9.

Diagram NOT to scale

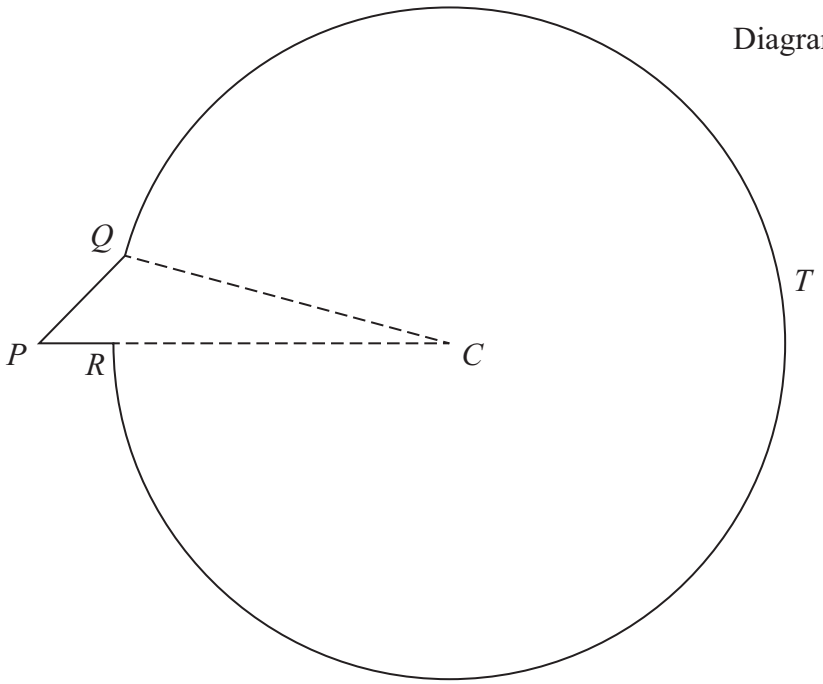

Figure 4

Figure 4 shows the outline of a sign that is used to advertise a bird sanctuary.

The sign is composed of a triangle CPQ joined to a sector $QCRTQ$ of a circle, centre C.

Given that

- angle $QPR = 0.8$ radians
- $PQ = 0.5\,\text{m}$
- $PC = 1.84\,\text{m}$
- PRC is a straight line

(a) find the radius, CQ, of the sector, in metres to 3 decimal places.

(2)

(b) Hence show that angle PCQ is 0.236 radians to 3 decimal places.

(2)

(c) Find the total area of the sign, giving your answer in m^2 to one decimal place.

(3)

(d) Find the total perimeter of the sign, giving your answer in metres to one decimal place.

(2)

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Question 9 continued

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Question 9 continued

(Total for Question 9 is 9 marks)

10. The curve C has equation $y = f(x)$.

Given that

- $f'(x) = \dfrac{k\sqrt{x}(x-3)}{5}$ where k is a constant
- the point P with x coordinate 4 lies on C
- the equation of the normal to C at P is $y = -\dfrac{5}{4}x + 2$

(a) find an equation of the tangent to C at P, giving your answer in the form $y = mx + c$, where m and c are constants,

(3)

(b) find the value of k,

(2)

(c) find $f(x)$, writing the answer in simplest form.

(5)

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