

Pearson Edexcel International Advanced Level

Tuesday 2 June 2026

Morning (Time: 1 hour 30 minutes)

Paper

reference

WMA13/01A

Mathematics

International Advanced Level

Pure Mathematics P3

Question paper

You must have:

Answer book (sent separately)

Do not return this question paper with the answer book

Turn over ►

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Pearson

1. The point $P(-4, -3)$ lies on the curve with equation $y = f(x)$, $x \in \mathbb{R}$

Find the coordinates of the point to which P is mapped when the curve with equation $y = f(x)$ is transformed to the curve with equation

(a) $y = f(2x)$ (1)

(b) $y = 3f(x - 5)$ (2)

(c) $y = f(-x) + 3$ (2)

(Total for Question 1 is 5 marks)



2.

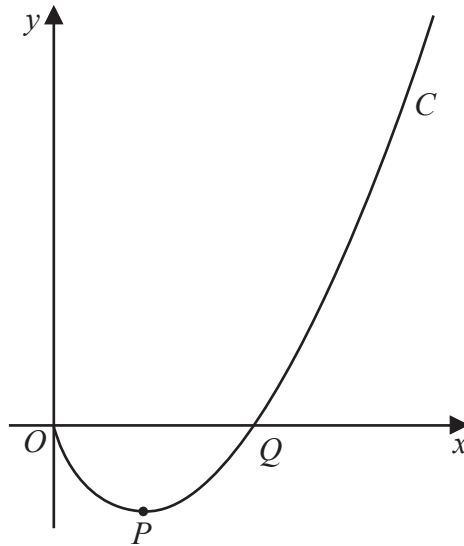


Figure 1

Figure 1 is a sketch of part of the curve C with equation

$$y = x(3 + x)\ln(2x) \quad x > 0$$

The curve cuts the x -axis at the point Q .

(a) Find the x coordinate of Q .

(1)

The point P with x coordinate α is the stationary point on C .

(b) Show that α is a solution of

$$x = \frac{1}{2}e^{-\left(\frac{x+3}{2x+3}\right)} \quad (4)$$

The iteration formula

$$x_{n+1} = \frac{1}{2}e^{-\left(\frac{x_n+3}{2x_n+3}\right)}$$

is used to find an approximate value of α

Starting with $x_1 = 0.5$

(c) (i) find, to 4 decimal places, the value of x_2

(ii) find, by repeated iteration, the value of α , giving the answer to 4 decimal places.

(3)

(Total for Question 2 is 8 marks)

3. The curve C has equation

$$x = \frac{2y - 1}{(y - 1)^2} \quad x > 0 \quad y > 1$$

- (a) Find $\frac{dx}{dy}$ in terms of y , giving the answer in simplest form. (3)

The point P lies on C .

Given that P has y coordinate 2

- (b) find the equation of the tangent to C at P , giving the answer in the form $ax + by + c = 0$, where a , b and c are integers. (3)

(Total for Question 3 is 6 marks)



4.

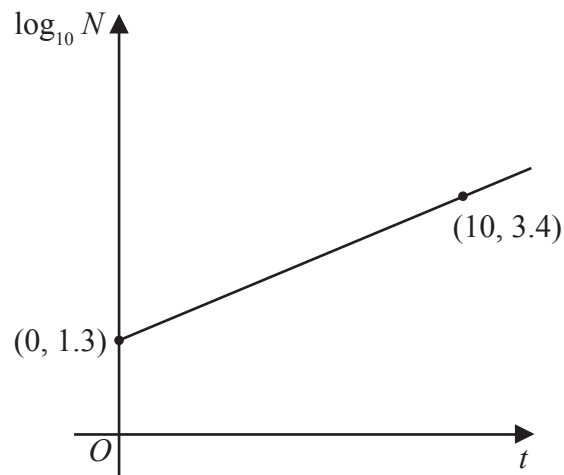


Figure 2

The total number of deliveries made by a company is being monitored.

The total number of deliveries, N thousands, made by the company, t years after monitoring began, is modelled by the equation

$$N = pq^t$$

where p and q are constants.

Figure 2 shows the linear relationship between $\log_{10} N$ and t

(a) Find, to 4 significant figures, the value of p and the value of q .

(4)

When $t = T$, $N = 700$

(b) Find, according to the model, the value of T to 3 significant figures.

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

(2)

(Total for Question 4 is 6 marks)

5.

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

The functions f and g are defined by

$$f(x) = \frac{5x+2}{x-3} \quad x \in \mathbb{R} \quad x > 3$$

$$g(x) = 7 + 5e^{x-2} \quad x \in \mathbb{R}$$

(a) State the range of f (2)

(b) Find g^{-1} (3)

(c) Find the exact value of a for which

$$fg(a) = 8$$

Give the answer in simplest form.

(3)

(Total for Question 5 is 8 marks)



6.

**In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.**

$$f(x) = 3\sin x + 4\cos x$$

(a) Express $f(x)$ in the form $R\sin(x + \alpha)$, where R and α are constants,

$R > 0$ and $0 < \alpha < \frac{\pi}{2}$ giving the value of α to 3 significant figures. (3)

$$h(x) = (4f(2x) - 3)^2 \quad 0 < x < 2\pi$$

(b) Using the answer to part (a),

(i) write down the maximum value of $h(x)$,

(ii) find the largest value of x for which this maximum value occurs.

