# Dr Oliver Mathematics
# Worked Examples
# Area 3

**From:** LoveMath., 11 April 2023

1. In Figure 2, a small circle is drawn inside a larger circle. The small circle crosses the centre of the large circle, as shown.

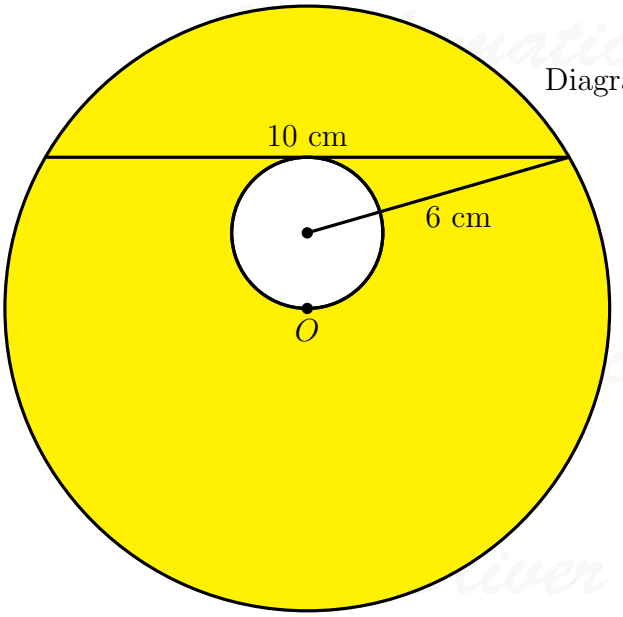


Figure 1: two circles

The length of the horizontal chord of the bigger half-circle is tangent to the smaller half-circle is 10 cm.

Moreover, the length of this line, which connects the centre of the small circle to the right-hand end of the chord, is 6 cm.

Find the shaded area in yellow.

**Solution**

Let $r$ cm be the radius of the smaller circle and let $R$ cm be the radius of the larger circle:

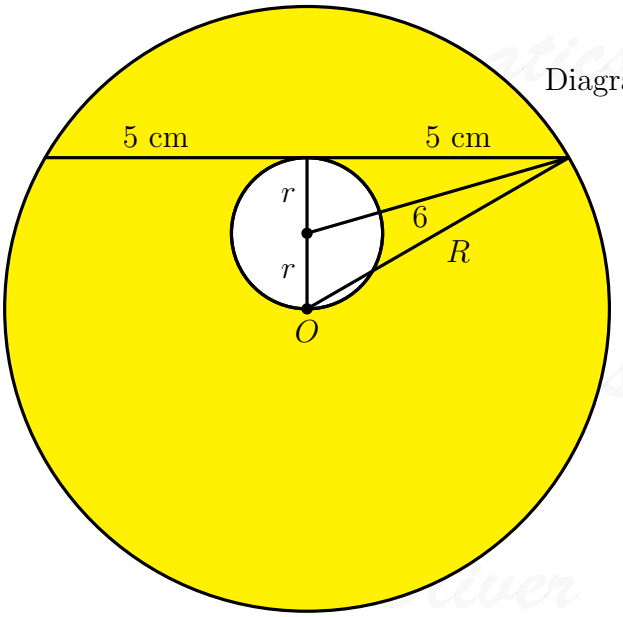


Diagram is not to scale

Figure 2: two circles

Two lots of Pythagoras' theorem:

$$\begin{aligned} r^2 + 5^2 = 6^2 &\Rightarrow r^2 + 25 = 36 \\ &\Rightarrow r^2 = 11 \end{aligned}$$

and

$$\begin{aligned} (2r)^2 + 5^2 = R^2 &\Rightarrow 4r^2 + 25 = R^2 \\ &\Rightarrow 4(11) + 25 = R^2 \\ &\Rightarrow 44 + 25 = R^2 \\ &\Rightarrow R^2 = 69; \end{aligned}$$

hence,

$$\begin{aligned} \text{shaded area} &= (\pi \times 69) - (\pi \times 11) \\ &= \pi(69 - 11) \\ &= \underline{\underline{58\pi \text{ cm}^2}}. \end{aligned}$$