6.

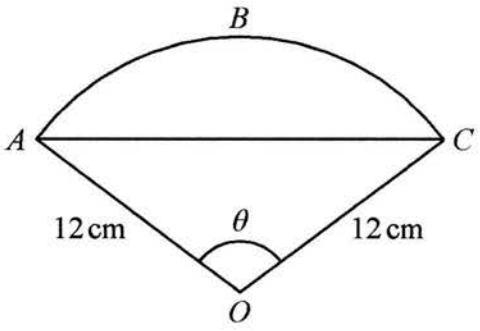

Diagram **NOT** accurately drawn

Figure 1

Figure 1 shows a sector $OABCO$ of a circle centre O.

Given that

- $OA = OC = 12\,\text{cm}$
- angle $AOC = \theta$ radians
- area triangle OAC : area segment $ABC = 3 : 1$

(a) show that

$$3\theta - 4\sin\theta = 0$$

(2)

(b) Taking 1.2 as a first approximation to θ, apply the Newton-Raphson method once to

$$f(\theta) = 3\theta - 4\sin\theta$$

to find a second approximation to θ

Give your answer to 3 decimal places.

(3)