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| Centre Number | | | | | | Candidate Number | | | | |
| Surname | | | | | | | | | | |
| Other Names | | | | | | | | | | |
| Candidate Signature | | | | | | | | | | |

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|---------------------|------|
| For Examiner's Use | |
| Examiner's Initials | |
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
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| 5 | |
| 6 | |
| TOTAL | |



General Certificate of Secondary Education
June 2013

Engineering

48501

Unit 1 Written Paper

Wednesday 15 May 2013

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 all rough work in this book. Cross through any work you do not want to be marked.
- Show the working of your calculations.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.
- The questions in Section A relate to the context referred to in the preliminary material that was previously issued.
- You are reminded of the need for good English and clear presentation in your answers. Quality of Written Communication will be assessed in Question 1(d).

A



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M/Jun13/48501

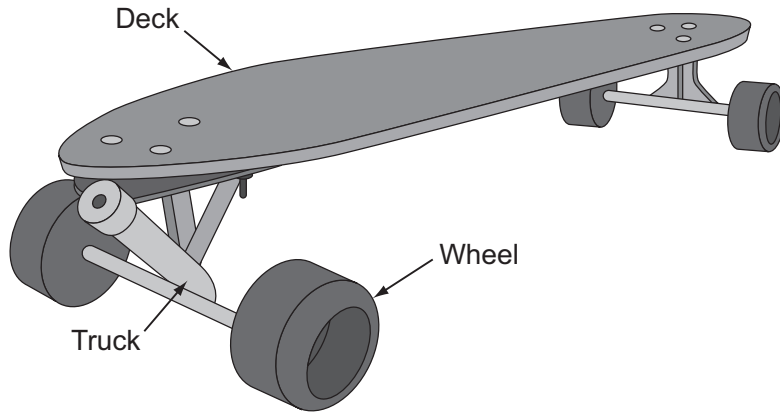
48501

Section A

Answer all the questions in this section.

1 A line drawing of a skateboard is shown below.

Figure 1



1 (a) (i) In the spaces below, identify a suitable construction material for each of the labelled parts.

Deck

.....

Wheel

.....

Truck

.....

(3 marks)



1 (a) (ii) In the spaces below, describe the properties of the chosen materials which make them suitable for their tasks.

Properties of deck material

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

(2 marks)

Properties of wheel material

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

(2 marks)

Properties of truck material

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

(2 marks)

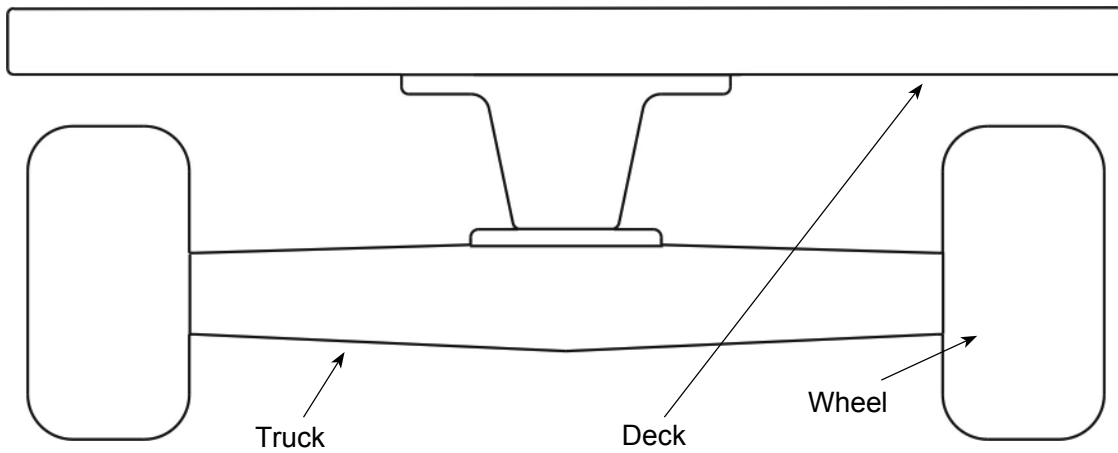
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- 1 (b) A line drawing of a skateboard viewed from the front is shown in **Figure 2** below. Modify the drawing by inserting a suitable method of fixing the truck to the deck **without** causing any obstruction to the upper surface of the deck.

Correctly label your modifications.

Figure 2



(5 marks)



1 (c) A skateboard truck cast from metal is shown below.

Figure 3



Describe using notes and sketches in the space below, **one** method of casting metal with which you are familiar.
Explain the full production process stage by stage.

(8 marks)

Turn over ►



2 (a) Describe how the characteristic curved shape of a skateboard deck is produced by lamination.

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

(2 marks)

2 (b) The performance of skateboard decks can be improved by using extra materials. Identify **two** suitable materials **and** explain why they are used.

Material 1

.....

(1 mark)

Explanation 1

.....

