Write your name here
Surname
Other names

Pearson
Edexcel GCSE

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

Thursday 14 June 2018 – Afternoon
Time: 1 hour 30 minutes

You do not need any other materials.

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
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 one of the four Rs does the logo below indicate?

☐ A Recover
☐ B Reduce
☐ C Reuse
☐ D Recycle

(Total for Question 1 = 1 mark)

2. Which one of the processes below involves the use of heat?

☐ A Soldering
☐ B Threading
☐ C Pop riveting
☐ D Knock down fittings

(Total for Question 2 = 1 mark)

3. Which type of manufactured board is made up of several thin layers joined together at right angles?

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

(Total for Question 3 = 1 mark)
4 Which one of the following materials is an alloy?

- A  Copper
- B  Zinc
- C  Brass
- D  Aluminium

(Total for Question 4 = 1 mark)

5 Which type of chisel is shown below?

- A  Mortise
- B  Cold
- C  Bevel edge
- D  Gouge

(Total for Question 5 = 1 mark)

6 Which turning process is shown in the diagram below?

- A  Knurling
- B  Parting off
- C  Facing off
- D  Taper turning

(Total for Question 6 = 1 mark)
7 Which one of the following processes would be used to manufacture yoghurt pots?

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

(Total for Question 7 = 1 mark)

8 Which type of drill is shown below?

- A Twist
- B Countersink
- C Masonry
- D Flat

(Total for Question 8 = 1 mark)

9 Which one of the following is a smart material?

- A Shape memory alloy (SMA)
- B Medium density fibreboard (MDF)
- C Stainless steel
- D Polyester resin

(Total for Question 9 = 1 mark)
10 Which property is described below?

The ability of a material to withstand sudden and shock loading without fracturing.

☐ A Ductility
☐ B Toughness
☐ C Hardness
☐ D Malleability

(Total for Question 10 = 1 mark)
11 (a) Complete the table below by giving the missing names and uses.

<table>
<thead>
<tr>
<th>Tools/Equipment</th>
<th>Name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="First Aid kit" /></td>
<td>First Aid kit</td>
<td>(1) Protect hearing in the workshop</td>
</tr>
<tr>
<td><img src="image" alt="Marking gauge" /></td>
<td>Marking gauge</td>
<td>(1) For holding a pattern/packing sand into when casting</td>
</tr>
<tr>
<td><img src="image" alt="Tool with packing sand" /></td>
<td></td>
<td>(1)</td>
</tr>
</tbody>
</table>
(b) The drawing below shows a child’s painting and drawing stand.

(i) Give two advantages of using medium density fibreboard (MDF) for the front panel of the painting and drawing stand.

1. ..............................................................
2. ..............................................................

MDF can be cut and sanded in the school workshop.

(ii) Give three health and safety risks of cutting and sanding MDF in the school workshop.

1. ..............................................................
2. ..............................................................
3. ..............................................................
(iii) Explain two advantages of using MDF for the board rather than hardboard.

1. ...........................................................

2. ...........................................................

(c) The other side of the child's painting and drawing stand is made from mild steel sheet that is painted.

(i) Name two other appropriate finishes that could be applied to the mild steel sheet.

1. ...........................................................

2. ...........................................................

(ii) Explain two reasons for applying a finish to the mild steel sheet.

1. ...........................................................

2. ...........................................................

(Total for Question 11 = 19 marks)
You have been asked to design a step ladder attachment for a window cleaner.

The specification for the step ladder attachment is that it must:

- attach to the ladder
- provide a method of holding some water
- provide a method of storing cloths
- include a non-slip surface for resting a mobile phone on
- be easy to carry when detached from the ladder
- hold a window squeegee safely
- be made from waterproof materials
- 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 step ladder attachment 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.
Design idea 1

Design idea 2

(Total for Question 12 = 16 marks)
13 The drawing below shows a pencil sharpener.

(a) (i) Give two properties of carbon steel that make it suitable for the blade of the pencil sharpener.

1. 
2. 

(ii) Describe one reason why carbon steel is a better choice of metal for the blade rather than aluminium.

(b) The blade of the pencil sharpener has been heat treated.

   Explain one reason for heat treating the blade of the pencil sharpeners.
(c) Explain why the pencil sharpener is successful in meeting the following specification points:

(i) easy to sharpen different sized pencils

(ii) collecting the waste produced.
(d) The images below show two different types of pencil sharpener.

Pencil sharpener A

Pencil sharpener B

ABS case

Carbon steel blade

Lid

Metal alloy
Evaluate pencil sharpener A in comparison to pencil sharpener B in terms of form, materials and components.

(Total for Question 13 = 16 marks)
14 (a) Give three risks associated with the use of glass reinforced plastic (GRP) in the school workshop.

1 ...........................................................................................................................................

2 ...........................................................................................................................................

3 ...........................................................................................................................................

GRP is a composite material.

(b) Explain what is meant by the term ‘composite’.
The drawing below shows a hockey stick.

The hockey stick is manufactured from GRP.

(c) Describe two advantages of manufacturing the hockey stick from GRP.

1. ..........................................................................................................................
   ..........................................................................................................................

2. ..........................................................................................................................
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(d) The image below shows a virtual model of a new hockey stick.

Explain **two** reasons for creating a virtual model of a new hockey stick.

1. ..........................................................................................................................

2. ..........................................................................................................................

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(e) Discuss the ways in which carbon fibre has had an impact on the performance of sports equipment.

(Total for Question 14 = 19 marks)