

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson Edexcel**  
**International**  
**Advanced Level**

Centre Number

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Candidate Number

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**Wednesday 13 May 2020**

Morning (Time: 1 hour 30 minutes)

Paper Reference **WMA11/01**

**Mathematics**

**International Advanced Subsidiary/Advanced Level**  
**Pure Mathematics P1**

**You must have:**

Mathematical Formulae and Statistical Tables (Lilac), calculator

Total Marks

**Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.**

### Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Inexact answers should be given to three significant figures unless otherwise stated.

### Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 9 questions in this question paper. The total mark for this paper is 75.
- 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.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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1. Given that

$$(3pq^2)^4 \times 2p\sqrt{q^8} \equiv ap^bq^c$$

find the values of the constants  $a$ ,  $b$  and  $c$ .

(3)

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2.

$$f(x) = 3 + 12x - 2x^2$$

(a) Express  $f(x)$  in the form

$$a - b(x + c)^2$$

where  $a$ ,  $b$  and  $c$  are integers to be found.

(3)

The curve with equation  $y = f(x) - 7$  crosses the  $x$ -axis at the points  $P$  and  $Q$  and crosses the  $y$ -axis at the point  $R$ .

(b) Find the area of the triangle  $PQR$ , giving your answer in the form  $m\sqrt{n}$  where  $m$  and  $n$  are integers to be found.

(4)

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Question 2 continued

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3.

Diagram not drawn to scale

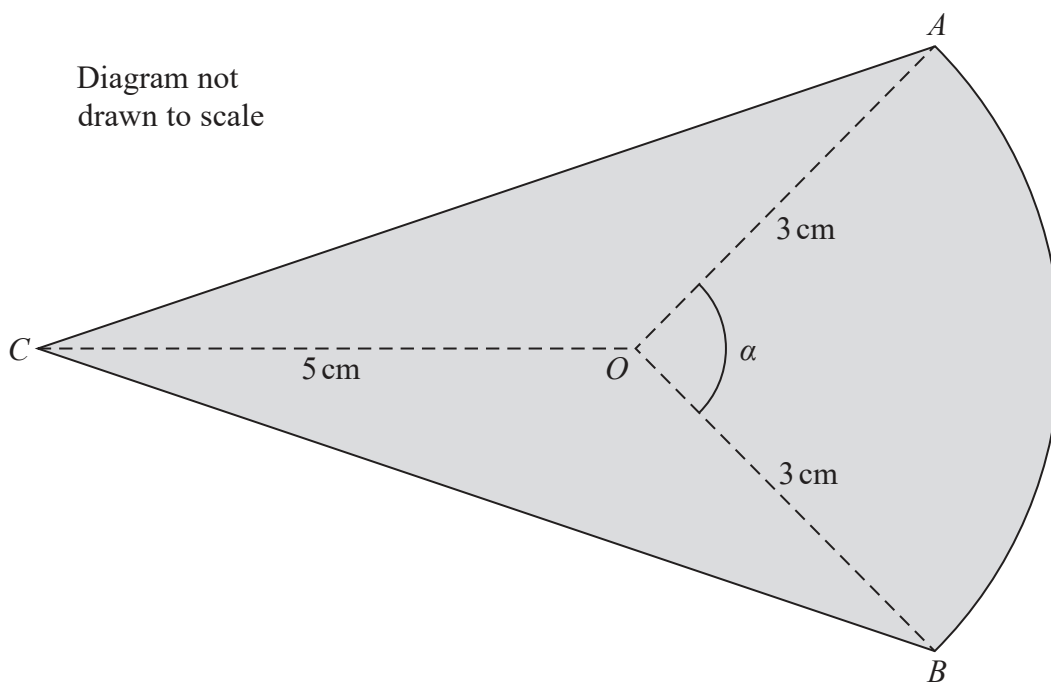


Figure 1

Figure 1 shows the design for a badge.

The design consists of two congruent triangles,  $AOC$  and  $BOC$ , joined to a sector  $AOB$  of a circle centre  $O$ .

- Angle  $AOB = \alpha$
- $AO = OB = 3$  cm
- $OC = 5$  cm

Given that the area of sector  $AOB$  is  $7.2$  cm<sup>2</sup>

(a) show that  $\alpha = 1.6$  radians. (2)

(b) Hence find

- (i) the area of the badge, giving your answer in cm<sup>2</sup> to 2 significant figures,
- (ii) the perimeter of the badge, giving your answer in cm to one decimal place.

(8)

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Question 3 continued

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**Question 3 continued**

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Lined area for writing the answer to Question 3.

**Q3**

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**(Total 10 marks)**



P 6 2 5 9 7 A 0 1 1 3 2

4. Use algebra to solve the simultaneous equations

$$\begin{aligned}y - 3x &= 4 \\x^2 + y^2 + 6x - 4y &= 4\end{aligned}$$

You must show all stages of your working.

