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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

Tuesday 10 June 2014 – 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.
- 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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6/6/4/4/3



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Answer ALL questions.

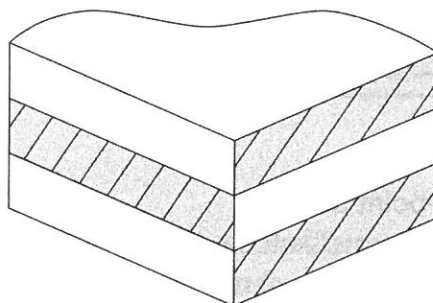
For each question 1 to 10, choose an answer A, B, C or D. Put a cross in the box indicating the answer you have chosen ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Which **one** of the following materials will rust if left outside in the rain?

- ☐ **A** Pine
- ☐ **B** Aluminium
- ☐ **C** Mild steel
- ☐ **D** Carbon fibre

(Total for Question 1 = 1 mark)

2 Which type of manufactured board is shown below?



- ☐ **A** Hardboard
- ☐ **B** Plywood
- ☐ **C** Chipboard
- ☐ **D** Medium density fibreboard (MDF)

(Total for Question 2 = 1 mark)

3 Which **one** of the following is a form of renewable energy?

- ☐ **A** Oil
- ☐ **B** Coal
- ☐ **C** Wind
- ☐ **D** Gas

(Total for Question 3 = 1 mark)



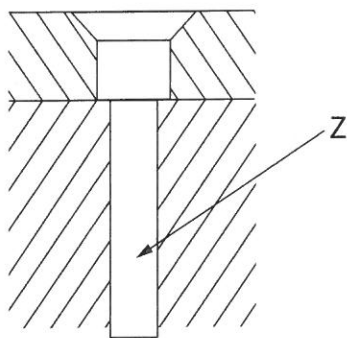
- 4 Which **one** of the following finishes is best applied to the mild steel hanging basket bracket shown below?



- ☐ A Plastic dip coating
- ☐ B Stain
- ☐ C Wax polish
- ☐ D Varnish

(Total for Question 4 = 1 mark)

- 5 The diagram below shows how two pieces of wood are prepared for screwing together.



What is the correct name for the hole labelled Z?

- ☐ A Clearance hole
- ☐ B Countersink hole
- ☐ C Shank hole
- ☐ D Pilot hole

(Total for Question 5 = 1 mark)



6 Which **one** of the following processes is best suited to manufacture a hollow shampoo bottle?

- ☐ A Blow moulding
- ☐ B Vacuum forming
- ☐ C Extrusion
- ☐ D Line bending

(Total for Question 6 = 1 mark)

7 The Kyoto Protocol was set up to help reduce which **one** of the following gases?

- ☐ A Oxygen
- ☐ B Nitrogen
- ☐ C Carbon monoxide
- ☐ D Carbon dioxide

(Total for Question 7 = 1 mark)

8 CAM stands for:

- ☐ A Computer and manufacture
- ☐ B Computer-aided manufacture
- ☐ C Computing and metalwork
- ☐ D Controlling and making

(Total for Question 8 = 1 mark)

9 Shear strength is defined as:

- ☐ A the ability of a material or joint to withstand being pulled apart
- ☐ B the ability of a material to return to its original shape once a deforming force is removed
- ☐ C the ability of a material to withstand being squashed
- ☐ D the ability of a material to withstand abrasive wear and indentation

(Total for Question 9 = 1 mark)



10 Which of the following statements about carbon nanotubes is **not** true?

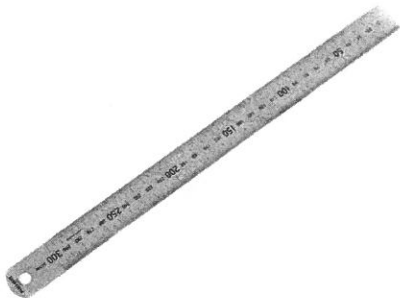
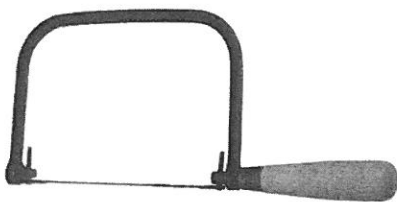
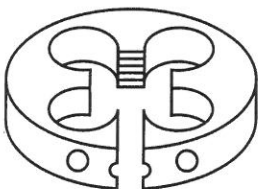

