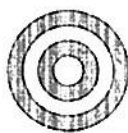Name: ___ANSWER KEY___   Date: _____

Period: _____   Mr. Valentino

Unit 12 Review Sheet

Test Topics

- Equation of a circle
- Circle Vocabulary
- Angles and Arcs of the circle
  - Central, Inscribed, Tangent-Chord, Intersecting Chords, Tangent-Tangent, Tangent-Secant, Secant-Secant, inscribed quadrilaterals
- Chord Length
- Tangent/Secant Length
- Super Circles

Equation of a Circle

1. Find the center and radius of the circle.

$(x-3)^2 + (y+5)^2 = 9$

[A] $(3, -5)$; 3   [B] $(-3, 5)$; 3   [C] $(-5, 3)$; 9   [D] $(-5, -3)$; 3

(A is circled)

2. Find the center and radius of $x^2 + y^2 - 8x + 2y + 8 = 0$.

[A] center $(4, -1)$; $r = 3$ $x^2 - 8x + y^2 + 2y = -8$ [B] center $(-4, 1)$; $r = 3$

[C] center $(4, -1)$; $r = 9$ $x^2 - 8x + 16 + y^2 + 2y + 1 =$ [D] center $(-4, 1)$; $r = 9$

$-8 + 16 + 1$

$(x-4)^2 + (y+1)^2 = 9$ $(4, -1)$ $r = 3$

(A is circled)

3. What is an equation of the circle with center $(-5, 4)$ and a radius of 7?

1) $(x-5)^2 + (y+4)^2 = 14$

2) $(x-5)^2 + (y+4)^2 = 49$

3) $(x+5)^2 + (y-4)^2 = 14$

4) $(x+5)^2 + (y-4)^2 = 49$

(4 is circled)

4. Find the center and radius of $x^2 + y^2 + 8x - 10y + 37 = 0$.

$x^2 + 8x + y^2 - 10y = -37$

$x^2 + 8x + 16 + y^2 - 10y + 25 = -37 + 16 + 25$

$(x+4)^2 + (y-5)^2 = 4$

$(-4, 5)$ $r = 2$

5. What is the equation of the circle passing through the point $(6, 5)$ and centered at $(3, -4)$?

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $(x-3)^2 + (y+4)^2 = 90$
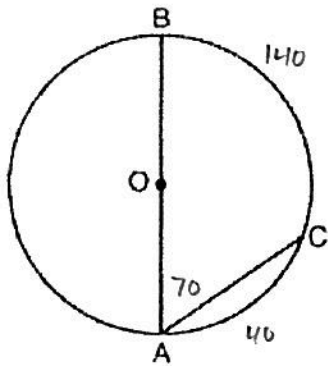
$d = \sqrt{(6-3)^2 + (5+4)^2}$

$= \sqrt{(3)^2 + (9)^2}$

$= \sqrt{9 + 81} = \sqrt{90}$

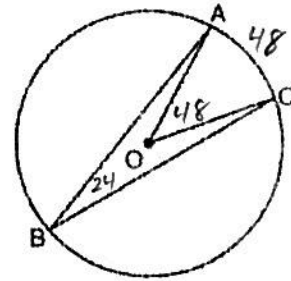1. As shown in the diagram below, $\overline{AB}$ is a diameter of circle O, and chord $\overline{AC}$ is drawn.

