

Write your name here

Surname	Other names
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**Pearson Edexcel**  
**International GCSE**

Centre Number

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Candidate Number

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# Mathematics B

**Level 2**  
**Paper 2R**



Thursday 7 June 2018 – Morning

**Time: 2 hours 30 minutes**

Paper Reference

**4MB1/02R****You must have:**

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

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## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- **Calculators may be used.**

## Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ►

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**Question 1 continued**

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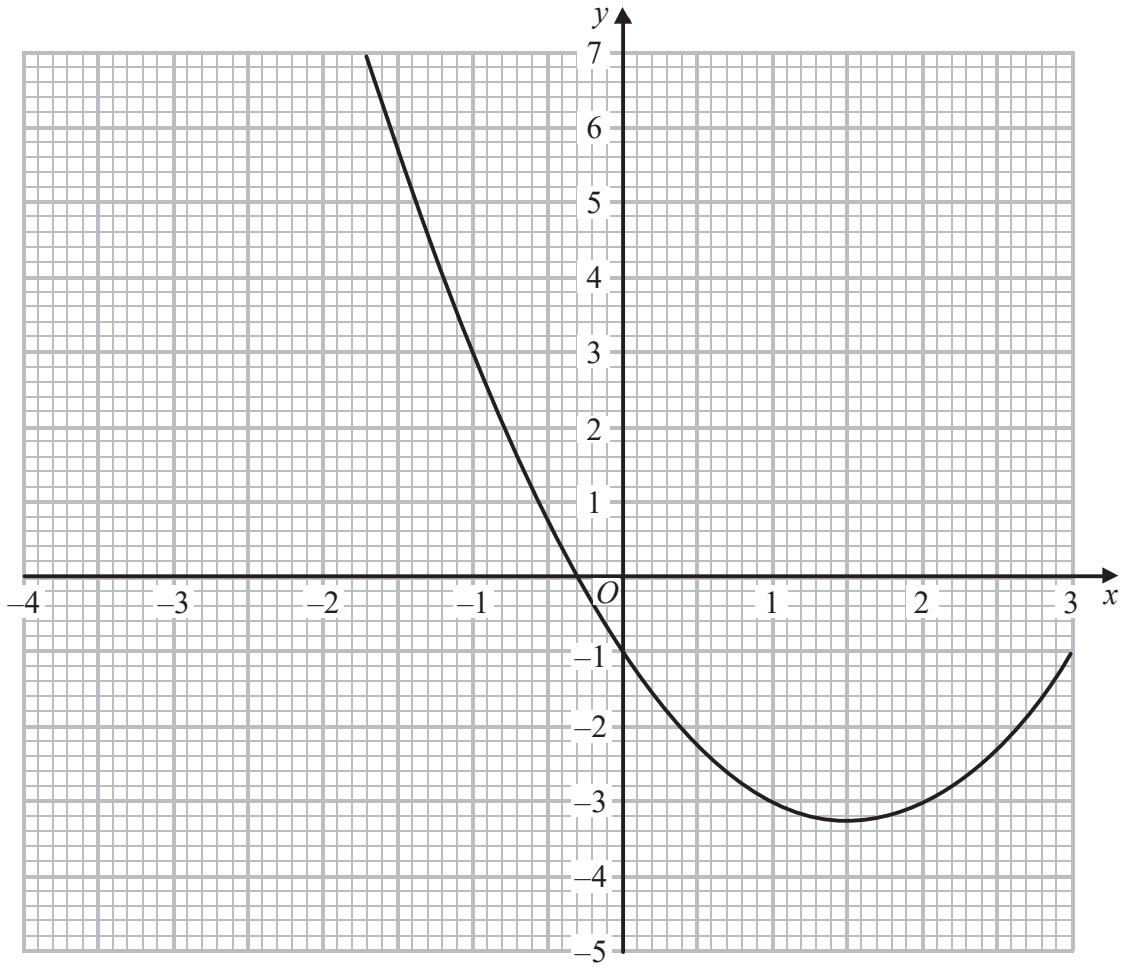
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**(Total for Question 1 is 5 marks)**





Question 2 continued



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(Total for Question 2 is 6 marks)





**Question 3 continued**

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**(Total for Question 3 is 7 marks)**







**Question 4 continued**

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**(Total for Question 4 is 7 marks)**





**Question 5 continued**

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**(Total for Question 5 is 8 marks)**



6 The curve  $C$  has equation  $y = 2x^3 + 3x^2 - 12x + 1$

The point  $P$  and the point  $Q$  are the turning points on  $C$ .

