

Answer ALL the questions. Write your answers in the spaces provided.

1. (a) Name a suitable material for each of the following products and give a property that makes it suitable.

(i) Product: A metal step ladder.

Material

Property

(2)

(ii) Product: Plastic lettering on a shop sign.

Material

Property

(2)

(b) Figure 1 shows a garden chair.



Figure 1

Garden chairs are often made from hardwoods rather than softwoods.

Other than hardness, give **two** differences between hardwoods and softwoods.

1

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2

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(2)



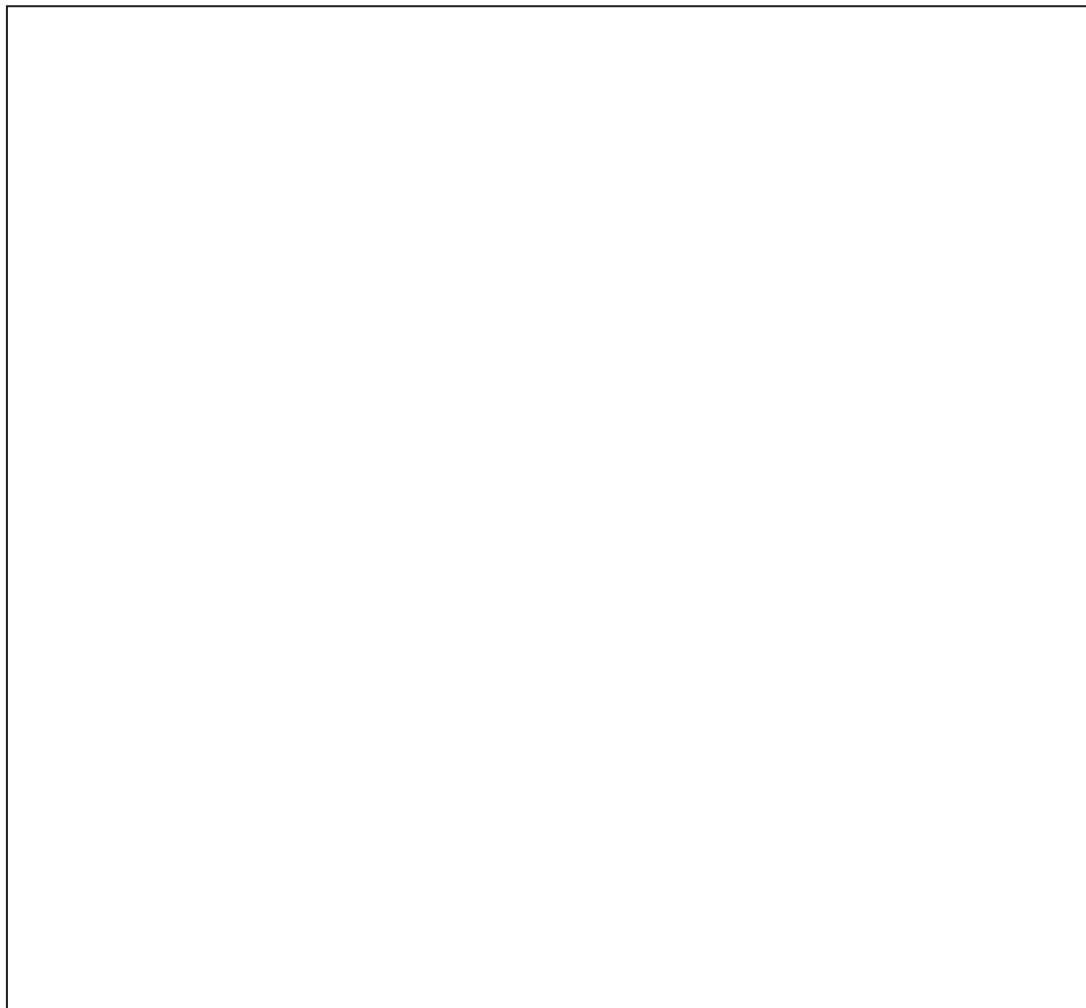
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(c) Figure 2 shows the garden chair. The joint at point A is a mortice and tenon joint.



