Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

AQA

General Certificate of Secondary Education
June 2015

Engineering 48501

Unit 1 Written Paper

Tuesday 19 May 2015 9.00 am to 10.00 am

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.
- All dimensions are given in millimetres unless otherwise stated.

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 8.

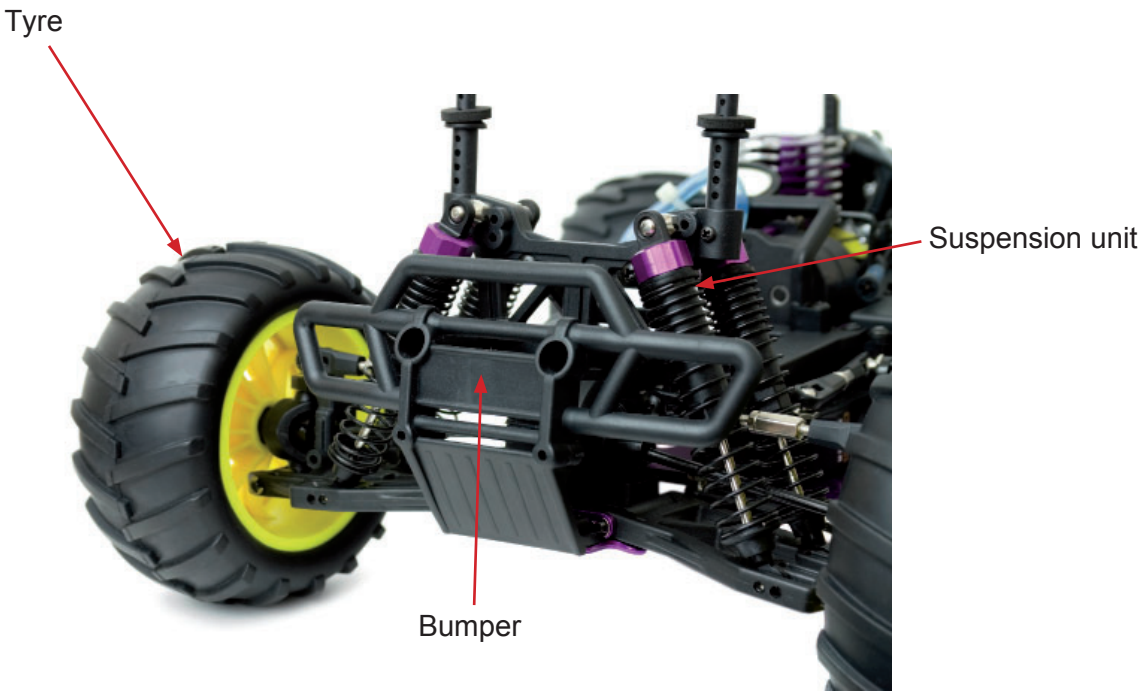
A

Section A

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

1 **Figure 1** shows the front of a radio controlled car.

Figure 1



1 (a) Describe the function of each labelled part.

[6 marks]

Tyre .....

.....

.....

Suspension unit. .....

.....

.....

Bumper .....

.....

.....

1 (b) The bodywork used on radio controlled vehicles can be made using the vacuum forming process.

Figure 2

1 (b) (i) Name a suitable polymer for vacuum forming.

[1 mark]

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1 (b) (ii) Describe why the polymer you have named in part (b)(i) is suitable for vacuum forming.

[2 marks]

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Question 1 continues on the next page

1 (b) (iii) Using notes and/or sketches, describe the vacuum forming process.

[6 marks]

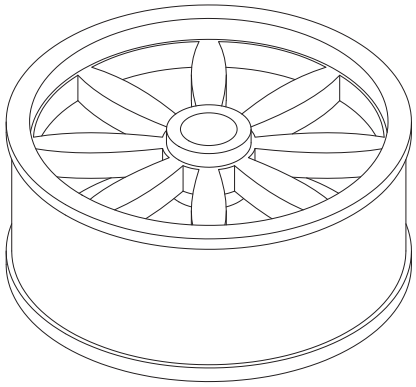
15

Section B

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

2 **Figure 3** shows an isometric view of a wheel used on a radio controlled car.

