6

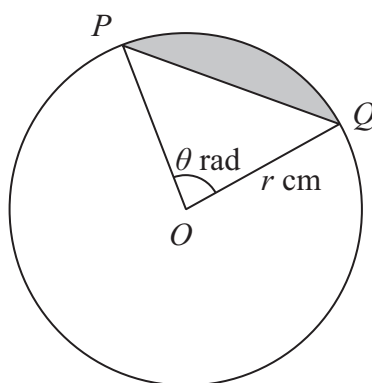**Figure 1**

The points P and Q lie on the circumference of a circle with centre O and radius r cm. Angle $POQ = \theta$ radians. The segment shaded in Figure 1 has area A cm².

(a) Show that $A = \dfrac{1}{2} r^2 (\theta - \sin \theta)$

(3)

When angle POQ is increased to $(\theta + \delta\theta)$ radians, where $\delta\theta$ is small, the area of the shaded segment is increased to $(A + \delta A)$ cm², where δA is small.

(b) Show that $\delta A \approx \dfrac{1}{2} r^2 (1 - \cos\theta)\delta\theta$

(3)

For a circle of radius 4 cm, the area of the shaded segment is increased by 0.05 cm² when angle POQ increases by 0.02 radians.

(c) Find, to 1 decimal place, an estimate for θ

(4)

Question 6 continued

Question 6 continued

Question 6 continued

(Total for Question 6 is 10 marks)