Figure 2

In the space below, sketch a mortice and tenon joint.



(3)

(Total 9 marks)

Q1



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2. (a) The 1974 Health and Safety at Work Act requires that risk assessments are carried out on all workshop machines to minimise the risk of injury.

Choose **one** of the following processes and identify **two** hazards associated with that process, and their respective control measures.

- Use of a pillar drill.
- Use of welding equipment.
- Use of a disc/belt sanding machine.

Chosen process

Hazard 1

.....

Control measure

.....

(2)

Hazard 2

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Control measure

.....

(2)

(b) State the principal responsibility the 1974 Health and Safety at Work Act places on both the employers and the employees.

(i) Employers

.....

(1)

(ii) Employees

.....

(1)





<p>(c) The Health and Safety Executive (HSE) is a government body. Give two of its main roles.</p> <p>1</p> <p>.....</p> <p>.....</p> <p>2</p> <p>.....</p> <p>.....</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(Total 8 marks)</p>	<p>Leave blank</p> <p>Q2</p> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div>
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N 3 3 0 1 4 A 0 5 2 0



3. Figure 3 shows a candlestick which is being produced by a small business.

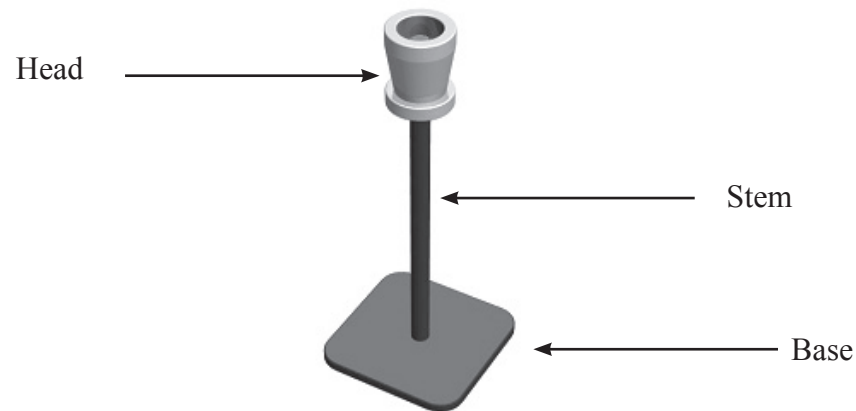


Figure 3

(a) The stem and base of the candlestick are made from a ferrous metal.

Explain what is meant by the term 'ferrous'.

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.....
(1)

(b) When an order for 50 candlesticks is placed they are manufactured to order and dispatched.

Name the scale of production that best describes this situation.

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(1)

(c) Figure 4 shows a symbol which appears on a label attached to the candlestick when it is sold.



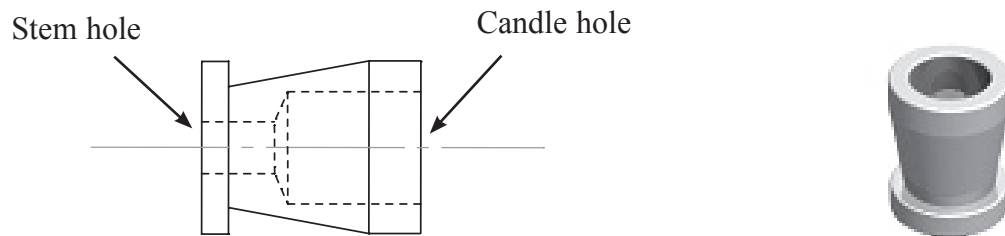
Figure 4

Name this symbol.

.....
.....
(1)



(d) Figure 5 shows a side view and a pictorial view of the candlestick's head which is turned on a lathe from a 20mm diameter aluminium bar.



