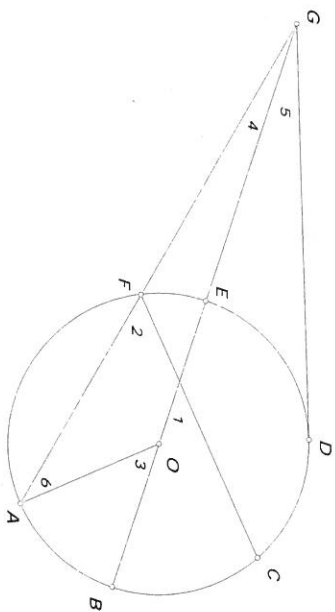


Given: $\odot O$, \overline{EB} is a diameter, $\widehat{AB} = 48^\circ$, $\widehat{AF} = 106^\circ$, $\widehat{DC} = 50^\circ$, $\widehat{BC} = 60^\circ$



Find all numbered angles.

$\angle 1 =$ _____

$\angle 2 =$ _____

$\angle 3 =$ _____

$\angle 4 =$ _____

$\angle 5 =$ _____

$\angle 6 =$ _____

Given: tangent \overline{PJ} , $\angle 4 = 52^\circ$

and $\widehat{HK} = 112^\circ$

Find:

1) $\widehat{KJ} =$ _____

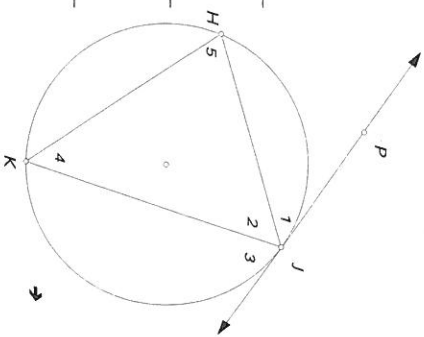
2) $\angle 2 =$ _____

3) $\angle 3 =$ _____

4) $\angle 1 =$ _____

5) $\angle 5 =$ _____

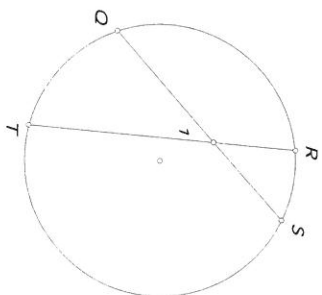
6) $\widehat{JHK} =$ _____



7) $\angle 1 = 23^\circ$, $\widehat{RS} = 13^\circ$, $\widehat{QT} =$ _____

8) $\angle 1 = 44^\circ$, $\widehat{RQ} = 103^\circ$, $\widehat{ST} =$ _____

9) $\angle 1 = 6x - 1$, $\widehat{RS} = 5x - 2$, $\widehat{QT} = 5x + 12$;



$x =$ _____ $\widehat{RS} =$ _____

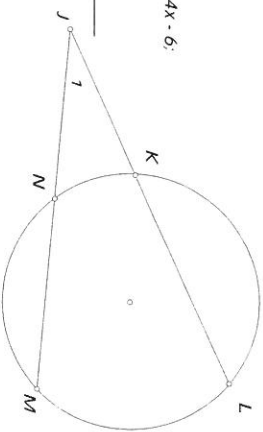
10) $\angle 1 = 32^\circ$, $\widehat{KN} = 13^\circ$, $\widehat{ML} =$ _____

11) $\angle 1 = 2x + 8$, $\widehat{LM} = 10x - 12$, $\widehat{KN} = 4x - 6$;

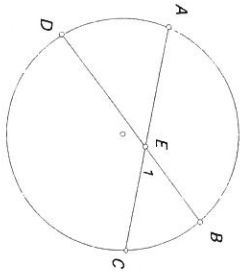
$x =$ _____ $\angle 1 =$ _____

12) $\angle 1 = 42^\circ$, $\widehat{KL} = 140^\circ$, $\widehat{NM} = 104^\circ$;

$\widehat{KN} =$ _____



13) $\widehat{BC} = 14^\circ$; $\angle 1 = 28^\circ$; $\widehat{AD} =$ _____

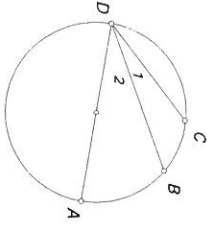


14) \widehat{AD} is a diameter; $\angle 1 = 10^\circ$; $\widehat{DC} = 100^\circ$;

