

1. Given that $y = x^4 + 6x^{\frac{1}{2}}$, find in their simplest form

(a) $\frac{dy}{dx}$ (3)

(b) $\int y dx$ (3)



Question 3 continued

Handwriting lines for the question response.

(Total 6 marks)

Q3



4. A sequence x_1, x_2, x_3, \dots is defined by

$$x_1 = 1$$

$$x_{n+1} = ax_n + 5, \quad n \geq 1$$

where a is a constant.

(a) Write down an expression for x_2 in terms of a .

(1)

(b) Show that $x_3 = a^2 + 5a + 5$

(2)

Given that $x_3 = 41$

(c) find the possible values of a .

(3)



Leave
blank

Question 5 continued

Q5

(Total 8 marks)



P 4 0 0 8 2 A 0 1 1 2 8

6.

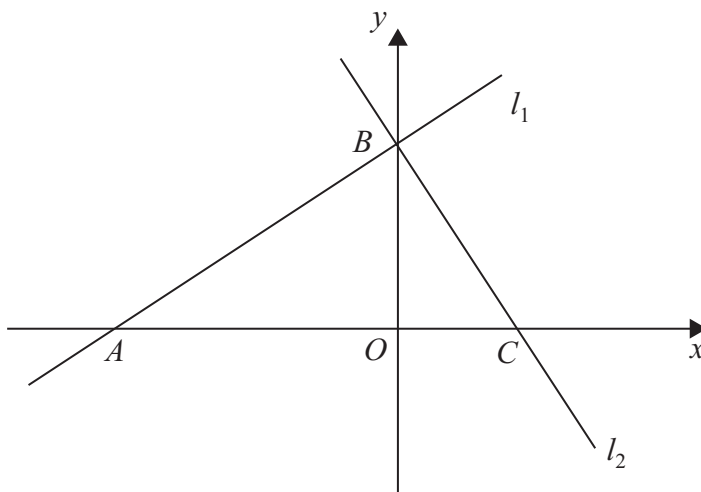


Figure 1

The line l_1 has equation $2x - 3y + 12 = 0$

- (a) Find the gradient of l_1 . **(1)**

The line l_1 crosses the x -axis at the point A and the y -axis at the point B , as shown in Figure 1.

The line l_2 is perpendicular to l_1 and passes through B .

- (b) Find an equation of l_2 . **(3)**

The line l_2 crosses the x -axis at the point C .

- (c) Find the area of triangle ABC . **(4)**



Question 8 continued



Question 8 continued



Question 8 continued

Q8

(Total 10 marks)



9. A company offers two salary schemes for a 10-year period, Year 1 to Year 10 inclusive.

Scheme 1: Salary in Year 1 is $\text{£}P$.
Salary increases by $\text{£}(2T)$ each year, forming an arithmetic sequence.

Scheme 2: Salary in Year 1 is $\text{£}(P + 1800)$.
Salary increases by $\text{£}T$ each year, forming an arithmetic sequence.

(a) Show that the **total** earned under Salary Scheme 1 for the 10-year period is

$$\text{£}(10P + 90T) \tag{2}$$

For the 10-year period, the **total** earned is the same for both salary schemes.

(b) Find the value of T . (4)

For this value of T , the salary in Year 10 under Salary Scheme 2 is $\text{£}29\,850$

(c) Find the value of P . (3)



Question 9 continued

A series of horizontal lines for writing the answer to Question 9 continued.



Question 9 continued

Lined area for writing the answer to Question 9.

(Total 9 marks)

Q9



10.

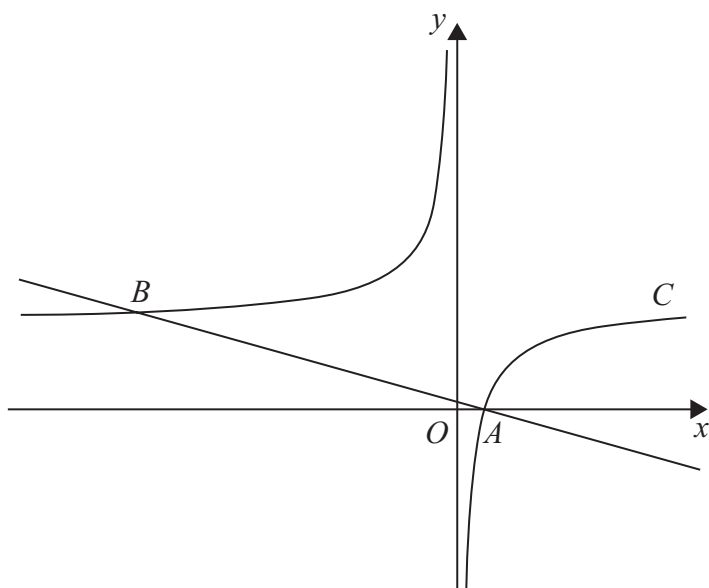


Figure 2

Figure 2 shows a sketch of the curve C with equation

$$y = 2 - \frac{1}{x}, \quad x \neq 0$$

The curve crosses the x -axis at the point A .

(a) Find the coordinates of A . (1)

(b) Show that the equation of the normal to C at A can be written as

$$2x + 8y - 1 = 0 \quad (6)$$

The normal to C at A meets C again at the point B , as shown in Figure 2.

(c) Find the coordinates of B . (4)



Leave
blank

Question 10 continued

(This area contains horizontal lines for writing the answer to Question 10.)

Q10

(Total 11 marks)

| | |
|--|--|
| | |
|--|--|

TOTAL FOR PAPER: 75 MARKS

END

