Please check the examination details bel	ow before ente	ering your candidate information			
Candidate surname		Other names			
Centre Number Candidate N	umber				
Pearson Edexcel Inter	nation	al Advanced Level			
Time 1 hour 30 minutes	Paper reference	WMA11/01			
Mathematics	Mathematics				
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Pure Mathematics P1					
		J			
You must have:		Total Marks			
Mathematical Formulae and Statistica	al Tables (Ye	ellow), calculator			

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 ▶







1. The curve C has equation

$$y = \frac{x^3}{4} - x^2 + \frac{17}{x} \qquad x > 0$$

(a) Find  $\frac{dy}{dx}$ , giving your answer in simplest form.

(3)

The point  $R\left(2, \frac{13}{2}\right)$  lies on C.

(b) Find the equation of the tangent to C at the point R. Write your answer in the form ax + by + c = 0, where a, b and c are integers to be found.

**(3)** 





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Question 1 continued
(Total for Question 1 is 6 marks)



**2.** Given that

$$(x-5)(2x+1)(x+3) \equiv ax^3 + bx^2 - 32x - 15$$

where a and b are constants,

(a) find the value of a and the value of b.

**(2)** 

(b) Hence find

$$\int \frac{(x-5)(2x+1)(x+3)}{5\sqrt{x}} \, \mathrm{d}x$$

writing each term in simplest form.

**(5)** 

Question 2 continued
(Total for Question 2 is 7 marks)



**3.** The share price of a company is monitored.

Exactly 3 years after monitoring began, the share price was £1.05

Exactly 5 years after monitoring began, the share price was £1.65

The share price,  $\pounds V$ , of the company is modelled by the equation

$$V = pt + q$$

where t is the number of years after monitoring began and p and q are constants.

(a) Find the value of p and the value of q.

**(3)** 

Exactly T years after monitoring began, the share price was £2.50

(b) Find the value of *T*, according to the model, giving your answer to one decimal place.

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Question 3 continued	
(Total for Question 3 is 5 marks)	
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# 4. In this question you must show detailed reasoning. Solutions relying on calculator technology are not acceptable.

$$f(x) = x^2(2x+1) - 15x$$

(a) Solve

$$f(x) = 0 (4)$$

(b) Hence solve

$$y^{\frac{4}{3}} \left(2y^{\frac{2}{3}} + 1\right) - 15y^{\frac{2}{3}} = 0 y > 0$$

giving your answer in simplified surd form.

**(2)** 



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(Total for Question 4 is 6 marks)	
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## 5. In this question you must show all stages of your working. Solutions relying entirely on calculator technology are not acceptable.

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

Given that

- $f'(x) = \frac{12}{\sqrt{x}} + \frac{x}{3} 4$
- the point P(9, 8) lies on C
- (a) find, in simplest form, f(x)

**(5)** 

The line l is the normal to C at P

(b) Find the coordinates of the point at which l crosses the y-axis.

**(4)** 

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Question 5 continued



Question 5 continued

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Question 5 continued	
(Tot	tal for Question 5 is 9 marks)
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- **6.** (a) Given that k is a positive constant such that 0 < k < 4 sketch, on **separate axes**, the graphs of
  - (i)  $y = (2x k)(x + 4)^2$

(ii) 
$$y = \frac{k}{x^2}$$

showing the coordinates of any points where the graphs cross or meet the coordinate axes, leaving coordinates in terms of k, where appropriate.

**(5)** 

(b) State, with a reason, the number of roots of the equation

$$(2x - k)(x + 4)^2 = \frac{k}{x^2}$$
 (1)



Question 6 continued	
	Total for Question 6 is 6 marks)



7.

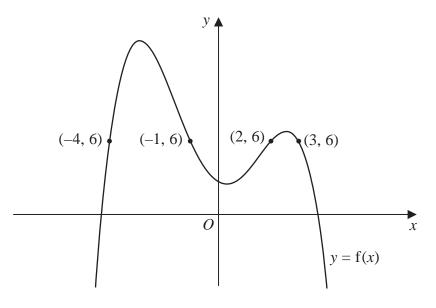


Figure 1

Figure 1 shows the curve with equation y = f(x).