$\widehat{BC} =$ _____

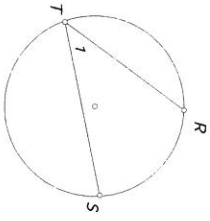
$\angle 2 =$ _____

$\widehat{ADC} =$ _____



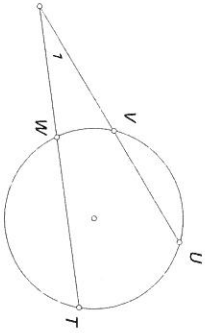
15) $\angle 1 = (3x - 1)^\circ$; $\widehat{RS} = (5x + 11)^\circ$

$\angle 1 =$ _____



16) $\widehat{TU} = 105^\circ$; $\widehat{VW} = 57^\circ$

$\angle 1 =$ _____

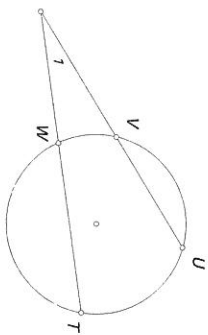


17) $\angle 1 = 31^\circ$; $\widehat{TU} = 106^\circ$

$\widehat{VW} =$ _____

18) $\angle 1 = x^\circ$; $\widehat{VW} = y^\circ$

$\widehat{TU} =$ _____

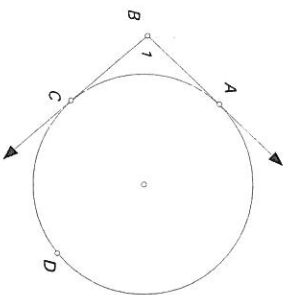


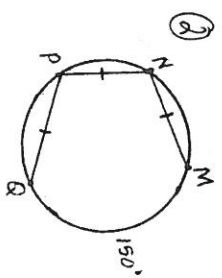
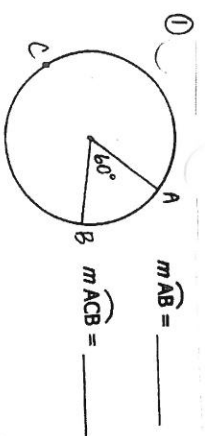
60 cont.

\overrightarrow{BC} & \overrightarrow{BA} are tangents

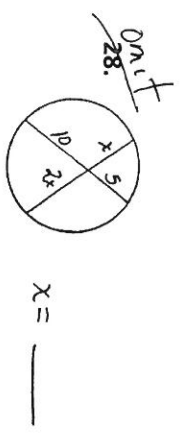
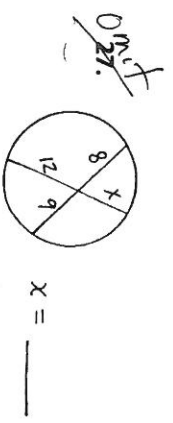
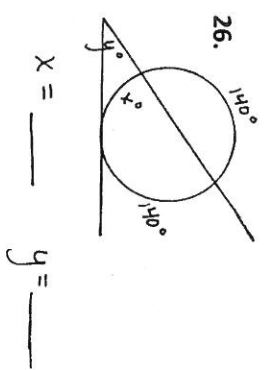
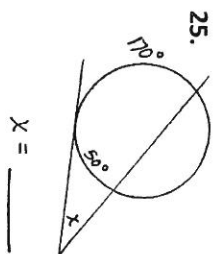
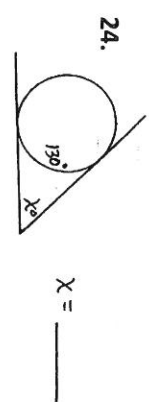
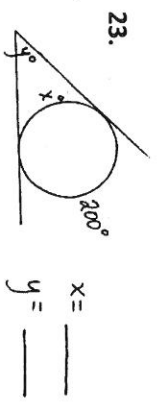
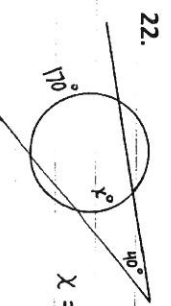
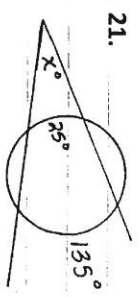
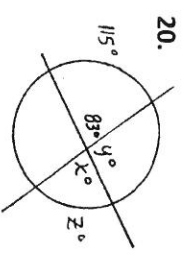
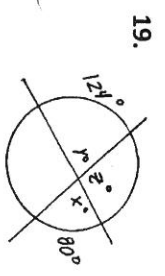
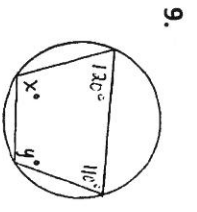
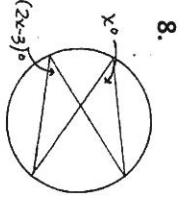
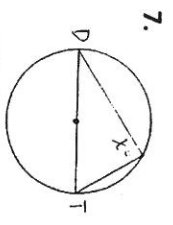
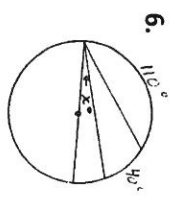
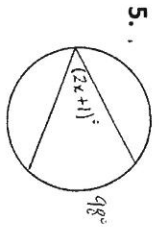
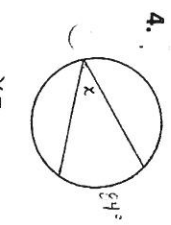
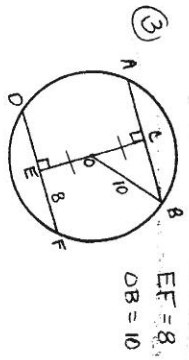
19) $\widehat{ADC} = 275^\circ$

