Please check the examination details be	low before ente	ring your candidate ii	nformation
Candidate surname		Other names	
Centre Number Candidate N	umber		
Pearson Edexcel Inter	nation	al Advand	ed Level
Time 1 hour 30 minutes	Paper reference	WMA	11/01
Mathematics			•
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Pure Mathematics PT			
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You must have: Mathematical Formulae and Statistic	al Tables (Ye	llow), 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 10 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.

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1.	Find $\int \left(10x^5 + 6x^3 - \frac{3}{x^2}\right) dx$	
	giving your answer in simplest form.	(4)

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2. In the triangle *ABC*,

- $AB = 21 \,\mathrm{cm}$
- $BC = 13 \,\mathrm{cm}$
- angle $BAC = 25^{\circ}$
- angle $ACB = x^{\circ}$

(a) Use the sine rule to find the value of $\sin x^{\circ}$, giving your answer to 4 decimal places.

(2)

Given also that AB is the longest side of the triangle,

(b) find the value of x, giving your answer to 2 decimal places.

(3)





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3. In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

(i) Show that $\frac{\sqrt{180} - \sqrt{80}}{\sqrt{5}}$ is an integer and find its value.

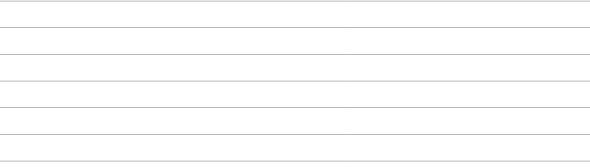
(2)

(ii) Simplify

$$\frac{4\sqrt{5}-5}{7-3\sqrt{5}}$$

giving your answer in the form $a + b\sqrt{5}$ where a and b are rational numbers.







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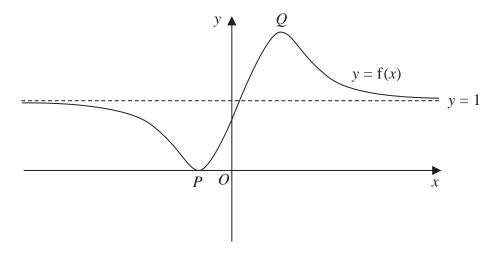


Figure 1

Figure 1 shows a sketch of a curve with equation y = f(x)

The curve has a minimum at P(-1, 0) and a maximum at $Q\left(\frac{3}{2}, 2\right)$

The line with equation y = 1 is the only asymptote to the curve.

On separate diagrams sketch the curves with equation

(i)
$$y = f(x) - 2$$

(3)

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

(3)

On each sketch you must clearly state

- the coordinates of the maximum and minimum points
- the equation of the asymptote

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5. The curve *C* has equation y = f(x)

Given that

- f(x) is a quadratic expression
- the maximum turning point on C has coordinates (-2, 12)
- C cuts the negative x-axis at -5
- (a) find f(x)

(4)

The line l_1 has equation $y = \frac{4}{5}x$

Given that the line $\ l_{\scriptscriptstyle 2}$ is perpendicular to $\ l_{\scriptscriptstyle 1}$ and passes through (-5, 0)

(b) find an equation for l_2 , writing your answer in the form y = mx + c where m and c are constants to be found.

(3)

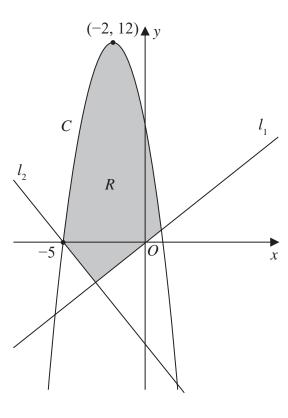


Figure 2

Figure 2 shows a sketch of the curve C and the lines l_1 and l_2

(c) Define the region R, shown shaded in Figure 2, using inequalities.

(2)

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(a) Given that

$$2xy - 3x^2 = 50$$

and

$$y - x^3 + 6x = 0$$

show that

$$2x^4 - 15x^2 - 50 = 0$$

(2)

(b) Hence solve the simultaneous equations

$$2xy - 3x^2 = 50$$

$$y - x^3 + 6x = 0$$

Give your answers in fully simplified surd form.