You must make your method clear.

(3)

(Total for Question 6 is 6 marks)

7.

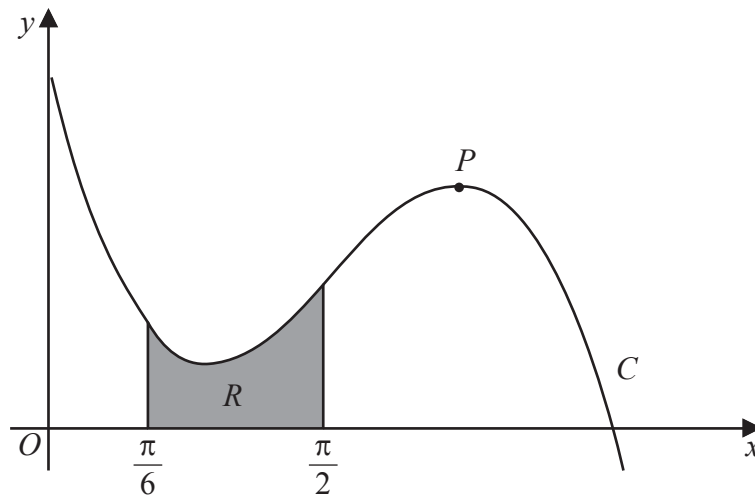


Figure 3

**In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.**

Figure 3 shows a sketch of part of the curve C with equation

$$y = 1 - 2x + 5\sin^2\left(\frac{1}{2}x\right) \quad x > 0$$

where x is measured in radians.

The point P lies on C and is a local maximum, as shown in Figure 3.

- (a) Use calculus and a suitable trigonometric identity to find the x coordinate of P .
Give the answer to 3 significant figures.

(4)

The region R , shown shaded in Figure 3, is bounded by C , the x -axis and the lines with equations $x = \frac{\pi}{6}$ and $x = \frac{\pi}{2}$

- (b) Use algebraic integration to find the exact area of R .

(4)

(Total for Question 7 is 8 marks)

8.

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

The number of electric cars and the number of petrol cars being registered in a country were monitored over the same period of time.

The number of electric cars, E thousands, registered in the country t years after monitoring began, is modelled by the equation

$$E = A + 40e^{0.2t} \quad t \geq 0$$

where A is a constant.

Given that $E = 5$ when $t = 0$

(a) state the value of A .

(1)

Use the equation for this model to answer parts (b) and (c).

(b) Find the number of electric cars registered in the country when $t = 3$, giving the answer to 3 significant figures.

(2)

(c) Find the **rate of increase** in the number of electric cars registered in the country when $t = 5$, giving the answer to 3 significant figures.

(2)

The number of petrol cars, P thousands, registered in the country t years after monitoring began, is modelled by the equation

$$P = 150 + 450e^{-0.2t} \quad t \geq 0$$

When $t = X$, the number of electric cars registered in the country was equal to the number of petrol cars registered in the country.

Using the equations of both models,

(d) find the value of X , giving the answer to one decimal place.

(You must show sufficient algebraic working to make your method clear.)

(4)

(Total for Question 8 is 9 marks)

9.

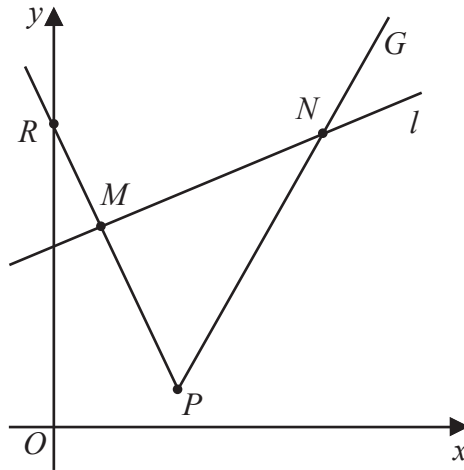


Figure 4

**In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.**

Figure 4 shows

- the graph G with equation $y = |2x - k| + 3$
- the line l with equation $y = \frac{1}{2}x + \frac{k+7}{2}$

where k is a constant, $k > 1$

Given that G has a minimum point at P ,

(a) find, in terms of k , the coordinates of P .

(2)

Given that l meets G at the points M and N , as shown in Figure 4,

(b) find, in terms of k , the x coordinate of M and the x coordinate of N .

(4)

Given also that

- graph G meets the y -axis at point R
- the area of triangle ORM is $\frac{33}{40}$ square units

(c) find the exact value of the area of triangle ORN .

(4)

(Total for Question 9 is 10 marks)

10.

**In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.**

(a) Show that

$$\cot x - \operatorname{cosec} 2x \equiv \cot 2x \quad x \neq 90n^\circ \quad n \in \mathbb{Z} \quad (4)$$

(b) Using

- the answer to part (a)
- suitable trigonometric identities

solve, for $0 < \theta < 90^\circ$, $\theta \neq 75^\circ$ the equation

$$13 + \cot(\theta + 15^\circ) - \operatorname{cosec}(2\theta + 30^\circ) = \operatorname{cosec}^2(2\theta + 30^\circ)$$

Give each of the answers to one decimal place.

(5)

(Total for Question 10 is 9 marks)

TOTAL FOR PAPER IS 75 MARKS

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