The points P(-4, 6), Q(-1, 6), R(2, 6) and S(3, 6) lie on the curve.

(a) Using Figure 1, find the range of values of x for which

$$f(x) < 6 \tag{3}$$

(b) State the largest solution of the equation

$$f(2x) = 6 ag{1}$$

(c) (i) Sketch the curve with equation y = f(-x).

On your sketch, state the coordinates of the points to which P, Q, R and S are transformed.

(ii) Hence find the set of values of x for which

$$f(-x) \geqslant 6 \text{ and } x < 0$$
 (4)

Question 7 continued



Question 7 continued

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



8.

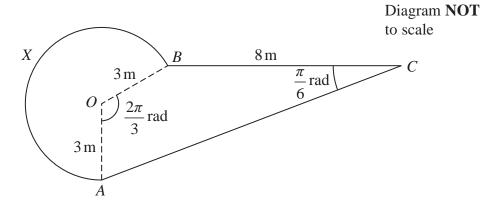


Figure 2

Figure 2 shows the plan view of a design for a pond.

The design consists of a sector *AOBX* of a circle centre *O* joined to a quadrilateral *AOBC*.

- $BC = 8 \,\mathrm{m}$
- $OA = OB = 3 \,\mathrm{m}$
- angle AOB is  $\frac{2\pi}{3}$  radians
- angle *BCA* is  $\frac{\pi}{6}$  radians
- (a) Calculate (i) the exact area of the sector AOBX,
  - (ii) the exact perimeter of the sector *AOBX*.

(5)

(b) Calculate the exact area of the triangle AOB.

**(2)** 

(c) Show that the length AB is  $3\sqrt{3}$  m.

**(2)** 

(d) Find the total surface area of the pond. Give your answer in m² correct to 2 significant figures.

**(5)** 

Question 8 continued	



Question 8 continued

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Question 8 continued						
(Total for Question 8 is 14 marks)						



9.

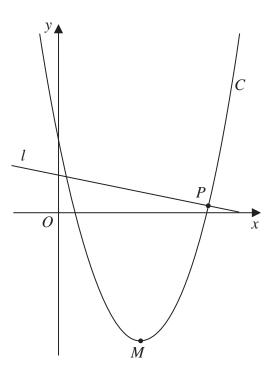


Figure 3

Figure 3 shows a sketch of the curve C with equation

$$y = \frac{1}{2}x^2 - 10x + 22$$

(a) Write  $\frac{1}{2}x^2 - 10x + 22$  in the form

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

where a, b and c are constants to be found.

(3)

The point M is the minimum turning point of C, as shown in Figure 3.

(b) Deduce the coordinates of M

**(2)** 

The line l is the normal to C at the point P, as shown in Figure 3.

Given that *l* has equation  $y = k - \frac{1}{8}x$ , where *k* is a constant,

- (c) (i) find the coordinates of P
  - (ii) find the value of k

**(6)** 

**Question 9 continues on the next page** 



### **Question 9 continued**

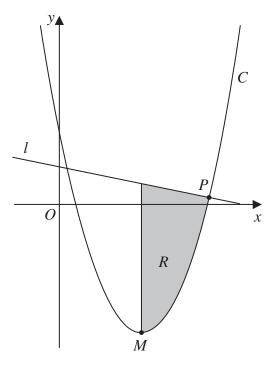


Figure 4

Figure 4 is a copy of Figure 3. The finite region R, shown shaded in Figure 4, is bounded by l, C and the line through M parallel to the y-axis.

(d)	Identify	the	inequalities	that	define	R
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(3)

Question 9 continued						



Question 9 continued						
(Total for Question 9 is 14 marks)						
TOTAL FOR PAPER IS 75 MARKS						

