

$$(a) \quad (3\sqrt{7})^2 \tag{1}$$

$$\text{(b) } (8 + \sqrt{5})(2 - \sqrt{5}) \quad (3)$$

(Total 4 marks)



1001

(3)

(Total 3 marks)



3. Given that $y = 2x^3 + \frac{3}{x^2}$, $x \neq 0$, find

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

(b) $\int y dx$, simplifying each term. (3)

4. Find the set of values of x for which

(a) $4x - 3 > 7 - x$

(2)

(b) $2x^2 - 5x - 12 < 0$

(4)

(c) **both** $4x - 3 > 7 - x$ **and** $2x^2 - 5x - 12 < 0$

(1)



5. A 40-year building programme for new houses began in Oldtown in the year 1951 (Year 1) and finished in 1990 (Year 40).

The numbers of houses built each year form an arithmetic sequence with first term a and common difference d .

Given that 2400 new houses were built in 1960 and 600 new houses were built in 1990, find

- (a) the value of d ,
- (3)

- (b) the value of a ,
- (2)

- (c) the total number of houses built in Oldtown over the 40-year period.



6. The equation $x^2 + 3px + p = 0$, where p is a non-zero constant, has equal roots.

Find the value of p .

(4)





8.

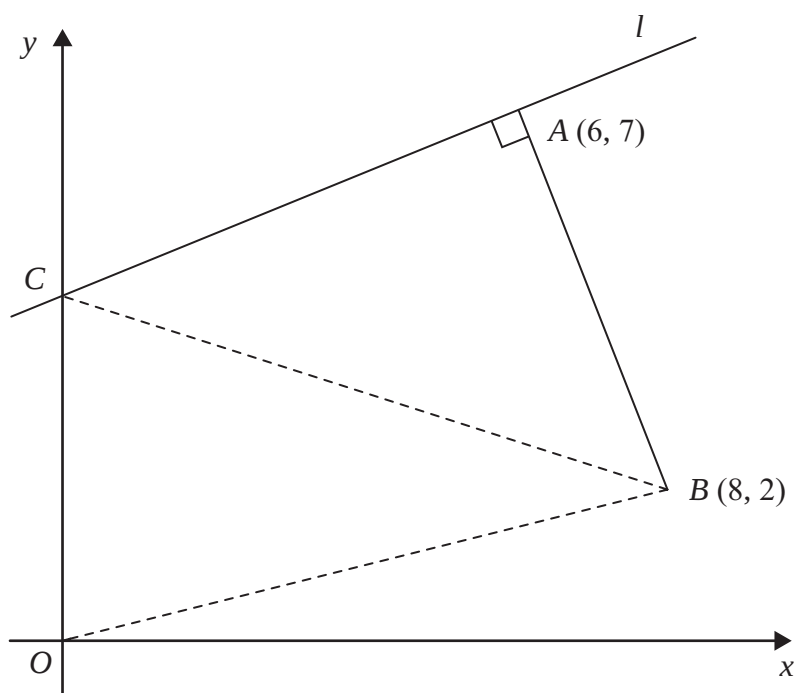


Figure 1

The points A and B have coordinates $(6, 7)$ and $(8, 2)$ respectively.

The line l passes through the point A and is perpendicular to the line AB , as shown in Figure 1.

- (a) Find an equation for l in the form $ax + by + c = 0$, where a , b and c are integers.

(4)

Given that l intersects the y -axis at the point C, find

- (b) the coordinates of C ,

(2)

- (c) the area of $\triangle OCB$, where O is the origin.

(2)

[illegible]

9.

$$f(x) = \frac{(3 - 4\sqrt{x})^2}{\sqrt{x}}, \quad x > 0$$

- (a) Show that $f(x) = 9x^{-\frac{1}{2}} + Ax^{\frac{1}{2}} + B$, where A and B are constants to be found. (3)
- (b) Find $f'(x)$. (3)
- (c) Evaluate $f'(9)$. (2)

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10. (a) Factorise completely $x^3 - 6x^2 + 9x$

(3)

(b) Sketch the curve with equation

$$y = x^3 - 6x^2 + 9x$$

showing the coordinates of the points at which the curve meets the x -axis.

(4)

Using your answer to part (b), or otherwise,

(c) sketch, on a separate diagram, the curve with equation

$$y = (x - 2)^3 - 6(x - 2)^2 + 9(x - 2)$$

showing the coordinates of the points at which the curve meets the x -axis.

(2)

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Question 10 continued



H 3 4 2 6 2 A 0 2 3 2 8



(Total 11 marks)

TOTAL FOR PAPER: 75 MARKS

END