$\angle 1 =$ _____



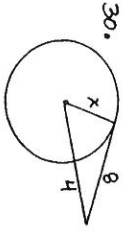


$DF = \underline{\hspace{2cm}}$
 $AB = \underline{\hspace{2cm}}$
 $DC = \underline{\hspace{2cm}}$





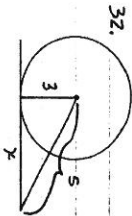
$x = \underline{\hspace{2cm}}$



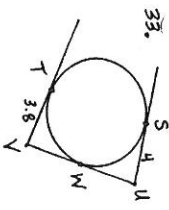
$x = \underline{\hspace{2cm}}$



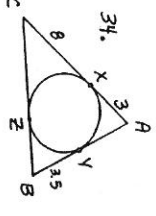
$x = \underline{\hspace{2cm}}$



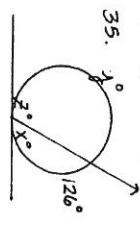
$x = \underline{\hspace{2cm}}$



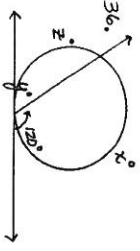
$x = \underline{\hspace{2cm}}$



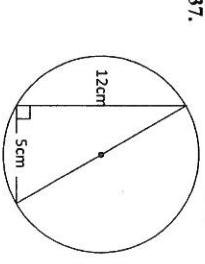
Perimeter of $\triangle ABC = \underline{\hspace{2cm}}$



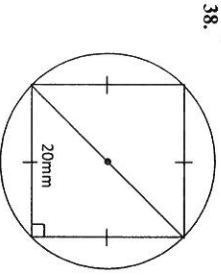
$x = \underline{\hspace{2cm}}$
 $y = \underline{\hspace{2cm}}$
 $z = \underline{\hspace{2cm}}$



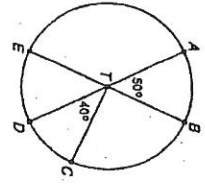
$x = \underline{\hspace{2cm}}$
 $y = \underline{\hspace{2cm}}$
 $z = \underline{\hspace{2cm}}$



Find the circumference and area of each circle

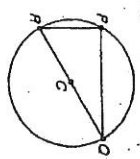


39. Name an arc with a measure of 230.
 A. \widehat{DEB} B. \widehat{ABC}
 C. \widehat{DE} D. \widehat{ABD}
40. If $AD = 7$, find the length of \widehat{CD} to the nearest tenth.
 A. 11.0 B. 1.2
 C. 2.4 D. 3.1

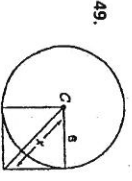
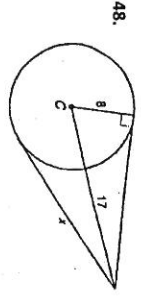


Complete: 41. The circumference of a circle is 21π . Find the radius. 41.