- ☐ **A** They are six times stronger than steel
- ☐ **B** They can be added to paint to give a hard, tough surface
- ☐ **C** They are very cheap to manufacture
- ☐ **D** They conduct heat and electricity better than any other material discovered

(Total for Question 10 = 1 mark)



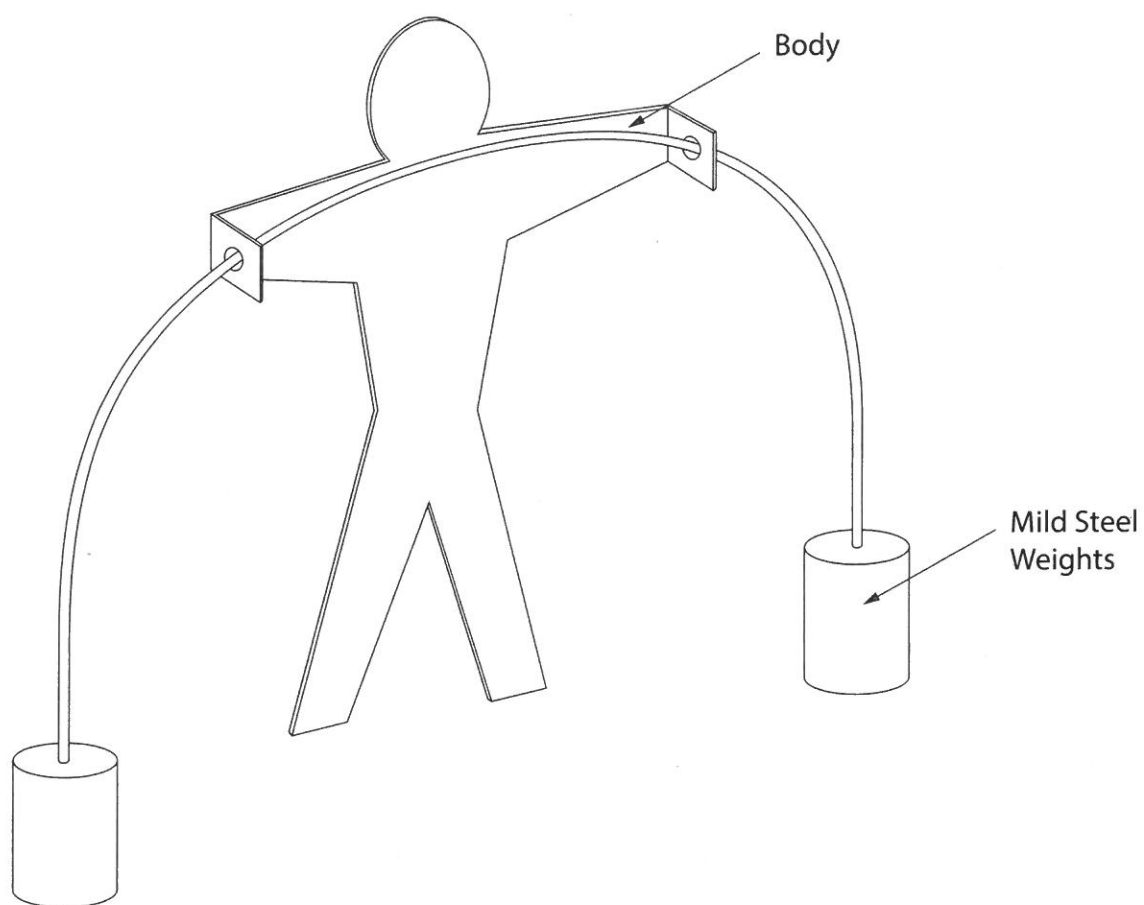
11 (a) The table below shows some tools, equipment and components.

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

Tool/Equipment/Component	Name	Use
	Steel rule	(1)
	(1)	Cutting curves in wood/plastic
	(1)	Cutting an external screw thread
	(1)	Helps protect the surface / spread the load when used with a nut



(b) The drawing below shows a balancing figure used as a desk toy.



