Geometry

Name _____
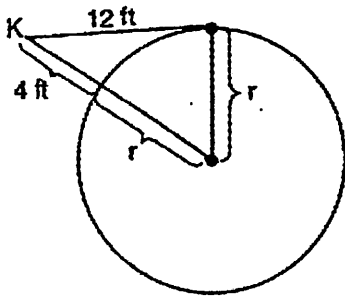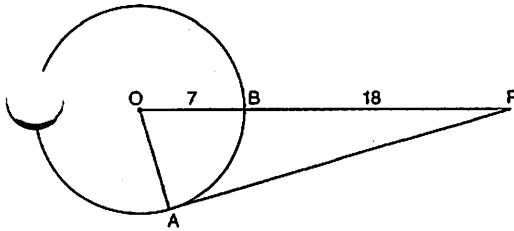
Segments Intercepted by a Circle Practice

Kimi wants to determine the radius of a circular pool without getting wet. She is located at point K, which is 4 feet from the pool and 12 feet from the point of tangency, as shown in the accompanying diagram.


2. In the diagram below of PAO, AP is tangent to circle O at point A, $OB = 7$, and $BP = 18$. What is the length of AP?
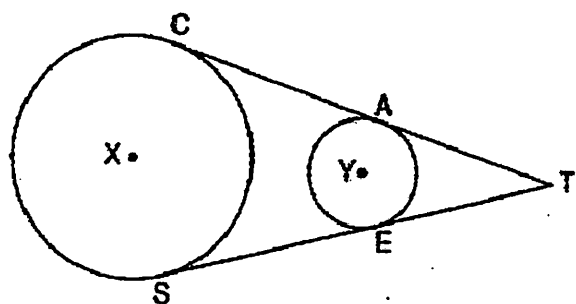

3. The accompanying diagram represents circular pond O with docks located at points A and B. From a cabin located at C, two sightings are taken that determine an angle of 30° for tangents CA and CB. What is $m\angle CAB$?
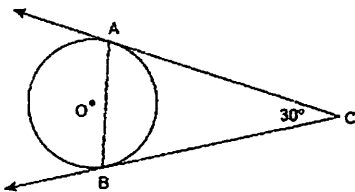
4. In the accompanying diagram, PA and PB are tangents drawn to circle O. If $m\angle PBA = 70$, find $m\angle P$.
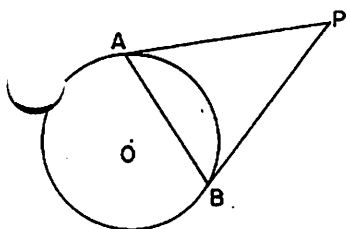
5. In the diagram below, circles X and Y have two tangents drawn to them from external point T. The points of tangency are C, A, S, and E. The ratio of TA to AC is 1:3. If $TS = 24$, find the length of SE.
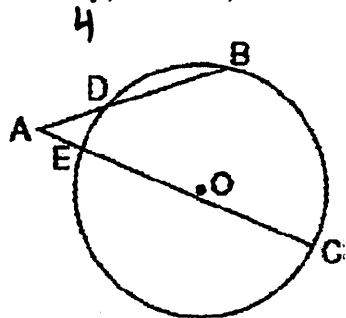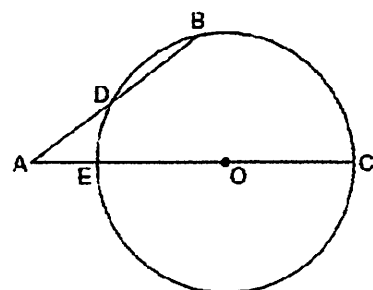

(Not drawn to scale)

6. In the accompanying diagram, segments RS, ST, and TR are tangent to circle O at A, B, and C, respectively. If $SB = 3$, $BT = 5$, and $TR = 13$, what is the measure of RS?
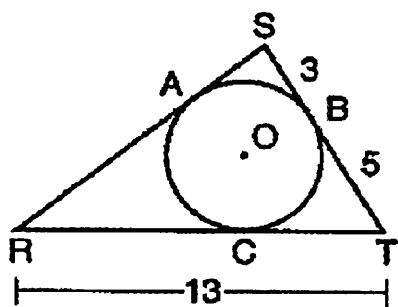
7. In the accompanying diagram, secant AB intersects circle O at D, secant AC intersects circle O at E, $AE = $ 4, $AC = 24$, and $AB = 16$. Find AD.
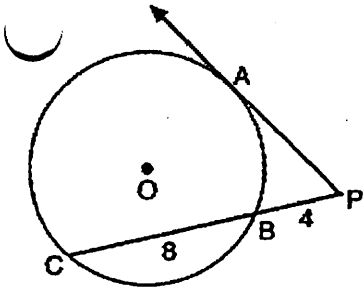