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Question 4 continued

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Q4

(Total 7 marks)



5. (i)

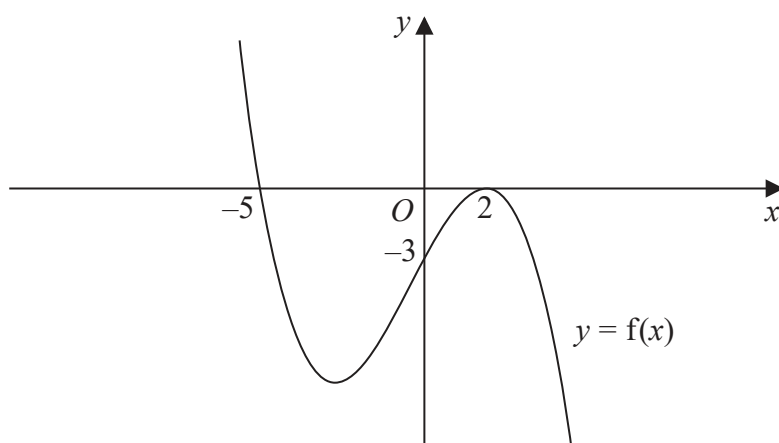


Figure 2

Figure 2 shows a sketch of the curve with equation  $y = f(x)$ .

The curve passes through the points  $(-5, 0)$  and  $(0, -3)$  and touches the  $x$ -axis at the point  $(2, 0)$ .

On separate diagrams sketch the curve with equation

(a)  $y = f(x + 2)$

(b)  $y = f(-x)$

On each diagram, show clearly the coordinates of all the points where the curve cuts or touches the coordinate axes.

(6)

(ii)

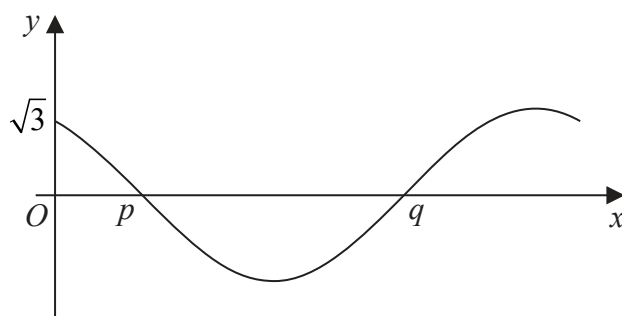


Figure 3

Figure 3 shows a sketch of the curve with equation

$$y = k \cos\left(x + \frac{\pi}{6}\right) \quad 0 \leq x \leq 2\pi$$

where  $k$  is a constant.

The curve meets the  $y$ -axis at the point  $(0, \sqrt{3})$  and passes through the points  $(p, 0)$  and  $(q, 0)$ .

Find

(a) the value of  $k$ ,

(b) the exact value of  $p$  and the exact value of  $q$ .

(3)

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**Question 5 continued**

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Question 5 continued

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**Question 5 continued**

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Q5

**(Total 9 marks)**



6. The point  $A$  has coordinates  $(-4, 11)$  and the point  $B$  has coordinates  $(8, 2)$ .

- (a) Find the gradient of the line  $AB$ , giving your answer as a fully simplified fraction. (2)

The point  $M$  is the midpoint of  $AB$ . The line  $l$  passes through  $M$  and is perpendicular to  $AB$ .

- (b) Find an equation for  $l$ , giving your answer in the form  $px + qy + r = 0$  where  $p, q$  and  $r$  are integers to be found. (4)

The point  $C$  lies on  $l$  such that the area of triangle  $ABC$  is 37.5 square units.

- (c) Find the two possible pairs of coordinates of point  $C$ . (5)

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### Question 6 continued

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7. The curve  $C$  has equation

$$y = \frac{1}{2-x}$$

- (a) Sketch the graph of  $C$ . On your sketch you should show the coordinates of any points of intersection with the coordinate axes and state clearly the equations of any asymptotes.

(3)

The line  $l$  has equation  $y = 4x + k$ , where  $k$  is a constant.

Given that  $l$  meets  $C$  at two distinct points,

- (b) show that

$$k^2 + 16k + 48 > 0$$

(4)

- (c) Hence find the range of possible values for  $k$ .

(4)

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Question 7 continued

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Ruled area for writing answers, consisting of multiple horizontal lines.











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Question 8 continued

Lined writing area for question 8



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9. A curve with equation  $y = f(x)$  passes through the point (9, 10).

Given that

$$f'(x) = 27x^2 - \frac{21x^3 - 5x}{2\sqrt{x}} \quad x > 0$$

find  $f(x)$ , fully simplifying each term.

(6)

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Question 9 continued

Lined writing area for the answer.

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