

Write your name here

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

Friday 16 June 2017 – Afternoon

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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Answer ALL questions.

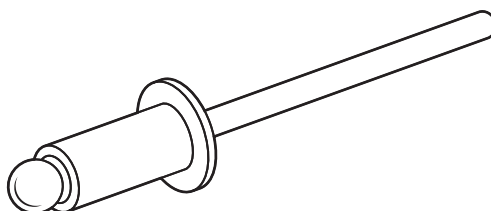
Questions 1–10 must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 To which group from the list below does mahogany belong?

- ☐ A Manufactured boards
- ☐ B Softwoods
- ☐ C Composites
- ☐ D Hardwoods

(Total for Question 1 = 1 mark)

2 What is the name of the component shown below?



- ☐ A Pop rivet
- ☐ B Countersunk head screw
- ☐ C Washer
- ☐ D Knock down fitting

(Total for Question 2 = 1 mark)

3 Which **one** of the following manufactured boards is made up of several layers glued together at right angles?

- ☐ A Hardboard
- ☐ B MDF
- ☐ C Chipboard
- ☐ D Plywood

(Total for Question 3 = 1 mark)

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4 Which **one** of the following polymers is a thermosetting plastic?

- ☐ A Urea formaldehyde
- ☐ B Acrylic
- ☐ C Polyvinyl Chloride
- ☐ D Acrylonitrile-Butadiene-Styrene (ABS)

(Total for Question 4 = 1 mark)

5 Which **one** of the following tools is an abrading tool?

- ☐ A Chisel
- ☐ B Plane
- ☐ C File
- ☐ D Twist drill

(Total for Question 5 = 1 mark)

6 Which **one** of the following ICT systems is used by retailers to record sales data?

- ☐ A OPEC
- ☐ B BTEC
- ☐ C EPOS
- ☐ D CAD/CAM

(Total for Question 6 = 1 mark)

7 Carbon steel is made from carbon and which other material?

- ☐ A Copper
- ☐ B Iron
- ☐ C Brass
- ☐ D Aluminium

(Total for Question 7 = 1 mark)

8 Which **one** of the following processes would be used to manufacture continuous lengths of plastic pipe?

- ☐ A Vacuum forming
- ☐ B Blow moulding
- ☐ C Injection moulding
- ☐ D Extrusion

(Total for Question 8 = 1 mark)

9 Which **one** of the following materials will respond quickly to a change in Ultra Violet (UV) light?

- ☐ A Shape memory alloys
- ☐ B Carbon fibre
- ☐ C Reactive glass
- ☐ D Carbon nanotubes

(Total for Question 9 = 1 mark)

10 A material that resists abrasive wear and indentation has which **one** of the following properties?

- ☐ A Elasticity
- ☐ B Hardness
- ☐ C Plasticity
- ☐ D Malleability

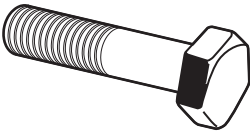
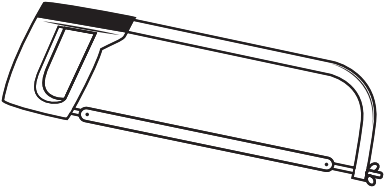

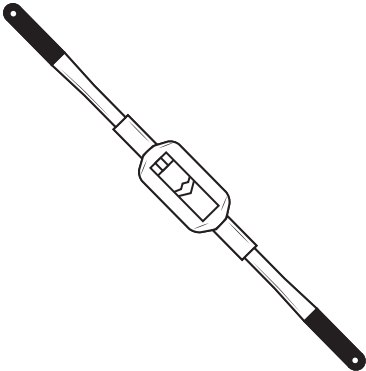
(Total for Question 10 = 1 mark)

