





2. (a) Evaluate  $(32)^{\frac{3}{5}}$ , giving your answer as an integer.

(2)

(b) Simplify fully  $\left(\frac{25x^4}{4}\right)^{\frac{1}{2}}$

(2)

Q2

(Total 4 marks)





**Question 3 continued**

A series of horizontal lines for writing the answer to Question 3.

Q3

[ ]

(Total 5 marks)





Leave blank

**Question 4 continued**

Handwritten response area consisting of approximately 30 horizontal lines.

**(Total 6 marks)**

Q4



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)

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**Question 7 continued**

Lined writing area for Question 7 continued.

**(Total 8 marks)**

**Q7**



8. 
$$4x - 5 - x^2 = q - (x + p)^2$$

where  $p$  and  $q$  are integers.

(a) Find the value of  $p$  and the value of  $q$ . **(3)**

(b) Calculate the discriminant of  $4x - 5 - x^2$  **(2)**

(c) On the axes on page 17, sketch the curve with equation  $y = 4x - 5 - x^2$  showing clearly the coordinates of any points where the curve crosses the coordinate axes. **(3)**

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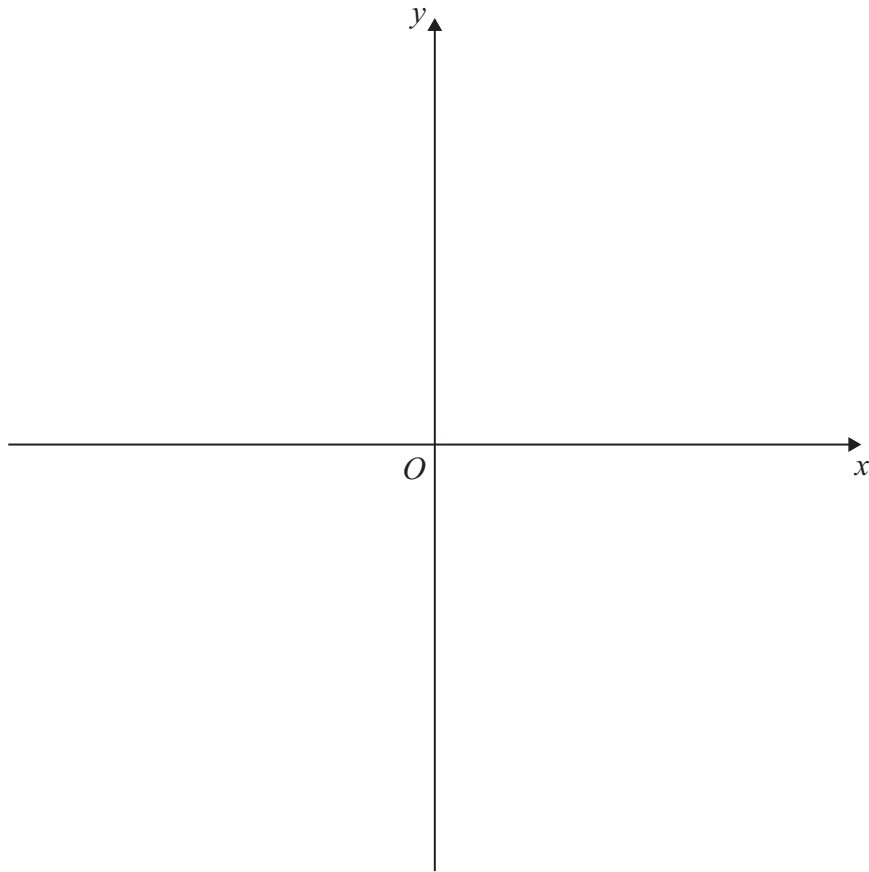
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**Question 8 continued**



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**(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)

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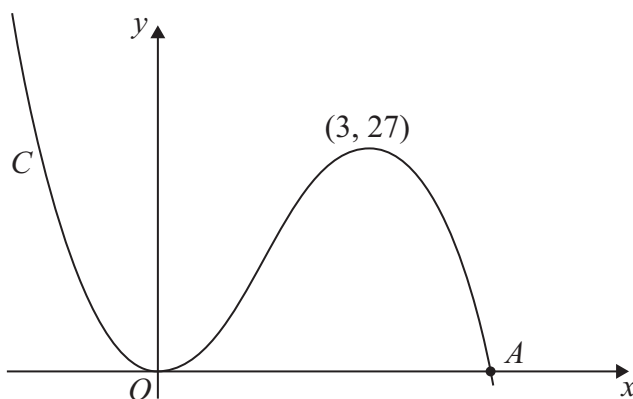


Figure 1

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)

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