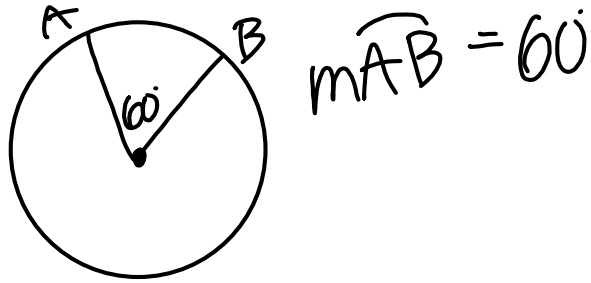
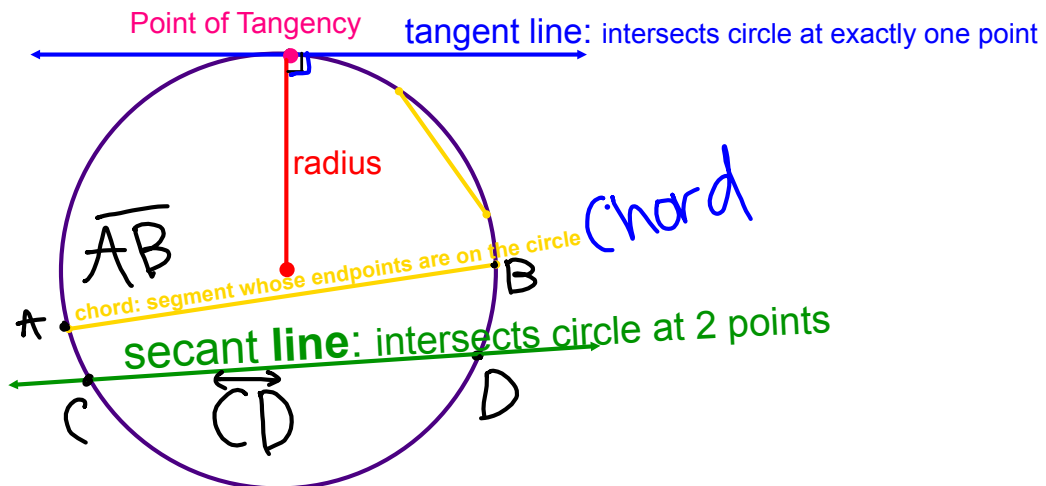