8. In the diagram below of circle O, secant AB intersects circle O at D, secant AOC intersects circle O at E, $AE = 4$, $AB = 12$, and $DB = 6$. What is the length of OC?
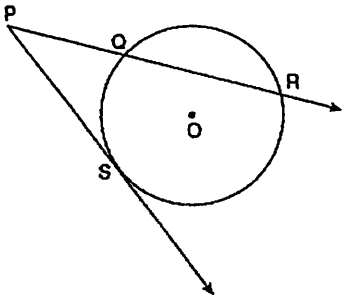

(Not drawn to scale)

9. In the accompanying diagram, *PA* is tangent to circle *O* at *A*, *PBC* is a secant, *PB* = 4, and *BC* = 8. What is the length of *PA in simplest radical form?*

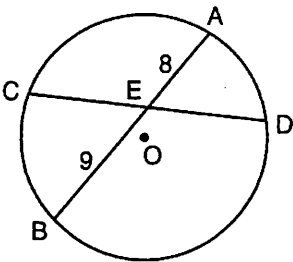10. In the diagram below, *PS* is a tangent to circle *O* at point *S*, *PQR* is a secant, *PS* = *x*, *PQ* = 3, and *PR* = *x* + 18. Find the value of *PS*.
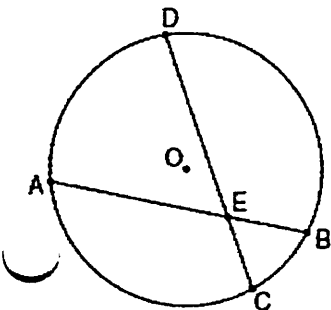
(Not drawn to scale)
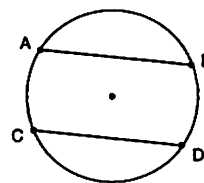
11. In the diagram below of circle *O*, chord *AB* bisects chord *CD* at *E*. If *AE* = 8 and *BE* = 9, find the length of *CE* in simplest radical form.

12. In the diagram of circle *O* below, chord *AB* intersects chord *CD* at *E*, *DE* = 2*x* + 8, *EC* = 3, *AE* = 4*x* − 3, and *EB* = 4. What is the value of *x?*
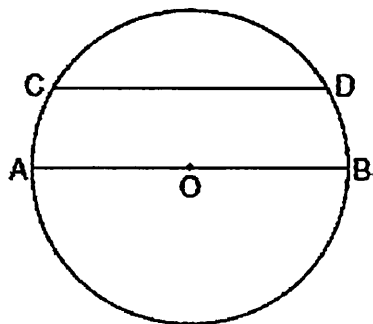
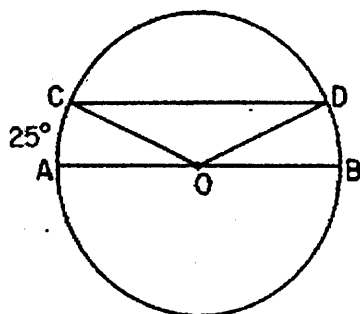| If lines are parallel in a circle, then the arcs they intercept are congruent.*		If $\overline{AB} \parallel \overline{CD}$ Then $\overarc{AC} \cong \overarc{BD}$

13. In the diagram of circle O below, chord CD is parallel to diameter AOB and $m\overarc{AC} = 30$. What is $m\overarc{CD}$?
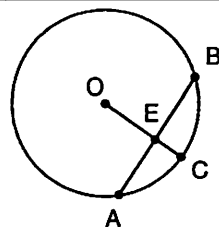