B
140
O
C
70
40
A

If m$\angle BAC = 70$, then m$\widehat{AC}$ is
(1) 40
2) 70
3) 110

2. In the diagram below of circle O, m$\angle ABC = 24$.

A
48
48
C
24 O
B

What is the m$\angle AOC$?
1) 12
2) 24
(3) 48
4) 60

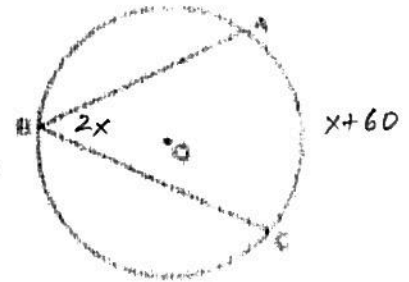3. In the accompanying diagram of circle O, m$\angle ABC = 2x$ and $m\widehat{AC} = x + 60$. Find the value of x.
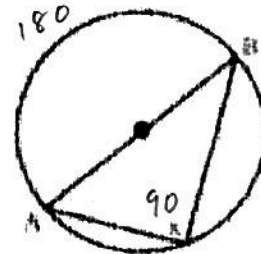(1) 20   [2] 40   [3] 60   [4] 80
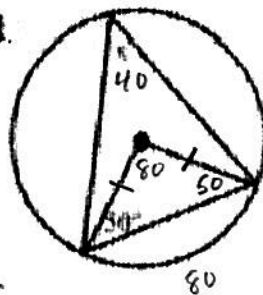
$2(2x) = x + 60$
$4x = x + 60$
$3x = 60$
$\boxed{x = 20}$

2x   x+60

180

4. Given the circle at the right with diameter $\overline{AB}$, find x.
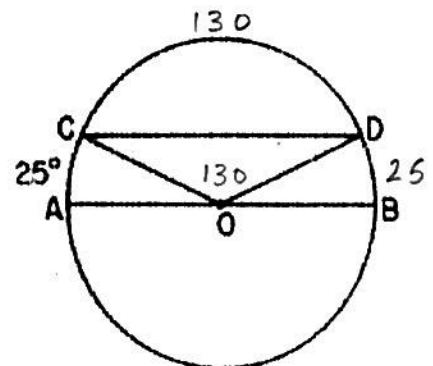[1] 30°   [2] 45°   [3] 60°   (4) 90°

B
90

5. Given a circle with the center indicated. Find x.
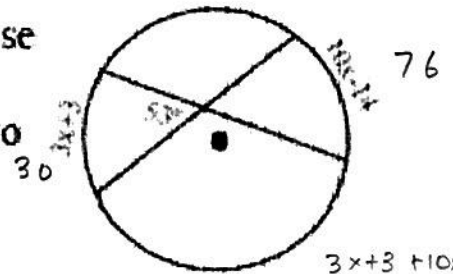[1] 100   [3] 50
[2] 80   (4) 40

40
80   50
90°
80

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

130°

130
C   D
25°   130   25
A   O   B
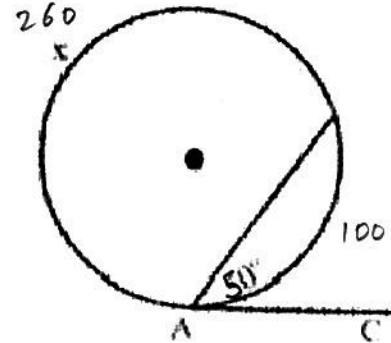
7. Two chords intersect within a circle to form an angle whose measure is 53°. If the intercepted arcs are represented by $3x + 3$ and $10x - 14$, find the measure of larger of these two arcs.

[1] 9   [2] 13   [3] 30   ([4]) 76

76

30

$\dfrac{3x+3 + 10x-14}{2} = 5.$

$\dfrac{13x-11}{2} = \dfrac{53}{1}$

$106 = 13x - 11$

$117 = 13x$

$9 = x$

8. Given tangent $\overline{AC}$ to the circle shown at the right. Find the size of the arc designated by x.

[1] 25
[2] 50
[3] 100
([4]) 260

260
x

100

50

A   C

9. Given the two secants shown in the diagram at the right, find the number of degrees in the angle labeled x.
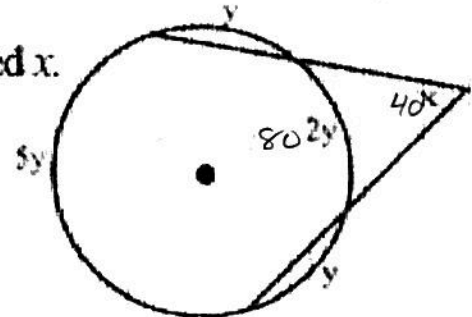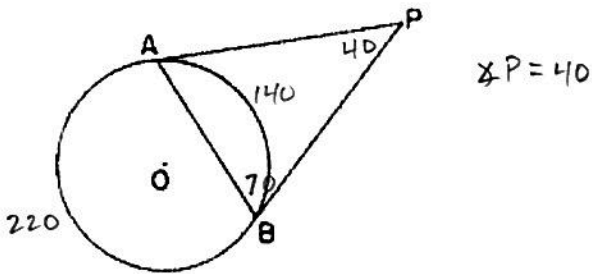
([1]) 40°
[2] 60°
[3] 80°
[4] 140°