12-4 Chords, Secants, and Tangents

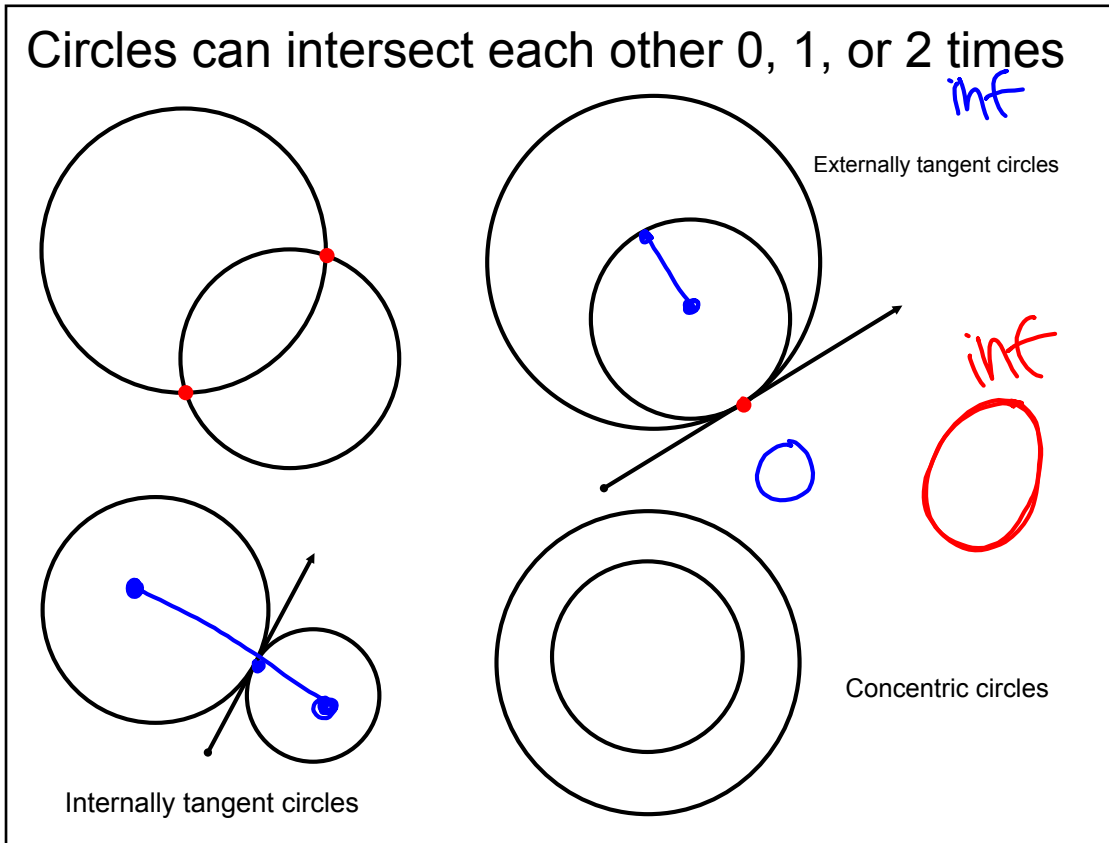
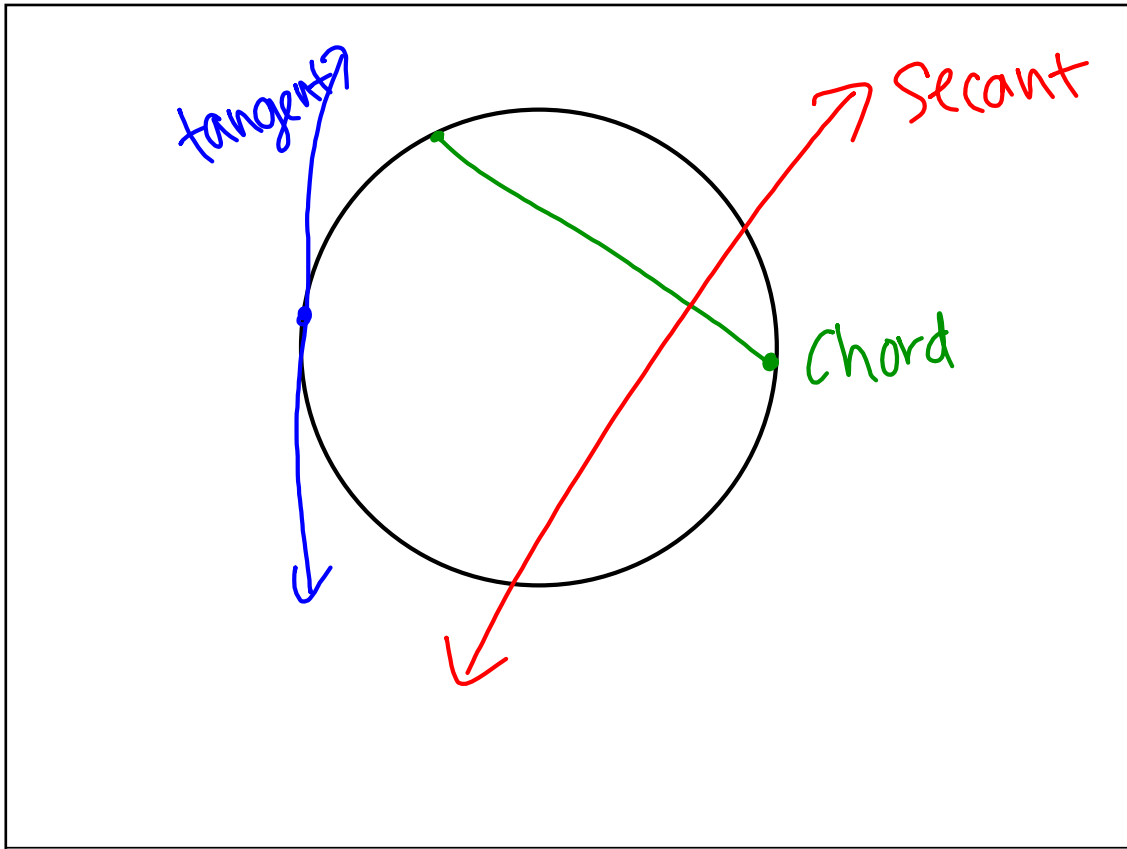
- I can name a chord, secant, and tangent line and their relationship with circles.
- I can describe the relationship between angles and chords when the angles are created inside, outside and on the circle.
- I can describe the relationship between opposite angles of inscribed quadrilaterals.



