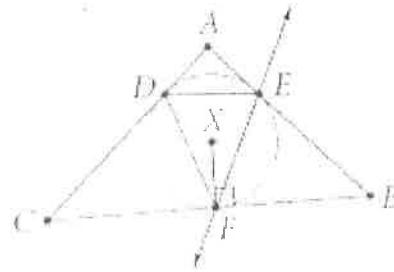Name _____ KEY _____

Date _____ Block _____

Use the figure to choose the correct term to complete each statement.

1. $\overline{CB}$ is (*a secant of,* *tangent to*) $\odot$X.

2. $\overline{DF}$ is a (*radius,* *chord*) of $\odot$X.

3. △DEF is (*inscribed in,* *circumscribed about*) $\odot$X.

4. ∠DEF is a(n) (*central,* *inscribed*) angle of $\odot$X.

5. ∠DFC is (*equal to,* *half of*) the intercepted arc $\overset{\frown}{DF}$.
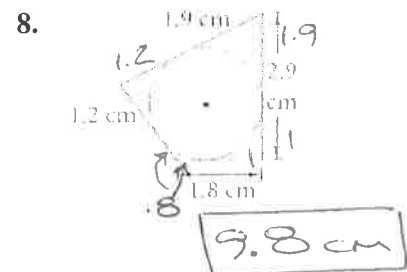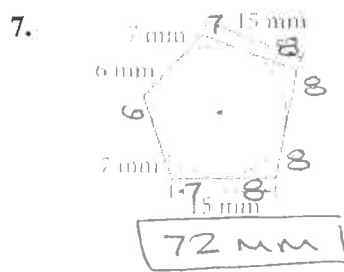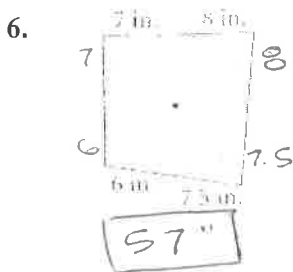
Skills and Concepts

A **tangent** is a line, ray or segment that intersects a circle in exactly <u>one</u> point, called the **point of tangency**. Two segments tangent to a circle from a point outside the circle are **congruent**. If a line is tangent to a circle, then the line is **perpendicular** to the radius drawn to the point of tangency. The converse is also true.
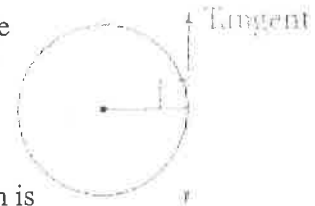
A polygon is **inscribed in** a circle if all of the vertices lie on the circle. When a polygon is **circumscribed about** a circle, each side is tangent to the circle.

Each polygon circumscribes a circle. Find the perimeter (add all sides) of the polygon.

6.
7 in. 8 in.
7 · 8
6 · 7.5
6 in. 7.5 in.
57"

7.
7 mm · 15 mm 8
6 mm · 8
6 · 8
7 mm · 8
15 mm
72 MM

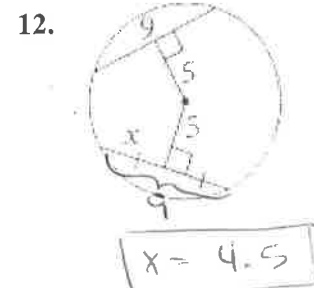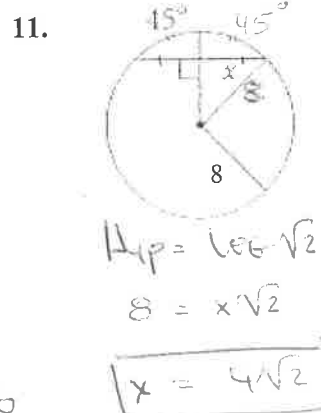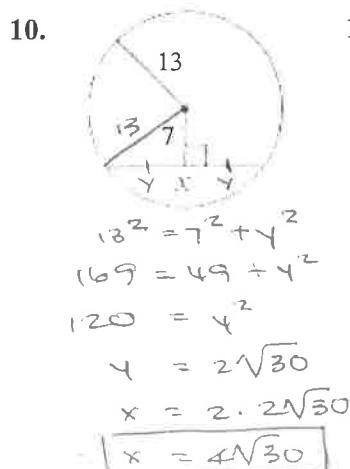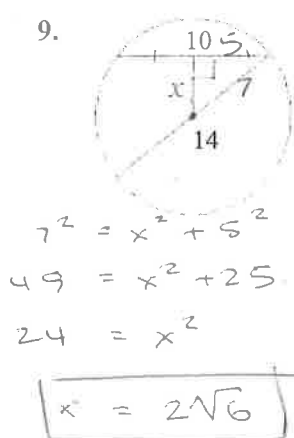8.
1.9 cm · 1.9
1.2 · 2.9
1.2 cm · cm
1.8 cm
9.8 cm

