# Warm-Up

Find  x

$67°$

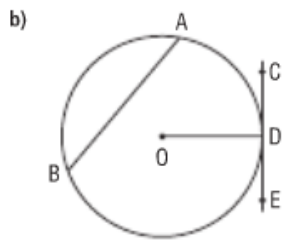Find y [OR]



$c^2 = a^2 + b^2$
$c^2 = 12^2 + 5^2$
$c^2 = 144 + 25$
$c^2 = 169$
$c = 13$

**3.** In each diagram, point O is the centre of each circle. Which lines are tangents?
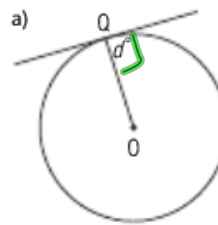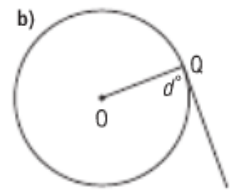
a)



QR

b)
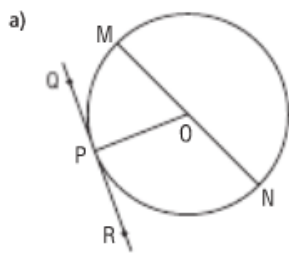


CE

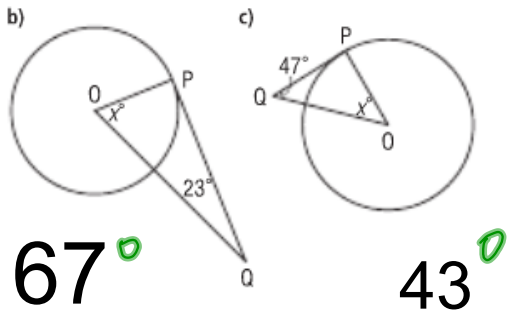**4.** Point Q is a point of tangency. Point O is the centre of each circle. What is each value of $d°$?

a)



90

b)



90

**5.** Point P is a point of tangency and O is the centre of each circle. Determine each value of $x°$.

a)

P
$x°$
70°
O
Q

**90**

b)

O
$x°$
P
23°
Q

**67**

c)

P
47°
Q
$x°$
O

**43**

**6.** Point P is a point of tangency and O is the centre of each circle. Determine each value of $a$.

a)

O
3
$a$
P    4    Q

**5**

b)

Q
13
$a$
O
5    P

**12**

c)

Q    25    O
$a$    15
P

**20**

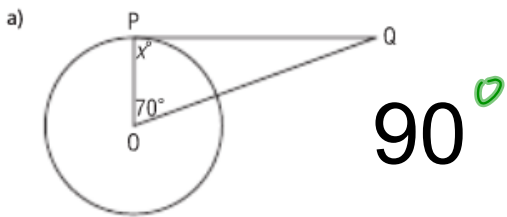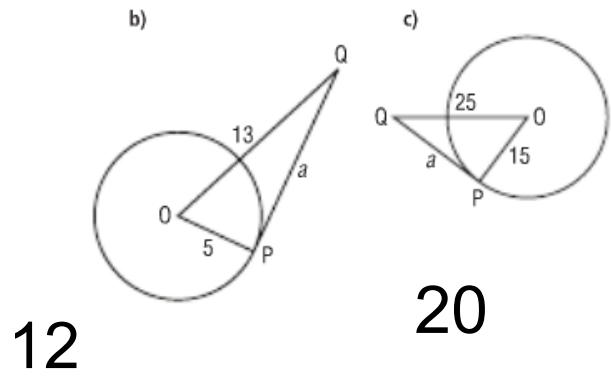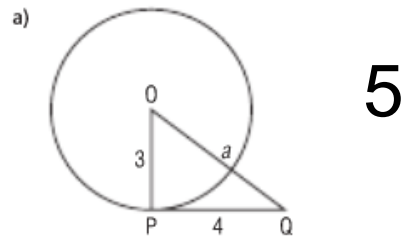**7.** Point T is a point of tangency and O is the centre of each circle. Determine each value of $d°$ and $e°$.