14. In the accompanying diagram, chord CD is parallel to diameter AB. If $m\overarc{AC} = 25$, what is $m\angle COD$?

15. In the accompanying diagram of circle O, chord AY is parallel to diameter DOE, AD is drawn, and $m\overarc{AD} = 40$. What is $m\angle DAY$?
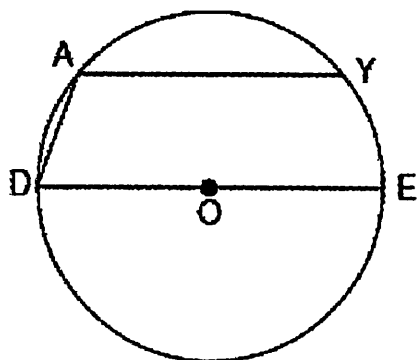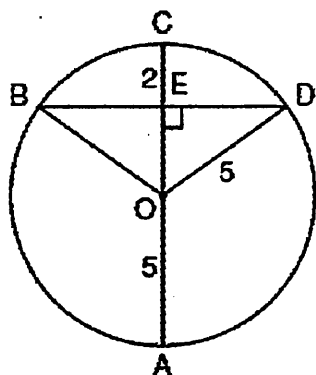
| If a radius (or diameter) is perpendicular to a chord, then the radius (or diameter) bisects the chord and the intercepted arc.*	If $\overline{OC} \perp \overline{AB}$ then $\overline{AE} \cong \overline{EB}$ and $\overset{\frown}{AC} \cong \overset{\frown}{CB}$

16. In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter AC is perpendicular to chord BD at E. What is the length of BD?

17. In the diagram below of circle O, diameter AOB is perpendicular to chord CD at point E, $OA = 6$, and $OE = 2$. What is the length of CE in simplest radical form?
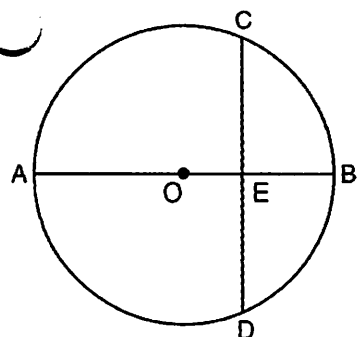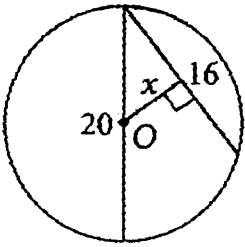

18. In the accompanying diagram of circle O, diameter AB is perpendicular to chord CD at E, $CD = 8$, and $EB = 2$. What is the length of the diameter of circle O?
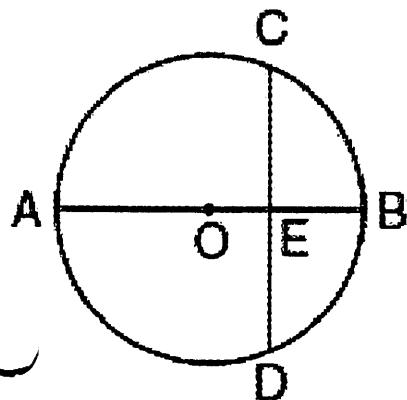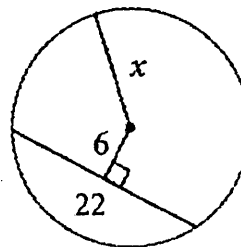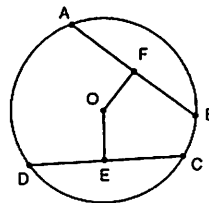
Find the values of x.
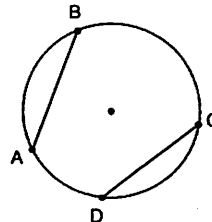
19.

20.

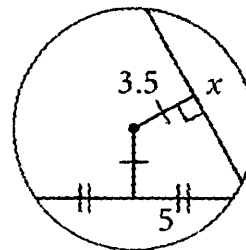| If chords are congruent, then they are equidistant from the center.*		If $\overline{AB} \cong \overline{DC}$ then $\overline{OF} \cong \overline{OE}$
If chords intercept congruent arcs, then chords are congruent. *		If $\overset{\frown}{AB} \cong \overset{\frown}{CD}$ Then $\overline{AB} \cong \overline{CD}$

Find the values of x.

21.
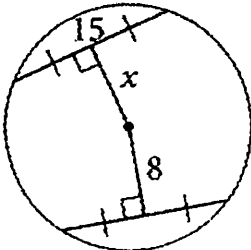
22.