Segments with endpoints on a circle are called **chords**. Within a circle or in congruent circles:
- congruent central angles have congruent chords
- congruent chords have congruent arcs
- congruent arcs have congruent central angles
- chords equidistant from the center are congruent
- congruent chords are equidistant from the center
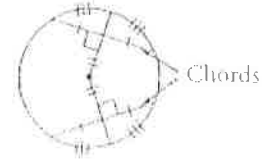
A **diameter** that is perpendicular to a chord bisects the chord and it arcs.

Find the value of x.

9.
10 · 7
x
14

$7^2 = x^2 + 5^2$

$49 = x^2 + 25$

$24 = x^2$

$x = 2\sqrt{6}$

10.
13 · 7
13 · 7
y x y

$13^2 = 7^2 + y^2$

$169 = 49 + y^2$

$120 = y^2$

$y = 2\sqrt{30}$

$x = 2 \cdot 2\sqrt{30}$

$x = 4\sqrt{30}$

11.
45° 45°
x · 8
8

$Hyp = Leg \sqrt{2}$

$8 = x\sqrt{2}$

$x = 4\sqrt{2}$

12.
9 · 5
x · 5
9

$x = 4.5$

An angle is an **inscribed angle** if the vertex is on a circle and the sides of the angle are chords of the circle. Its **intercepted arc** is the arc whose endpoints are on the sides of the angle and whose remaining points lie in the interior of the angle.

The measure of an inscribed angle is **half** the measure of its intercepted arc. The measure of an angle formed by a tangent and a chord that intersect on a circle is half the measure of the intercepted arc.
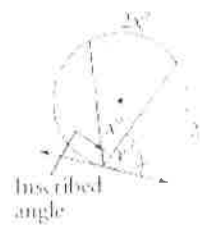
Find the value of each variable.

13.

$a = 40°$ $b = 140°$

$c = 90°$ $d = 180°$

14.

$a = 118°$ $b = 49°$

$c = 144°$ $d = 98°$

15.
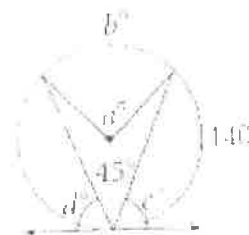
$a = 90°$ $b = 90°$

$c = 70°$ $d = 65°$

A **secant** is a line, ray, or segment that intersects a circle at two points.

The measure of an angle formed by two chords that intersect in a circle is half the sum of the intercepted arcs.

The measure of an angle formed by two secants, two tangents, or a secant and a tangent drawn from a point outside the circle is half the difference of the measures of the intercepted arcs.
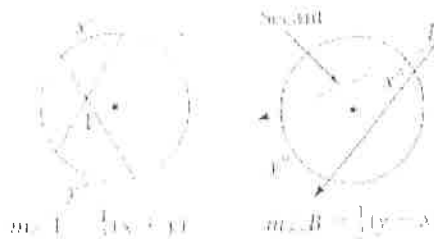
Find the value of each variable.

16.

$a = 95°$ $b = 85°$

17.

$x = 37°$

18.

$x = 57°$ $y = 44.5°$

$v = 51°$ $z = 129°$

Find the measures of angles 1-10. Complete the table below.

Angle	Type of Angle	Equation	Answer
m∠1	INSCRIBED	½(32)	16°
m∠2	OUTSIDE	½(128-32)	48°
m∠3	INSCRIBED	½(64)	32°
m∠4	FLOATING	½(128+32)	80°
m∠5	INSCRIBED	½(64)	32°
m∠6	OUTSIDE	½(264-64)	100°
m∠7	FLOATING	½(136+64)	100°
m∠8	INSCRIBED	½(128)	64°
m∠9		½(192)	96°
m∠10		½(128)	64°

64°

128°

136°
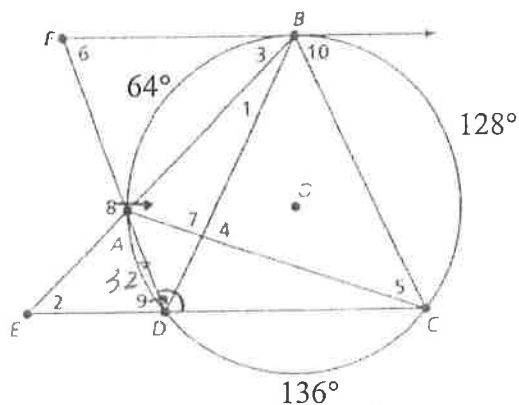
Circles

$\overleftrightarrow{EH}$ is tangent to $\odot O$. Complete.