.....

.....

(2 marks)

Material 2

.....

(1 mark)

Explanation 2

.....

.....

.....

(2 marks)

| |
|---|
| |
| 8 |

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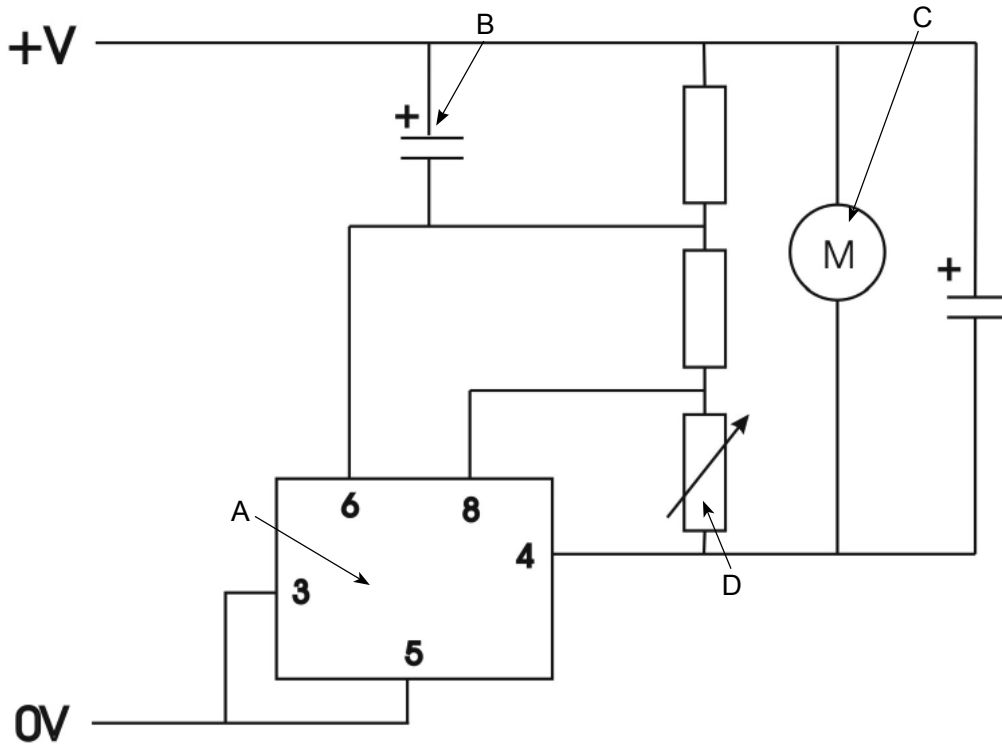


Section B

Answer all the questions in this section.

3 (a) A speed controller circuit for an electrically powered skateboard is shown below.

Figure 4



Correctly identify the labelled components in the spaces below.

A.....

B.....

C.....

D.....

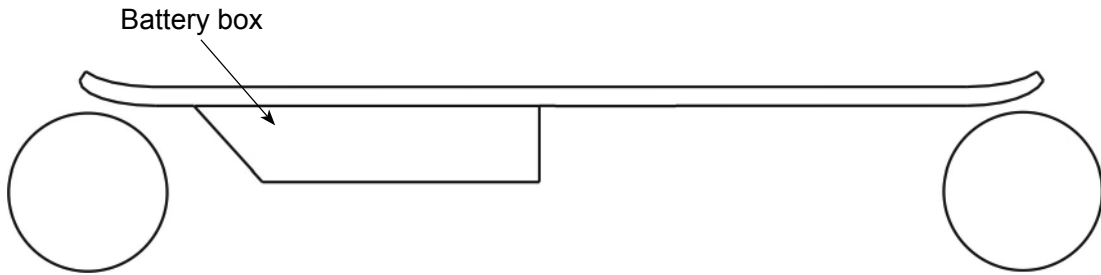
(4 marks)



3 (b) An outline diagram of a motorised skateboard is shown below.

3 (b) (i) Complete the diagram in **Figure 5** below by adding a motor **and** one way of transferring the drive from the motor to the wheels.
Correctly label the components you have added.

Figure 5 A Motorised Skateboard



(3 marks)

3 (b) (ii) Explain the reasons behind your choice of position for the motor.

.....

.....

.....

.....

.....

.....

(3 marks)

Question 3 continues on the next page

Turn over ▶



3 (b) (iii) In the space provided, produce notes and sketches to show how the motorised skateboard is controlled.