Find the m$\overset{\frown}{AB}$.
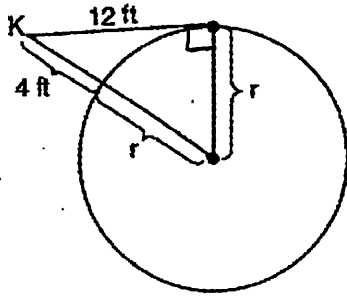
23.
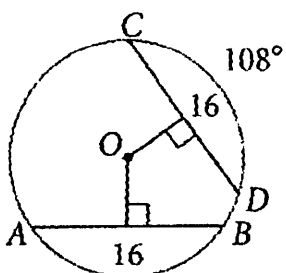
24.
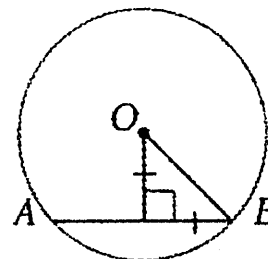
Geometry

Segments Intercepted by a Circle Practice

Name _____ Key _____

1. Kimi wants to determine the radius of a circular pool without getting wet. She is located at point K, which is 4 feet from the pool and 12 feet from the point of tangency, as shown in the accompanying diagram.

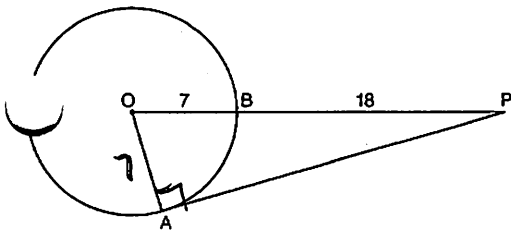

$$r^2 + 12^2 = (r+4)^2$$

$$r^2 + 144 = r^2 + 8r + 16$$

$$144 = 8r + 16$$
$$-16 \qquad -16$$

$$\frac{128}{8} = \frac{8r}{8}$$

$$\boxed{16 = r}$$

2. In the diagram below of PAO, AP is tangent to circle O at point A, $OB = 7$, and $BP = 18$. What is the length of AP?
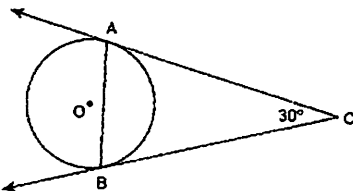

$$7^2 + b^2 = 25^2$$

$$49 + b^2 = 625$$

$$b^2 = 576$$

$$\boxed{b = 24}$$

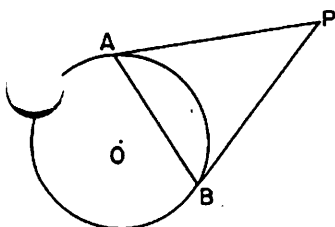3. The accompanying diagram represents circular pond O with docks located at points A and B. From a cabin located at C, two sightings are taken that determine an angle of 30° for tangents CA and CB. What is $m\angle CAB$?
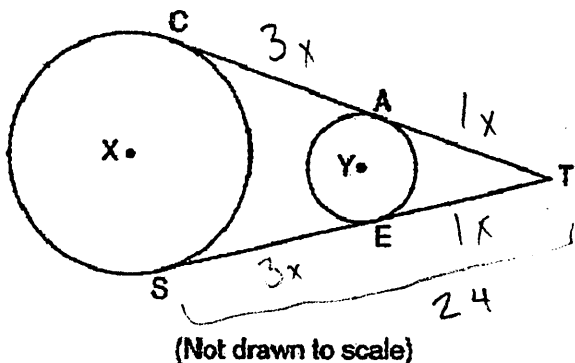

$$\boxed{m\angle CAB = 75°}$$

4. In the accompanying diagram, PA and PB are tangents drawn to circle O. If $m\angle PBA = 70$, find $m\angle P$.

$$\boxed{m\angle P = 40°}$$

5. In the diagram below, circles X and Y have two tangents drawn to them from external point T. The points of tangency are C, A, S, and E. The ratio of TA to AC is 1:3. If $TS = 24$, find the length of SE.

