

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



General Certificate of Secondary Education  
June 2014

# Engineering

# 48503

## Unit 3 Written Paper

Wednesday 4 June 2014 1.30 pm to 2.30 pm

**For this paper you must have:**

- normal writing and drawing instruments.

**Time allowed**

- 1 hour

**Instructions**

- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.
- You are reminded of the need for good English and clear presentation in your answers. Quality of Written Communication will be assessed in Question 5(a).



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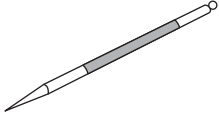
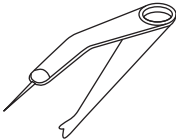
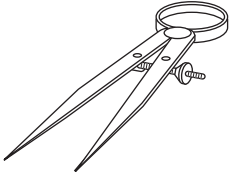
Answer **all** questions in the spaces provided.

**1** **Figure 1** below shows an incomplete table of marking out tools used by engineers.

Complete the table. The first name has been done for you.

**[5 marks]**

**Figure 1**

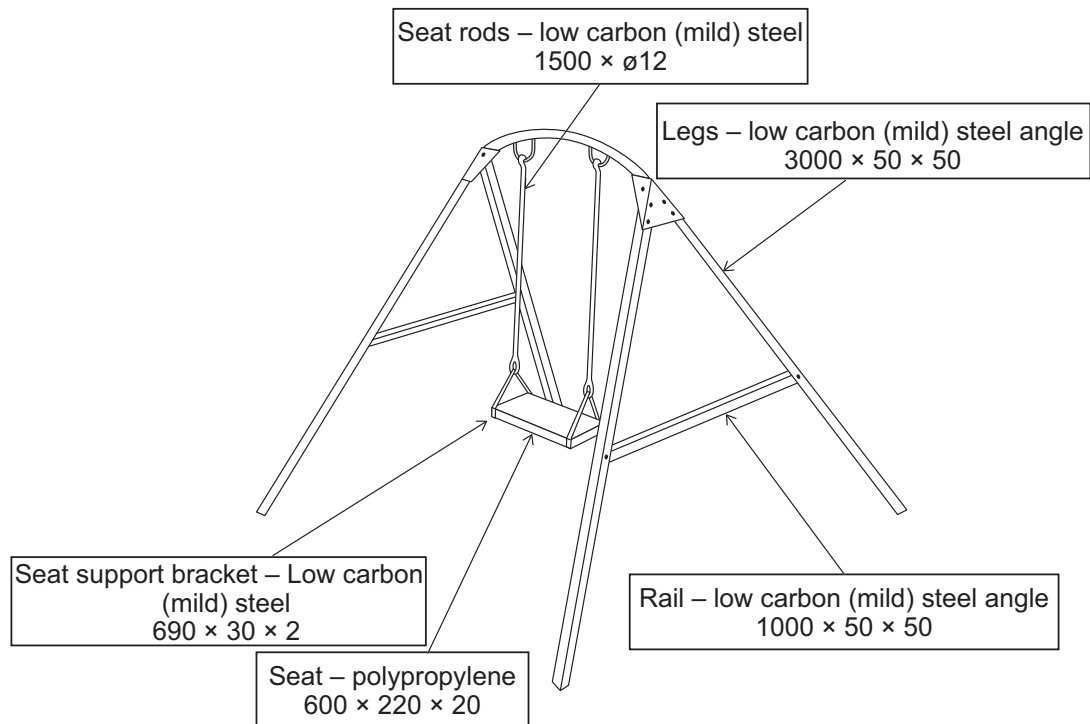
Tool	Name	What it is used for
	<p>scriber</p>	
		
		

5



2 (a) Figure 2 shows a garden swing.

Figure 2



All dimensions are in mm

Use the information in **Figure 2** to complete the cutting list below.

