6.

Diagrams Not to scale

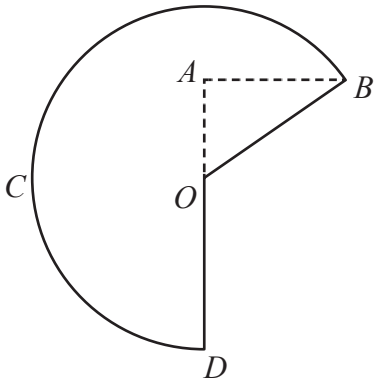

Figure 2

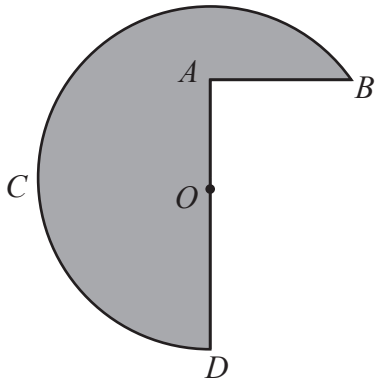

Figure 3

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

Figure 2 shows

- a sector $DOBCD$ of a circle with centre O
- a right-angled triangle OAB with the right angle at A

A company's logo, shown shaded in Figure 3, is formed when the right-angled triangle is removed from the sector of the circle.

Given that

- $OB = OD = 9$ cm
- $AB = 7.3$ cm

(a) find the size of angle BOA, in radians, to 3 decimal places,

(2)

(b) find the area of the logo, in cm^2, to 3 significant figures,

(3)

(c) find the perimeter of the logo, in cm, to one decimal place.

(3)

(Total for Question 6 is 8 marks)

7. The curve C has equation $y = \mathrm{f}(x)$, $x > 0$

The point P with x coordinate 4 lies on C.

Given that

- $\mathrm{f}'(x) = \dfrac{k - \sqrt{x}}{2x^2}$ where k is a constant
- the normal to C at P has equation $y + 2x - 5 = 0$

(a) (i) show that $k = 18$

(ii) find the equation of the tangent to C at P. Give the answer in the form $y = mx + c$, where m and c are constants.

(6)

(b) Find an expression for $\mathrm{f}(x)$ in terms of x, giving the answer in simplest form.

(5)

(Total for Question 7 is 11 marks)