C
3x
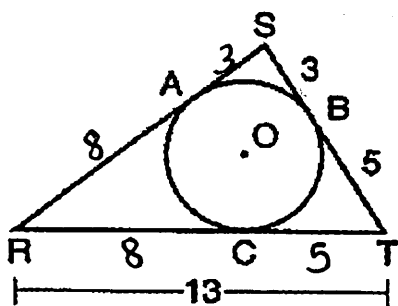A
1x
X•
Y•
T
E   1x
S
3x
24
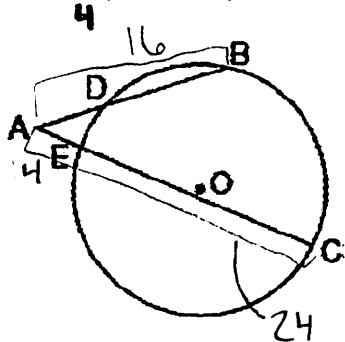(Not drawn to scale)

$3x + 1x = 24$

$4x = 24$

$x = 6$

$SE = 3(6) = 18$

6. In the accompanying diagram, segments RS, ST, and TR are tangent to circle O at A, B, and C, respectively. If $SB = 3$, $BT = 5$, and $TR = 13$, what is the measure of RS?

S
3   3
A   B
8   •O
.O   5
R   8   C   5   T
—13—

$RS = 11$

7. In the accompanying diagram, secant AB intersects circle O at D, secant AC intersects circle O at E, $AE = 4$, $AC = 24$, and $AB = 16$. Find AD.
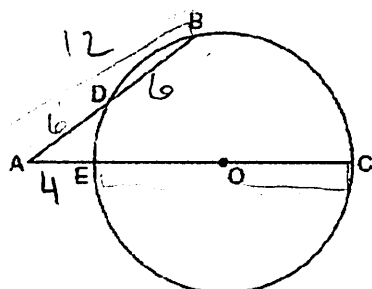
4
16
B
D
A
E
•O
C
24

$(AE)(AC) = (AD)(AB)$

$(4)(24) = X(16)$

$AD = 6$

8. In the diagram below of circle O, secant AB intersects circle O at D, secant AOC intersects circle O at E, $AE = 4$, $AB = 12$, and $DB = 6$. What is the length of OC?

12
B
D   6
6
A   E
4   O   C

(Not drawn to scale)
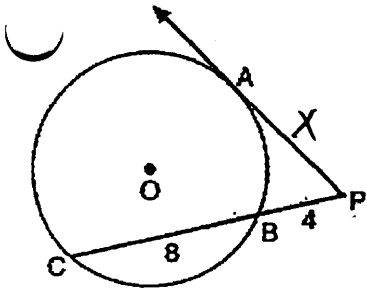
$(AD)(AB) = (AE)(AC)$

$(6)(12) = (4)(x+4)$

$72 = 4x + 16$

$56 = 4x$

$14 = x$

$OC = 7$

9. In the accompanying diagram, *PA* is tangent to circle *O* at *A*, *PBC* is a secant, *PB* = 4, and *BC* = 8. What is the length of *PA* in simplest radical form?

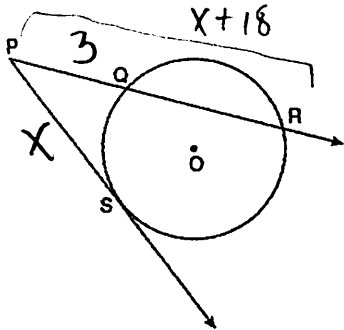$$x^2 = 4(12)$$
$$x^2 = 48$$
$$x = \sqrt{48}$$
$$\overline{PA} = 4\sqrt{3}$$

10. In the diagram below, *PS* is a tangent to circle *O* at point *S*, *PQR* is a secant, *PS* = x, *PQ* = 3, and *PR* = x + 18. Find the value of *PS*.

(Not drawn to scale)
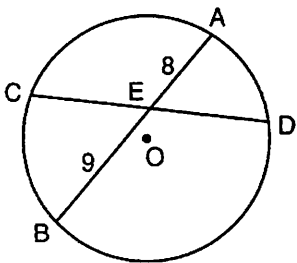
$$x^2 = 3(x+18)$$
$$x^2 = 3x + 54$$
$$x^2 - 3x - 54 = 0$$
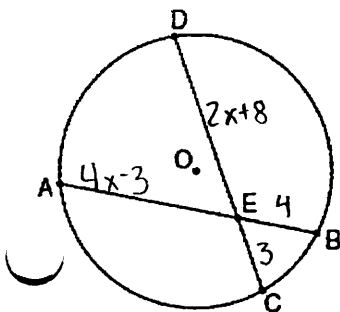$$(x-9)(x+6) = 0$$
$$x = 9 \qquad x = -6$$

$$PS = 9$$

11. In the diagram below of circle *O*, chord *AB* bisects chord *CD* at *E*. If *AE* = 8 and *BE* = 9, find the length of *CE* in simplest radical form.

