

5. A sequence of numbers $a_1, a_2, a_3 \dots$ is defined by

$$a_1 = 3$$

$$a_{n+1} = 2a_n - c \quad (n \geq 1)$$

where c is a constant.

(a) Write down an expression, in terms of c , for a_2 (1)

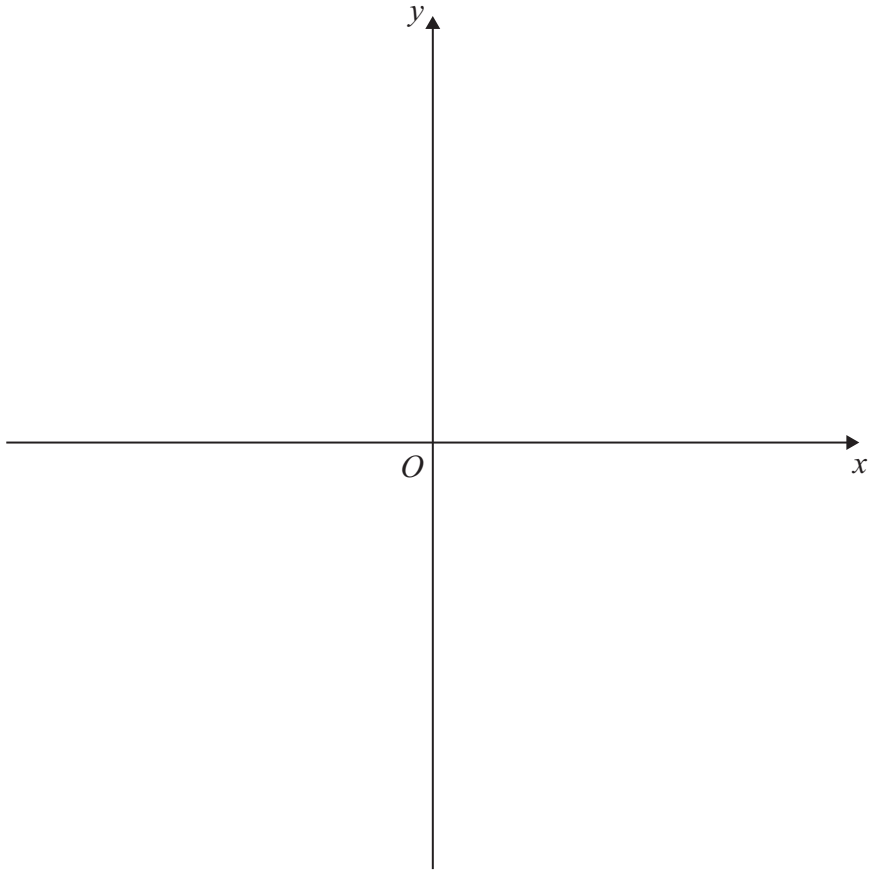
(b) Show that $a_3 = 12 - 3c$ (2)

Given that $\sum_{i=1}^4 a_i \geq 23$

(c) find the range of values of c . (4)



Question 8 continued



(Total 8 marks)

Q8



9. The line L_1 has equation $4y + 3 = 2x$

The point $A(p, 4)$ lies on L_1

- (a) Find the value of the constant p . (1)

The line L_2 passes through the point $C(2, 4)$ and is perpendicular to L_1

- (b) Find an equation for L_2 giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. (5)

The line L_1 and the line L_2 intersect at the point D .

- (c) Find the coordinates of the point D . (3)

- (d) Show that the length of CD is $\frac{3}{2}\sqrt{5}$ (3)

A point B lies on L_1 and the length of $AB = \sqrt{80}$

The point E lies on L_2 such that the length of the line $CDE = 3$ times the length of CD .

- (e) Find the area of the quadrilateral $ACBE$. (3)



10.

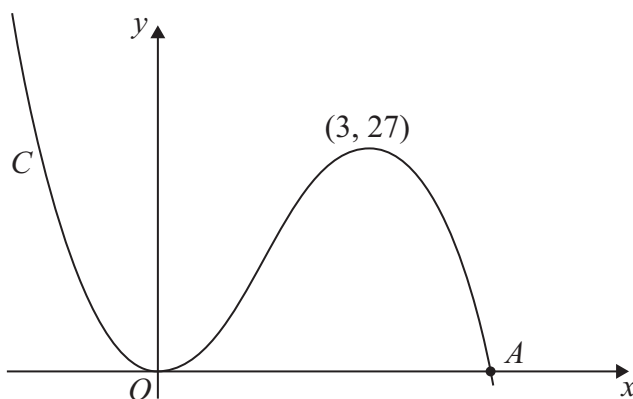


Figure 1

Figure 1 shows a sketch of the curve C with equation $y = f(x)$ where

$$f(x) = x^2(9 - 2x)$$

There is a minimum at the origin, a maximum at the point $(3, 27)$ and C cuts the x -axis at the point A .

(a) Write down the coordinates of the point A . (1)

(b) On separate diagrams sketch the curve with equation

(i) $y = f(x + 3)$

(ii) $y = f(3x)$

On each sketch you should indicate clearly the coordinates of the maximum point and any points where the curves cross or meet the coordinate axes. (6)

The curve with equation $y = f(x) + k$, where k is a constant, has a maximum point at $(3, 10)$.

(c) Write down the value of k . (1)



