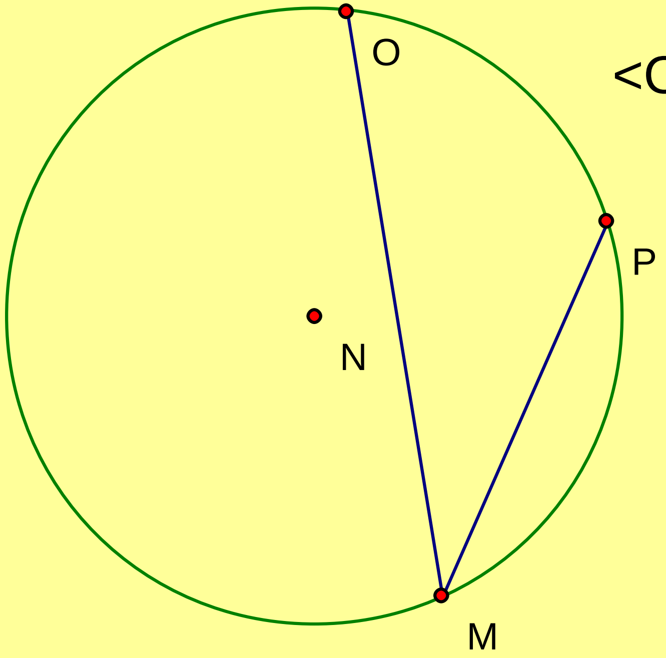
10.4 Inscribed Angles and Polygons

Inscribed Angle:

- An angle whose vertex is on a circle and whose sides contain chords of the circle.



<OMP is an inscribed angle.

Intercepted Arc:

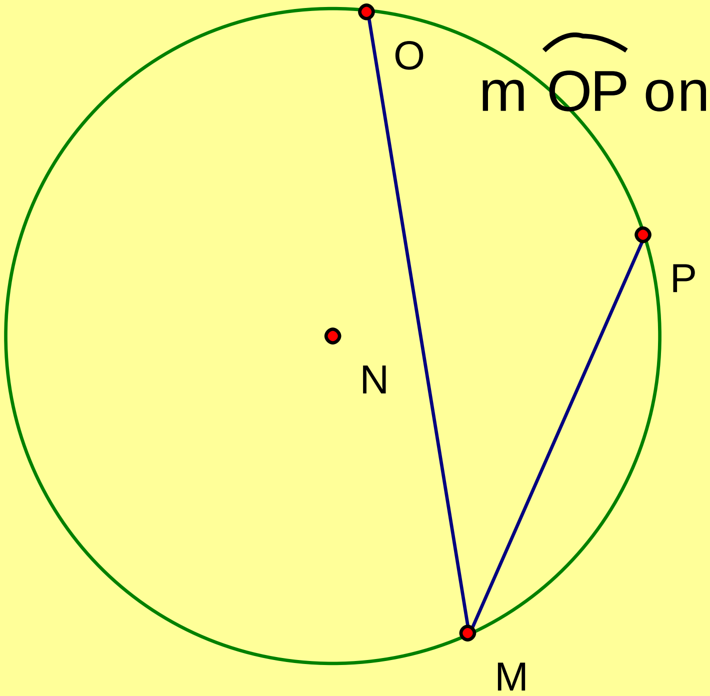
The arc inside the inscribed angle; its endpoints are on the angle.

^OP is the intercepted arc.

It's the part of the circle cut off by the angle.

The measure of an inscribed angle:

- One half the measure of its intercepted arc.



$m\,\overset{\frown}{OP}$ on $\odot NM = 66.01°$

(Let's just say 66.)

What is the measure of angle OMP?