$$x^2 = 72$$

$$CE = 6\sqrt{2}$$

12. In the diagram of circle *O* below, chord *AB* intersects chord *CD* at *E*, *DE* = 2x + 8, *EC* = 3, *AE* = 4x − 3, and *EB* = 4. What is the value of x?

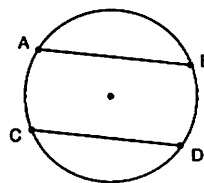$$6x + 24 = 16x - 12$$
$$\frac{36}{10} = \frac{10x}{10}$$
$$3.6 = x$$
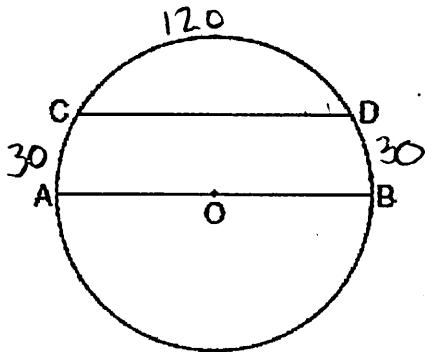
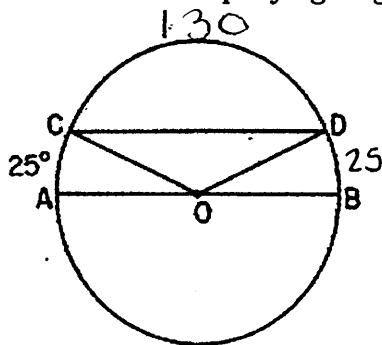|		
If lines are parallel in a circle, then the arcs they intercept are congruent.*		If $\overline{AB} \parallel \overline{CD}$ Then $\overarc{AC} \cong \overarc{BD}$

13. In the diagram of circle O below, chord CD is parallel to diameter AOB and $m\overarc{AC} = 30$. What is $m\overarc{CD}$?
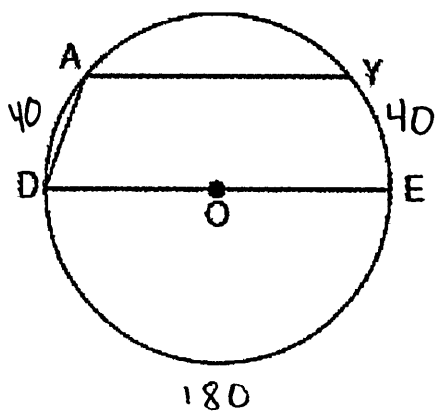
120

C
30
A   O

D
30
B

m CD = 120

14. In the accompanying diagram, chord CD is parallel to diameter AB. If $m\overarc{AC} = 25$, what is $m\angle COD$?
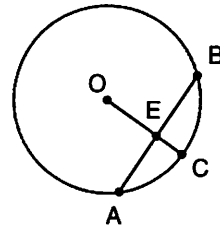
130

C
25°
A   O

D
25
B

m∠COD = 130°

15. In the accompanying diagram of circle O, chord AY is parallel to diameter DOE, AD is drawn, and $m\overarc{AD} = 40$. What is $m\angle DAY$?

A
40
D   O

Y
40
E

180

$m\angle DAY = \frac{1}{2}(220)$

$= 110°$

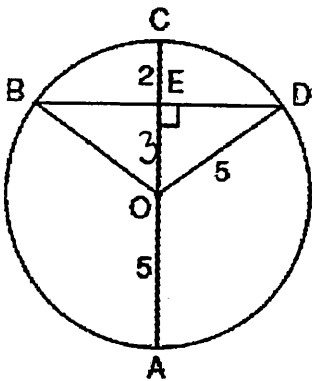| If a radius (or diameter) is perpendicular to a chord, then the radius (or diameter) bisects the chord and the intercepted arc.*	If $\overline{OC} \perp \overline{AB}$ then $\overline{AE} \cong \overline{EB}$ and $\overset{\frown}{AC} \cong \overset{\frown}{CB}$