1. $m\angle OHI =$ ___90°___

2. If $m\widehat{CH} = 130$, then $m\angle CHI =$ ___65°___.

3. If $m\widehat{CH} = 120$, then $m\angle CEH =$ ___30___.

4. If $m\widehat{CF} = 80$ and $m\widehat{DG} = 20$, then $m\angle FEC =$ ___30°___.
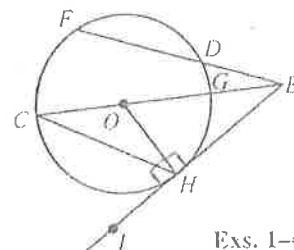
Exs. 1–4

In $\odot P$, $m\angle FPG = 75$. Complete.

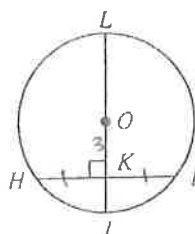5. $m\widehat{FG} =$ ___75°___

6. $m\widehat{EGF} =$ ___180°___

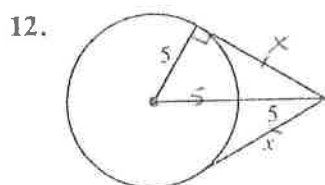7. $m\widehat{GE} =$ ___105°___

8. $m\widehat{EFG} =$ ___225°___
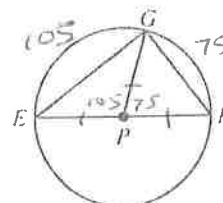
Exs. 5–8

In $\odot O$, $\overline{OJ} \perp \overline{HI}$ and $OK = 3$. Complete.

9. If $HI = 8$, then $HK =$ ___4___.

10. If $KJ = 2$, then $LJ =$ ___10___.

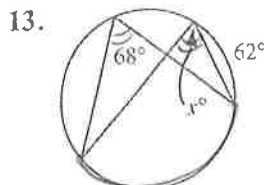11. If $m\widehat{HI} = 70$, then $m\widehat{HJ} =$ ___35___.

Exs. 9–11

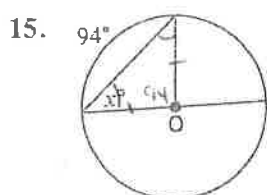Chords, secants, and tangents are shown. Find the indicated values.
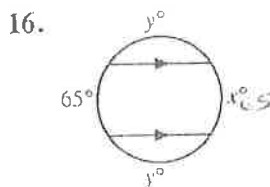
12.

$x =$ ___$5\sqrt{3}$___

13.

$x =$ ___68°___

14.

$x =$ ___60°___

15.

$x =$ ___43°___

16.

$x =$ ___65°___; $y =$ ___115°___

17.

$\frac{1}{2}(110+80)$

$x =$ ___95___

18.

$\frac{1}{2}(250-110)$

$x =$ ___70___

19.

$x =$ ___37°___

20.
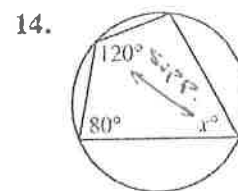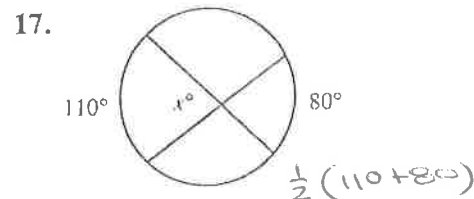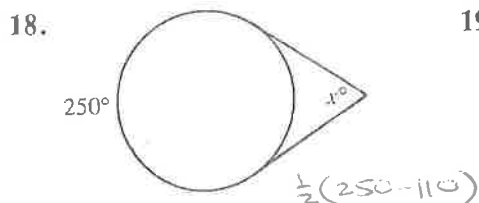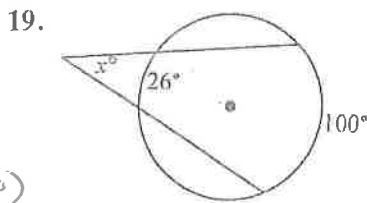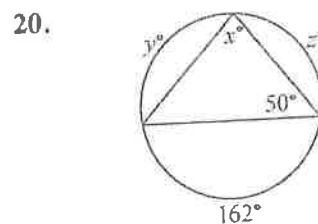
$x =$ ___81°___ $y =$ ___100°___ $z =$ ___98°___