Find an equation of the straight line that passes through  $P$  and  $Q$ .

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**Question 6 continued**

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**(Total for Question 6 is 8 marks)**

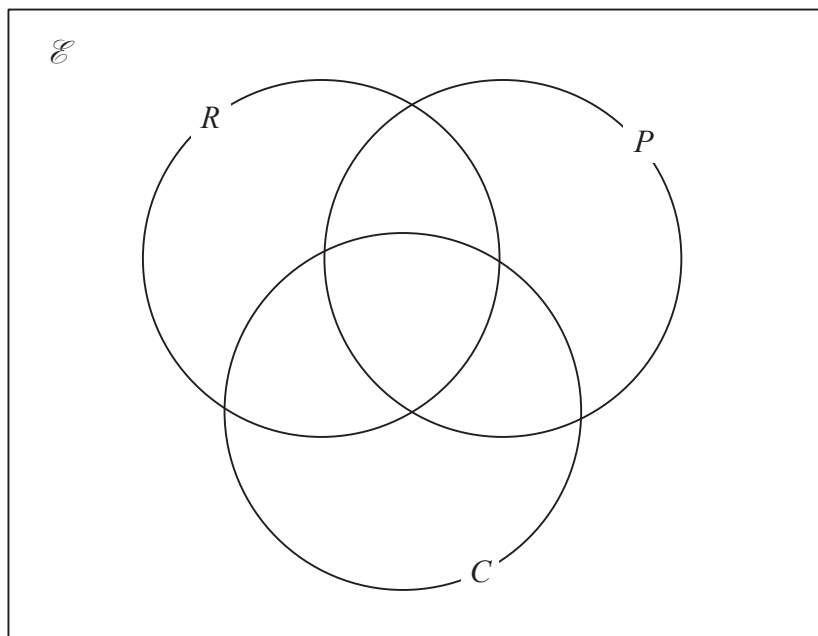


- 7 Mr Ng is the head of mathematics at a school.  
He asked the students in Year 9 which of a ruler ( $R$ ), a protractor ( $P$ ) and a calculator ( $C$ ) they each had.

Of these students

- 10 students had a ruler, a protractor and a calculator
- 25 students had a ruler and a protractor
- 18 students had a protractor and a calculator
- 17 students had a ruler and a calculator
- 54 students had a ruler
- 49 students had a protractor
- 29 students had a calculator
- 8 students did not have a ruler or a protractor or a calculator.

- (a) Show all this information in the Venn diagram.



- (b) Find the number of students in Year 9 (3)
- (c) Find  $n([R \cup P]')$  (2)
- (d) Find  $n([R \cup P]')$  (1)

One of the students in Year 9 is chosen at random.

- (d) Given that this student had a calculator, find the probability that this student had a ruler but not a protractor. (2)

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**Question 7 continued**

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**(Total for Question 7 is 8 marks)**



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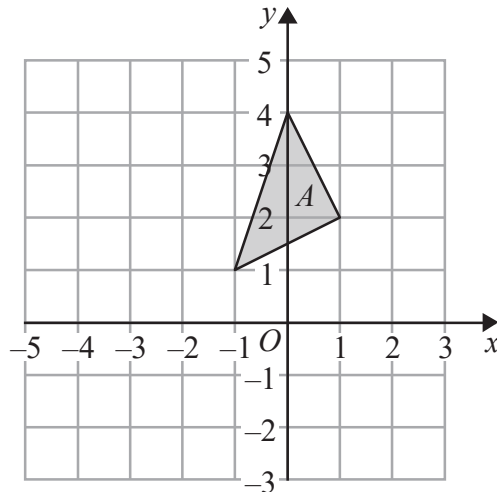


Figure 3

Figure 3 shows a triangle,  $A$ , drawn on a grid.