16. In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter AC is perpendicular to chord BD at E. What is the length of BD?
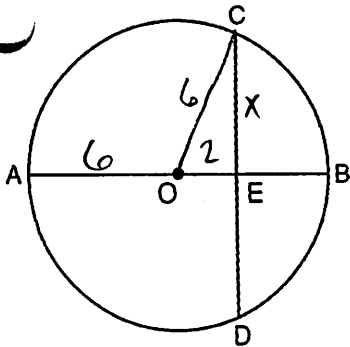
$a^2 + b^2 = c^2$

$3^2 + b^2 = 5^2$

$b^2 = 16$

$b = 4$

$\overline{BD} = 8$

17. In the diagram below of circle O, diameter AOB is perpendicular to chord CD at point E, $OA = 6$, and $OE = 2$. What is the length of CE in simplest radical form?
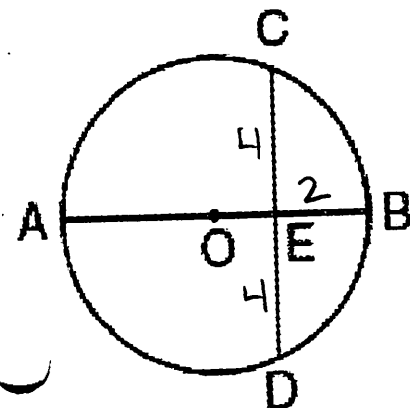
$X^2 + 2^2 = 6^2$

$X^2 + 4 = 36$

$X^2 = 32$

$X = \sqrt{32}$

$X = 4\sqrt{2}$

$CE = 4\sqrt{2}$

18. In the accompanying diagram of circle O, diameter AB is perpendicular to chord CD at E, $CD = 8$, and $EB = 2$. What is the length of the diameter of circle O?
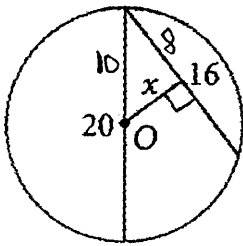
$(CE)(DE) = (BE)(AE)$

$4 \cdot 4 = 2(x)$
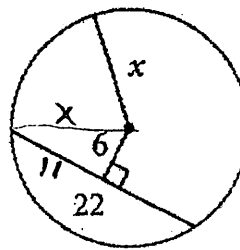
$X = 8$

$AB = 10$

Find the values of x.

19.

$x^2 + 8^2 = 10^2$

$x^2 + 64 = 100$

$x^2 = 36$

$\boxed{x = 6}$

20.

$11^2 + 6^2 = x^2$
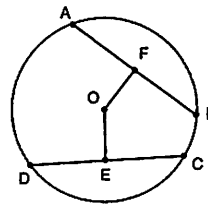
$121 + 36 = x^2$

$157 = x^2$

$\sqrt{157} = x$
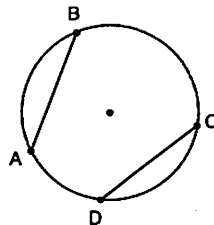
$\boxed{12.5 = x}$

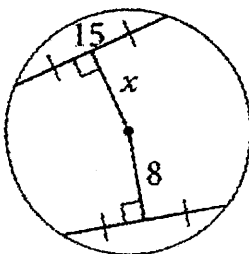|		
If chords are congruent, then they are equidistant from the center.*		If $\overline{AB} \cong \overline{DC}$ then $\overline{OF} \cong \overline{OE}$
If chords intercept congruent arcs, then chords are congruent. *		If $\overset{\frown}{AB} \cong \overset{\frown}{CD}$ Then $\overline{AB} \cong \overline{CD}$

Find the values of x.

21.

$\boxed{x = 8}$

22.
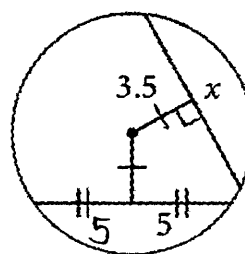
$\boxed{x = 10}$

Find the m$\overset{\frown}{AB}$.

23.

$\boxed{m\overset{\frown}{AB} = 108}$

24.

$\boxed{m\overset{\frown}{AB} = 90}$