7.

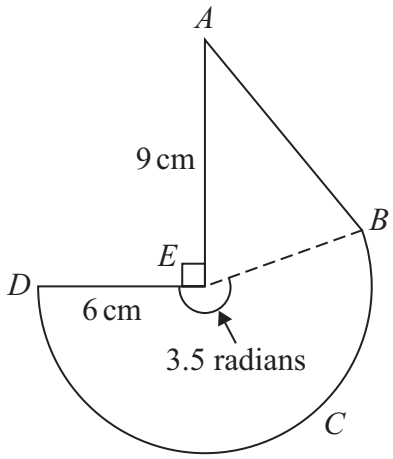


Diagram not drawn to scale

Figure 3

In this question you must show detailed reasoning.

Figure 3 shows the design for a company logo.

The design consists of a triangle *ABE* joined to a sector *BCDE* of a circle with radius 6 cm and centre *E*.
The line *AE* is perpendicular to the line *DE* and the length of *AE* is 9 cm.

The size of angle *DEB* is 3.5 radians, as shown in Figure 3.

(a) Find the length of the arc *BCD*.

(2)

Find, to one decimal place,

(b) the perimeter of the logo,

(3)

(c) the area of the logo.

(4)

(Total for Question 7 is 9 marks)

8.

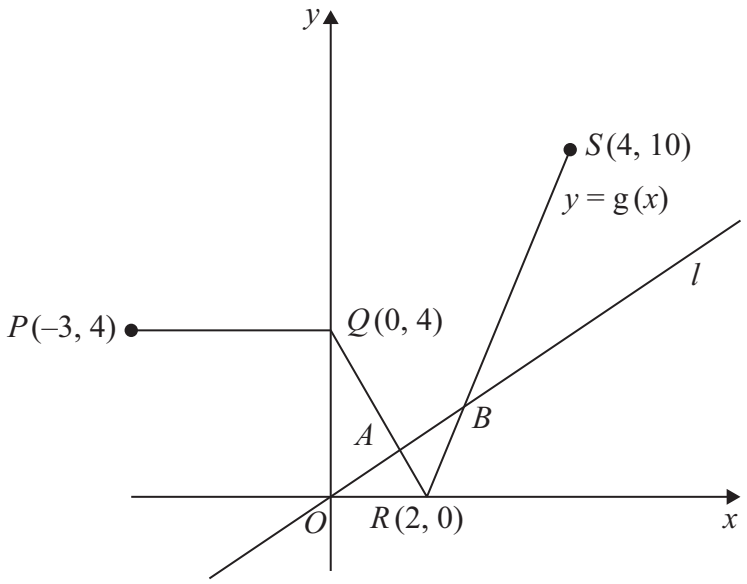


Figure 4

Figure 4 shows a sketch of the graph of $y = g(x)$, $-3 \leqslant x \leqslant 4$ and part of the line l with equation $y = \frac{1}{2}x$

The graph of $y = g(x)$ consists of three line segments, from $P(-3, 4)$ to $Q(0, 4)$, from $Q(0, 4)$ to $R(2, 0)$ and from $R(2, 0)$ to $S(4, 10)$.

The line l intersects $y = g(x)$ at the points A and B as shown in Figure 4.

(a) Use algebra to find the x coordinate of the point A and the x coordinate of the point B.
Show each step of your working and give your answers as exact fractions.

(6)

(b) Sketch the graph with equation

$$y = \frac{3}{2}g(x) \qquad -3 \leqslant x \leqslant 4$$

On your sketch show the coordinates of the points to which P, Q, R and S are transformed.

(2)

(Total for Question 8 is 8 marks)