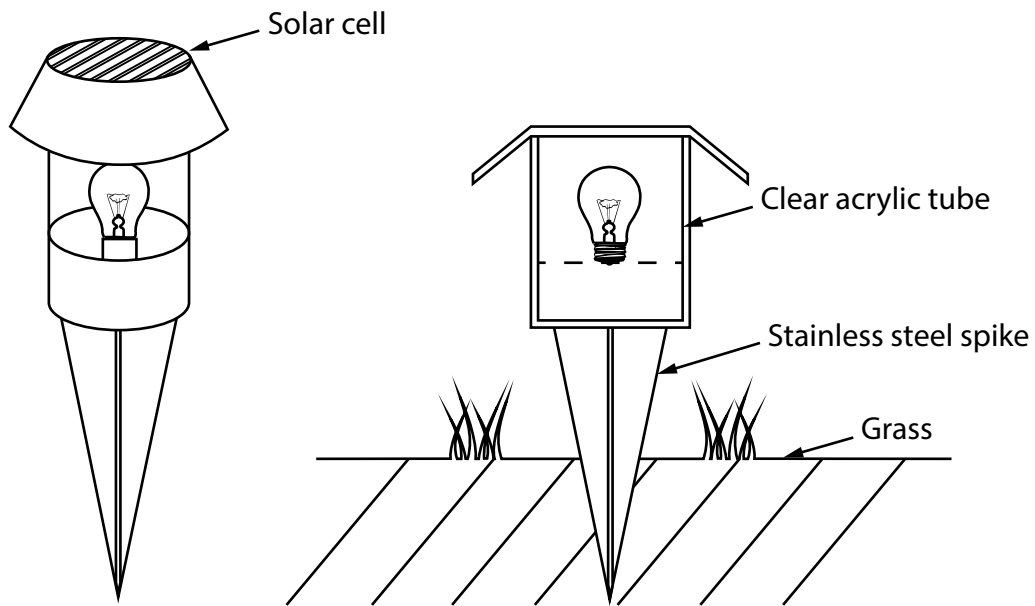
11 (a) The table below shows some tools and equipment.

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

Tool	Name	Use
	(i)	Putting nails into wood (1)
	Flat bit	(ii) (1)
	Rasps	(iii) (1)
	(iv)	Marking out and checking 45° and 135° angles (1)



- (b) The drawings below show a solar-powered garden light that can be moved around the garden and pushed into the grass.



- (i) Give **two** properties of stainless steel that make it suitable for the spike.

(2)

1

2

- (ii) Stainless steel can be welded.

Give **three** risks associated with welding.

(3)

1

2

3



(iii) The stainless steel sections are cut on a CNC laser cutter.

Describe **two** advantages of cutting the stainless steel sections on a CNC laser cutter.

(4)

1

.....

.....

2

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.....

(c) (i) State whether acrylic is a thermosetting plastic or a thermoplastic.

(1)

.....

(ii) The clear acrylic tube has a fixed cross-section.

State the name of the process used to manufacture the acrylic tube.

(1)

.....

(d) Explain **two** advantages of using solar energy to power the garden light.

(4)

1

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2

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(Total for Question 11 = 19 marks)

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12 You have been asked to design a unit to display picture postcards for sale.



The specification for the display unit is that it must:

- allow for the front of the picture postcards to be seen
- allow for the picture postcards to be removed easily
- hold four different picture postcards
- sit flat on a surface
- be capable of being mounted on a wall
- use an appropriate method to display a selling price (e.g. 50p/€1)
- be made from materials available in the school workshop
- be made using processes available in the school workshop.

In the spaces opposite, use sketches and, where appropriate, brief notes to show **two different** design ideas for the display unit 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.