$y + 2y + y + 5y = 360$

$9y = 360$

$y = 40$

y
40x
80 2y
5y
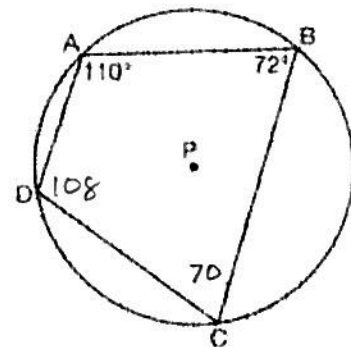y

In the accompanying diagram, $\overline{PA}$ and $\overline{PB}$ are tangents drawn to circle O. If $m\angle PBA = 70$, find $m\angle P$.
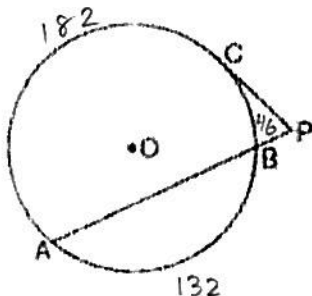
A
40
P
140
220
O
70
B

$\angle P = 40$

11. In the accompanying diagram of circle O, $\overline{PC}$ is a tangent, $\overline{PBA}$ is a secant, $m\widehat{AB} = 132$, and $m\widehat{CB} = 46$. Find $m\angle P$.
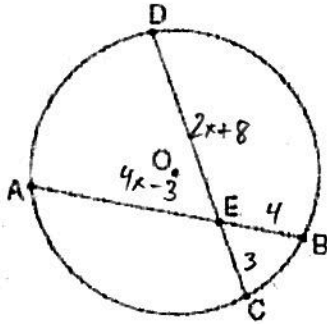
182
C
46
P
B
O
A
132

$\dfrac{182 - 46}{2}$

$= 68°$

12. In the diagram below, quadrilateral $ABCD$ is inscribed in circle P.

A
110°
B
72°
D
108
P
70
C

What is $m\angle ADC$?

$108°$

Chord Length

1. In the diagram of circle O below, chord $\overline{AB}$ intersects chord $\overline{CD}$ at E. $DE = 2x + 8$, $EC = 3$, $AE = 4x - 3$, and $EB = 4$.
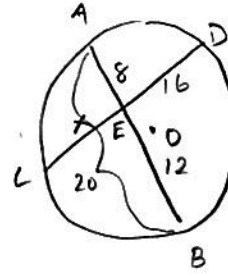

$$(2x+8)(3) = (4)(4x-3)$$
$$6x+24 = 16x-12$$
$$36 = 10x$$
$$x = 3.6$$

What is the value of x?

2. Chords $\overline{AB}$ and $\overline{CD}$ intersect at point E in a circle with center at O. If $AE = 8$, $AB = 20$, and $DE = 16$, what is the length of $\overline{CE}$?
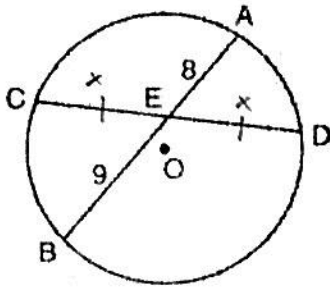

$$(8)(12) = (16)(x)$$
$$96 = 16x$$
$$x = 6$$
$$\boxed{CE = 6}$$

3. In the diagram below of circle O, chord $\overline{AB}$ bisects chord $\overline{CD}$ at E. If $AE = 8$ and $BE = 9$, find the length of $\overline{CE}$ in simplest radical form.
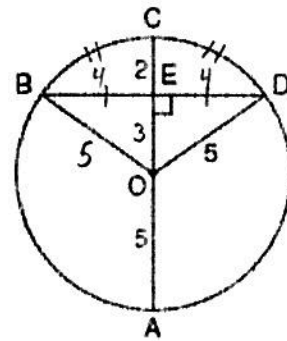

$$(8)(9) = (x)(x)$$
$$72 = x^2$$
$$x = \sqrt{72}$$
$$x = \sqrt{36}\sqrt{2}$$
$$= 6\sqrt{2}$$

4. In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter $\overline{AC}$ is perpendicular to chord $\overline{BD}$ at E.
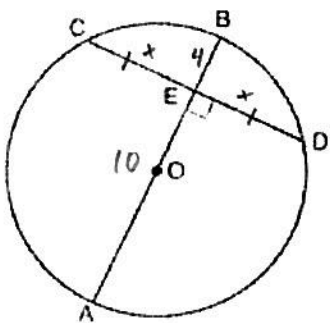

3,4,5 triangle

$$BD = 4+4$$
$$= \boxed{8}$$

What is the length of $\overline{BD}$?

