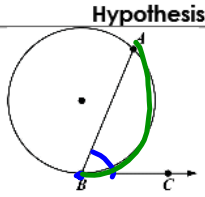
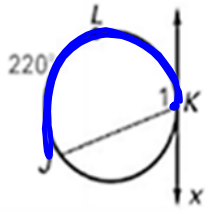
Angle Relationships (Vertex On, Inside & Outside)

Name	Theorem	Hypothesis	Conclusion
Tangent Chord Theorem **(Vertex On)**	If a tangent and a chord intersect at a point on the circle, then the measure of each angle formed is one half the measure of its intercepted arc.		$\angle = \frac{1}{2}$ arc $m\angle ABC = \frac{1}{2}\overset{\frown}{AB}$

Example: Find the measure of angle 1.

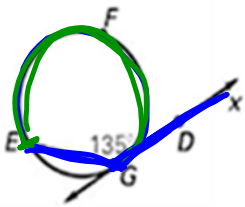


$m\angle 1 = \frac{1}{2}$ arc

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

$m\angle 1 = 110°$

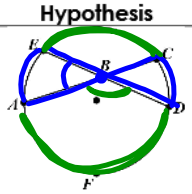
Example: Find the measure of arc EFG.



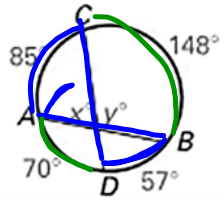
$arc = 2 \cdot \angle$

$arc = 2(135)$

$m\overset{\frown}{EFG} = 270°$

Name	Theorem	Hypothesis	Conclusion
Interior Angles of a Circle Theorem **(Vertex Inside)**	If two chords intersect **inside** the circle, then the measure of each angle is half the sum of the measures of the arcs intercepted by the angle and its vertical angle.		$\frac{\overset{\frown}{EA}+\overset{\frown}{CD}}{2} = \angle CBD$ or $\angle EBA$ $\frac{\overset{\frown}{AD}+\overset{\frown}{EC}}{2} = m\angle ABD$ or $\angle EBC$

Example: Find x and y.



$\frac{148+70}{2} = m\angle y$

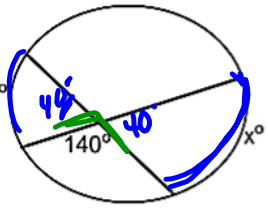
$\frac{85+57}{2} = m\angle x$

$109 = m\angle y$

$71° = m\angle x$

$71+109=180$

Example: Find the value of x.



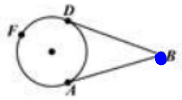
$180 - 140 = 40°$

$2 \cdot \frac{x+25}{2} = \frac{40°}{1} \cdot 2$

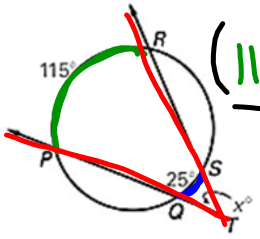
$x+25 = 80$

$-25 \quad -25$

$x = 55°$

Name	Theorem	Hypothesis	Conclusion
Exterior Angles of a Circle Theorem (Vertex Outside)	If a tangent and a secant, two tangents, or two secants intersect **outside** the circle, then the measure of the angle formed is half the difference of the measures of the intercepted arcs.		$\frac{\text{Big arc} - \text{Small arc}}{2} = \text{angle}$

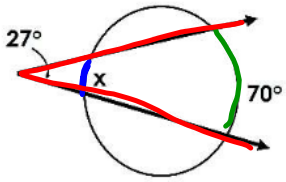
Example: Find the value of x.



$\frac{(115 - 25)}{2} = x$

$45° = x$

Example: Find the value of x.



$70° - x = 27 \cdot 2$

$70 - x = 54$

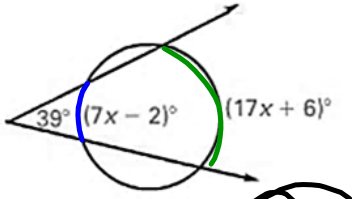
$-70 \quad -70$

$-x = -16$

$-1 \quad -1$

$x = 16$

Example: Find the value of x.



$\frac{(17x+6) - (7x-2)}{2} = 39$

$\frac{17x+6-7x+2}{2} = 39$

$\frac{10x+8}{2} = 39 \cdot 2$

$10x + 8 = 78$

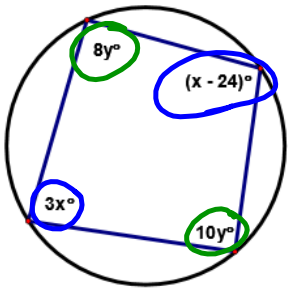
$-8 \quad -8$

$\frac{10x}{10} = \frac{70}{10}$

$x = 7$

Mixed Review:

1. Find the value of x and y.



$8y+10y=180$

$18y=180$

$y=10$

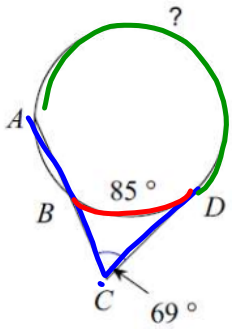
$3x+x-24=180$

$4x-24=180$

$4x=204$

$x=51$

2. Find the value of ?.



Big - small

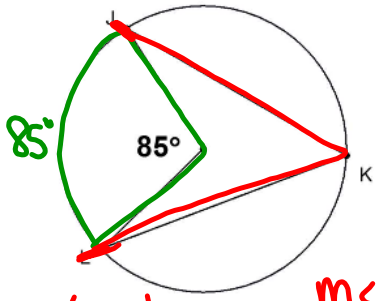
$\frac{?-85}{2}=69$

$?-85=138$

$+85 \quad +85$

$?=223°$

3. Find the value of m∠JKL.

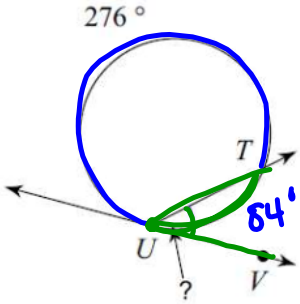


$\angle = \frac{1}{2}$ arc

$\angle = \frac{1}{2}(85)$

$m\angle JKL=42.5$

4. Find the value of ?.



360

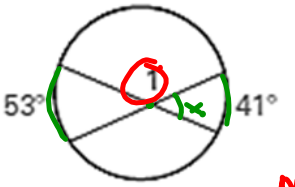
−276

84°

$m\angle TUV=\frac{84}{2}$

$m\angle TUV=42°$

5. Find $m\angle 1$.



$\frac{53+41}{2}=x$

$47°=x$

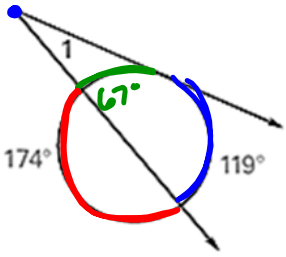
$m\angle 1+x=180$

$m\angle 1+47=180$

$-47 \quad -47$

$m\angle 1=133°$

6. Find $m\angle 1$.



360

−119

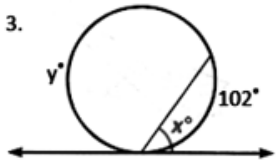
−174

67°

$m\angle 1=\frac{119-67}{2}$

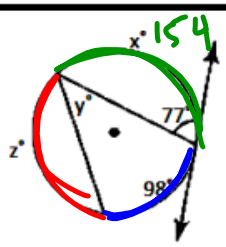
$m\angle 1=26°$

1)



x = 51° y = 258°

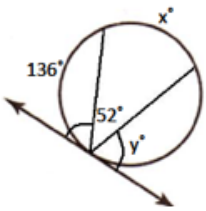
2)



x = 154° y = 49° z = 108°

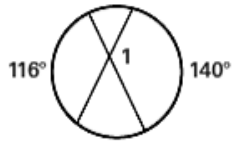
360
- 98
- 154
108°

3)



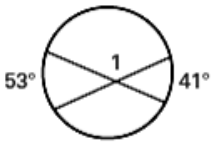
x = 104° y = 60°

4) Solve for Angle 1.



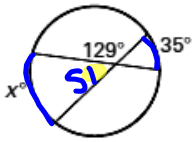
$m\angle 1 = 128°$

5) Solve for Angle 1.



$m\angle 1 = 133°$

6) Solve for x.

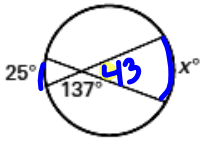


$x = 67°$

$180 - 129 = 51$

$\frac{x+35}{2} = 51$

7) Solve for x.

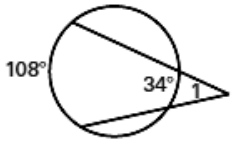


$x = 61°$

$180 - 137 = 43$

$\frac{x+25}{2} = 43°$

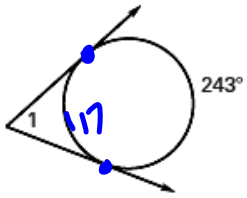
8) Solve for Angle 1.



$m\angle 1 = 37°$

$\frac{108 - 34}{2}$

9) Solve for Angle 1.



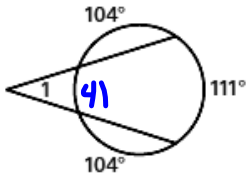
$m\angle 1 = 63°$

1

$\begin{array}{r} 360 \\ -243 \\ \hline 117 \end{array}$

GSE Geometry

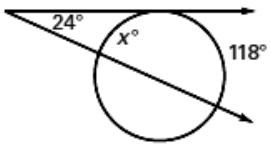
10) Solve for Angle 1.



$m\angle 1 = 35^\circ$

Unit 7: Circles

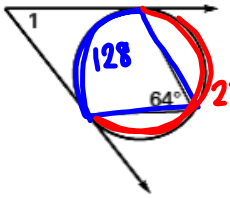
11) Solve for x.



$X = 70^\circ$

$$\frac{118 - X}{2} = 24^\circ$$

12) Solve for Angle 1.

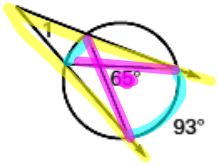


360
−128
232

$\frac{232-128}{2} = m\angle 1$

$52 = m\angle 1$

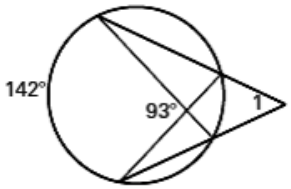
13) Solve for Angle 1.



$\frac{93+x}{2} = 65$

$\frac{93-}{2} = m\angle 1$

14) Solve for Angle 1.



15) Find the measure of all numbered angles.