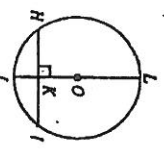
42. What is the radius of a circle if the endpoints of a diameter are (4, -5) and (4, 9). 42.
43. A central angle is a right angle. What is the measure of its minor arc? 43.
44. Points A, B, and D are on $\odot C$. If $m\angle ACB = 70$ and \widehat{BD} is a diameter, find $m\widehat{ADB}$. 44.
45. Suppose a chord of a circle is 80 cm long and is 30 cm from the center of the circle. Find the length of the radius. 45.
- For Questions 46-47 refer to $\odot C$.
46. What kind of triangle is $\triangle PQR$? 46.
47. If $m\angle R = 2m\angle Q$, find $m\widehat{PR}$. 47.



For Questions 48-49, find the value of x . Assume that segments that appear to be tangent are tangent.

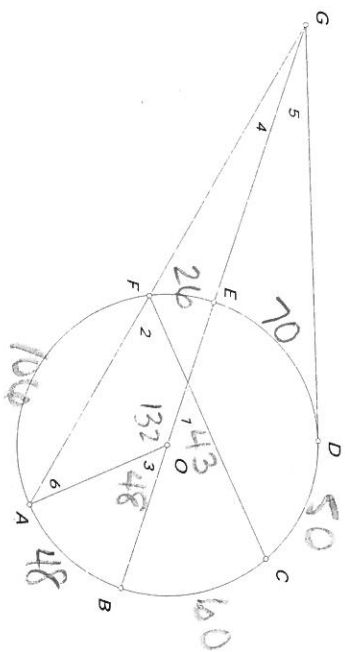


- In $\odot O$, $\overline{OJ} \perp \widehat{HI}$ and $OK = 3$. Complete.
50. If $HI = 8$, then $HK = \underline{\hspace{2cm}}$.
51. If $KJ = 2$, then $LJ = \underline{\hspace{2cm}}$.
52. If $m\widehat{HI} = 70$, then $m\widehat{HJ} = \underline{\hspace{2cm}}$.



53. Sketch a square circumscribed about a circle.
54. Sketch a squared inscribed in a circle.

Given: $\odot O$, \overline{EB} is a diameter, $\widehat{AB} = 48^\circ$, $\widehat{AF} = 106^\circ$, $\widehat{DC} = 50^\circ$, $\widehat{BC} = 60^\circ$



Find all numbered angles:

$\angle 1 = 43$

$\angle 2 = 54$

$\angle 3 = 48^\circ$

$\angle 4 = 11^\circ$

$\angle 5 = 20^\circ$

$\angle 6 = 37^\circ$

Given: tangent \overline{PJ} , $\angle 4 = 52^\circ$

and $\widehat{HK} = 112^\circ$

Find:

1) $\angle R = 144^\circ$

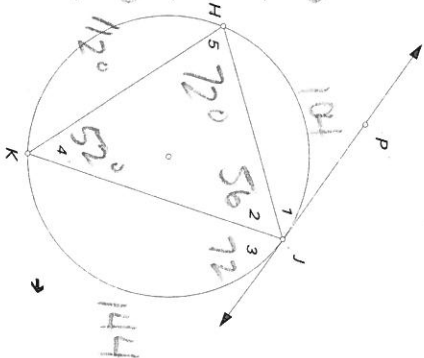
2) $\angle 2 = 56^\circ$

3) $\angle 3 = 72^\circ$

4) $\angle 1 = 52^\circ$

5) $\angle 5 = 72^\circ$

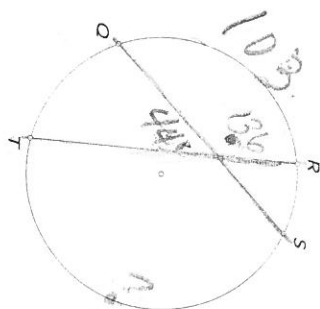
6) $\angle HK = 216^\circ$



Key

$23 = \frac{1}{2}(13+x)$

7) $\angle T = 23^\circ$, $\widehat{RS} = 13^\circ$, $\widehat{QT} = 33^\circ$



8) $\angle T = 44^\circ$, $\widehat{RO} = 103^\circ$, $\widehat{ST} = 169^\circ$

$136 = \frac{1}{2}(103+x)$

9) $\angle T = 6x - 1$, $\widehat{RS} = 5x - 2$, $\widehat{QT} = 5x + 12$

$6x - 1 = \frac{1}{2}(5x - 2 + 5x + 12)$

$x = \frac{10}{2} = 5$

$6x - 1 = \frac{1}{2}(10x + 10)$

$6x - 1 = 5x + 5$

$x = 6$

$32 = \frac{1}{2}(x - 13)$

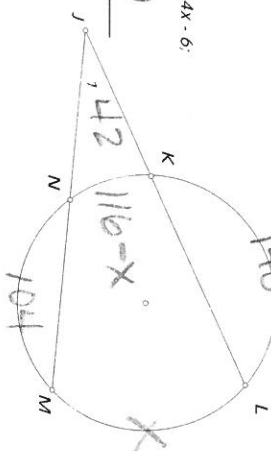
10) $\angle T = 32^\circ$, $\widehat{KN} = 13^\circ$, $\widehat{ML} = 77^\circ$

11) $\angle T = 2x + 8$, $\widehat{LM} = 10x - 12$, $\widehat{KN} = 4x - 6$

$x = 11$, $\angle T = 30$

12) $\angle T = 42^\circ$, $\widehat{KL} = 140^\circ$, $\widehat{NM} = 104^\circ$

$\widehat{KN} = 6^\circ$



$2x + 8 = \frac{1}{2}(10x - 12 - (4x - 6))$

$2x + 8 = \frac{1}{2}(6x - 6)$

$2x + 8 = 3x - 3$

$11 = x$

$42 = \frac{1}{2}(x - (116 - x))$

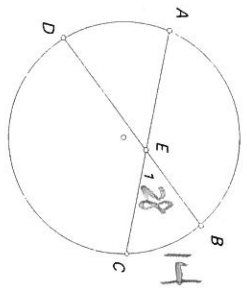
$42 = \frac{1}{2}(2x - 116)$

$42 = x - 58$

$x = 100$

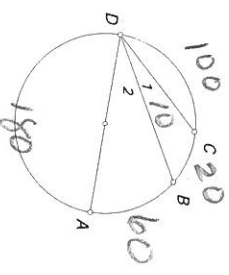
13) $\widehat{BC} = 14^\circ$; $\angle 1 = 28^\circ$; $\widehat{AD} = 42^\circ$

$28 = \frac{1}{2}(14+x)$
 $56 = 14+x$ $x = 42$



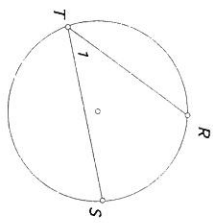
14) \widehat{AD} is a diameter; $\angle 1 = 10^\circ$; $\widehat{DC} = 100^\circ$

$\widehat{BC} = \frac{20^\circ}{30^\circ}$
 $\angle 2 = \frac{280^\circ}{280^\circ}$



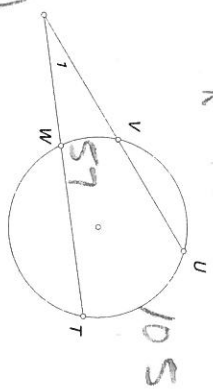
15) $\angle 1 = (3x-1)^\circ$; $\widehat{RS} = (5x+11)^\circ$

$\angle 1 = 38$
 $3x-1 = \frac{1}{2}(5x+11)$
 $6x-2 = 5x+11$
 $x = 13$



16) $\widehat{TU} = 105^\circ$; $\widehat{VW} = 57^\circ$
 $\angle 1 = 24^\circ$

$\frac{1}{2}(105-57)$

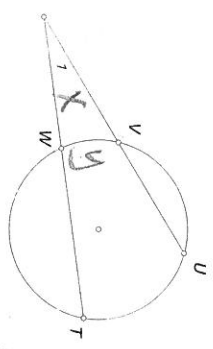


17) $\angle 1 = 31^\circ$; $\widehat{TU} = 106^\circ$

$\widehat{VW} = \frac{44^\circ}{31} = \frac{1}{2}(106-x)$

18) $\angle 1 = x$; $\widehat{VW} = y$

$\widehat{TU} = \frac{2x+y}{2}$
 $x = \frac{1}{2}(\widehat{TU} - y)$
 $2x = \widehat{TU} - y$