The body is made out of aluminium

Give **two** properties of aluminium.

(2)

1

2



(c) The mild steel weights are turned on a centre lathe.

(i) Give **three** risks associated with turning on a centre lathe.

(3)

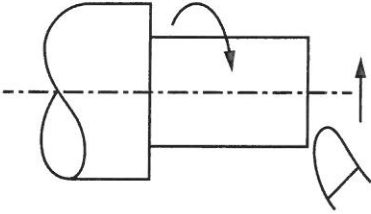
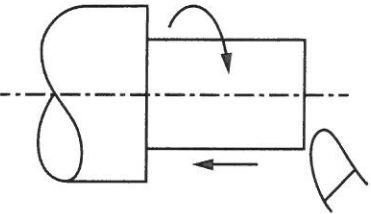
1

2

3

(ii) The table below shows two of the turning processes used to manufacture the mild steel weights

Complete the table by naming the correct process from the description and process given.

Process description		Process name
The tool is moved at right angles to the work		<p>.....</p> <p>(1)</p>
The tool is moved along the centre axis to reduce the diameter		<p>.....</p> <p>(1)</p>



(d) The body of the balancing figure could be made from acrylic rather than aluminium.

(i) Give **two** advantages of making the body out of acrylic rather than aluminium.

(2)

1

.....

2

.....

(ii) Describe **one** disadvantage of using acrylic for the body.

(2)

.....

.....

.....

.....

(e) A template is used when marking out 50 of the bodies.

Describe **two** advantages of using a template when marking out the bodies.

(4)

1

.....

.....

2

.....

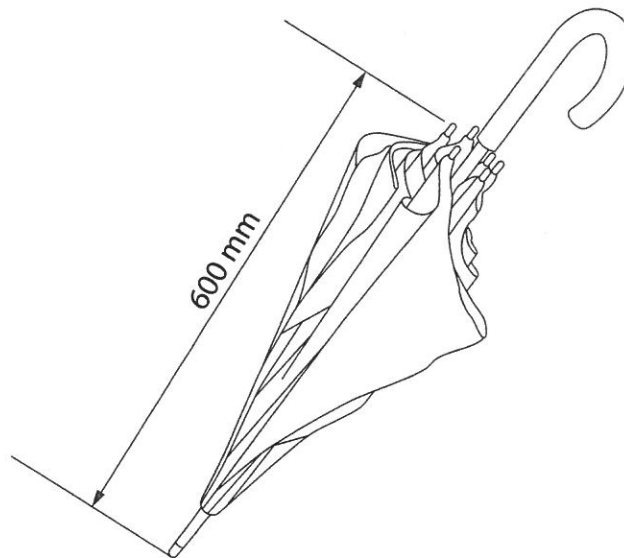
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(Total for Question 11 = 19 marks)



12 You have been asked to design a coat and umbrella storage unit for young children.

Additional information



Umbrella

The specification for the coat and umbrella storage unit is that it must:

- provide a method of holding two coats
- hold an umbrella
- collect any water that drips from the umbrella
- have a stable base
- be able to be assembled at home
- be appealing to young children
- be made from materials available in the school workshop
- be manufactured, as a one-off, using tools and 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 coat and umbrella storage 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.

PLEASE DO NOT WRITE OR DRAW IN THIS SPACE.

PLEASE USE THE SPACES OPPOSITE FOR YOUR DESIGNS.



Design idea 1

(8)