a)



Q

28°

T

$d°$

$e°$ O

35°

R

d= 62⁰

e= 55⁰

b)

R $e°$      T $d°$ Q

69°  33°

O

d=57⁰

e =21⁰
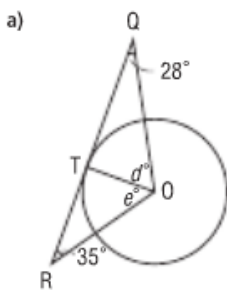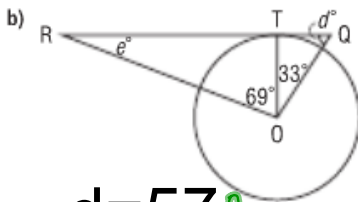
**8.** Point S is a point of tangency and O is the centre of each circle. Determine each value of $a$ to the nearest tenth.
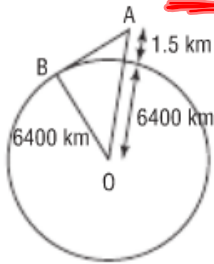
a)



B

a

8

O

3

S

A
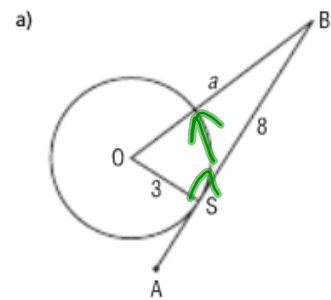
a =8.5

**12.** A small aircraft, A, is cruising at an altitude of 1.5 km. The radius of Earth is approximately 6400 km. How far is the plane from the horizon at B? Calculate this distance to the nearest kilometre.

A
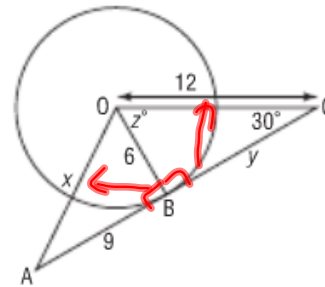1.5 km
B
6400 km
6400 km
0

$a^2 = c^2 - b^2$

$a^2 = 6401.5^2 - 6400^2$

139 km

**14.** Point O is the centre of the circle. Point B is a point of tangency. Determine the values of x, y, and z°. Give the answers to the nearest tenth where necessary. Justify the strategies you used.
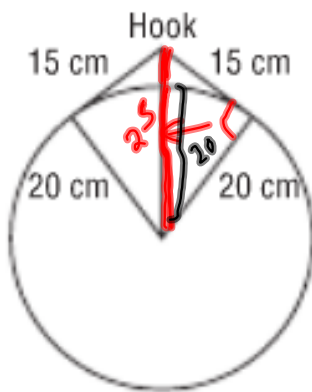
O
12
z°
30°
C
6
x
y
B
9
A

x= 10.8

y= 10.4

z =60°

**17.** A circular mirror with radius 20 cm hangs by a wire from a hook. The wire is 30 cm long and is a tangent to the mirror in two places. How far above the top of the mirror is the hook? How do you know?