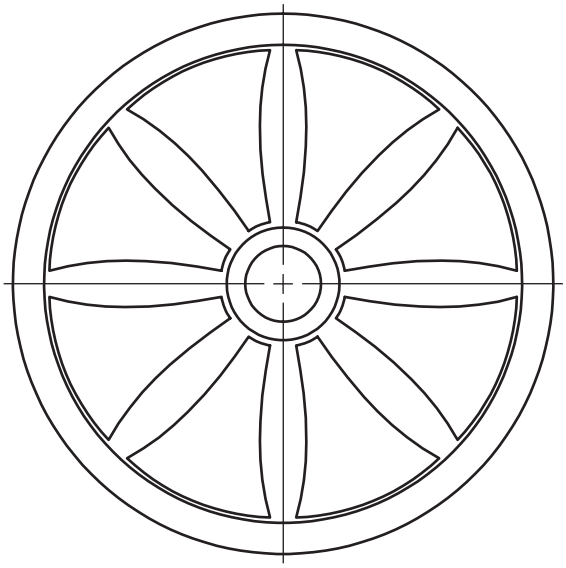
Figure 3

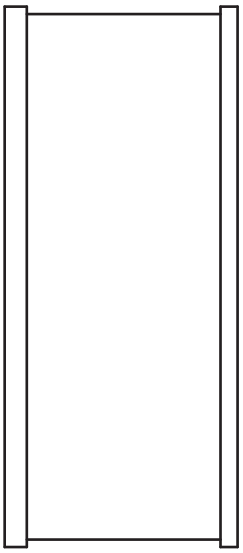


2 (a) The wheel is 30 mm in diameter and 13 mm in width.
Using standard drawing conventions, add the dimensions to the drawing below.

[4 marks]

Figure 4





Question 2 continues on the next page

2 (b) (i) Engineers use scale drawings. Explain what is meant by the term 'scale drawing'.

[2 marks]

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2 (b) (ii) An object is drawn 20 mm wide on a drawing which is scaled at 1:5. How wide is the actual object? Tick the correct answer.

[1 mark]

4 mm ☐

20 mm ☐

200 mm ☐

25 mm ☐

100 mm ☐

2 (c) When designing new products engineers often use Computer Aided Design (CAD) software. Explain the benefits to the engineer of using CAD instead of drawing by hand.

[3 marks]

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10

3 Radio controlled toys similar to the one shown in **Figure 5** are often fitted with decorative vinyl graphics.

Figure 5

Describe how the vinyl graphics could be produced using Computer Numerical Control (CNC) equipment.

[6 marks]

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6

4 Radio controlled handsets are made in different shapes and designs as shown in **Figures 6** and **7** below.

Figure 6

Figure 7

A client asks a designer to create a new handset.

Suggest **three** user requirements a designer would need to consider before producing a specification for the handset.

For each user requirement, state a reason why the designer would need the information.

[6 marks]

User requirement 1 .....

Reason.....

.....

User requirement 2 .....

Reason.....

.....

User requirement 3 .....