$m\angle OMP = 33.00°$

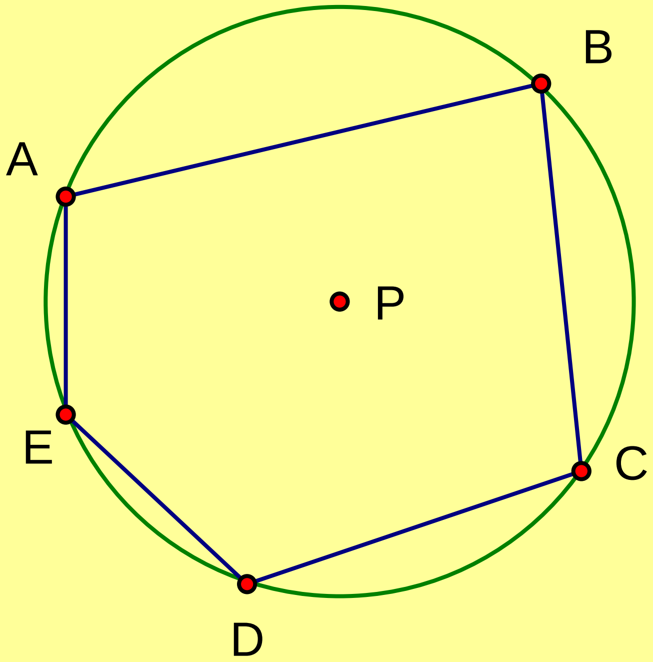
What is the measure of angle ONP?

66

Inscribed Polygon:

- Polygon having all vertices as points of the circle.

- The circle around it is ___**circumscribed**___.

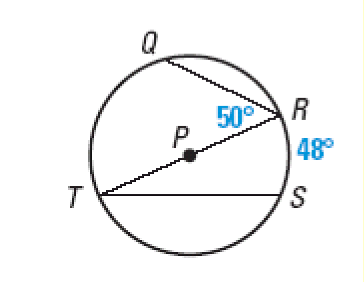


___ABCDE___is inscribed.

___Circle P___is circumscribed.

Use inscribed angles

Find the indicated measure in $\odot P$.



a. $m\angle T$ **b.** $m\overset{\frown}{QR}$

SOLUTION

a. $M\angle T = \frac{1}{2}\, m\overset{\frown}{RS} = \frac{1}{2}(48^{o}) = 24^{o}$

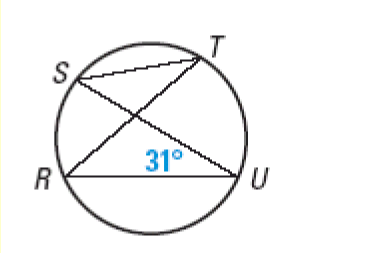
b. $m\overset{\frown}{TQ} = 2m\angle R = 2 \cdot 50^{o} = 100^{o}$. **Because** $\overset{\frown}{TQR}$ **is a semicircle,**

$mQR = 180^{o} - \;mTQ \;= 180^{o} - 100^{o} = 80^{o}$. So, $mQR = 80^{o}$.

EXAMPLE 2

Find the measure of an intercepted arc

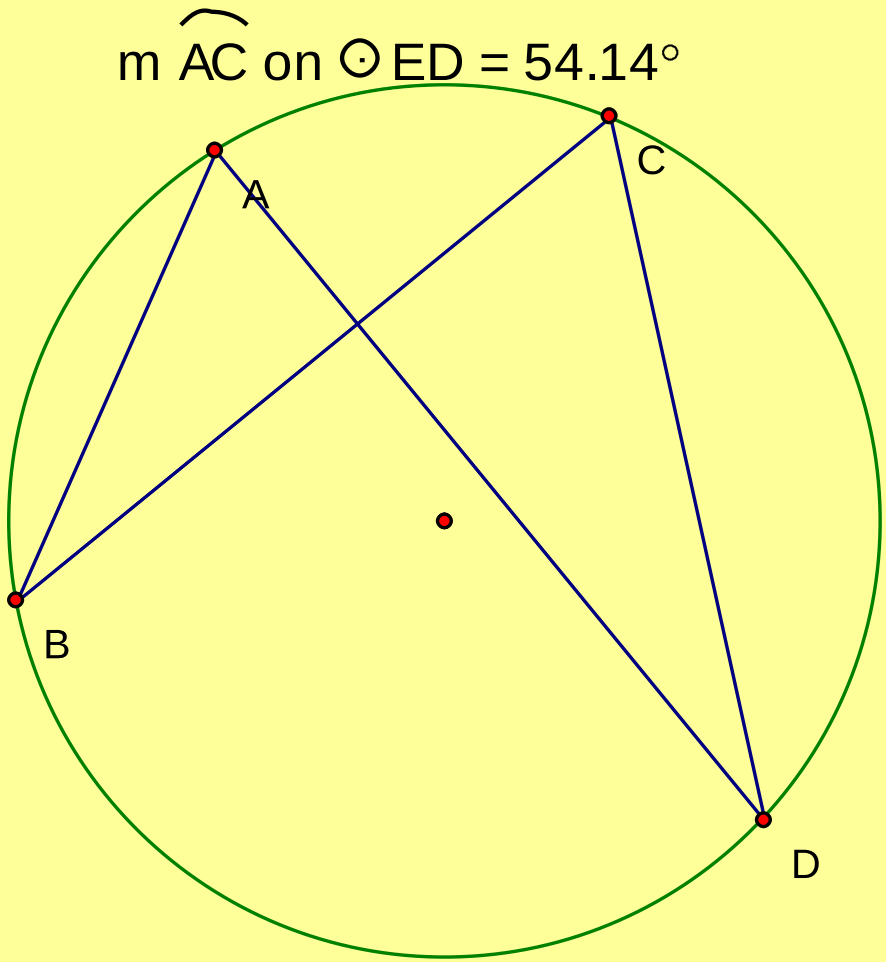
Find $m\overset{\frown}{RS}$ **and** $m\angle STR$**. What do you notice about** $\angle STR$ **and** $\angle RUS$**?**