Triangle  $A$  is transformed to triangle  $B$  under the transformation with matrix  $\mathbf{P}$  where

$$\mathbf{P} = \begin{pmatrix} 2 & -1 \\ 3 & -\frac{1}{2} \end{pmatrix}$$

(a) On the grid in Figure 3, draw and label triangle  $B$ .

(4)

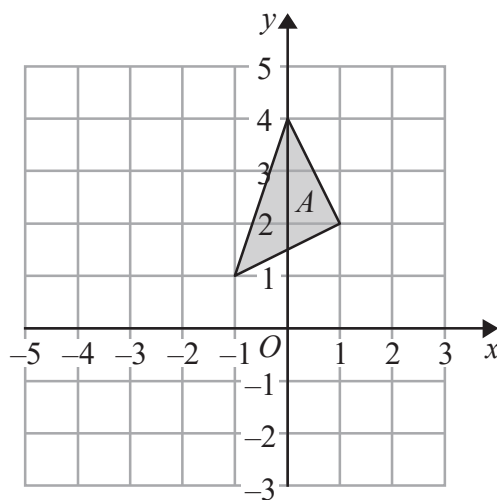


Figure 4

Figure 4 shows triangle  $A$  drawn on a grid.

Triangle  $B$  is transformed to triangle  $C$  under the transformation with matrix  $\mathbf{Q}$  where

$$\mathbf{Q} = \begin{pmatrix} 3 & -4 \\ 1 & -2 \end{pmatrix}$$

(b) On the grid in Figure 4, draw and label triangle  $C$ .

(3)

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Triangle  $C$  is the image of triangle  $A$  under a **single** transformation.

(c) Describe fully this transformation.

(2)

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Area with horizontal dotted lines for writing the answer.

Turn over for a spare copy of Figure 3 and Figure 4 if you need to redraw your triangles.



**Question 8 continued**

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Question 8 continued

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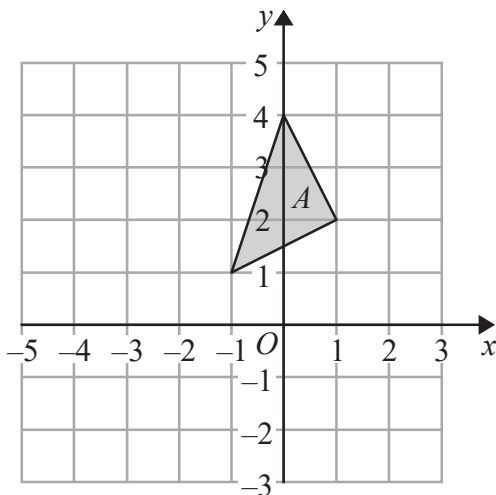


Figure 3

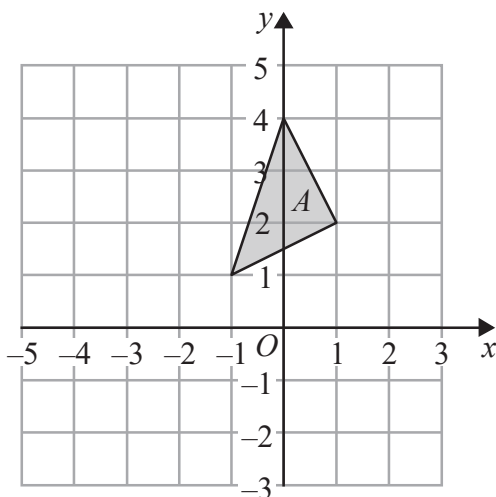


Figure 4

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(Total for Question 8 is 9 marks)





**Question 9 continued**

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**(Total for Question 9 is 9 marks)**



10 Zahur made 250 cakes to sell at a cake sale.  
Of the cakes made by Zahur, 28% were chocolate cakes.

- (a) Calculate the number of chocolate cakes made by Zahur. (2)

All the other cakes made by Zahur were either lemon cakes or vanilla cakes.  
The ratio of the number of lemon cakes to the number of vanilla cakes was 4 : 5

- (b) Calculate the number of lemon cakes made by Zahur. (2)

Zahur put icing on each of the vanilla cakes he made.  
The icing for each vanilla cake needed 75 g of icing sugar.