[5 marks]

	Length	Width/DIA	Thickness	Material	Quantity
<b>Legs</b>		50	50	Low carbon steel angle	4
<b>Rail</b>	1000	50	50	Low carbon steel angle	
<b>Seat</b>	600	220	20		1
<b>Seat Support Bracket</b>	690		2	Low carbon steel	2
<b>Seat Rods</b>	1500			Low carbon steel	2

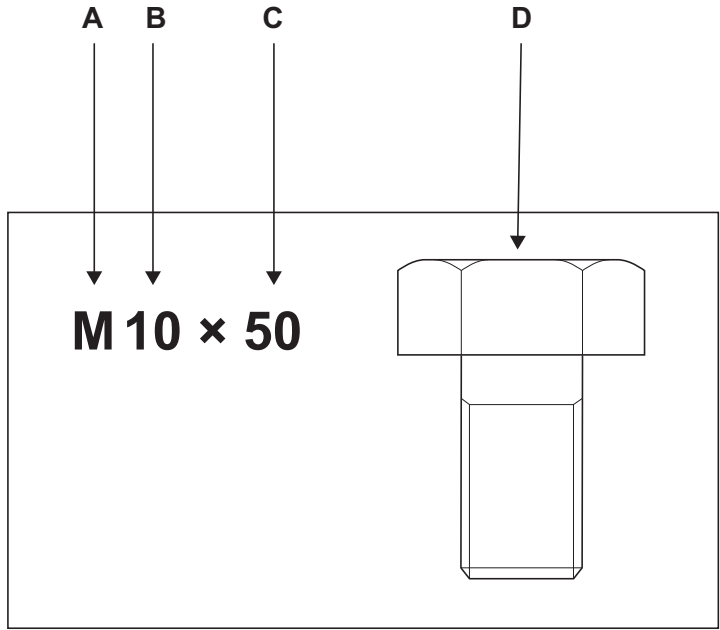
Question 2 continues on the next page

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2 (b) The manufacturer ordered steel nuts and bolts from a supplier to complete the assembly of the swing.  
Figure 3 shows the label on the box of bolts sent by the supplier.

Figure 3



State what each item of information means.

[4 marks]

- A .....
- B .....
- C .....
- D .....

2 (c) Give a suitable surface finish for the steel bolts other than painting.

[1 mark]

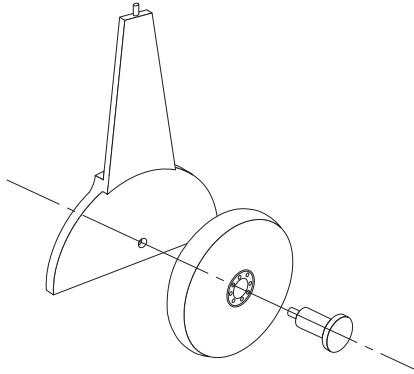
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- 3 (a) Figure 4 shows a drawing from a model aeroplane kit.

Figure 4



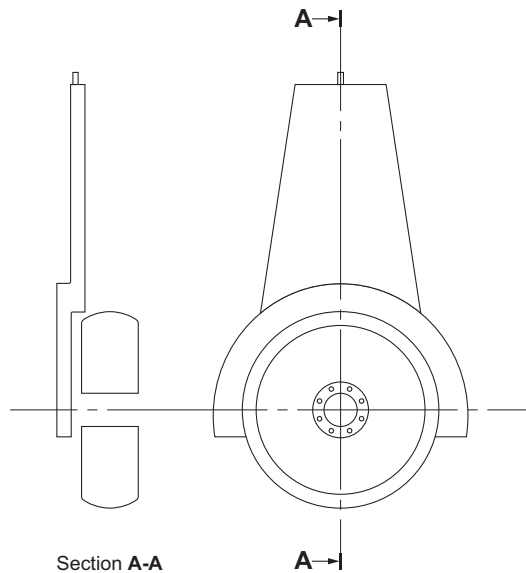
State the type of drawing.

