Please check the examination details bel	ow before ente	ring your candidate inf	ormation
Candidate surname		Other names	
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Pearson Edexcel Inter	nation	al Advance	ed Level
Time 1 hour 30 minutes	Paper reference	WMA1	1/01
Mathematics			0
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Pure Mathematics P1			
			J
You must have:			Total Marks
Mathematical Formulae and Statistica	al Tables (Ye	llow), 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 11 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.

Turn over ▶







1. A curve C has equation

$$y = 2 + 10x^{\frac{1}{2}} - 2x^{\frac{3}{2}} \qquad x > 0$$

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

(3)

(b) Hence find the exact value of the gradient of the tangent to C at the point where x = 2 giving your answer in simplest form.

 $(Solutions\ relying\ on\ calculator\ technology\ are\ not\ acceptable.)$

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



2.	The points P , Q and R have coordinates $(-3, 7)$, $(9, 11)$ and $(12, 2)$ respectively. (a) Prove that angle $PQR = 90^{\circ}$	
	(a) 110ve that angle 1 QN = 30	(3)
	Given that the point S is such that $PQRS$ forms a rectangle,	
	(b) find the coordinates of <i>S</i> .	(2)

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Question 2 continued
(Total for Question 2 is 5 marks)



3.	Find	
	$\int \frac{4x^5 + 3}{2x^2} \mathrm{d}x$	
	giving your answer in simplest form.	(5)

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Question 3 continued	
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(Tot	al for Question 3 is 5 marks)



4.	Given	that	the	equation
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$kx^2 + 6kx + 5 = 0$	where k is a non zero constant

has no real roots, find the range of possible values for k.

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

Solutions relying on calculator technology are not acceptable.

(a) By substituting $p = 3^x$, show that the equation

$$3 \times 9^x + 3^{x+2} = 1 + 3^{x-1}$$

can be rewritten in the form

$$9p^2 + 26p - 3 = 0$$

(3)

(b) Hence solve

$$3 \times 9^x + 3^{x+2} = 1 + 3^{x-1}$$

(3)



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Question 5 continued
(Total for Question 5 is 6 marks)
(Total for Question 3 is 6 marks)



6.

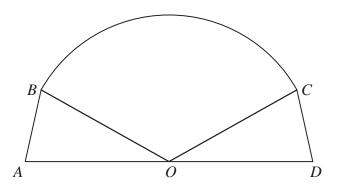


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Figure 1

Figure 1 shows the plan view for the design of a stage.

The design consists of a sector *OBC* of a circle, with centre *O*, joined to two congruent triangles *OAB* and *ODC*.

Given that

- angle BOC = 2.4 radians
- area of sector $BOC = 40 \,\mathrm{m}^2$
- AOD is a straight line of length 12.5 m
- (a) find the radius of the sector, giving your answer, in m, to 2 decimal places,

(2)

(b) find the size of angle AOB, in radians, to 2 decimal places.

(1)

Hence find

(c) the total area of the stage, giving your answer, in m², to one decimal place,

(3)

(d) the total perimeter of the stage, giving your answer, in m, to one decimal place.

(4)

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Question 6 continued



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Question 6 continued	
(Total for Question	n 6 is 10 marks)
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7. (a) On Diagram 1, sketch a graph of the curve C with equation

$$y = \frac{6}{x} \qquad x \neq 0$$

(2)

The curve *C* is transformed onto the curve with equation $y = \frac{6}{x-2}$ $x \ne 2$

(b) Fully describe this transformation.

(2)

The curve with equation

$$y = \frac{6}{x - 2} \qquad x \neq 2$$

and the line with equation

$$y = kx + 7$$
 where *k* is a constant

intersect at exactly two points, P and Q.

