

Unit 8: Circle Geometry

Name: \_\_\_\_\_

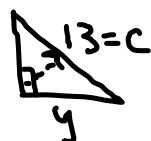
# 8.1 Properties of Tangents to a Circle - Worksheet

1. Point O is the centre of the circle. Points P and Q are points of tangency. Determine the values of  $x^\circ$  and  $y$ . Justify your solutions.

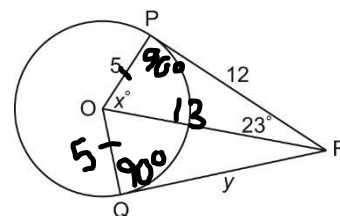
Find angle  $x$ :

$$\begin{aligned} 180 - (90 + 23) &= 67^\circ \\ \therefore \angle x &= 67^\circ \end{aligned}$$

Find missing side length  $y$ :



$$\begin{aligned} b^2 &= c^2 - a^2 \\ b^2 &= 13^2 - 5^2 \\ b^2 &= 169 - 25 \\ \sqrt{b^2} &= \sqrt{144} \\ b &= 12 \end{aligned}$$



$$\therefore y = 12$$

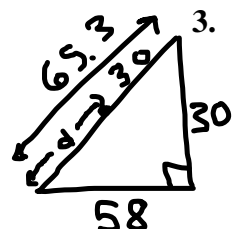
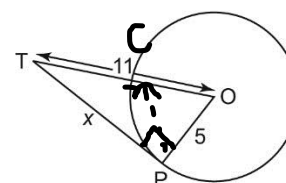
$$\begin{aligned} a^2 + b^2 &= c^2 \\ 5^2 + 12^2 &= c^2 \\ 25 + 144 &= c^2 \\ 169 &= c^2 \\ \sqrt{169} &= \sqrt{c^2} \\ c &= 13 \end{aligned}$$

find this length first.

2. Point O is the centre of the circle. Point P is a point of tangency. Determine the value of  $x$  to the nearest tenth. Justify your solution.

$$\begin{aligned} b^2 &= c^2 - a^2 \\ b^2 &= 11^2 - 5^2 \\ b^2 &= 121 - 25 \\ \sqrt{b^2} &= \sqrt{96} \\ b &= 9.8 \end{aligned}$$

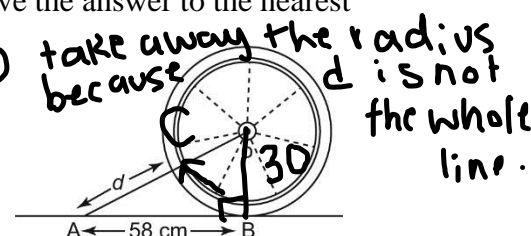
$$\therefore x = 9.8$$



3. A wheel has radius 30 cm. It rolls along the ground toward a tack that is 58 cm from the point where the wheel currently touches the ground. What is the distance,  $d$ , between the tack and the closest point on the circumference of the wheel? Give the answer to the nearest tenth of a centimetre.

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 58^2 + 30^2 &= c^2 \\ 3364 + 900 &= c^2 \\ \sqrt{4264} &= \sqrt{c^2} \\ c &= 65.3 \end{aligned}$$

$$\begin{aligned} d &= 65.3 - 30 \\ \therefore d &= 35.3 \end{aligned}$$



4. A circular plate has radius 13 cm. It is packed in a square cardboard frame whose 4 edges just touch the plate. What is the distance,  $d$ , from the centre of the plate to a corner of the frame? Give the answer to the nearest tenth of a centimetre.

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 13^2 + 13^2 &= c^2 \\ 169 + 169 &= c^2 \\ \sqrt{338} &= \sqrt{c^2} \\ c &= 18.4 \end{aligned}$$

$$\therefore d = 18.4$$