(5 marks)

Question 4 is on page 12

15



Turn over for the next question

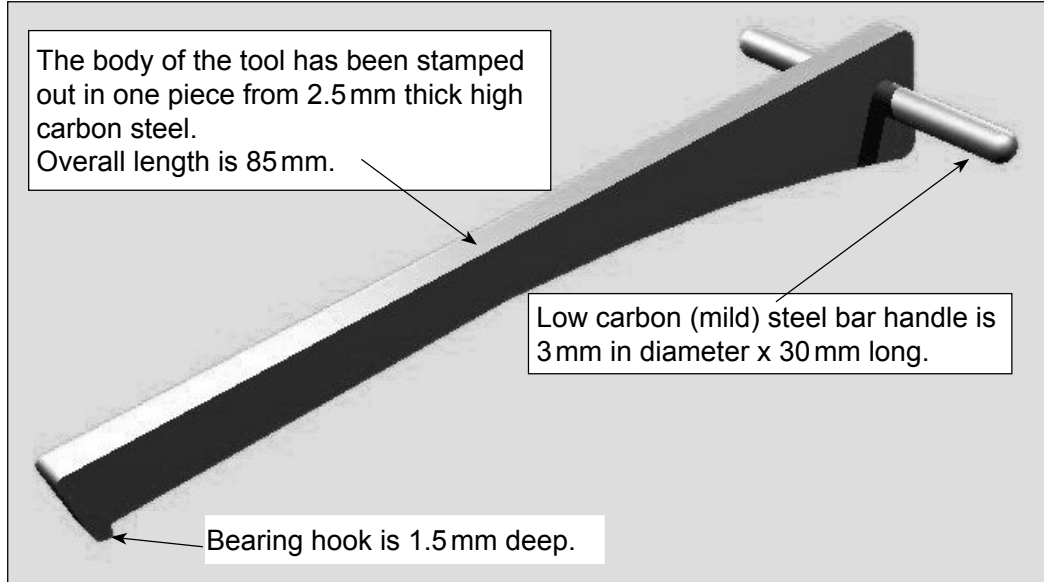
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ANSWER IN THE SPACES PROVIDED**

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- 4 **Figure 6** below shows a high carbon steel maintenance tool for removing bearings from skateboard wheels.

Figure 6 High Carbon Steel Maintenance Tool



Not to scale

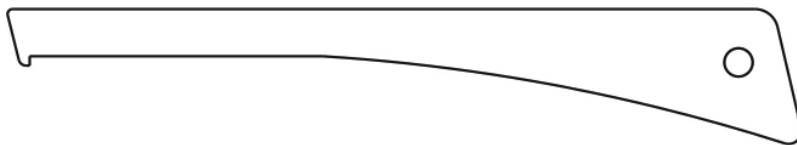


4 (a) Complete the drawing in **Figure 7** below to an appropriate standard by carrying out the following tasks:

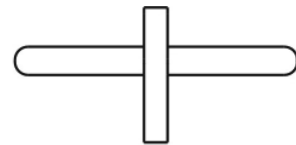
- construct a plan from the existing elevations (3 marks)
- add one accurate dimension (3 marks)
- use one additional drawing convention. (1 mark)

Figure 7 High Carbon Steel Maintenance Tool

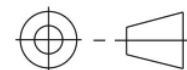
Plan



Front Elevation



End Elevation



Not to scale

Turn over ►



4 (b) In the table below, complete the Production Plan listing five major operations needed to complete the body of the High Carbon Steel Maintenance Tool in **Figure 6** on page 12 shown to the required specification. Some parts have been done for you. Select the others from the list given beneath the table and insert the identification letter in the appropriate box.

| Order | Operation | Tools and Equipment | Description of task carried out |
|-------|--------------------------------|--|--|
| 1 | Cut out the blank for the tool | Stamping press and die | |
| 2 | De-burr the blank | Angle grinder fitted with a flexible abrasive flap wheel | |
| 3 | Hardening | | Heat hooked end of tool until red hot and quench |
| 4 | De-scaling | | Remove layer of oxide formed by heating and create a shiny surface |
| 5 | Tempering | Controllable heat source | |

(5 marks)

Use the information below to complete the Production Plan. Use the letter only.

Rough edges produced during forming are removed **A**

Heat hooked end to a specific temperature and quench **B**

Outline of tool and required hole created in one action **C**

Gas/air or oxy-acetylene torch and water bath **D**

file **E**
emery cloth
polishing wheel



5 In the spaces below, identify **two** examples where new technology, such as Computer Aided Manufacture or Robotics, can be applied to the production of skateboards **and** describe the benefit of each.

Example 1

.....

(1 mark)

Benefit.....

.....

.....

.....

(2 marks)

Example 2

.....

(1 mark)

Benefit.....

.....

.....

.....

(2 marks)

| |
|----------|
| |
| 6 |

Turn over for the next question

Turn over ▶



6 In the spaces below, identify **two** different techniques of applying artwork to the underside of a mass produced skateboard deck **and** describe how each effect is achieved.

Technique 1

.....

(1 mark)

Description 1

.....

.....

.....

(2 marks)

Technique 2

.....

(1 mark)

Description 2

.....

.....

.....

(2 marks)

| |
|---|
| 6 |
|---|

END OF QUESTIONS

