

3.

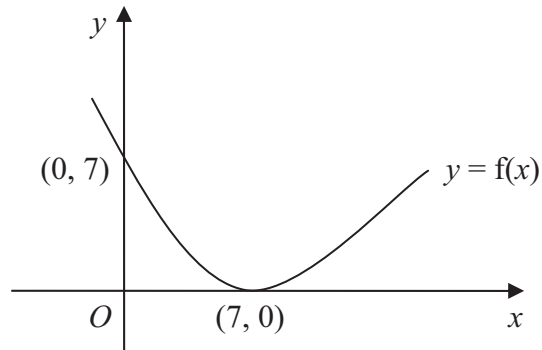


Figure 1

Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve passes through the point $(0, 7)$ and has a minimum point at $(7, 0)$.

On separate diagrams, sketch the curve with equation

(a) $y = f(x) + 3$, **(3)**

(b) $y = f(2x)$. **(2)**

On each diagram, show clearly the coordinates of the minimum point and the coordinates of the point at which the curve crosses the y -axis.



Question 3 continued

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(Total 5 marks)

Q3

5

Turn over



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

$$x_1 = 1,$$

$$x_{n+1} = ax_n - 3, \quad n \geq 1,$$

where a is a constant.

(a) Find an expression for x_2 in terms of a . (1)

(b) Show that $x_3 = a^2 - 3a - 3$. (2)

Given that $x_3 = 7$,

(c) find the possible values of a . (3)



Question 5 continued

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Lined area for writing the answer to Question 5. The area contains 30 horizontal lines.

(Total 6 marks)

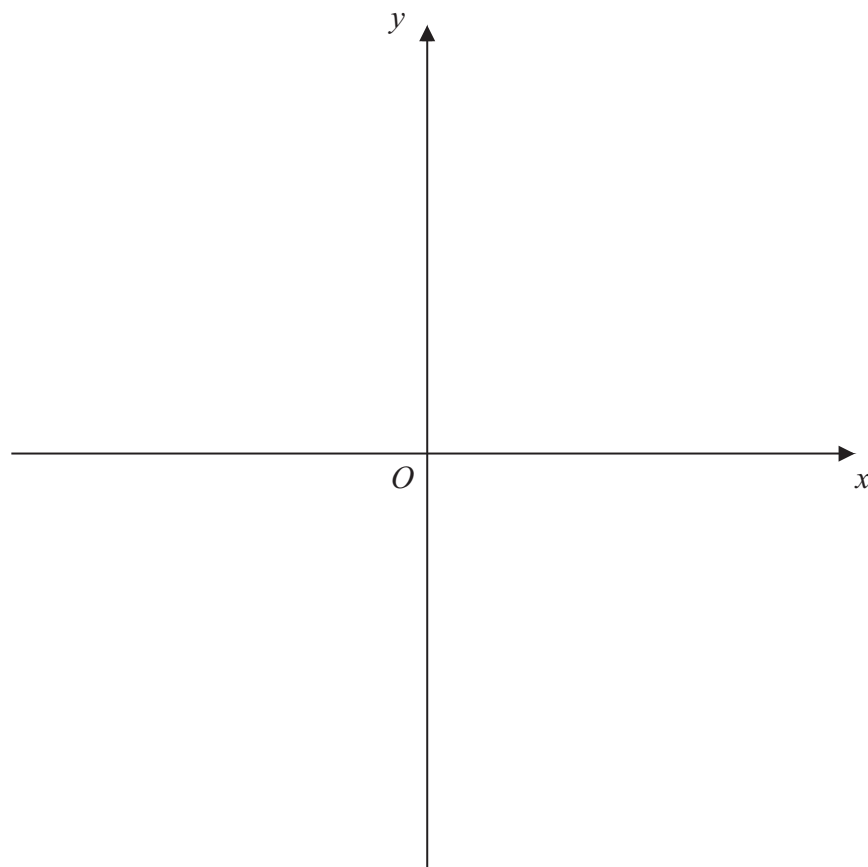
Q5



6. The curve C has equation $y = \frac{3}{x}$ and the line l has equation $y = 2x + 5$.

(a) On the axes below, sketch the graphs of C and l , indicating clearly the coordinates of any intersections with the axes. (3)

(b) Find the coordinates of the points of intersection of C and l . (6)



7. Sue is training for a marathon. Her training includes a run every Saturday starting with a run of 5 km on the first Saturday. Each Saturday she increases the length of her run from the previous Saturday by 2 km.

(a) Show that on the 4th Saturday of training she runs 11 km. (1)

(b) Find an expression, in terms of n , for the length of her training run on the n th Saturday. (2)

(c) Show that the total distance she runs on Saturdays in n weeks of training is $n(n + 4)$ km. (3)

On the n th Saturday Sue runs 43 km.

(d) Find the value of n . (2)

(e) Find the total distance, in km, Sue runs on Saturdays in n weeks of training. (2)





Question 7 continued

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Lined area for writing the answer to Question 7.



10.

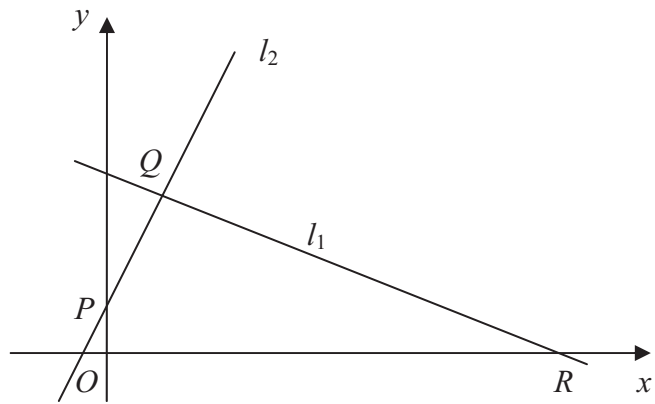


Figure 2

The points $Q(1, 3)$ and $R(7, 0)$ lie on the line l_1 , as shown in Figure 2.

The length of QR is $a\sqrt{5}$.

- (a) Find the value of a . (3)

The line l_2 is perpendicular to l_1 , passes through Q and crosses the y -axis at the point P , as shown in Figure 2.

Find

- (b) an equation for l_2 , (5)
- (c) the coordinates of P , (1)
- (d) the area of $\triangle PQR$. (4)



Question 11 continued

Lined area for writing the answer to Question 11.

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