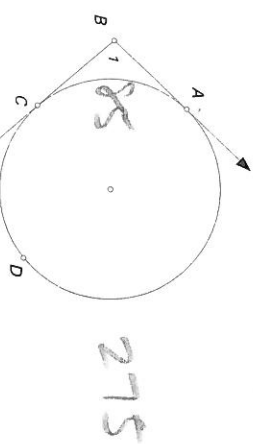


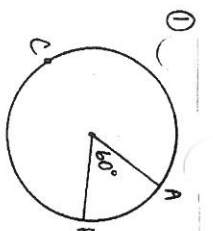
60 cont.

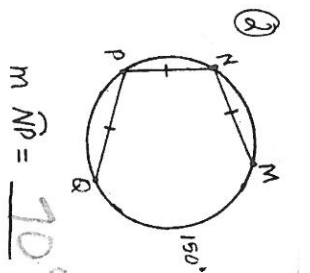
\widehat{BC} & \widehat{BA} are tangents

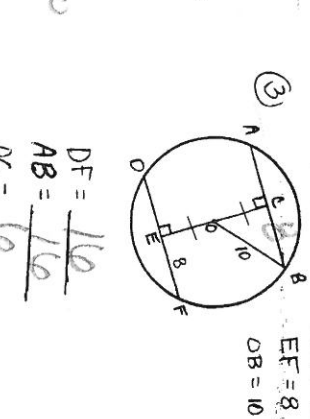
19) $\widehat{ADC} = 275^\circ$

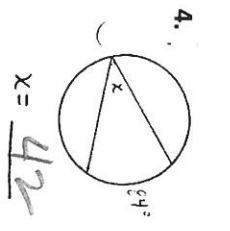
$\angle 1 = 95^\circ$
 $\frac{1}{2}(275-85)$

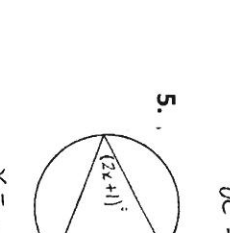


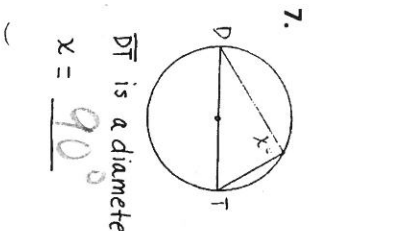
1.  $m\widehat{AB} = \underline{60^\circ}$
 $m\widehat{ACB} = \underline{300^\circ}$

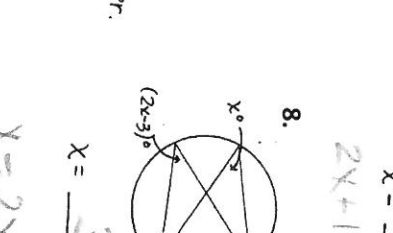
2.  $m\widehat{NP} = \underline{70^\circ}$

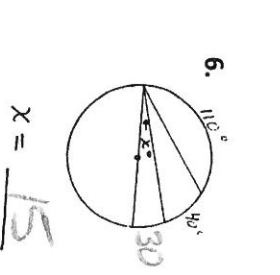
3.  $DF = \underline{16}$
 $AB = \underline{16}$
 $DC = \underline{16}$

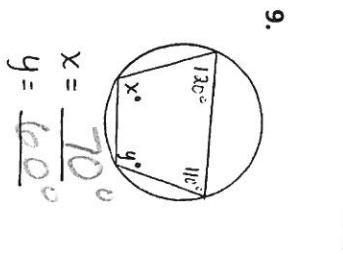
4.  $x = \underline{42}$

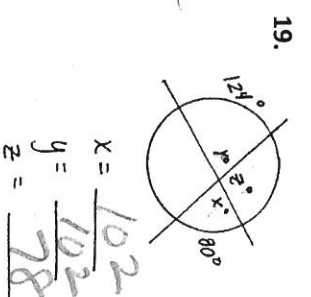
5.  $x = \underline{24}$
 $2x + 1 = \frac{1}{2}(98)$

