

3.

In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

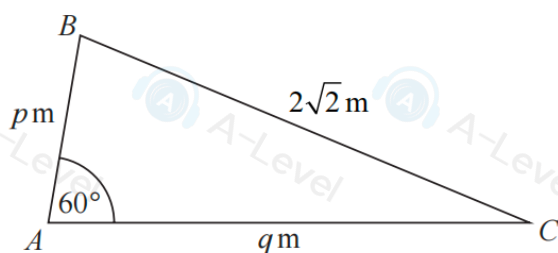
Not drawn
to scale

Figure 1

Figure 1 shows the plan view of a flower bed.
The flowerbed is in the shape of a triangle ABC with

- $AB = p$ metres
- $AC = q$ metres
- $BC = 2\sqrt{2}$ metres
- angle $BAC = 60^\circ$

(a) Show that

$$p^2 + q^2 - pq = 8 \quad (2)$$

Given that side AC is 2 metres longer than side AB , use algebra to find(b) (i) the exact value of p ,(ii) the exact value of q . (5)

Using the answers to part (b),

(c) calculate the exact area of the flower bed. (2)6. The line with equation $y = 4x + c$, where c is a constant, meets the curve with equation $y = x(x - 3)$ at only one point.(a) Find the value of c . (4)(b) Hence find the coordinates of the point of intersection. (3)

4. Use algebra to solve the simultaneous equations

$$\begin{aligned} y - 3x &= 4 \\ x^2 + y^2 + 6x - 4y &= 4 \end{aligned}$$

You must show all stages of your working. (7)

1. The line l_1 passes through the point $A(-5, 20)$ and the point $B(3, -4)$.

- (a) Find an equation for l_1 giving your answer in the form $y = mx + c$, where m and c are constants.

(3)

The line l_2 is perpendicular to l_1 and passes through the midpoint of AB

- (b) Find an equation for l_2 giving your answer in the form $px + qy + r = 0$, where p , q and r are integers.

(3)

10.

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$$(k-1)x^6 + 4x^3 + (k-4) = 0 \quad \text{where } k \text{ is a constant}$$

- (a) Find the exact solutions to the given equation for $k = 4.5$

(3)

- (b) Find the set of possible values of k for which the given equation has no real roots.

(4)

6.

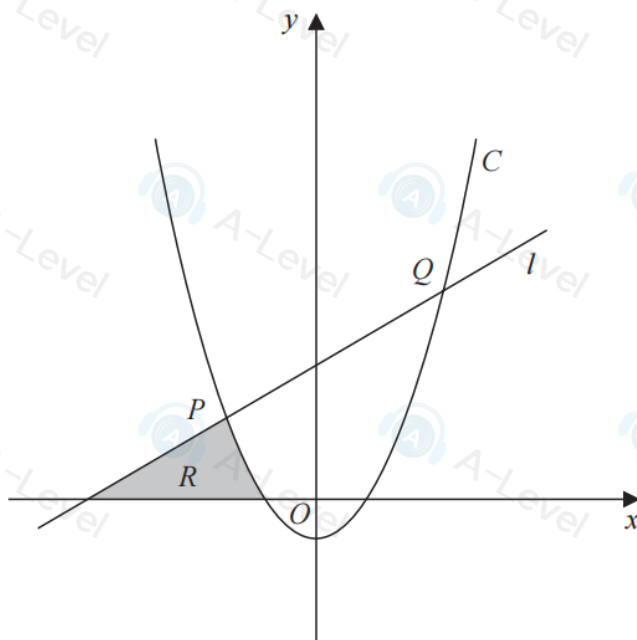


Figure 3

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Figure 3 shows

- the line l with equation $y - 5x = 75$
- the curve C with equation $y = 2x^2 + x - 21$

The line l intersects the curve C at the points P and Q , as shown in Figure 3.

- (a) Find, using algebra, the coordinates of P and the coordinates of Q .

(4)

The region R , shown shaded in Figure 3, is bounded by C , l and the x -axis.

- (b) Use inequalities to define the region R .

(3)

4.

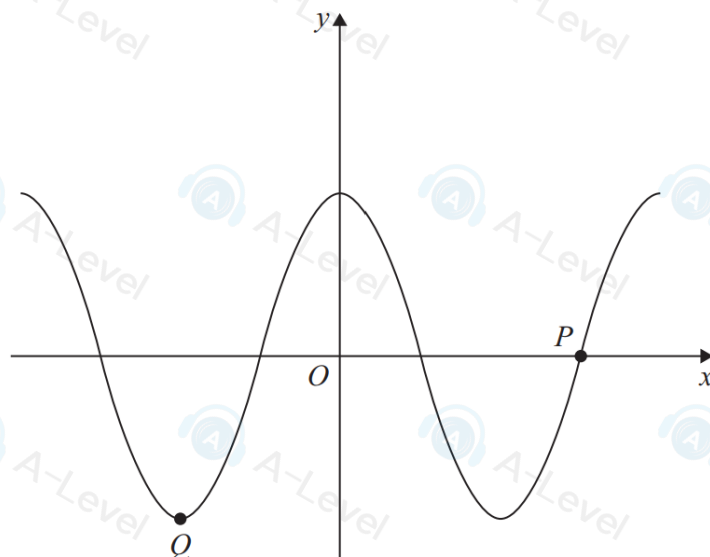


Figure 1

Figure 1 shows a sketch of part of the curve with equation

$$y = 4 \cos x$$

where x is measured in degrees.

The points P and Q lie on the curve and are shown in Figure 1.

(a) State the coordinates of P .

(1)

(b) State the coordinates of Q .

(2)

(c) State the **number** of solutions of the equation

(i) $4 \cos x = 3$ in the interval $0 < x \leq 18\,000^\circ$

(ii) $5 + 4 \cos x = 1$ in the interval $-720^\circ < x \leq 720^\circ$

(iii) $4 \cos x - 3 = 1$ in the interval $-1080^\circ \leq x \leq 1080^\circ$

(3)