6.

Diagram not drawn to scale

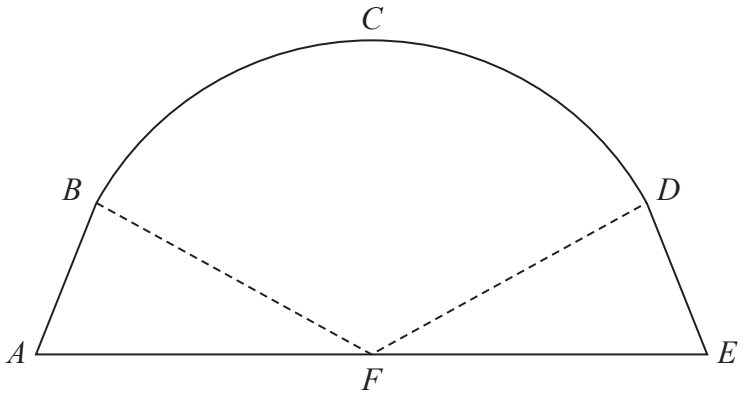


Figure 1

Figure 1 shows a sketch of the entrance to a tunnel.

The shape of the entrance consists of a sector $BCDF$, of a circle centre F, joined to two congruent (identical) triangles ABF and EDF.

Given that

AFE is a straight line

$AF = FE = 6.4\,\text{m}$

$FB = FD = 6.2\,\text{m}$

angle $BFD = 2.275$ radians

(a) Show that angle $AFB = 0.433$ radians to 3 decimal places.

(1)

(b) Find the perimeter of the entrance to the tunnel, $ABCDEFA$, in metres, to one decimal place.

(4)

(c) Find the cross-sectional area of the entrance to the tunnel, $ABCDEFA$, in m^2, to one decimal place.

(4)

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Question 6 continued

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Question 6 continued

(Total for Question 6 is 9 marks)

7.

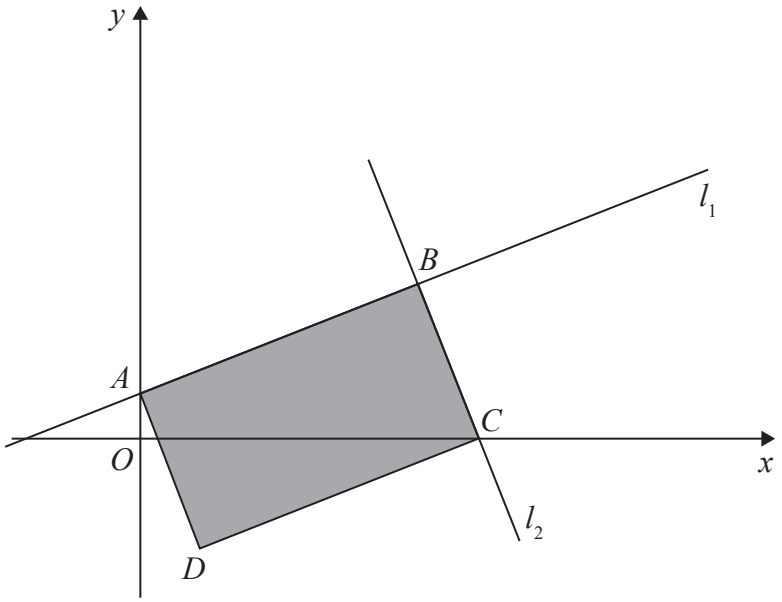


Figure 2

The straight line l_1 shown in Figure 2 has equation $5y = 2x + 10$

The points A and B lie on l_1 such that

- point A lies on the y-axis
- point B has x coordinate 10

(a) Find the distance AB writing your answer as a fully simplified surd.

(3)

The straight line l_2 also shown in Figure 2

- passes through B
- is perpendicular to l_1

(b) Find an equation for l_2 writing your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

Line l_2 crosses the x-axis at the point C.

Point D is such that the points A, B, C and D form the vertices of a rectangle, shown shaded in Figure 2.

(c) Find the area of rectangle $ABCD$.

(3)

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