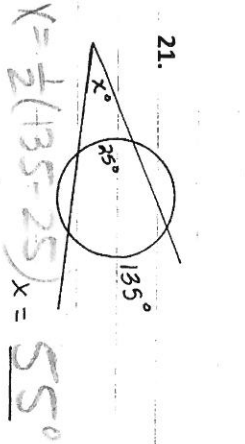
7.  \widehat{DT} is a diameter.
 $x = \underline{90^\circ}$

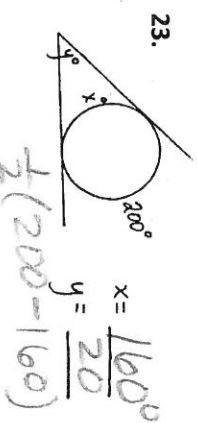
8.  $x = \underline{3}$
 $K = 2x - 3$
 $3 = x$

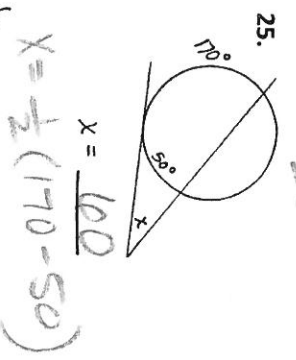
6.  $x = \underline{15}$

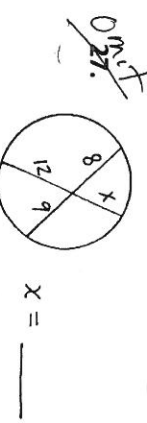
9.  $x = \underline{70^\circ}$
 $y = \underline{100^\circ}$

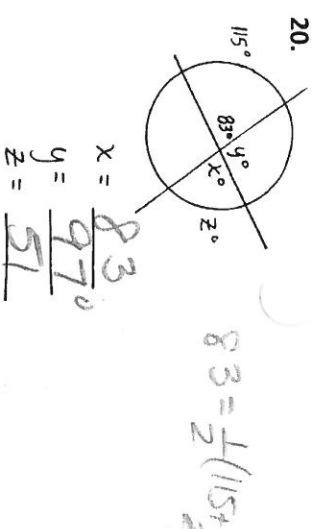
19.  $x = \underline{102}$
 $y = \underline{102}$
 $z = \underline{78}$

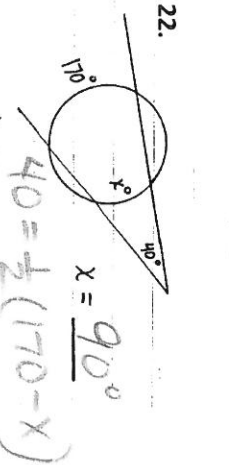
21.  $x = \underline{55^\circ}$
 $x = \frac{1}{2}(135 - 25)$

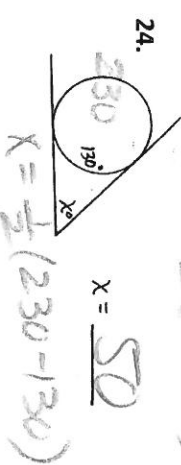
23.  $x = \underline{160^\circ}$
 $y = \underline{20}$
 $\frac{1}{2}(200 - 160)$

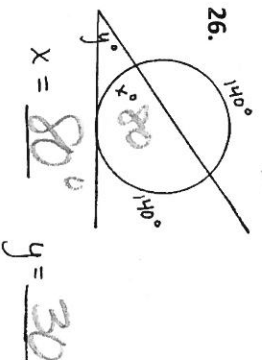
25.  $x = \underline{100}$
 $x = \frac{1}{2}(170 - 50)$

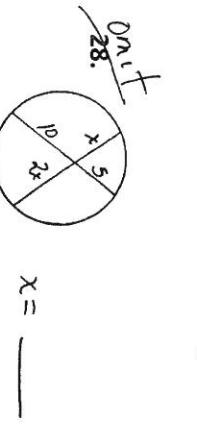
~~OMIT~~
 $x = \underline{\quad}$

20.  $x = \underline{83}$
 $y = \underline{97^\circ}$
 $z = \underline{51}$
 $83 = \frac{1}{2}(115 + \dots)$

