



The photograph below shows a kitchen sink that has been manufactured from stainless steel.



1

Give **two** physical and **two** mechanical properties of the metal used for the kitchen sink. In each case, state why the property is suitable for this product.

[8 marks]

Physical  
Property 1

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Physical  
Property 2

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Mechanical  
Property 1

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Mechanical  
Property 2

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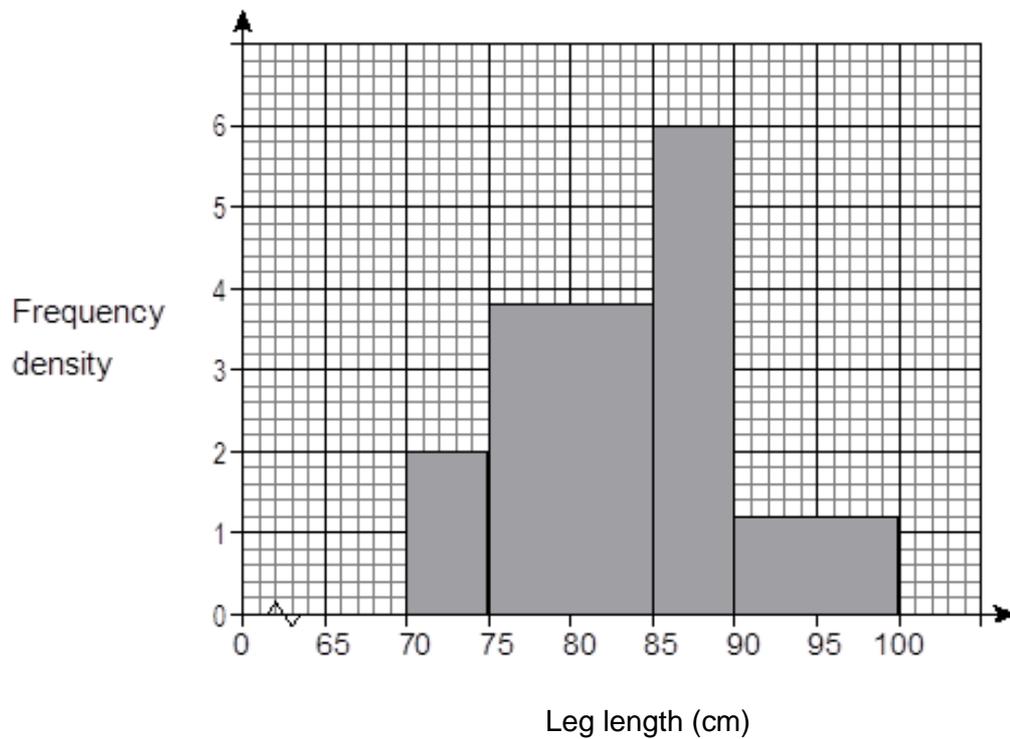
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2

A manufacturer of kitchen furniture wishes to design a range of kitchen high stools. The histogram below shows the leg length of a sample group of potential users.



Calculate the total number of users in the sample group and which of the four bars represents the greatest number of potential users

[4 marks]

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3

Explain the meaning of the term 'fabrication process' and give an appropriate example.

[2 marks]

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**Figure 2**



**Manufactured from thermoplastic using polymer redistribution process**

**Figure 3**



**Manufactured from hardwood using fabrication process**

4

Compare the two types of chair shown in **Figure 2** and **Figure 3**. Evaluate their suitability for long term use in an outdoor environment.

[6 marks]