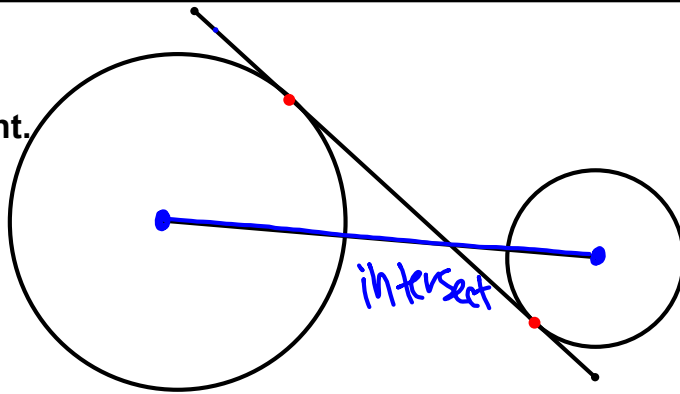
Tangent, Secant Lines and Chords



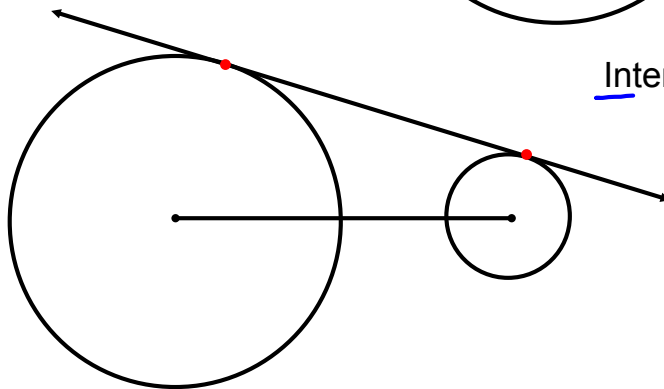
If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency.



A line or segment that is tangent to two circles is called a **common tangent**. There are two types: internal and external.

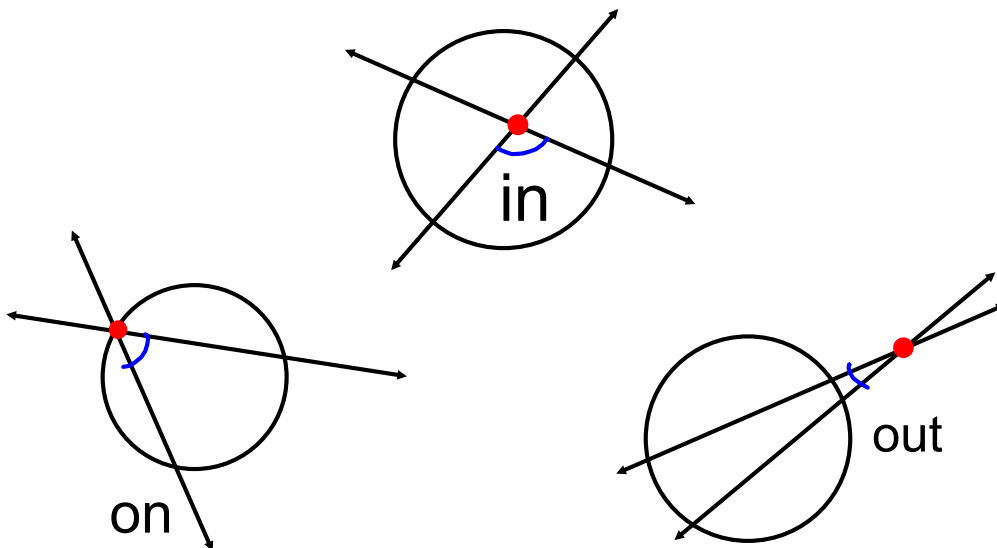


Internal common tangent
Share



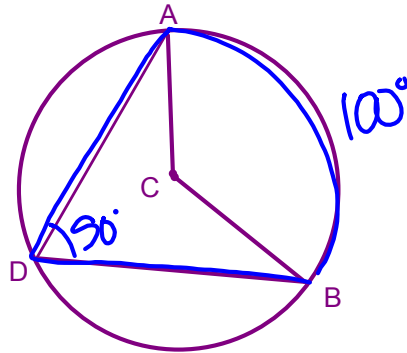
External common tangent

If two lines intersect a circle, there are three places where the lines can intersect.