22.  $x = \underline{90^\circ}$
 $40 = \frac{1}{2}(170 - x)$

24.  $x = \underline{50}$
 $x = \frac{1}{2}(230 - 130)$

26.  $x = \underline{80^\circ}$
 $y = \underline{30}$

~~OMIT~~
 $x = \underline{\quad}$

$$21 = 3x + 6$$

$$15 = 3x$$

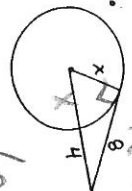


$$x = 5$$

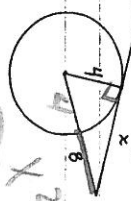
$$(x+4)^2 = x^2 + 8x + 16$$

$$x^2 + 8x + 16 = x^2 + 64$$

$$8x = 48$$



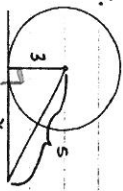
$$x = 6$$



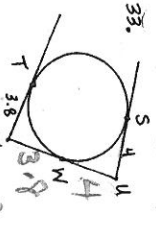
$$x = \sqrt{128}$$

$$x^2 + 16 = 144$$

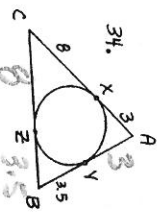
$$x^2 = 128$$



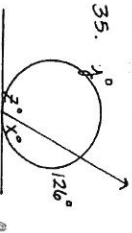
$$x = 4$$



$$UN = 7.8$$



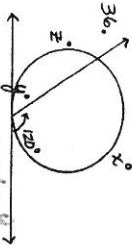
$$\text{Perimeter of } \triangle ABC = 29$$



$$x = \frac{63}{2}$$

$$y = \frac{234}{2}$$

$$z = \frac{117}{2}$$

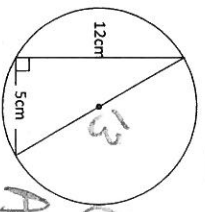


$$x = \frac{240}{2}$$

$$y = \frac{60}{2}$$

$$z = \frac{120}{2}$$

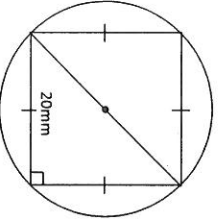
Find the circumference and area of each circle



$$C = 13\pi$$

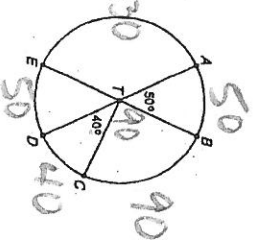
$$A = \pi \left(\frac{13}{2}\right)^2$$

$$A = \frac{169\pi}{4}$$



38.

39. Name an arc with a measure of 230.
 A. ~~DEB~~ B. ~~ABC~~
 C. ~~CDE~~ D. ~~ABD~~
40. If $AD = 7$, find the length of CD to the nearest tenth.
 A. 11.0 B. 1.2
 C. 2.4 D. 3.1

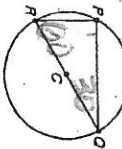


41. The circumference of a circle is 21π . Find the radius.

$$\frac{21\pi}{2}$$

42. What is the radius of a circle if the endpoints of a diameter are $(4, -5)$ and $(4, 9)$?
43. A central angle is a right angle. What is the measure of its minor arc?
44. Points A, B, and D are on $\odot C$. If $m\angle ACB = 70$ and \overline{BD} is a diameter, find $m\angle ADB$.

45. Suppose a chord of a circle is 80 cm long and is 30 cm from the center of the circle. Find the length of the radius.



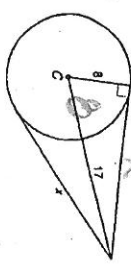
42. 7

43. 90°

44. 290

45. 50 cm

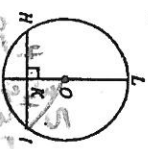
For Questions 46-47 refer to $\odot C$.



46. What kind of triangle is $\triangle PQR$? RIGHT

47. If $m\angle R = 2m\angle Q$, find $m\angle P$. 60°

- In $\odot O$, $\overline{OJ} \perp \overline{HI}$ and $OK = 3$. Complete.
50. If $HI = 8$, then $HK =$ 4.
51. If $KJ = 2$, then $LJ =$ 10.
52. If $m\widehat{HI} = 70$, then $m\widehat{HJ} =$ 35.



$$x^2 = 6^2 + 6^2 \Rightarrow x = \sqrt{72} = 6\sqrt{2} = 8.49$$

53. Sketch a square circumscribed about a circle.

54. Sketch a square inscribed in a circle.