Hook

15 cm     15 cm

20 cm     20 cm
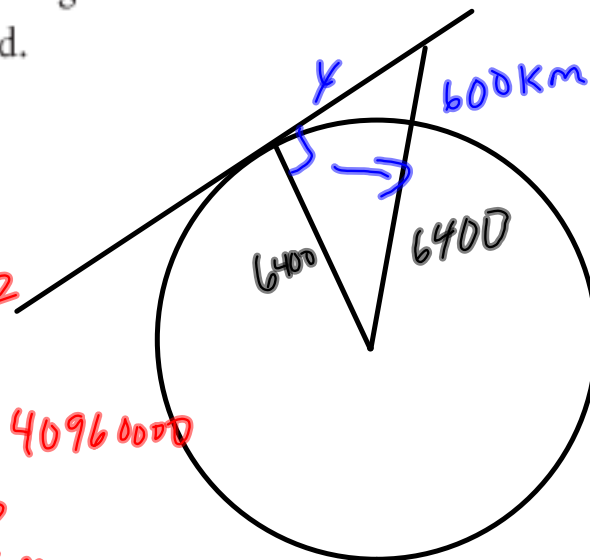
$$c^2 = a^2 + b^2$$
$$= 20^2 + 15^2$$
$$= 400 + 225$$
$$= 625$$
$$c^2 = 625 \qquad c = 25$$

**18.** A communications satellite orbits Earth at an altitude of about 600 km. What distance from the satellite is the farthest point on Earth's surface that could receive its signal? Justify the strategy you used.

2835 km

$$a^2 = c^2 - b^2$$
$$= 7000^2 - 6400^2$$
$$= 49\,000\,000 - 40\,960\,000$$
$$= 8\,040\,000$$
$$a = 2835.49 \text{ km}$$
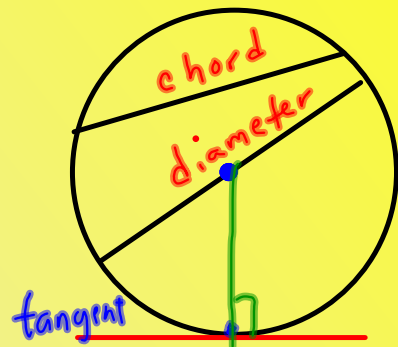


600 km

6400   6400
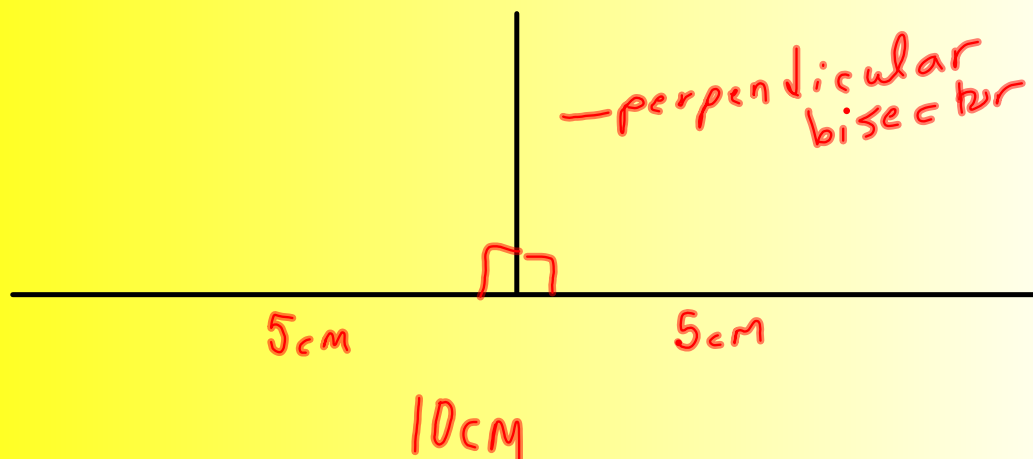
# SECTION 8.2
# PROPERTIES OF A CHORD

A line segment that joins two points on a circle is a **CHORD**.

A diameter of the circle is a chord that goes through the center of the circle.

**Where is the tangent?**

A <u>perpendicular bisector</u> intersects a line segment at 90$^\circ$ and divides the line segment into two equal parts.

perpendicular bisector

5cm    5cm

10cm

Properties of a CHORD

**1. Perpendicular to chord Property 1**

      The perpendicular from the center of a circle to a chord bisects the chord [that is the perpendicular divides the chord into two equal parts.]

AC = CB

<ACO = <BCO