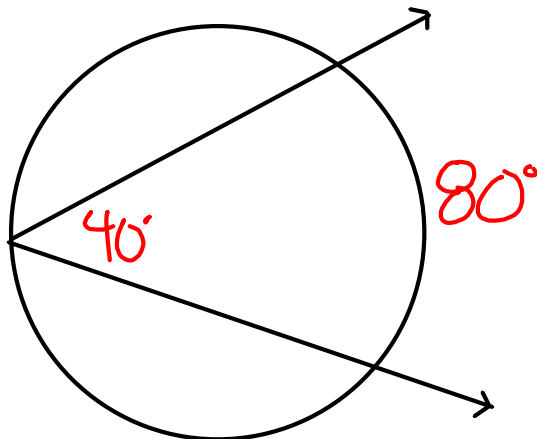
ON

$$m\angle ADB = \frac{1}{2}m\widehat{AB}$$



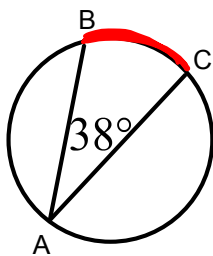
ON

$$\frac{\text{arc}}{2}$$



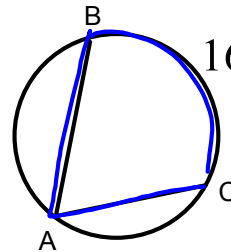
Find the measure of the indicated arc or angle.

1. $m\widehat{BC} =$



$38 \cdot 2 = 76^\circ$

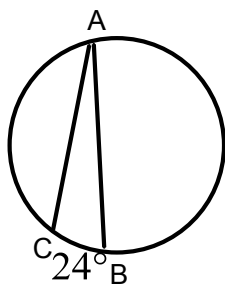
2. $m\angle BAC$



$\frac{160}{2} = 80^\circ$

you try

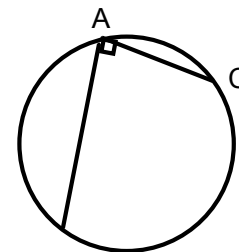
3. $m\angle BAC$



$\frac{24}{2} = 12^\circ$

24°

4. $m\widehat{BC}$

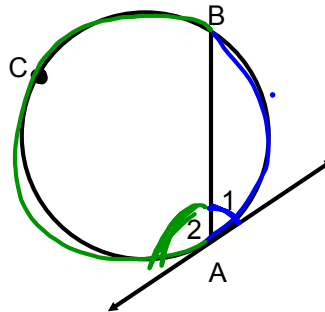


$90 \cdot 2 = 180^\circ$

Another type of ON

$$m\angle 1 = \frac{1}{2} m\widehat{AB}$$

$$m\angle 2 = \frac{1}{2} m\widehat{BCA}$$



Find the measure of angle 1.

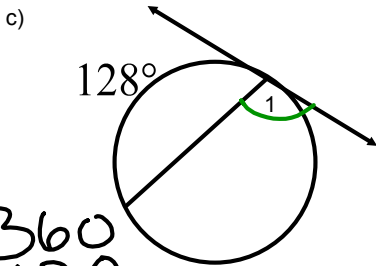
a) $360 - 234 = 126$

$$\frac{126}{2} = \boxed{63^\circ}$$

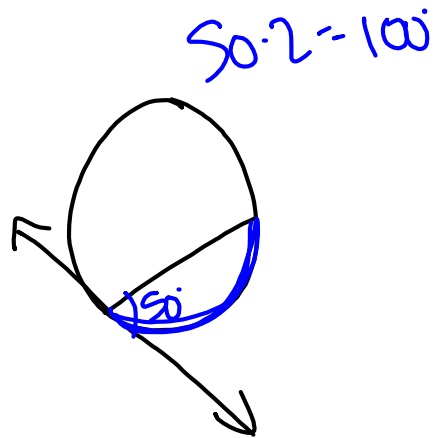
b) $\frac{172}{2} = \boxed{86}$

50

You Try:
Find the measure of angle 1.