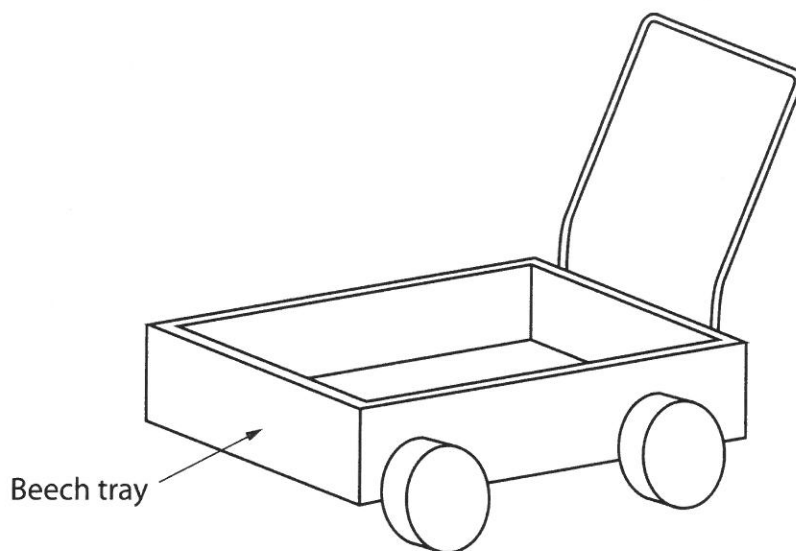
Design idea 2

(8)

(Total for Question 12 = 16 marks)



13 The drawing below shows a baby-walking aid.



(a) Give **two** properties of beech that make it suitable for the tray.

(2)

1

2

(b) (i) Name **two** finishes that could be applied to the beech tray.

(2)

1

2

(ii) Explain **one** reason for applying a finish to the beech tray.

(2)

.....

.....

.....



(c) Explain why the baby-walking aid is successful in meeting the following specification points:

(i) encourages young children to walk

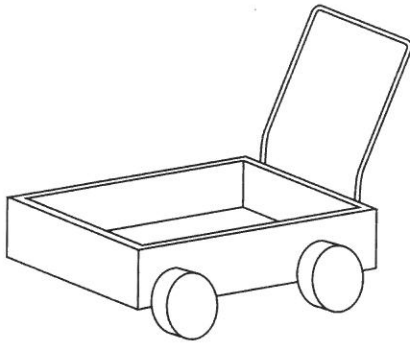
(2)

(ii) provides a stable base.

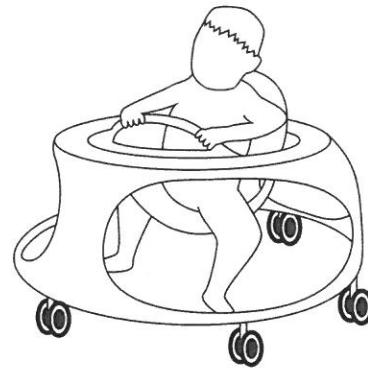
(2)



*(d) The drawings below show two different types of baby-walking aid.



Walking aid A



Walking aid B

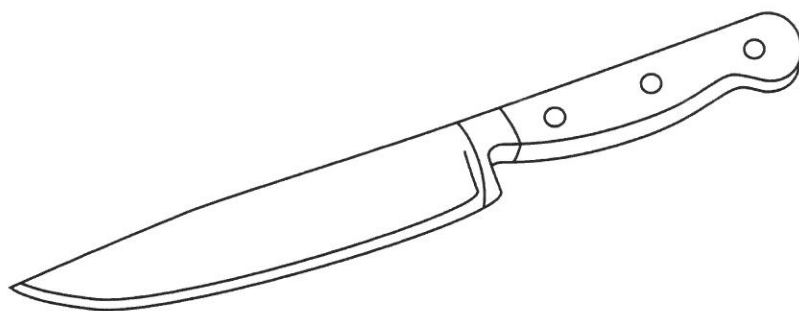
Evaluate walking aid A compared with walking aid B, in terms of form and user requirements.

(6)

(Total for Question 13 = 16 marks)



14 The drawing below shows a kitchen knife.



(a) The handle is made from urea formaldehyde

State whether urea formaldehyde is thermoplastic or thermosetting plastic.

(1)

(b) The blade of the knife is made from stainless steel.

Give **two** properties of stainless steel that make it suitable for the blade of the knife.

Justify your answer.

(4)

Property 1

Justification

Property 2

Justification



(c) Cheaper knife blades can be made from carbon steel.

The carbon steel has been hardened.

Describe the process of hardening the knife blade.

(2)

(d) The manufacturer of the kitchen knife uses an ICT system in its business.

(i) Give **two** pieces of information that can be collected using an EPOS system.

(2)

1

2

(ii) Describe **two** ways in which the manufacturer is able to use email in its business.

(4)

1

2



* (e) Discuss the effects on society of internet marketing and sales.

(6)

(Total for Question 14 = 19 marks)

TOTAL FOR PAPER = 80 MARKS



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