[1 mark]

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- 3 (b) Figure 5 shows a part complete third angle projection of the same components in Figure 4.

Figure 5



- 3 (b) (i) Complete the assembly drawing through section A-A. It is drawn in third angle projection.

[4 marks]

- 3 (b) (ii) Add the correct symbol for third angle projection to Figure 5.

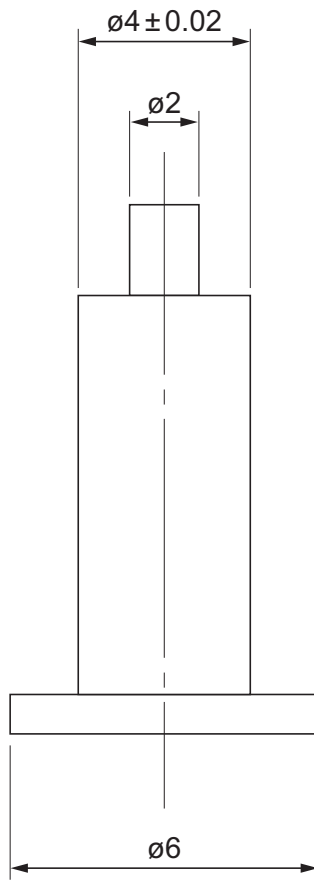
[1 mark]

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3 (c) Figure 6 gives details of a component.

Figure 6



Explain what the information  $\varnothing 4 \pm 0.02$  means.

[2 marks]

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3 (d) Explain the advantages of using a digital measuring device when checking components.

[2 marks]

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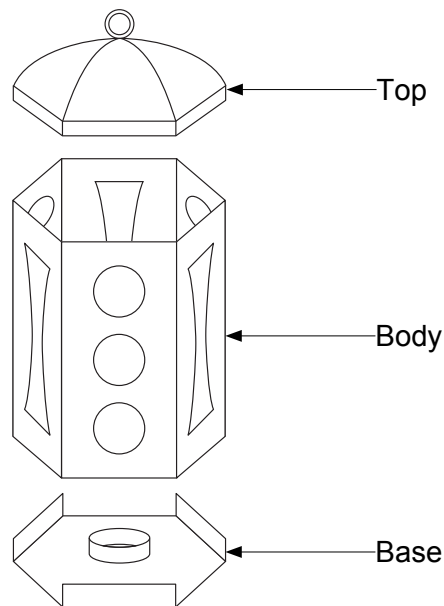
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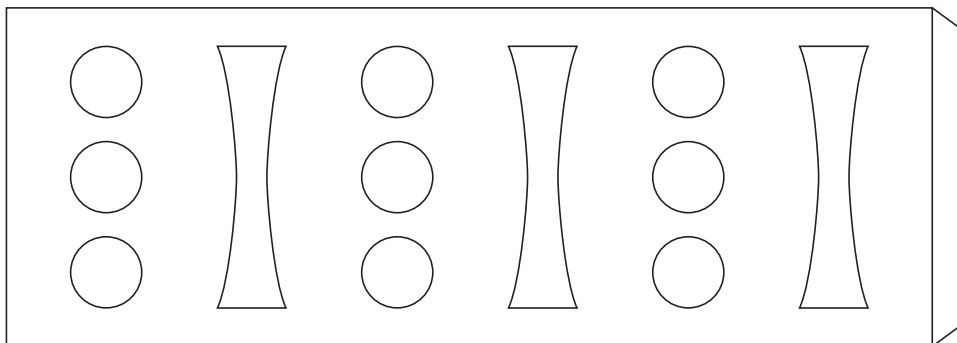
4 **Figure 7** shows a lantern made from low carbon steel.

**Figure 7**



**Figure 8** gives some details for the manufacturer.

**Figure 8**



4 (a) Using the correct British Standard drawing conventions, add the following dimensions to **Figure 8**:

**[4 marks]**

- Length of sheet = 120
- Width of sheet = 60
- Diameter of a hole = 20

Turn over ►



**4 (b)** Describe an industrial method which could be used for cutting the body of the lantern. **[2 marks]**

.....