5. In the diagram below of circle O, diameter $\overline{AB}$ is perpendicular to chord $\overline{CD}$ at E. If $AO = 10$ and $BE = 4$, find the length of $\overline{CE}$.
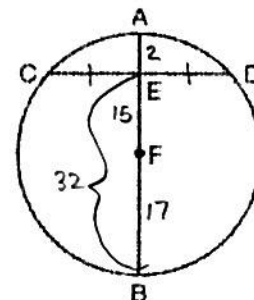

$$(10)(4) = (x)(x)$$
$$40 = x^2$$
$$x = \sqrt{40}$$
$$= \sqrt{4}\sqrt{10}$$
$$= \boxed{2\sqrt{10}}$$

6. In the diagram below, diameter $\overline{AB}$ bisects chord $\overline{CD}$ at point E in circle F.

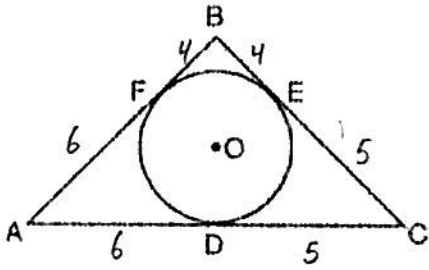$$(2)(32) = (x)(x)$$
$$64 = x^2$$
$$x = 8$$
$$\boxed{CE = 8}$$

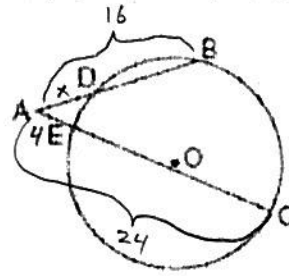If $AE = 2$ and $FB = 17$, then the length of $\overline{CE}$ is

1. In the diagram below, $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are tangents to circle O at points F, E, and D, respectively, $AF = 6$, $CD = 5$, and $BE = 4$.

B
4   4
F   E
6   •O   5
A   6   D   5   C

What is the perimeter of $\triangle ABC$?

$\boxed{30}$

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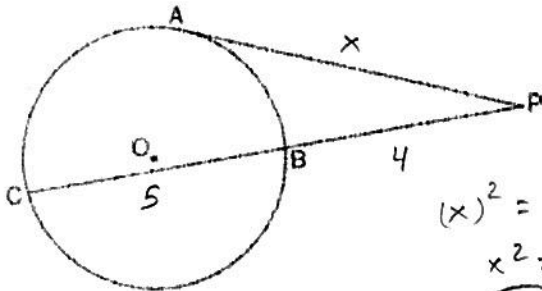
16
D
x
A
4 E
•O
B
C
24

$(x)(16) = (4)(24)$

$16x = 96$

$\boxed{x = 6}$

3. In the diagram below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn to circle O from external point P.
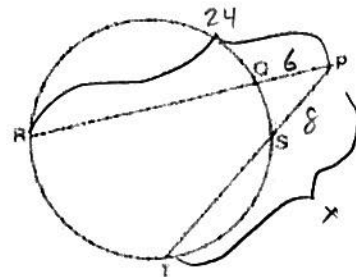
A
x
O.
C   B   P
5   4

$(x)^2 = (4)(9)$

$x^2 = 36$

$\boxed{x = 6}$

If $PB = 4$ and $BC = 5$, what is the length of $\overline{PA}$?

