P is the center of the circle. Use the given information to find $\overline{XY}$.

4. $ZY = 3$

$ZY = XY$

3

5. $ZY = 6,\ XW = 4$

5

$3^2 + 4^2 = c^2$
$9 + 16 = c^2$
$\sqrt{25} = \sqrt{c^2}$
$\boxed{c = 5}$

6. $\overline{CA} = 3$

6
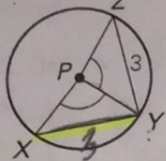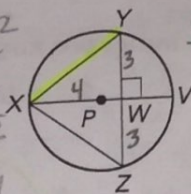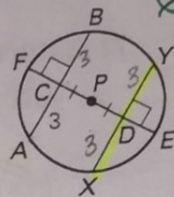
$\overline{XY} = 3 + 3$
$\boxed{\overline{XY} = 6}$

Find the measure of $\widehat{MN}$.

7.   60°
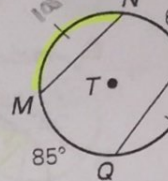
$\begin{array}{r} 100 \\ +140 \\ \hline 240 \end{array}$

$\begin{array}{r} 360 \\ -240 \\ \hline 120 \end{array}$

8.   90°

$\dfrac{120}{2} = \boxed{60°}$

$\begin{array}{r} 135 \\ +135 \\ \hline 270 \end{array}$

$\begin{array}{r} 360 \\ -270 \\ \hline \boxed{90°} \end{array}$

9.   105°

$\begin{array}{r} 65 \\ +85 \\ \hline 140 \end{array}$

$\begin{array}{r} 360 \\ -140 \\ \hline 220 \end{array}$

$\dfrac{220}{2} = \boxed{105°}$

10.   140°

$\begin{array}{r} 130 \\ +130 \\ \hline 260 \end{array}$

$\begin{array}{r} 360 \\ -260 \\ \hline \boxed{100°} \end{array}$

11.   106°

$\begin{array}{r} 74 \\ 74 \\ \hline 148 \end{array}$

$\begin{array}{r} 360 \\ -148 \\ \hline 212 \end{array}$

$\dfrac{212}{2} = \boxed{106}\ 212$

12.   66°

$\begin{array}{r} 147 \\ +147 \\ \hline 294 \end{array}$

$\begin{array}{r} 360 \\ -294 \\ \hline \boxed{66°} \end{array}$

13.   48°

$\begin{array}{r} 132 \\ +132 \\ \hline 264 \end{array}$

$\begin{array}{r} 360 \\ -264 \\ \hline 96 \end{array}$

$\dfrac{96}{2} = \boxed{48°}$

14.   38°

$\begin{array}{r} 103 \\ 103 \\ 116 \\ \hline 322 \end{array}$

$\begin{array}{r} 360 \\ -322 \\ \hline \boxed{38} \end{array}$

15.   70°

$\begin{array}{r} 20 \\ +90 \\ \hline 110 \end{array}$

$\begin{array}{r} 180 \\ -110 \\ \hline \boxed{70°} \end{array}$
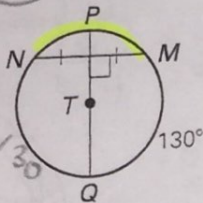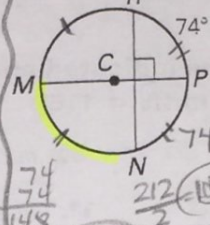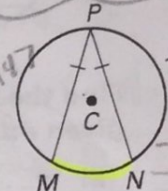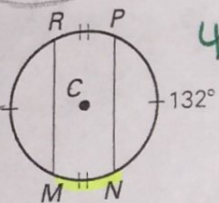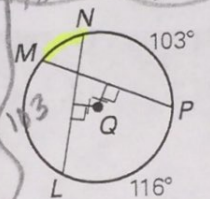
$\overline{AC}$ and $\overline{BD}$ **are diameters of $\odot E$. Find the measure of the given arc if**