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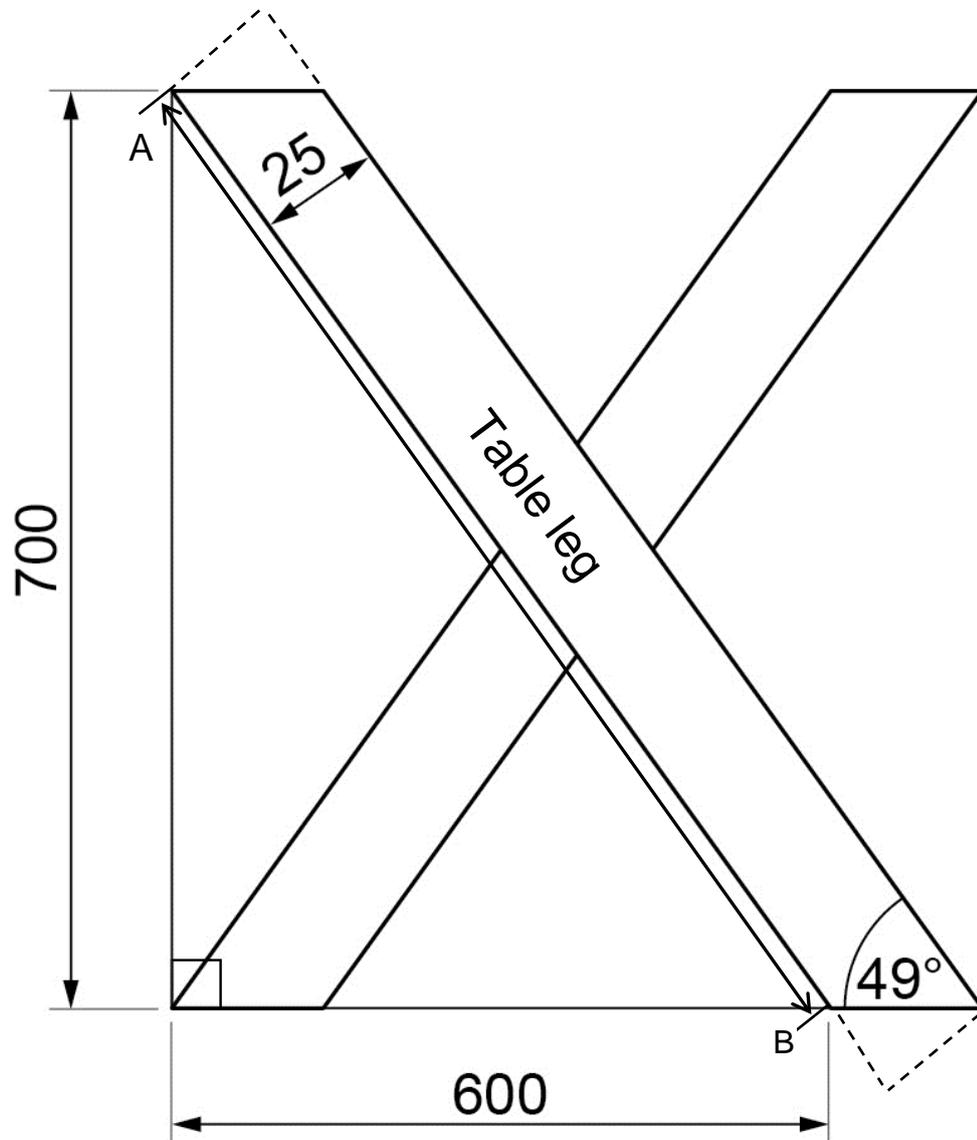
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5

A dining table has been manufactured from lengths of wood. **Figure 4** shows a cross sectional view of two of the table legs.



All dimensions in millimetres

**Figure 4**  
Cross sectional view of two of the table legs



6

The photograph below shows a domestic bathroom shower. The shower tray is made from Acrylonitrile Butadiene Styrene (ABS) and has been manufactured using a vacuum forming process.



Name three key features of a successful vacuum forming mould.

**[3 marks]**

Feature 1

Feature 2

Feature 3



8 . 1

Figure 5 shows a CAD drawing of a lamp produced by a designer.



Figure 5

The aluminium lamp base is to be cast with the dimensions shown in Figure 6.

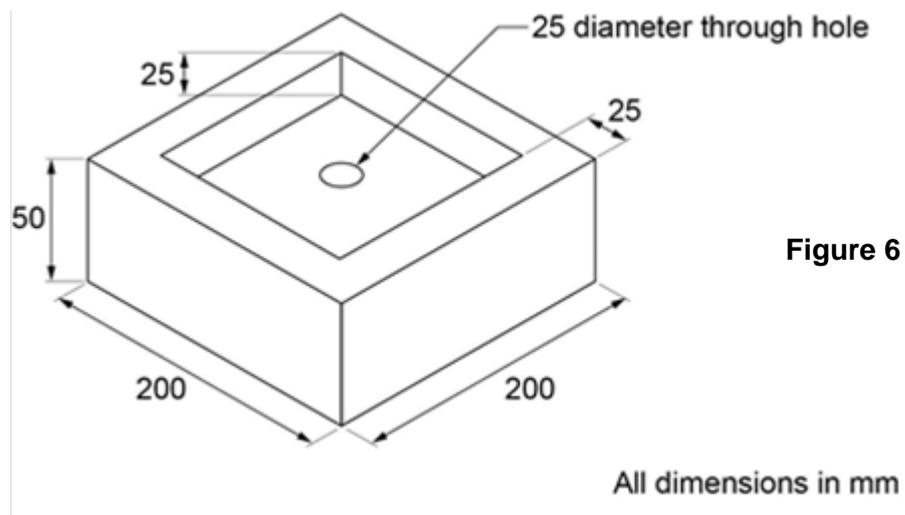


Figure 6

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Aluminium costs £1580 per m<sup>3</sup>.

Calculate the material cost for 150 of the lamp bases described in **Figure 6**.