- (c) Calculate the total amount, in kg, of icing sugar needed for all the vanilla cakes made by Zahur. (2)

At the start of the cake sale, the selling price of each of the cakes made by Zahur was \$4 and he sold 204 cakes at this price.

Zahur then reduced the selling price of each cake by 30% and he sold all the remaining cakes.

- (d) Calculate the total amount of money, in \$, that Zahur received by selling all 250 cakes. (3)

When Zahur had subtracted the cost of all the ingredients he needed to make his cakes from the total amount of money he received by selling all the cakes, he found that he had made a profit of 60%

- (e) Calculate, in \$, the cost of all the ingredients Zahur needed. (3)

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**Question 10 continued**

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**Question 10 continued**

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**(Total for Question 10 is 12 marks)**





**Question 11 continued**

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**Question 11 continued**

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**Question 11 continued**

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**(Total for Question 11 is 10 marks)**



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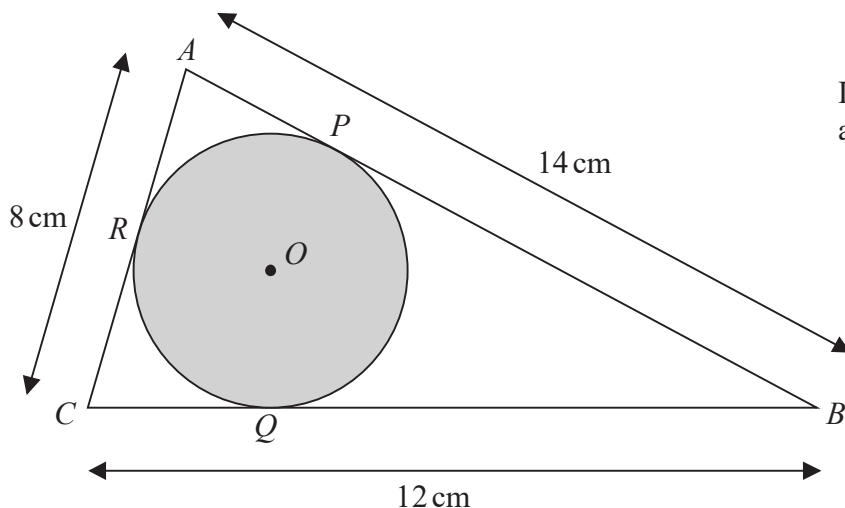


Diagram NOT accurately drawn

Figure 6

Figure 6 shows a triangle  $ABC$  and a circle  $PQR$ , centre  $O$ . The triangle is such that side  $AB$  is the tangent to the circle at  $P$ , side  $BC$  is the tangent to the circle at  $Q$  and side  $AC$  is the tangent to the circle at  $R$ . The region inside the circle is shaded, as shown in Figure 6.

$AB = 14\text{ cm}$ ,  $BC = 12\text{ cm}$  and  $AC = 8\text{ cm}$ .

Let  $BP = x\text{ cm}$  and by considering the lengths of the tangents to the circle,

(a) obtain an equation in  $x$  only and solve it to find the length, in cm, of  $BP$ . (4)

(b) Find, to 3 significant figures, the area of the circle as a percentage of the total area of triangle  $ABC$ . (7)

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$$\left( \begin{array}{l} \text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A \\ \text{Area of triangle} = \frac{1}{2} ab \sin C \end{array} \right)$$

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**Question 12 continued**

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**Question 12 continued**

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**(Total for Question 12 is 11 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