Given: ⊙O, m$\widehat{AD}$=54°, m$\widehat{BC}$=62°, m$\widehat{DE}$=36°, m$\widehat{FH}$=22°, m$\widehat{EF}$=78°

Determine the missing angles. It will be helpful to indicate the type of angle (central, inscribed, floating, outside). Be sure you are using the correct formulas!
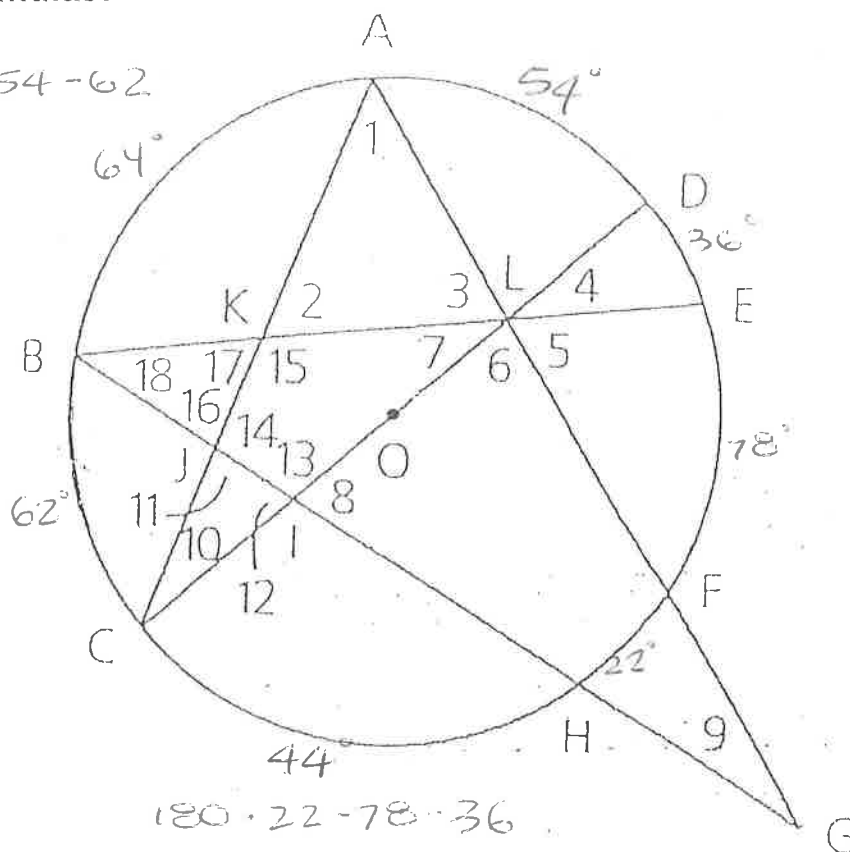
	Type of ∠	Measure		Type of ∠	Measure
∠1	INSCRIBED	$\frac{1}{2}(66) = 33°$	∠10	INSCRIBED	$\frac{1}{2}(54) = 27°$
∠2	FLOATING	$\frac{1}{2}(62+90) = 76°$	∠11	FLOATING	$\frac{1}{2}(64+44) = 54°$
∠3		$\frac{1}{2}(64+78) = 71°$	∠12		$\frac{1}{2}(62+136) = 99°$
∠4		$\frac{1}{2}(62+36) = 49°$	∠13		$\frac{1}{2}(118+44) = 81°$
∠5		$\frac{1}{2}(64+78) = 71°$	∠14		$\frac{1}{2}(62+190) = 126°$
∠6		$\frac{1}{2}(54+66) = 60°$	∠15		$\frac{1}{2}(64+144) = 104°$
∠7		$\frac{1}{2}(62+36) = 49°$	∠16		$\frac{1}{2}(64+44) = 54°$
∠8		$\frac{1}{2}(62+136) = 99°$	∠17		$\frac{1}{2}(90+62) = 76°$
∠9	OUTSIDE	$\frac{1}{2}(64-22) = 21°$	∠18	INSCRIBED	$\frac{1}{2}(100) = 50°$