**[4 marks]**

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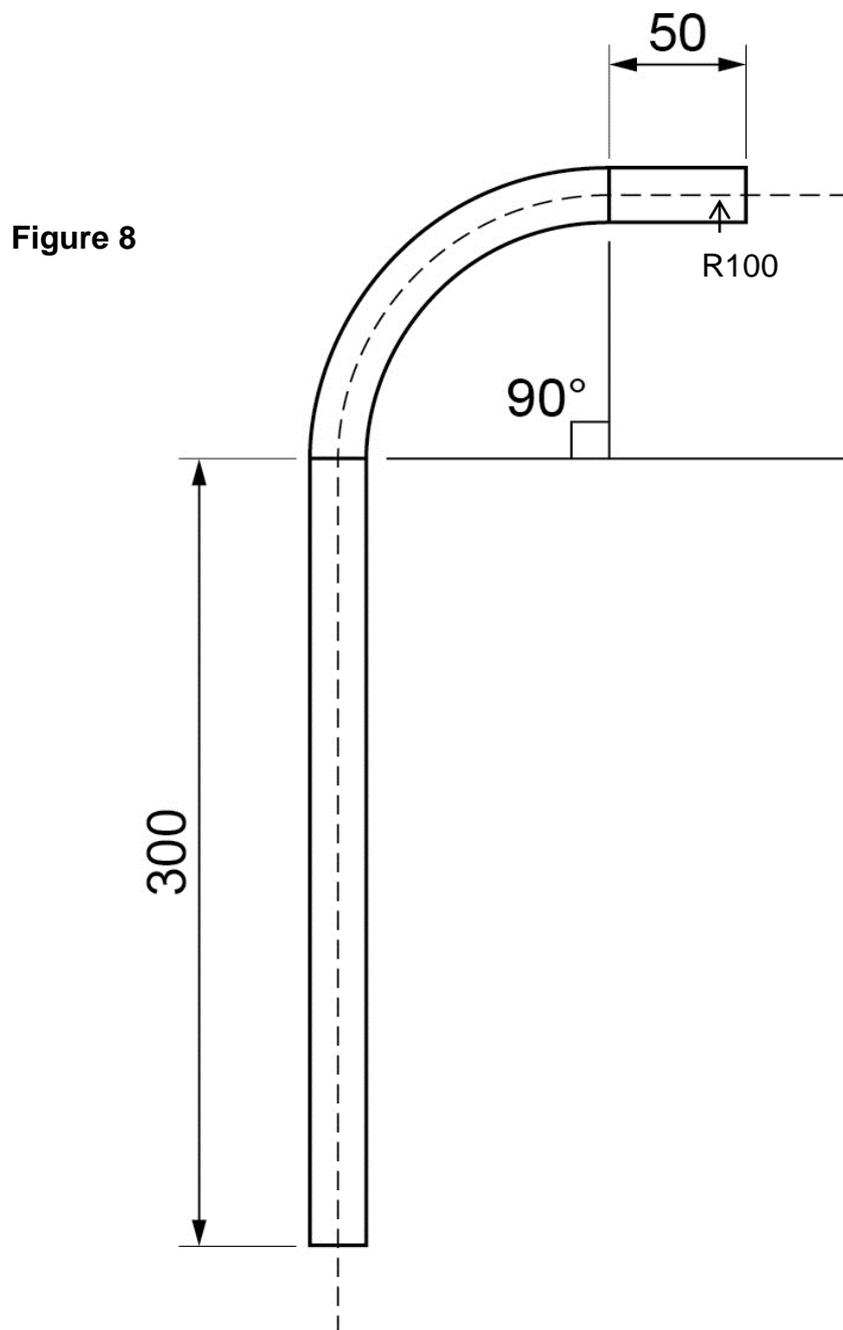
The stem of the lamp is bent from a single tube of mild steel with the dimensions shown in **Figure 7**.

Describe how the tube could be formed.

In your answer you should:

- explain the forming process and refer to the tools used, and
- calculate the length of tube required to create the stem. Give your answer to the nearest mm.

[6 marks]

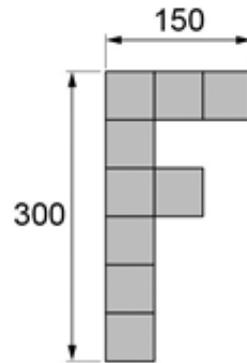






**9**

It takes 5 minutes to cut out a single acrylic copy of the shape shown in **Figure 9**. Cutting in plywood takes 15% longer. Calculate the laser cutting speed for each of these materials in metres per second.

**[2 marks]****Figure 9**

All dimensions in mm

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Shown below are two types of packaging used to contain soup.



Paper based soup carton



Metal soup can

Compare and evaluate the suitability of the two types of packaging used to contain soup. In your answer, you should make reference to:

- the materials used
- implications for the consumer.

[12 marks]

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**1 5**

The body of the racing car shown in is manufactured from a composite material.



Explain the meaning of the term 'composite material'.

**[2 marks]**

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**1 6**

Name a suitable composite material for the body of the Formula 1 racing car shown in **Figure 9**.

**[1 mark]**

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The body of the racing car has been manufactured using a lay-up method. Name 6 stages in the manufacturing process.

**[6 marks]**

Stage 1 \_\_\_\_\_

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Stage 2 \_\_\_\_\_

\_\_\_\_\_

Stage 3 \_\_\_\_\_

\_\_\_\_\_

Stage 4 \_\_\_\_\_

\_\_\_\_\_

Stage 5 \_\_\_\_\_

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Stage 6 \_\_\_\_\_

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1 9

The photographs below show two baby feeding spoons. One spoon is made from metal, one spoon is made from a polymer with a smart material.



Metal spoon  
**Spoon A**



**Spoon B**

Explain why **Spoon B** may be more suitable than **Spoon A** for this application.

[5 marks]

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