4. In the diagram below, secants $\overline{PQR}$ and $\overline{PST}$ are drawn to a circle from point P.

24
Q 6 P
R
S 8
x
T

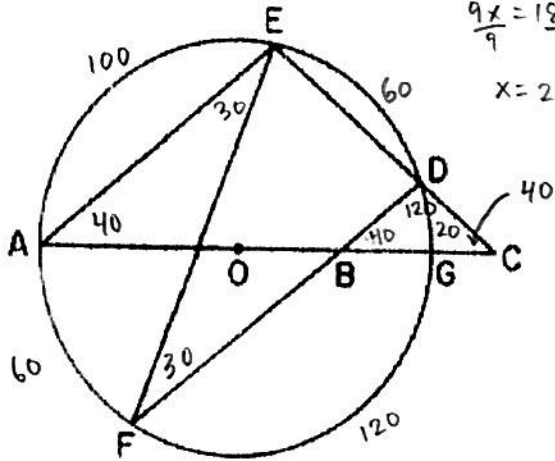If $PR = 24$, $PQ = 6$, and $PS = 8$, determine and state the length of $\overline{PT}$.

$(24)(6) = (8)(x)$

$144 = 8x$

$\boxed{x = 18}$

Super Circles

1. In the accompanying diagram of circle O. $\overline{AE}$ and $\overline{FD}$ are chords, $\overline{AOBG}$ is a diameter and is extended to C, $\overline{CDE}$ is a secant, $\widehat{AE} \parallel \widehat{FD}$, and $m\widehat{AE}:m\widehat{ED}:m\widehat{DG} = 5:3:1$.

$5x+3x+x=180$
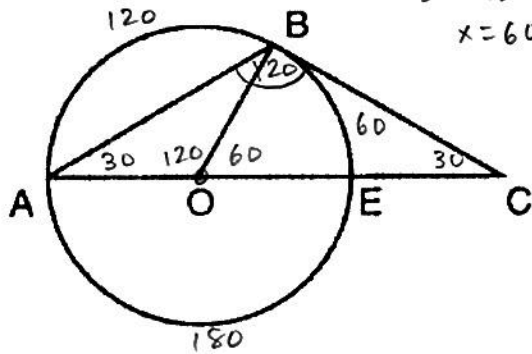
$\dfrac{9x}{9}=\dfrac{180}{9}$

$x=20$

$m\widehat{DG} = $ **20**

$m\angle AEF = $ **30**

$m\angle DBG = $ **40**

$m\angle DCA = $ **40**

$m\angle CDF = $ **120**

2. In the accompanying diagram of circle O, diameter $\overline{AE}$ is extended through E to C; tangent $\overline{CB}$, chord $\overline{AB}$, and radius $\overline{OB}$ are drawn; and $m\widehat{AB}:m\widehat{BE} = 2:1$.

$2x+x=180$
$3x=180$
$x=60$

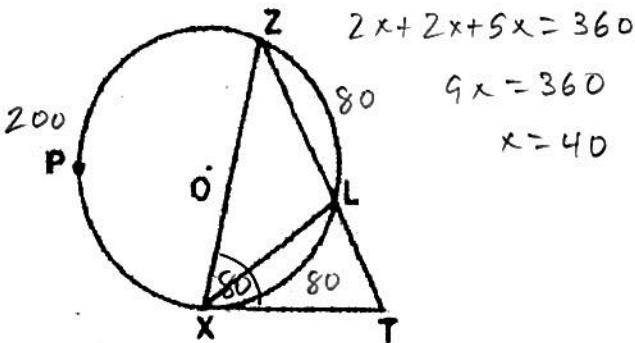$m\widehat{AB} = $ **120**

$m\angle BAC = $ **30**

$m\angle C = $ **30**

$m\angle ABC = $ **120**

Is $\triangle OBC$ acute, right, obtuse, or equiangular? Why?

right. $30-60-90$

3. Given: circle O, tangent $\overleftrightarrow{TX}$, secant $\overleftrightarrow{TLZ}$, chords $\overline{ZX}$ and $\overline{XL}$, $m\widehat{XL}:m\widehat{LZ}:m\widehat{XPZ} = 2:2:5$.

$2x+2x+5x=360$
$9x=360$
$x=40$

$m\widehat{XL} = $ **80**

$m\angle Z = $ **40**

$m\angle T = $ **60** $\dfrac{200-80}{2}=\dfrac{120}{2}$

$m\angle ZXT = \dfrac{160}{2} = 80$

$m\angle XLT = $ **80**

$\dfrac{80}{2}=40$ $\dfrac{200-80}{2}=\dfrac{120}{2}=60$