Machined from 20mm diameter aluminium bar

Figure 5

There are four stages in the production of the head:

Stage 1 – Face off
Stage 2 – Produce holes
Stage 3 – Produce shape
Stage 4 – Part off

Describe how stages 2 and 3 are carried out.

(i) Stage 2 – Produce holes

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.....
.....

(2)

(ii) Stage 3 – Produce shape

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(2)



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(e) The small business has upgraded to a computer numerically controlled (CNC) lathe for manufacturing the candlestick heads.

Give **four** advantages of using a CNC lathe over a manual lathe.

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(4)

Q3

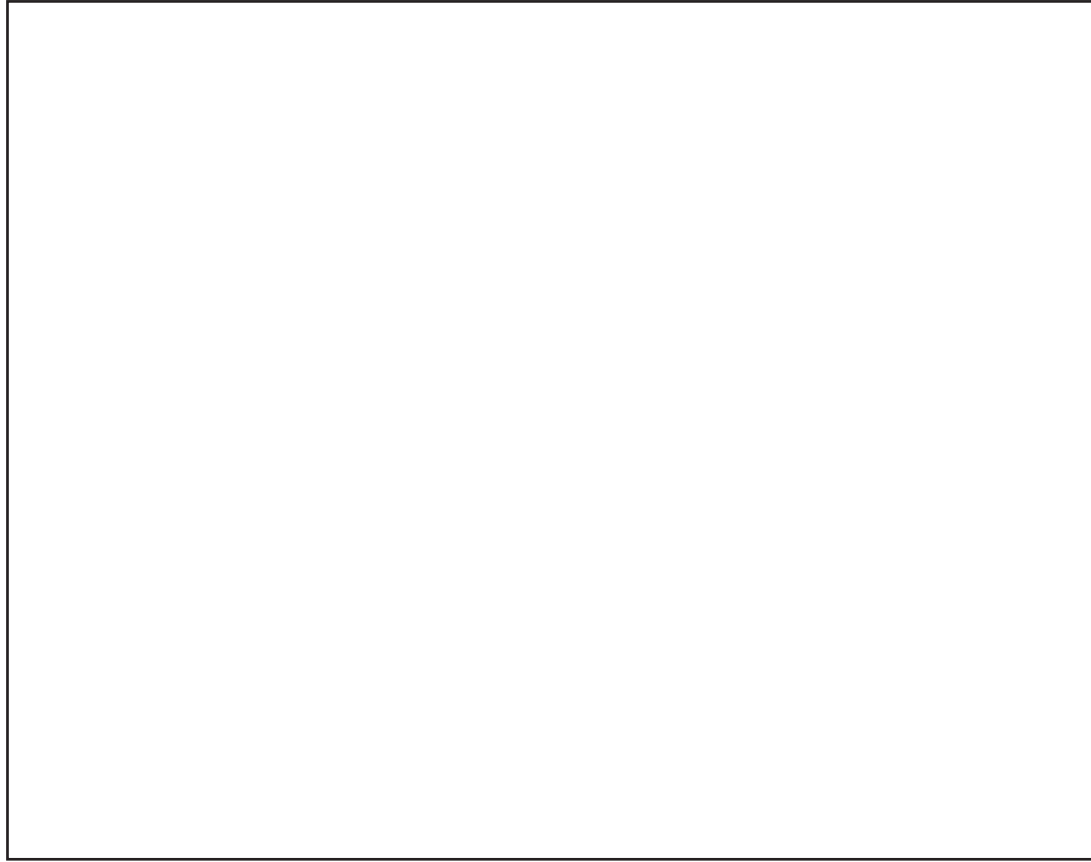
(Total 11 marks)



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4. (a) Pop rivets are often used to assemble products.

Explain, using notes and sketches, how pop rivets are fitted.



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(4)



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(b) CAD systems can be used to generate virtual models of products before physical prototypes are made.

(i) Describe what is meant by a 'virtual model'.

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(2)

(ii) Designers use virtual models to help them develop ideas.

Give **four** advantages of using virtual models to aid the design process.

