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.
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 following paper sizes is the smallest?

☐ A A0
☐ B A2
☐ C A3
☐ D A4

(Total for Question 1 = 1 mark)

2 Which one of the following is a composite material?

☐ A Balsa
☐ B Pine
☐ C Acrylic
☐ D Carbon fibre

(Total for Question 2 = 1 mark)

3 Which piece of equipment is shown below?

☐ A Ruler
☐ B Drawing board
☐ C Set square
☐ D French curve

(Total for Question 3 = 1 mark)
4 Which one of the following is most appropriate for joining two 300mm square pieces of MDF when model making?

A PVA  
B Epoxy resin  
C Tensol® cement  
D Polystyrene cement  

(Total for Question 4 = 1 mark)

5 Which one of the following processes would be used to mass-produce the plastic bottle shown below?

A Line bending  
B Vacuum forming  
C Injection moulding  
D Blow moulding  

(Total for Question 5 = 1 mark)

6 A photovoltaic cell responds to which form of energy?

A Wind  
B Biomass  
C Tidal  
D Solar  

(Total for Question 6 = 1 mark)
7 The 4Rs for minimising waste production are reduce, recover, recycle and

- A Reuse
- B Renew
- C Repair
- D Replace

(Total for Question 7 = 1 mark)

8 Which type of system is identified by the logo shown below?

- A Bluetooth®
- B Radio frequency identification tags
- C High definition television
- D Desktop publishing

(Total for Question 8 = 1 mark)

9 Which one of the following would be used to prototype a one-off 3D design?

- A Injection moulding
- B Blow moulding
- C Stereolithography
- D Vinyl cutting

(Total for Question 9 = 1 mark)
10 Which one of the following modern or smart materials changes colour to give an indication of temperature?

- A Polymorph
- B Thermochromic film
- C Transdermal patches
- D E-paper

(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>Steel rule</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Safety goggles</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Laminating machine</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For drilling holes</td>
</tr>
<tr>
<td></td>
<td>Laminating machine</td>
<td>(1)</td>
</tr>
</tbody>
</table>
(b) A mass-produced glass bottle containing oil is shown below.

The bottle of oil would be sold in supermarkets.

(i) Give **two** reasons why the glass bottles are mass-produced.

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

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

(ii) Glass can be recycled.

Give **two** other properties of glass that make it suitable for bottles.

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

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

(iii) Give **three** benefits to the environment of being able to recycle glass.

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

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

3 ..........................................................................................................................
(c) The manufacturer packages the bottle of oil in a wooden presentation box as shown below.

(i) Explain two advantages of using pine for the box rather than MDF.

1. 

2. 


(ii) Explain **two** reasons for using clear acrylic for the front of the presentation box.

1

..........................................................................................................................
..........................................................................................................................
..........................................................................................................................

2

..........................................................................................................................
..........................................................................................................................
..........................................................................................................................

(Total for Question 11 = 19 marks)
12 You have been asked to design a point-of-sale display for ‘Sue’s’, a chip shop.

The specification for the point-of-sale display is that it must:

• hold four cones of chips upright
• hold the cones of chips securely
• have a stable base
• be easy to wipe clean
• be easy to get the cones in and out of
• use a display method to show the name ‘Sue’s’
• be produced from readily available materials
• be manufactured using processes available in school.

In the spaces opposite, use sketches and, where appropriate, brief notes to show two different design ideas for the point-of-sale display 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).

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Design idea 1

Design idea 2

(Total for Question 12 = 16 marks)
The drawing below shows a set of paintbrushes in a blister pack.

(a) (i) The blister pack has been vacuum formed from rigid polystyrene (PS).

Give two properties of rigid polystyrene that make it suitable for the blister pack.

1

2
(ii) Explain one advantage and one disadvantage of using vacuum forming to manufacture the blister pack.

(4)

Advantage

Disadvantage

(b) Explain how the blister pack is successful in meeting the following specification points:

(i) keeping the brushes together

(2)

(ii) easy to display

(2)
*(c) The drawing below shows two different types of packaging.*

Packaging A – Blister pack

Packaging B – Boxboard sleeve wrapped around the paintbrush
Evaluate blister pack A in comparison to the boxboard sleeve B in terms of scale of production and sustainability.

(Total for Question 13 = 16 marks)
The drawing below shows a tube of artist's paint.

(a) The coloured information label is wrapped around the tube of paint.

(i) Give one reason why the information label is applied separately to the tube of paint.

(ii) Explain two reasons why aluminium is used for the paint tube.
(b) The screw cap lid is mass-produced by injection moulding.

Explain two reasons why injection moulding is a suitable process for making the screw cap lids.

1

2

(c) Sets of different colours of paint are often sold in a box like the one shown below.

Varnish has been applied over the coloured inks

Parts of the graphic image on the front of the box have been finished with a layer of varnish.

Explain two reasons why parts of the graphic image on the box have been finished with a layer of varnish.

1

2
*(d) Discuss the advantages and disadvantages of commercial screenprinting.*

(Total for Question 14 = 19 marks)

TOTAL FOR PAPER = 80 MARKS