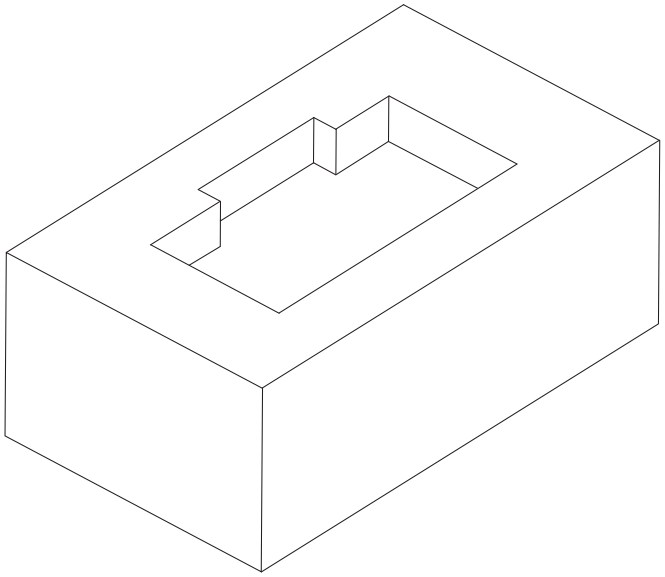
Reason.....

.....

6

5 (a) A wide variety of engineered products are manufactured using moulds.

Figure 8



Give **three** ways that the block shown in **Figure 8** would need to be modified to be used for casting a product.

[3 marks]

1 .....

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2 .....

.....

3 .....

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5 (b) List **three** benefits of using moulds to manufacture products.

[3 marks]

1 .....

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2 .....

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3 .....

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5 (c) Some moulds are manufactured using a milling machine.
Name **three** health and safety hazards when using a milling machine.
For each one, suggest a safety measure.

[6 marks]

Hazard 1 .....

Safety measure.....

.....

Hazard 2 .....

Safety measure.....

.....

Hazard 3 .....

Safety measure.....

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12

6 Radio controlled cars are one type of electrical product.

6 (a) Copper is often used in electrical products.
Explain why copper is a suitable material for use in electrical products.

[4 marks]

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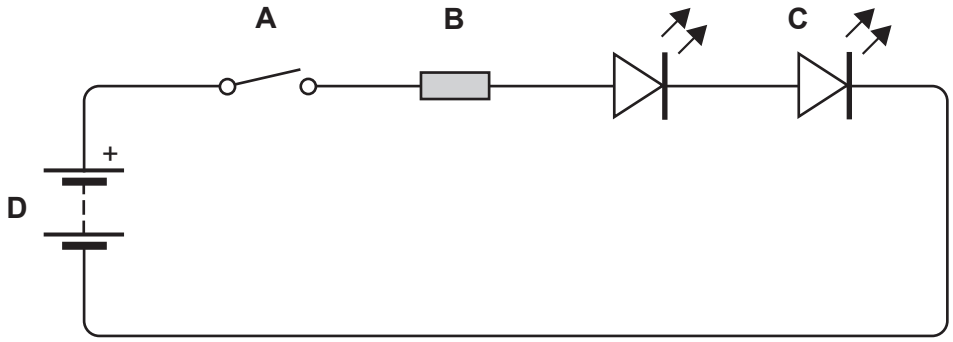
6 (b) (i) Radio controlled cars can be fitted with working Light Emitting Diode (LED) headlights.
A computer program has been used to design the circuit diagram below.



In the spaces below identify the electrical components labelled **A** to **D** on the circuit diagram.

[4 marks]

A .....

B .....

C .....

D .....

6 (b) (ii) Explain the benefits of using a computer program to design the circuit.

[3 marks]

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6 (c) Describe how to connect electrical components together using solder.

[3 marks]

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14

7 Computer Numerical Control (CNC) and chemical etching are two methods of producing a Printed Circuit Board (PCB).

Choose **one** of the methods above. Give **three** advantages and **three** disadvantages of using the method you have chosen to manufacture a PCB.

[6 marks]

Method chosen .....

Advantage 1.....

.....

Advantage 2.....

.....

Advantage 3.....

.....

Disadvantage 1.....

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Disadvantage 2.....

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Disadvantage 3.....

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6

Turn over for the next question

8 Radio controlled vehicles are usually powered by batteries. Discuss the environmental effects of disposing of batteries.

You will be assessed on Quality of Written Communication (QWC) in this question.

[6 marks]

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6

END OF QUESTIONS

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