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4

(4)

Q4

(Total 10 marks)



5. Figure 6 shows a stainless steel drinks flask.

Stainless steel drinks flask



Figure 6

(a) Stainless steel is an alloy of medium carbon steel and other metals.

Name **one** of the other metals.

..... (1)

(b) Metals are alloyed to modify their properties.

Give **one** property of stainless steel that is not present in medium carbon steel.

.....
..... (1)

(c) Describe the process of alloying.

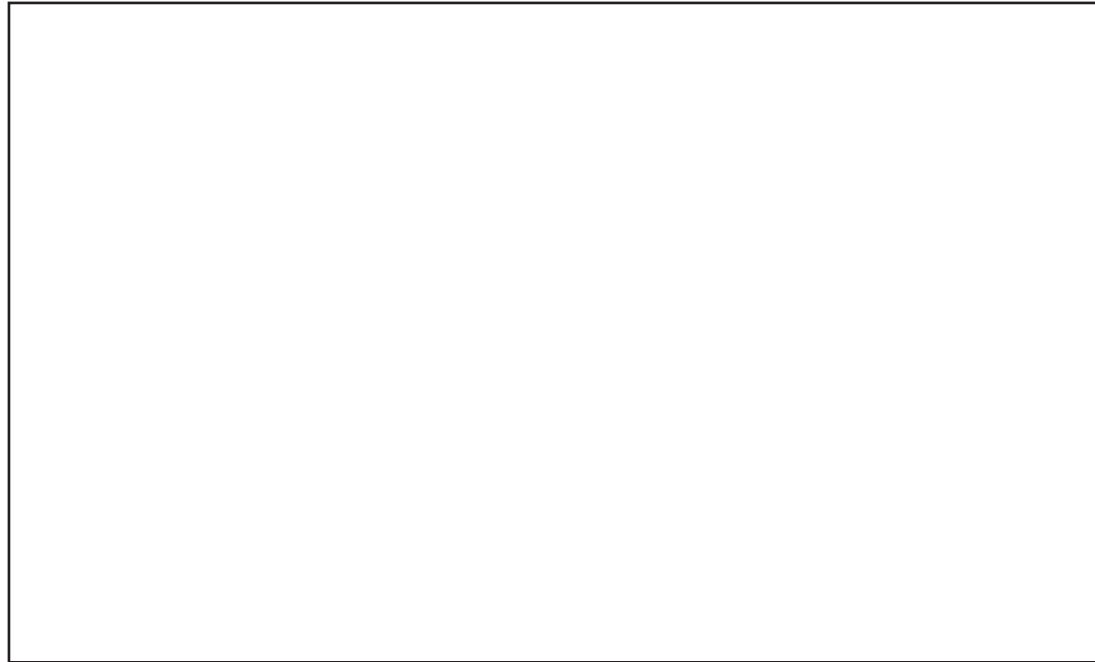
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..... (2)



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(d) Vacuum forming is a process commonly used to manufacture plastic containers.

In the space below, draw a labelled diagram of a vacuum forming machine showing clearly the position of the mould and plastic sheet prior to forming.



(4)

(e) Most raw materials for plastics are extracted from oil and undergo polymerisation in order to produce plastics for the manufacturing industry.

Describe, using notes and sketches, the molecular process of polymerisation.



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(4)

Q5

(Total 12 marks)



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6. (a) ICT-based systems are used to aid production planning because they can rapidly generate manufacturing schedules, making them more efficient than manual methods.

Explain **two** further ways ICT-based systems improve the efficiency of production planning.

1

2

(4)

(b) When generating production schedules the planning software uses a range of different strategies in order to ensure that orders are met on time.

Describe **three** scheduling strategies used by production planning systems.

1

2

3

(6)

(Total 10 marks)

Q6

13

Turn over



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8. (a) Many modern mass produced products employ increasing levels of miniaturised electronics.

Give **four** ways in which miniaturisation has made products more desirable.

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(4)

QUESTION 8 CONTINUES ON THE NEXT PAGE



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