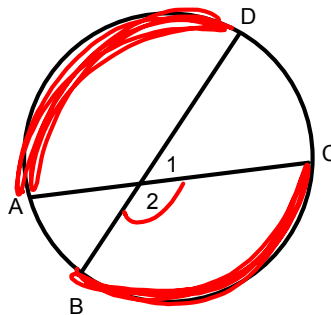
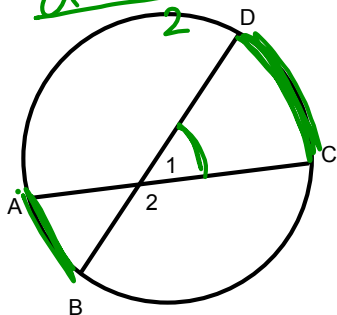
$$\begin{array}{r} 360 \\ - 128 \\ \hline 232 \\ \hline 2 \end{array} = 116^\circ$$



IN

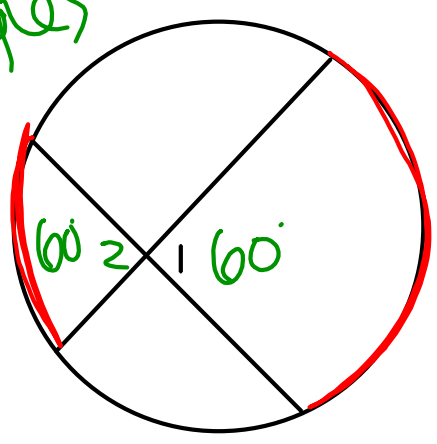
$$m\angle 1 = \frac{1}{2}(m\widehat{CD} + m\widehat{AB}), m\angle 2 = \frac{1}{2}(m\widehat{BC} + m\widehat{AD})$$

ARC₁ + ARC₂



IN

Vertical angles



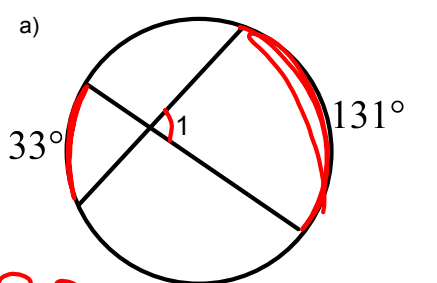
$$\frac{\text{arc}_1 + \text{arc}_2}{2}$$

$$\frac{20 + 100}{2}$$

$$\frac{120}{2} = 60$$

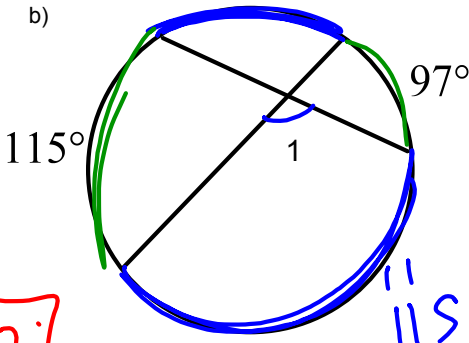
Find the measure of angle 1.

a)



$$\frac{33 + 131}{2} = \frac{164}{2} = \boxed{82}$$

b)



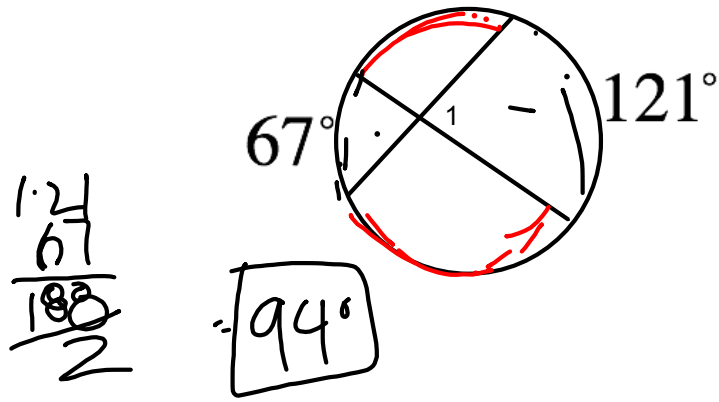
$$\frac{115 + 97}{2} = \frac{212}{2} = \boxed{106}$$