Given that the x coordinate of point P is -4

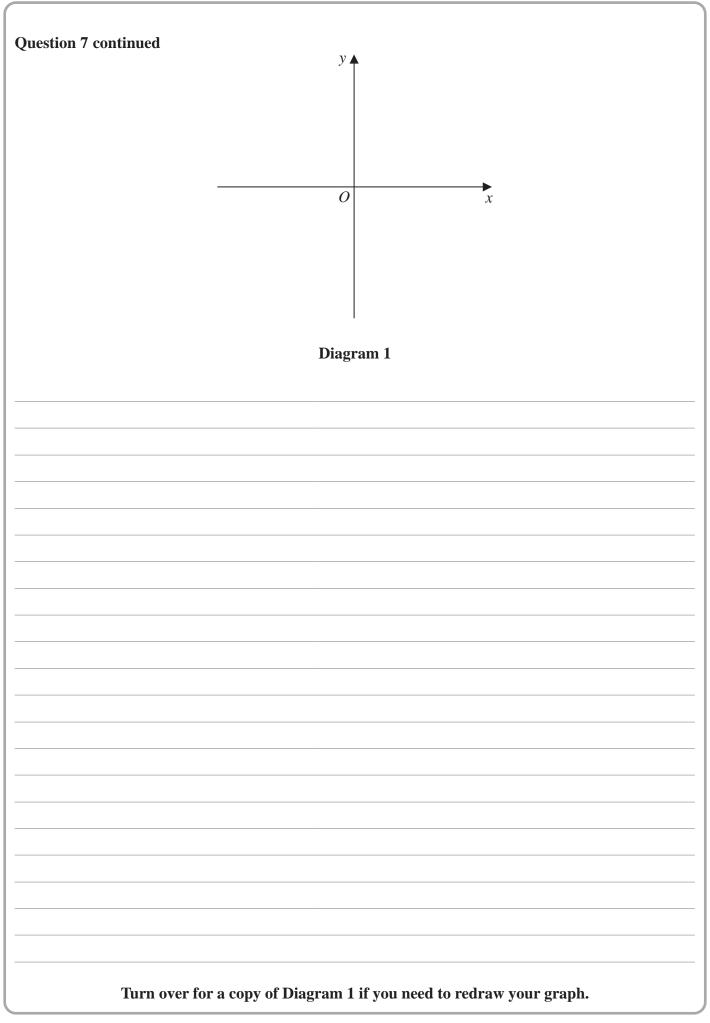
(c) find the value of k,

(2)

(d) find, using algebra, the coordinates of point Q.

(Solutions relying entirely on calculator technology are not acceptable.)

(4)





Question 7 continued

Question 7 continued
Only use this copy of Diagram 1 if you need to redraw your graph.
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Copy of Diagram 1
(Total for Question 7 is 10 marks)



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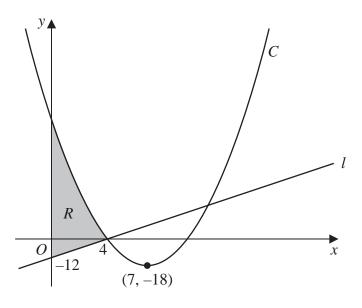


Figure 2

Figure 2 shows a sketch of the straight line l and the curve C.

Given that l cuts the y-axis at -12 and cuts the x-axis at 4, as shown in Figure 2,

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

(2)

Given that *C*

- has equation y = f(x) where f(x) is a quadratic expression
- has a minimum point at (7, -18)
- cuts the x-axis at 4 and at k, where k is a constant
- (b) deduce the value of k,

(1)

(c) find f(x).

(3)

The region *R* is shown shaded in Figure 2.

(d) Use inequalities to define R.

(2)



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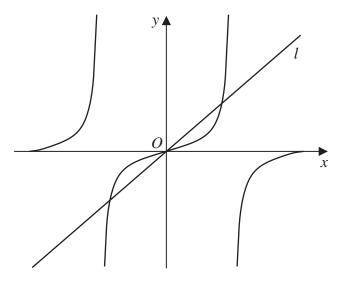


Figure 3

Figure 3 shows a sketch of

- the curve with equation $y = \tan x$
- the straight line 1 with equation $y = \pi x$

in the interval $-\pi < x < \pi$

(a) State the period of $\tan x$

(1)

- (b) Write down the number of roots of the equation
 - (i) $\tan x = (\pi + 2)x$ in the interval $-\pi < x < \pi$

(1)

(ii) $\tan x = \pi x$ in the interval $-2\pi < x < 2\pi$

(1)

(iii) $\tan x = \pi x$ in the interval $-100\pi < x < 100\pi$

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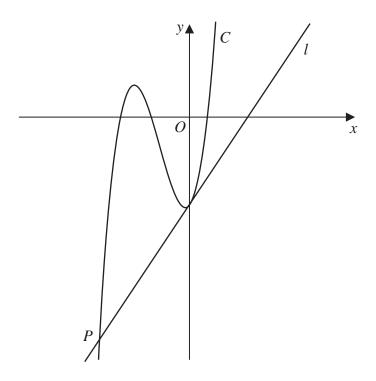


Figure 4

Figure 4 shows a sketch of part of the curve C with equation y = f(x), where

$$f(x) = (3x + 20)(x + 6)(2x - 3)$$

(a) Use the given information to state the values of x for which

(2)

(b) Expand (3x + 20)(x + 6)(2x - 3), writing your answer as a polynomial in simplest form.

(3)

The straight line l is the tangent to C at the point where C cuts the y-axis.

Given that l cuts C at the point P, as shown in Figure 4,

(c) find, using algebra, the x coordinate of P

(Solutions based on calculator technology are not acceptable.)

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Question 10 continued

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Question 10 continued



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Question 10 continued	
(Tota	l for Question 10 is 10 marks)
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11. A curve *C* has equation y = f(x), x > 0

Given that

$$\bullet \quad \mathbf{f}''(x) = 4x + \frac{1}{\sqrt{x}}$$

- the point *P* has *x* coordinate 4 and lies on *C*
- the tangent to C at P has equation y = 3x + 4
- (a) find an equation of the normal to C at P

(2)

(b) find f(x), writing your answer in simplest form.

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Question 11 continued



Question 11 continued				
	(Total for Question 11 is 8 marks)			
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