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Design idea 1

(8)

Design idea 2

(8)

(Total for Question 12 = 16 marks)

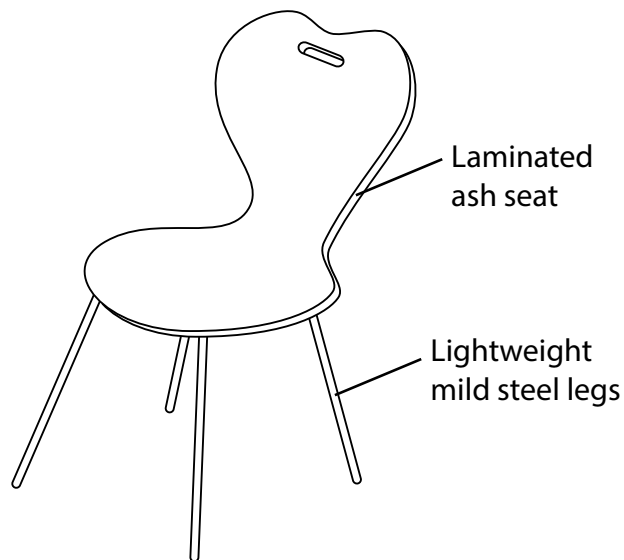


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13 The drawing below shows a chair made from ash and mild steel.



(a) (i) Give **two** properties of ash that make it suitable for the laminated seat. (2)

1

2

(ii) Describe **one** reason why ash is a better choice of material than mild steel for the laminated seat. (2)

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(b) The ash seat is finished with a coat of varnish.
Describe **one** reason why the ash seat is finished with a coat of varnish. (2)

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

(i) easy to stack

(2)

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(ii) easy to move.

(2)

.....

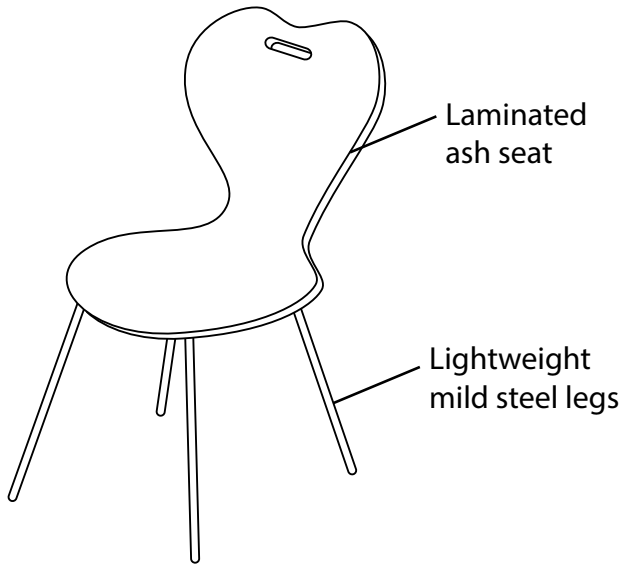
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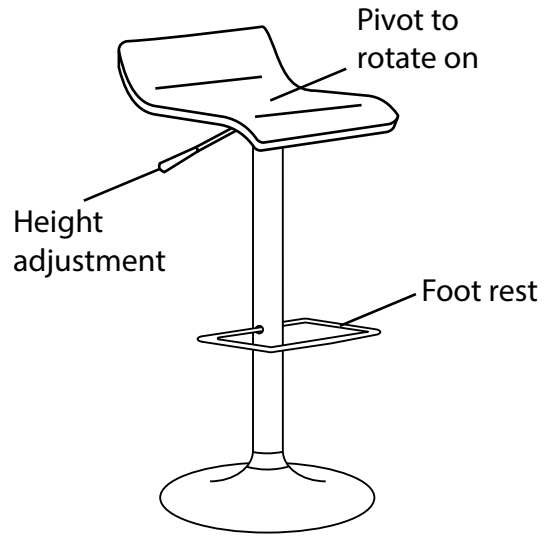
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*(d) The drawings below show two different types of chair.



Chair A



Chair B

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Evaluate chair A and chair B in terms of:

- form
- user requirements.

(6)

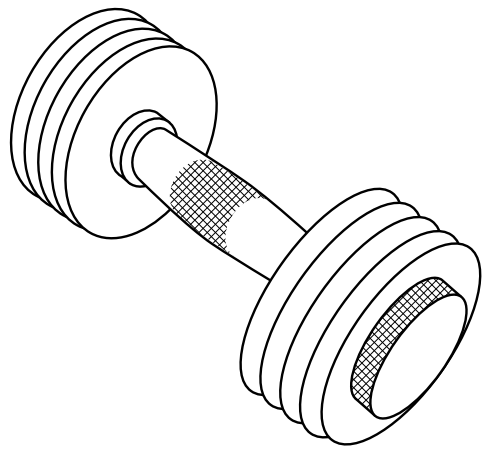
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Area for writing the evaluation response, consisting of multiple horizontal dotted lines.