$$\frac{360}{2} = 180$$

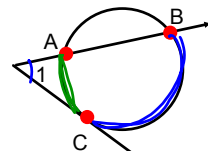
$$180 - 106 = 74$$

$$\boxed{74}$$

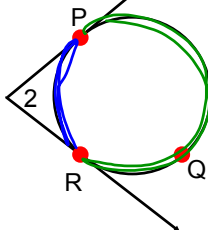
You try: Find the measure of angle 1



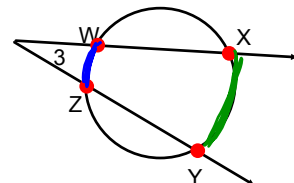
OUT



$$m\angle 1 = \frac{1}{2}(m\widehat{BC} - m\widehat{AC})$$

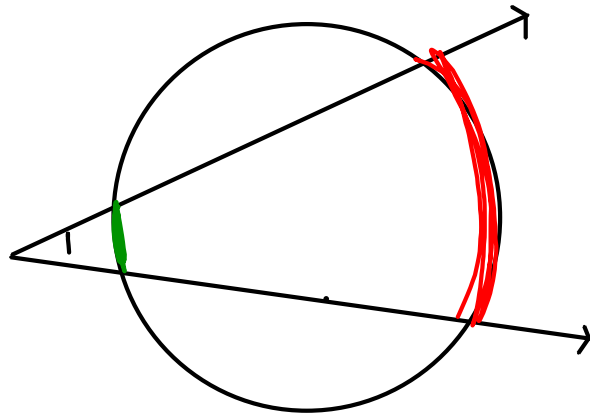


$$m\angle 2 = \frac{1}{2}(m\widehat{PQR} - m\widehat{PR})$$



$$m\angle 3 = \frac{1}{2}(m\widehat{XY} - m\widehat{WZ})$$

OUT

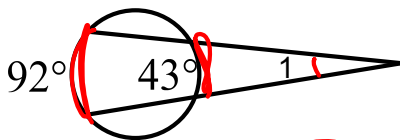


$$\frac{\text{ARC}_1 - \text{ARC}_2}{2}$$

Find the measure of angle 1.

$$\frac{214 - 134}{2} = \frac{80}{2} = 40^\circ$$

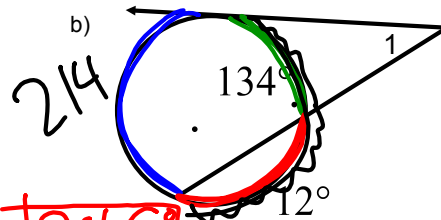
a)



$$\frac{92 - 43}{2} = \frac{49}{2} = 24.5^\circ$$

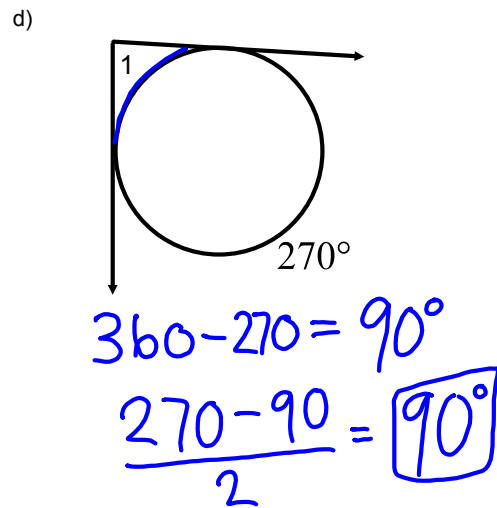
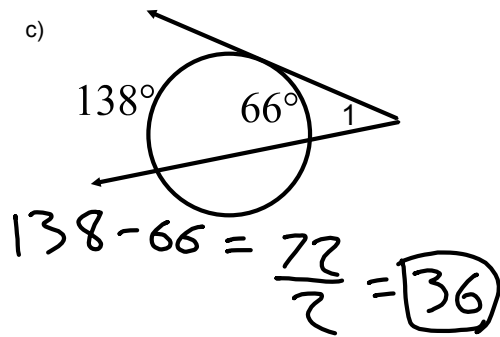
$$\begin{array}{r} 360 \\ - 146 \\ \hline \end{array}$$

b)