SOLUTION

From Theorem 10.7, **you know that** $m\overset{\frown}{RS} = 2m\angle RUS$
$= 2\,(31^\circ) = 62^\circ$.

Also, $m\angle STR = \frac{1}{2}\, m\overset{\frown}{RS} = \frac{1}{2}(62^\circ) = 31^\circ$. **So,** $\angle STR \cong \angle RUS$.



What is the measure of angle B?

What is the measure of angle D?

Can you make any conclusions about Inscribed angles that intersect the same arc?

They are both 27.07 .

If two inscribed angles of a circle intercept the same arc, then the angles are congruent.

EXAMPLE 3

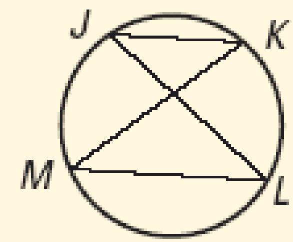
Name two pairs of congruent angles in the figure.

Ⓐ $\angle JKM \cong \angle KJL$, $\angle JLM \cong \angle KML$

Ⓑ $\angle JLM \cong \angle KJL$, $\angle JKM \cong \angle KML$

Ⓒ $\angle JKM \cong \angle JLM$, $\angle KJL \cong \angle KML$

Ⓓ $\angle JLM \cong \angle KJL$, $\angle JLM \cong \angle JKM$



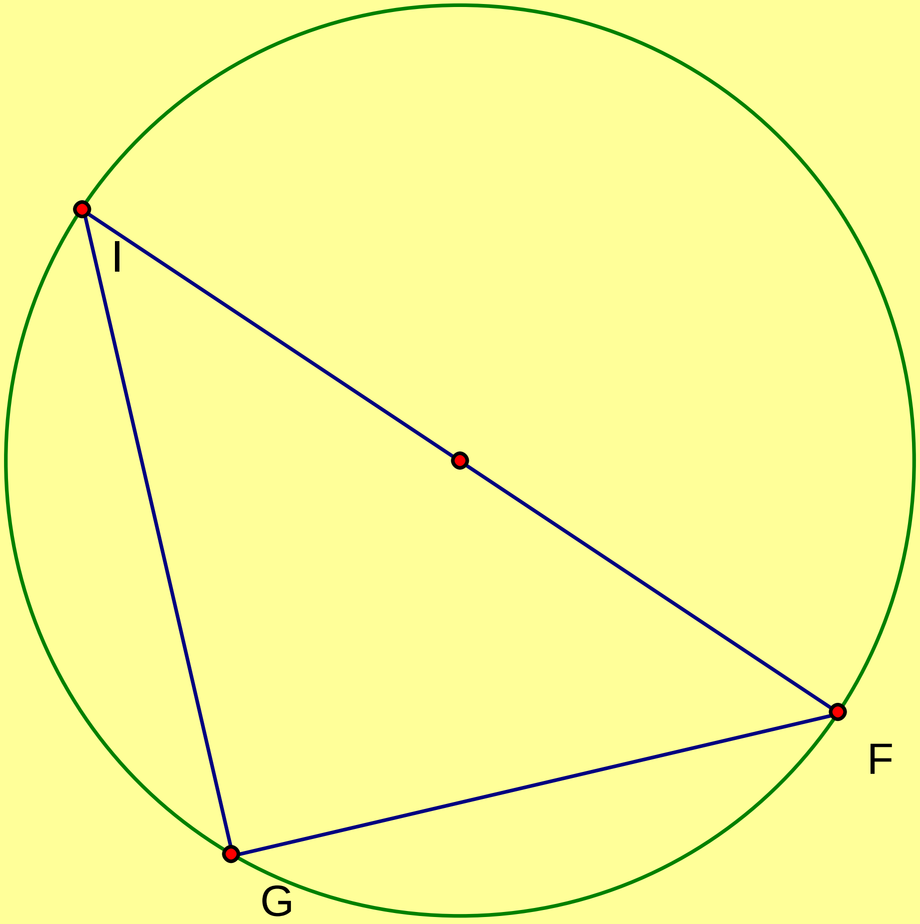
SOLUTION

Notice that $\angle JKM$ **and** $\angle JLM$ **intercept the same arc, and so** $\angle JKM \cong JLM$ **by Theorem** 10.8. **Also,**$\angle KJL$ **and**$\angle KML$ **intercept the same arc, so they must also be congruent. Only choice C contains both pairs of angles.**

So, by Theorem 10.8**, the correct answer is** C**.** Ⓐ Ⓑ Ⓒ Ⓓ

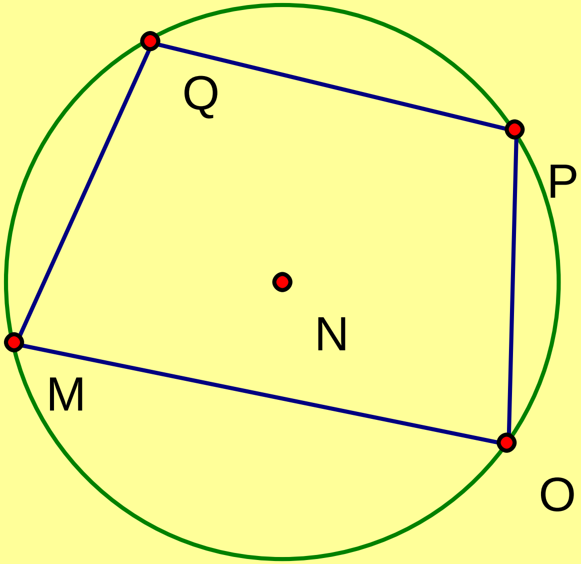