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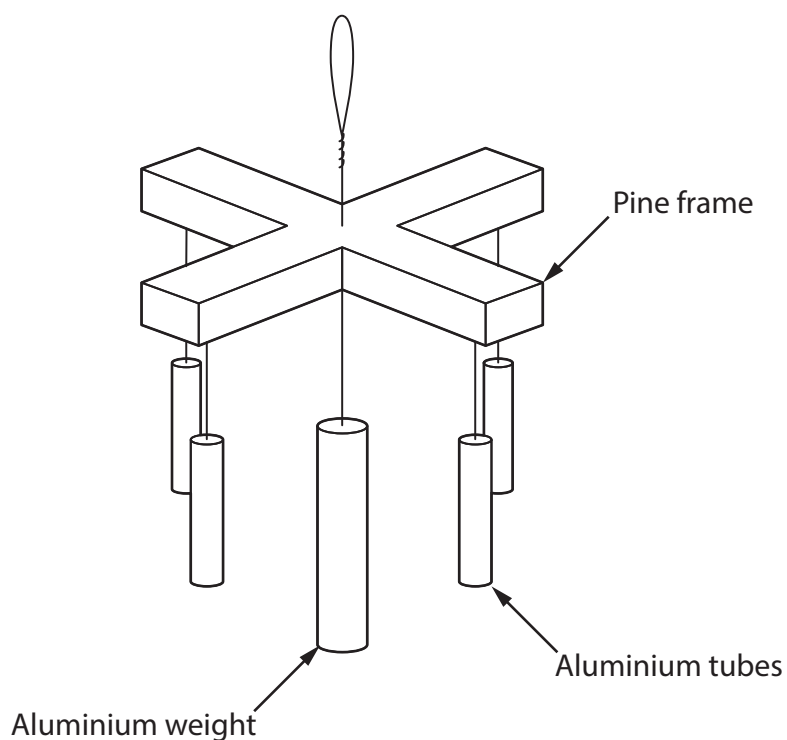
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11 (a) Complete the table below by giving the missing names and uses.

Tools/Equipment	Name	Use
	(1)	Making temporary joints
	(1)	Cutting metal
	Laser cutter	(1)
	Tap wrench	(1)

- (b) The drawing below shows a wind chime. It hangs from a tree in the garden and makes a gentle noise when blown in the wind.



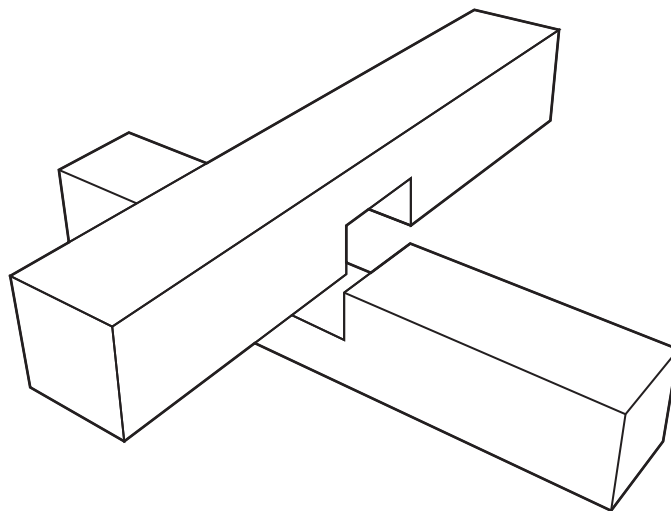
- (i) Give **two** properties of aluminium that make it suitable for the weight.

(2)

- (ii) Name **two** other non-ferrous metals that could be used for the weight.

(2)

(c) A cross halving joint is used to join the two pieces of pine together for the frame.



Name **three** hand tools that would be used to mark out and make the cross halving.

(3)

(d) (i) Explain **two** advantages of using pine to make the frame rather than MDF.

(4)

(ii) The pine used to make the frame is from a recycled source.

Explain **two** advantages for the environment of using pine from a recycled source.

(4)

(Total for Question 11 = 19 marks)

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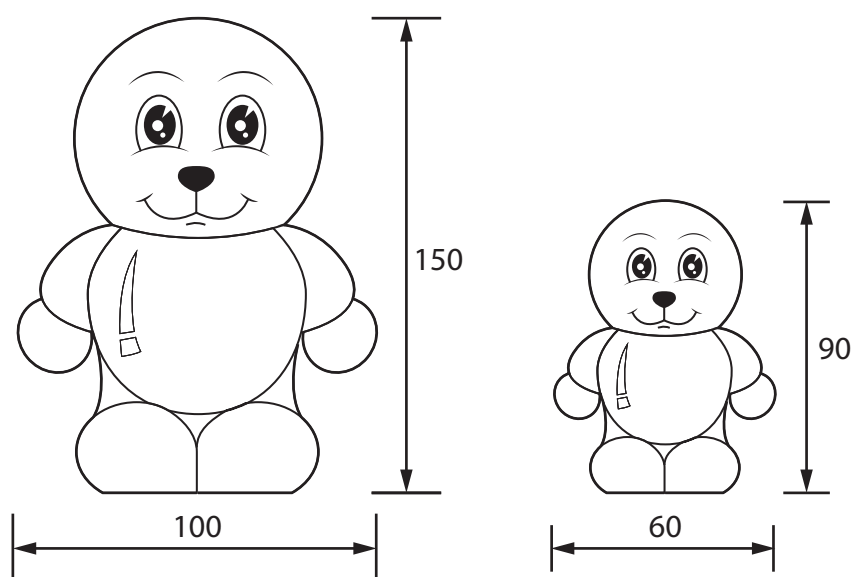
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12 You have been asked to design a display unit for small plastic figures.