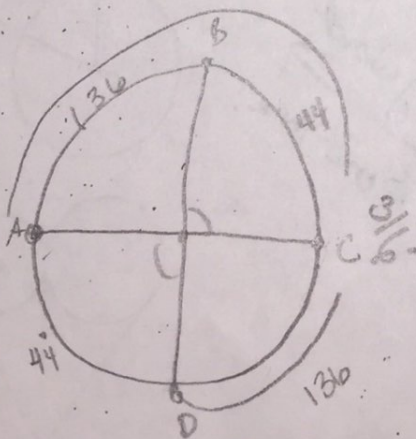$m\widehat{ACD} = 316°$.

19. $m\widehat{AD}$ 44° $360 - 316 =$

20. $m\widehat{BC}$ 44°   vertical angles

21. $m\widehat{BCA}$ 224° $44 + 136 +$

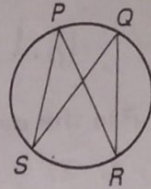**22.** $m\widehat{DCB}$ 180°   semicircle

23. $m\widehat{AB}$ 136°   vertical angles

24. $m\widehat{CDB}$ 316° $360 - 44 =$

1. Multiple Choice In the figure shown, which statement is true?

A. $\angle SPR \cong \angle PSQ$ **B.** $\angle RQS \cong \angle RPS$

C. $\angle RPS \cong \angle PRQ$ D. $\angle PRQ \cong \angle SQR$

Find the measure of the indicated angle or arc in $\odot P$.

2. $m\widehat{ST}$ $58°$

61°
61
$\times 2$ 180
122 -122
$\boxed{58}$

3. $m\widehat{AB}$ $140°$

20
$\times 2$
40
180
-40
$\boxed{140}$

20°

4. $m\angle JLM$ $46°$ $\begin{matrix}180\\-88\\92\end{matrix}$

88°
$\frac{92}{2} = \boxed{46}$

92

5. $m\angle A$ $63°$

54°
$\begin{matrix}180\\-54\\\overline{126}\end{matrix}$ $\frac{126}{2}$

6. $m\angle K$ $28°$

K equal
28°

7. $m\widehat{VST}$ $123°$

84 T
39° 51°
135°

$\begin{matrix}51\\\times 2\\\overline{102}\end{matrix}$ $\begin{matrix}102\\135\\+39\\\overline{276}\end{matrix}$

$\begin{matrix}360\\-276\\\overline{84}\end{matrix}$

84
39
$\boxed{123}$

Find the measure of the indicated angle or arc in $\odot P$, given $m\widehat{LM} = 84°$ and $m\widehat{KN} = 116°$.

8. $m\angle JKL$ $90°$ $\frac{180}{2} =$

9. $m\angle MKL$ $42°$ $\frac{84}{2} =$

10. $m\angle KMN$ $58°$ $\frac{116}{2} =$

11. $m\angle JKM$ $48°$ $90-42=$

12. $m\angle KLN$ $58°$ $\frac{116}{2} =$

13. $m\angle LNM$ $42°$ $\frac{84}{2} =$

14. $m\widehat{MJ}$ $96°$ $48 \times 2 =$

15. $m\widehat{LKJ}$ $180°$ semicircle

48 42
116
84
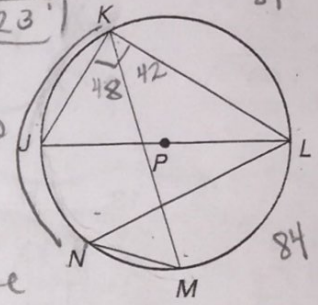
In Exercises 16–18, find the values of the variables.