.....

.....

.....

**4 (c)** The lantern is to be powered electrically.  
Draw a circuit diagram including the symbols for the following components:

- switch
- battery
- light emitting diode.

**[4 marks]**





**Turn over for the next question**

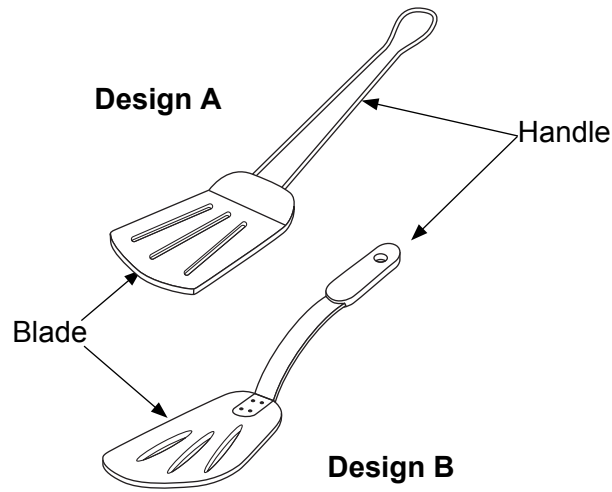
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ANSWER IN THE SPACES PROVIDED**

**Turn over ▶**



5 **Figure 9** shows two designs of a metal kitchen utensil.

**Figure 9**



5 (a) Evaluate the two designs from the viewpoint of the user and the manufacturer. Quality of written communication will be assessed in this question.

**[6 marks]**

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**5 (b)** The handle in **Design B** can be made from a plastic.  
Explain **two** ways plastic products impact on the environment.

**[4 marks]**

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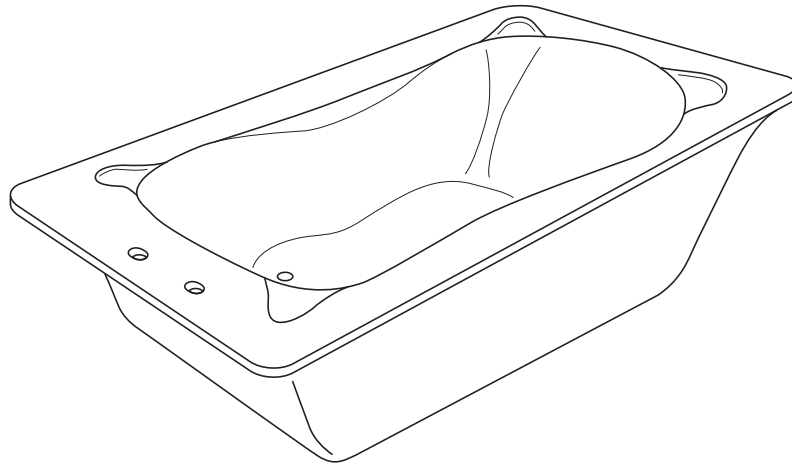
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**Turn over ▶**



6 Figure 10 shows a bath. Many baths are manufactured by vacuum forming.

Figure 10



6 (a) Identify **two** key features of a pattern for a successful vacuum formed product.

[2 marks]

Feature 1 .....

Feature 2 .....

6 (b) Some baths are manufactured using composite materials such as glass reinforced plastics (GRP).

Give **one** advantage and **one** disadvantage of using a composite material.

[2 marks]

Advantage.....

Disadvantage.....



**6 (c)** Give **two** health and safety risks when working with GRP.

**[2 marks]**

Risk 1 .....

.....

Risk 2 .....

.....

**6 (d)** A batch of 50 baths is to be manufactured.  
Use sketches and notes to show how the holes for the taps could be cut in the correct position without the bath being damaged.