All dimensions in millimetres

Design specification

The specification for the display unit is that it must:

- be capable of holding at least two small and two large figures
- be lockable
- allow them to be easily accessed
- have adjustable shelves
- include a light source
- be capable of being fixed to a wall
- be made from materials available in the school workshop
- be made using processes suitable for a one-off

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

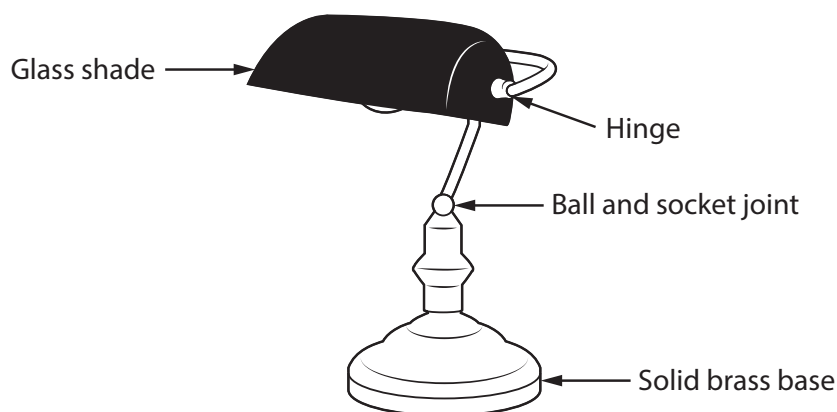
(8)

Design idea 2

(8)

(Total for Question 12 = 16 marks)

13 The image below shows a desk lamp.



- (a) (i) Give **two** properties of brass that make it suitable for the base of the desk lamp.

(2)

- (ii) Explain **one** reason why brass is a better choice of material than acrylic for the base of the desk lamp.

(2)

- (b) The electric cable is coated with a thin layer of PVC

Explain **one** reason why the electric cable is coated with a thin layer of PVC.

(2)

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

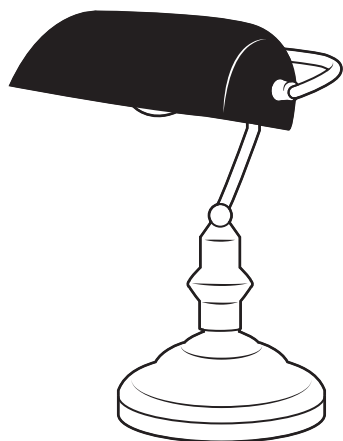
(i) easy to light up different areas of the desk

(2)

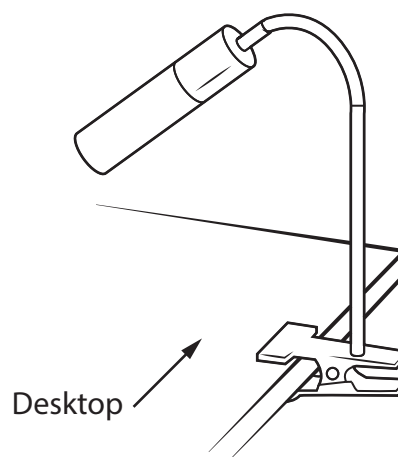
(ii) will not fall over.

(2)

*(d) The images below show two different types of desk lamp.



Desk lamp A - Mains powered



Desk lamp B - Battery powered

Evaluate desk lamp A in comparison to desk lamp B in terms of form and user requirements.

(6)

(Total for Question 13 = 16 marks)

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14 The image below shows the frame of a mass-produced chair made from mild steel.



- (a) One reason mild steel was chosen was because it is easily welded.
- (i) Name **one** other method of joining mild steel which involves the use of heat. (1)
- (ii) Explain **two** other reasons why mild steel is an appropriate choice of material for the frame of the chair. (4)

(b) Describe **two** health and safety precautions that should be taken when welding.

(4)

(c) The metals parts are held in a jig when they are being welded.

Explain **two** reasons why a jig is used when the parts are being welded.

(4)

*(d) A new chair frame is to be designed using a CAD system.

Discuss the advantages and disadvantages of using CAD for virtual modelling and testing the designs.

(6)

(Total for Question 14 = 19 marks)

TOTAL FOR PAPER = 80 MARKS

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