(Total for Question 13 = 16 marks)



14 The drawing below shows an exercise weight.



(a) The weight is made from aluminium.

Give **two** finishes that could be applied to the aluminium.

(2)

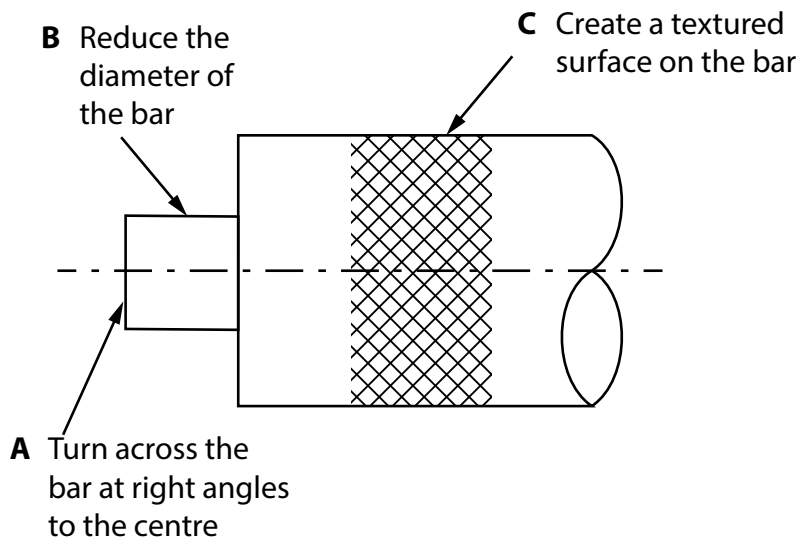
1

2

(b) The bar is machined on a centre lathe using several different processes.

Name the processes used for the different stages, labelled **A**, **B** and **C** on the diagram below.

(3)



A

B

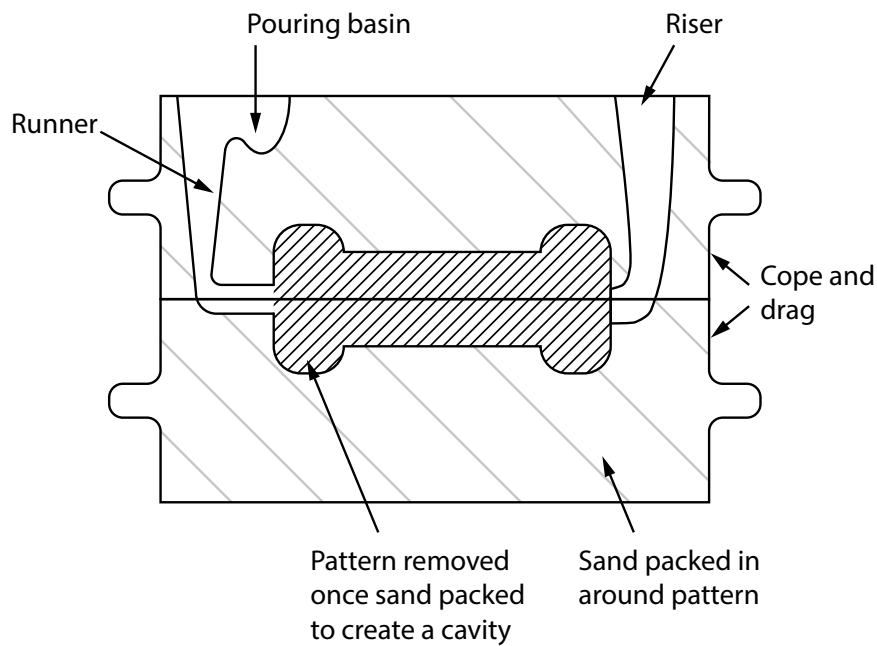
C



(c) The weight is manufactured by sand casting. The drawing below shows the method used to cast the weight.

- (i) Describe **one** reason why a split pattern is used when making the aluminium weight.

(2)



(ii) Describe **one** reason for including a runner and a riser in the moulding process.

(2)

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(d) Describe **two** disadvantages of sand casting.

(4)

1

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2

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