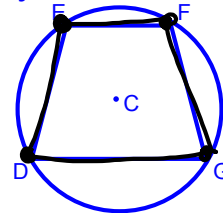
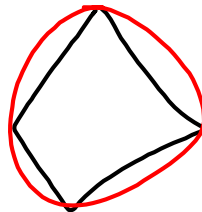
$$\begin{aligned} 134 + 12 &= 146 \\ 360 - 146 &= 214 \end{aligned}$$

you try



A quadrilateral can be inscribed in a circle if and only if its opposite angles are supplementary.

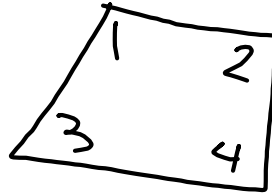
D, E, F, and G lie on some circle, C, if and only if
 $m\angle D + m\angle F = 180^\circ$ and $m\angle E + m\angle G = 180^\circ$



QUAD

360°

if opposite angles are
Supplementary 180°



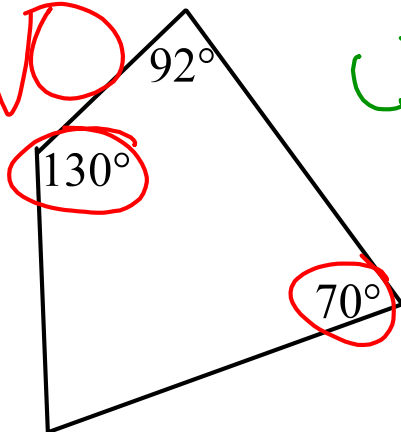
$$1 + 4 = 180$$

$$2 + 3 = 180$$

Can a circle be circumscribed about the quad?

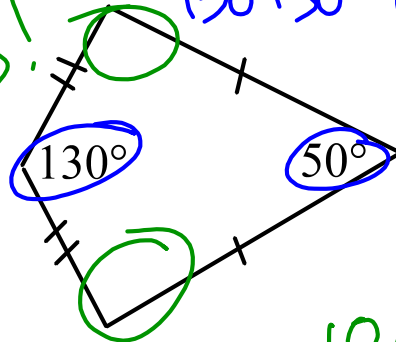
$$130 + 70 = 200$$

NO



Yes!

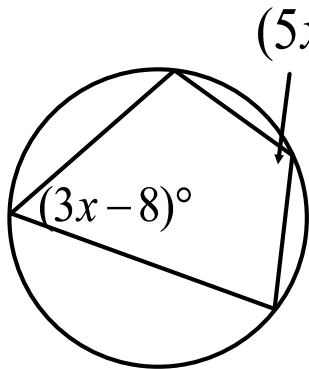
$$130 + 50 = 180$$



$$360 - 180 = 180$$

both green

Find x.

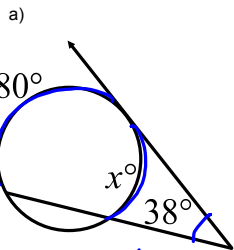


$$3x - 8 + 5x + 2 = 180$$

$$8x - 6 = 180$$

$$\frac{8x}{8} = \frac{186}{8} \quad 23.25$$

Find the value of x.



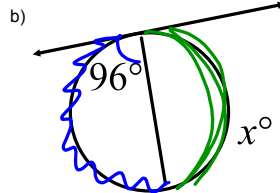
outside

$$\frac{180 - x}{2} = 38 \cdot 2$$

$$180 - x = 76$$

$$-76 + x \quad -76 + x$$

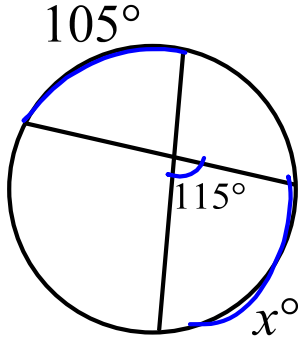
$$104 = x$$



$$360 - x = 96 \cdot 2$$

You try: Find the value of x

c)



$$\frac{105 + x}{2} = 115$$

HW



\overline{AB} segment chord

\overleftrightarrow{AB} line secant