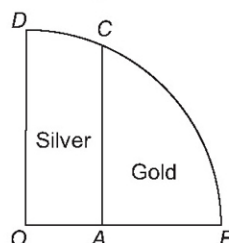


15

A jeweller has been asked to make a pendant in the shape of a quarter-circle.

Half of the area of the pendant is to be made from gold and half from silver as shown in **Figure 1**.

Figure 1

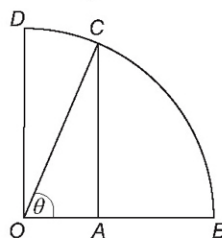


The line AC is parallel to the line OD

To position the line AC correctly, the jeweller needs to find the angle COA

The angle COA is θ radians as shown in **Figure 2**.

Figure 2



15 (a) Show that

$$4\theta - 2\sin 2\theta = \pi$$

[5 marks]

15 (b) Use a suitable **change of sign** to show that the solution to the equation

$$4\theta - 2\sin 2\theta = \pi$$

lies in the interval $1.1 < \theta < 1.2$

[2 marks]

15 (c) Apply the Newton-Raphson method once with $\theta_0 = 1.1$ to find an approximate solution θ_1 to the equation

$$4\theta - 2\sin 2\theta = \pi$$

Give your answer to four decimal places.

[3 marks]