**[4 marks]**

<b>10</b>

**Turn over ▶**



7 Computer Integrated Manufacturing (CIM) is used increasingly in engineering companies.

7 (a) One type of CIM system is Computer Aided Design (CAD).  
Give **two** advantages to the company of using CAD.

[2 marks]

Advantage 1.....

.....

Advantage 2.....

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7 (b) Another type of CIM system is a 'Just in Time' (JIT) system.  
Give **two** advantages to the company of using a JIT system.

[2 marks]

Advantage 1.....

.....

Advantage 2.....

.....

7 (c) Describe **one** disadvantage to the company of using a JIT system.

[2 marks]

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7 (d) Explain how robotics could be used in a CIM system.

[2 marks]

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7 (e) How can robotics reduce health and safety risks to the workforce in an engineering company?

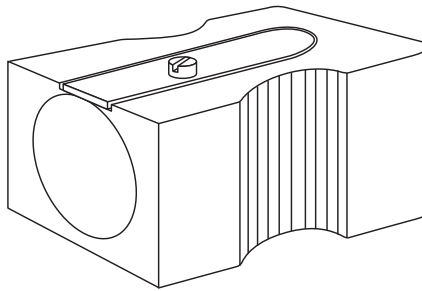
[2 marks]

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8 Figure 11 shows a pencil sharpener made from aluminium alloy.

Figure 11



8 (a) State what is meant by an alloy.

[1 mark]

.....

8 (b) Give **three** reasons why metals are alloyed.

[3 marks]

Reason 1 .....

Reason 2 .....

Reason 3 .....

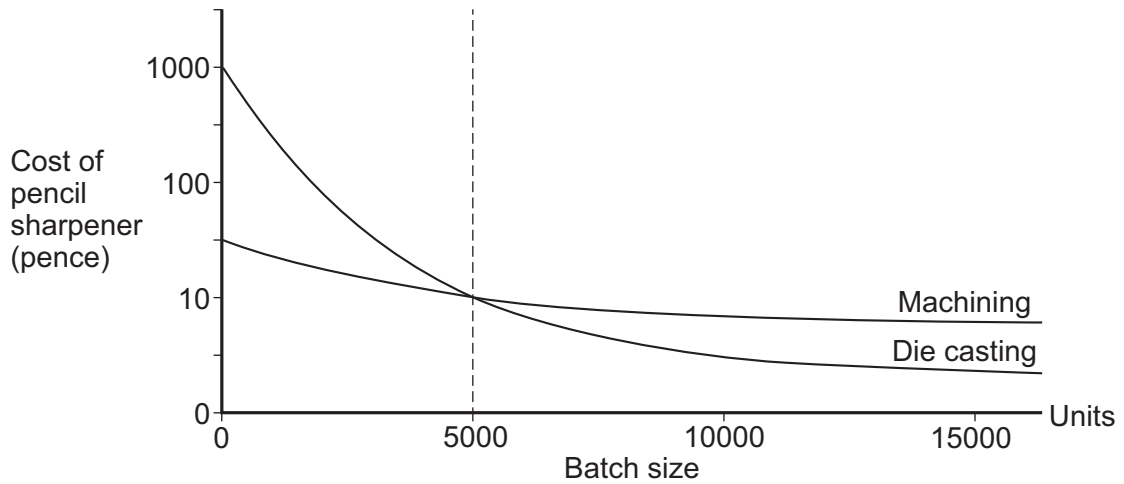
Question 8 continues on the next page

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8 (c) Costs are a significant part of production planning. Figure 12 gives details of the production of the pencil sharpener.

Figure 12



Using the graph, state which is the most cost effective method of production for volumes of less than 5000 units.

[1 mark]

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8 (d) Give two fixed production costs.

[2 marks]

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8 (e) Explain how costs can change during production.

[3 marks]

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END OF QUESTIONS

10