16.
$x = 14$
$y = 38$

$5x°$
$104°$
$110°$
$2y°$ K

$2y + 104 = 180$
$2y = 76$
$\boxed{y = 38}$

$5x + 110 = 180$
$5x = 70$
$\boxed{x = 14}$

17. $x = 58$
$y = 29$

$2x°$ $4y°$
$64°$ $64°$

$4y + 64 = 180$
$4y = 116$
$\boxed{y = 29}$

$2x + 64 = 180$
$2x = 116$ $\boxed{x = 58}$

18. $x = 72$
$y = 90$

$y°$
$x°$
$108°$

$x + 108 = 180$
$\boxed{x = 72}$

$y + y = 180$
$2y = 180$
$\boxed{y = 90}$

In the diagram, assume that segments are tangents if they appear to be. Find the value(s) of x.

may want to omit these!

20. 20

B   99
A
x 81

21. $4\sqrt{5} - 4$

8
4   x
C

22.

$4x^2 + 5x$ C
6

$-2, \frac{3}{4}$

23.

C   C'
$6x + 5$ $37 - 2x$

$6x + 5 = 37 - 2x$
$8x + 5 = 37$
$8x = 32$
$\boxed{x = 4}$
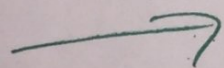
81+26

$\overline{MQ}$ and $\overline{NR}$ are diameters of $\odot O$. Determine whether the given arc is a minor arc, major arc, or semicircle. Then find the measure of the arc.

1. $\overparen{MN}$ minor 73°

2. $\overparen{NQ}$ minor 107°   81+26 = 107

3. $\overparen{NQR}$ semicircle 180°

4. $\overparen{MRP}$ major 206°   107+73+26 =

5. $\overparen{PN}$ minor 81°

6. $\overparen{MNQ}$ semicircle 180°

7. $\overparen{QR}$ minor 73° vertical angles

8. $\overparen{MR}$ minor 107°
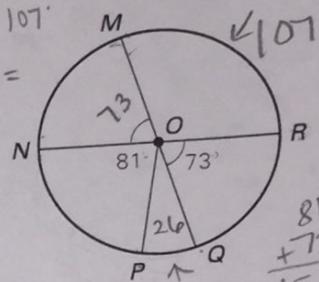
26+81+73+107 = 9. $\overparen{QMR}$ major 287°

10. $\overparen{PQ}$ minor 26°

11. $\overparen{PRN}$ major 279° $\frac{360}{-81}$

12. $\overparen{MQN}$ major 287° $\frac{360}{-73}$

M ∠107

73   O   R

N   81 73

26

P   Q

81   180
+73 -154
154   26

Find the indicated arc measure.

13. $m\overparen{QS}$ 154°

$\begin{array}{r}360\\-52\\\hline308\end{array}$ $\frac{308}{2} = $ 154

Q
P 52° R
S

14. $m\overparen{LKJ}$ 217°

K
74°
J G L
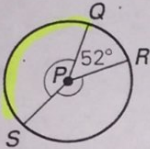
$\begin{array}{r}360\\-74\\\hline286\end{array}$ $\frac{286}{2}$ =143

143
+74
217

2

15. $m\overparen{DH}$ 120°

E   F x°30
60° 2x° C G
D y° y° H
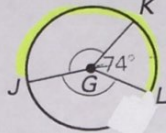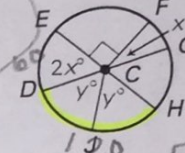
2x+x+90=180
3x+90=180
3x=90
x=30

120
180-60 =   y=120

Find the value of x.

67   180
+80 -147
147   33

16.
x° 80°
67°
x°
33

17.
(x⁷)°
52°
x⁷+52=180
x⁷= 128
2⁷=128
x=2

2

18. (7x − 12)°   16
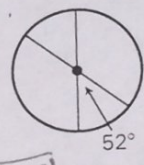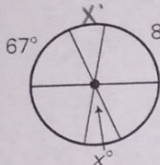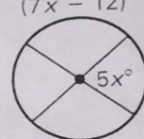
5x°
7x-12+5x=180
12x-12=180
12x=192
x=16