If IF is a diameter, what is the measure of angle G?

$m\angle IGF = 90.00°$



If a triangle is inscribed in a circle so that its side is a diameter, then the triangle is a right triangle.

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



Which angles are supplementary?

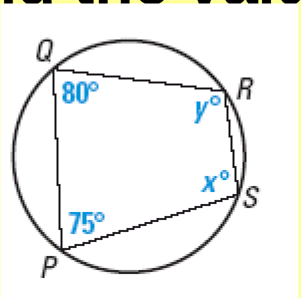
What is the sum of all of the angles?

Q, O and M, P 360

EXAMPLE 5 **Use Theorem 10.10**

Find the value of each variable.

a.



SOLUTION

a. *PQRS* **is inscribed in a circle, so opposite angles are supplementary.**

$m\angle P + m\angle R = 180^{o}$

$75^{o} + y^{o} = 180^{o}$

$y = 105$

$m\angle Q + m\angle S = 180^{o}$

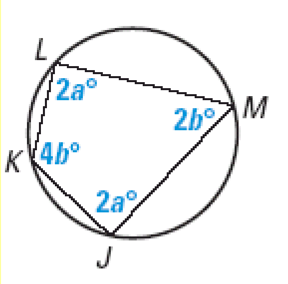
$80^{o} + x^{o} = 180^{o}$

$x = 100$

EXAMPLE 5 **Use Theorem 10.10**

Find the value of each variable.

b.



SOLUTION

b. *JKLM* **is inscribed in a circle, so opposite angles are supplementary.**

$m\angle J + m\angle L = 180^\circ$

$2a^\circ + 2a^\circ = 180^\circ$

$4a = 180$

$a = 45$

$m\angle K + m\angle M = 180^\circ$

$4b^\circ + 2b^\circ = 180^\circ$

$6b = 180$

$b = 30$

Geometry

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- day 2

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Sophomore Math

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