(5)

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7. The curve C has equation y = f(x), x > 0

Given that

- $f'(x) = \frac{2}{\sqrt{x}} + \frac{A}{x^2} + 3$, where A is a constant
- f''(x) = 0 when x = 4
- (a) find the value of A.

(4)

Given also that

- $f(x) = 8\sqrt{3}$, when x = 12
- (b) find f(x), giving each term in simplest form.

(5)

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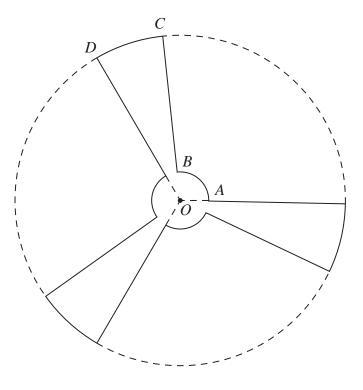


Figure 3

Figure 3 shows a sketch of the outline of the face of a ceiling fan viewed from below.

The fan consists of three identical sections congruent to *OABCDO*, shown in Figure 3, where

- OABO is a sector of a circle with centre O and radius 9 cm
- OBCDO is a sector of a circle with centre O and radius 84 cm
- angle $AOD = \frac{2\pi}{3}$ radians

Given that the length of the arc AB is 15 cm,

(a) show that the length of the arc CD is 35.9 cm to one decimal place.

(3)

The face of the fan is modelled to be a flat surface.

Find, according to the model,

(b) the perimeter of the face of the fan, giving your answer to the nearest cm,

(2)

(c) the surface area of the face of the fan.

Give your answer to 3 significant figures and make your units clear.

(5)

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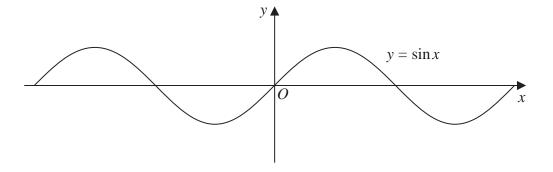


Figure 4

Figure 4 shows part of the graph of the curve with equation $y = \sin x$

Given that $\sin \alpha = p$, where $0 < \alpha < 90^{\circ}$

- (a) state, in terms of p, the value of
 - (i) $2\sin(180^{\circ} \alpha)$
 - (ii) $\sin(\alpha 180^\circ)$

(iii)
$$3 + \sin(180^{\circ} + \alpha)$$

A copy of Figure 4, labelled Diagram 1, is shown on page 27.

On Diagram 1,

(b) sketch the graph of $y = \sin 2x$

(2)

(3)

(c) Hence find, in terms of α , the x coordinates of any points in the interval $0 < x < 180^{\circ}$ where

$$\sin 2x = p$$

(3)

Leave blank Question 9 continued $y = \sin x$ Diagram 1 Q9 (Total 8 marks)



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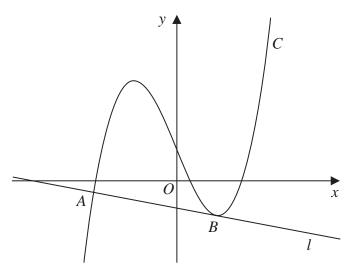


Figure 5

Figure 5 shows a sketch of the curve C with equation

$$y = \frac{2}{7}x^3 + \frac{1}{7}x^2 - \frac{5}{2}x + k$$

where k is a constant.

(a) Find $\frac{dy}{dx}$

(2)

The line l, shown in Figure 5, is the normal to C at the point A with x coordinate $-\frac{7}{2}$. Given that l is also a tangent to C at the point B,

(b) show that the x coordinate of the point B is a solution of the equation

$$12x^2 + 4x - 33 = 0$$

(4)

(c) Hence find the x coordinate of B, justifying your answer.

(2)

Given that the y intercept of l is -1

(d) find the value of k.

(4)

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