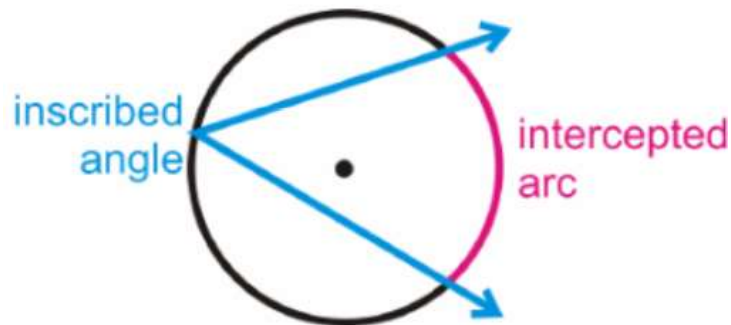


# CIRCLES

## ARCS AND INSCRIBED ANGLES



### Unit Overview

In this unit, students will identify and describe relationship among inscribed angles and arcs.

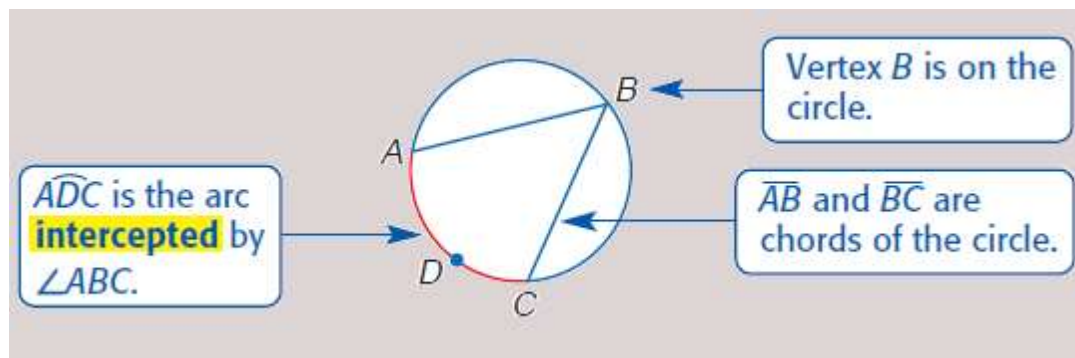
### Key Vocabulary

<b>Chord</b>	Segment whose endpoints lie on a circle
<b>Inscribed angle</b>	Angle whose vertex is on a circle and whose sides contain chords of the circle
<b>Radius</b>	The distance from the center of the circle to its outer rim
<b>Diameter</b>	A chord that passes through the center of a circle; the length of a diameter is two times the length of a radius
<b>Circle</b>	Set of all points in the plane that are the same distance away from a specific point, called the center.
<b>Center</b>	A circle is usually named by its center point.
<b>Arc</b>	Part of the circumference of a circle.
<b>Circumference</b>	The distance around the circle
<b>Vertex</b>	The common endpoint of two or more rays or line segments
<b>Intercepted Arc</b>	The arc that is on the interior of the inscribed angle and whose endpoints are on the angle

## Arcs and Inscribed Angles

An **inscribed angle** is an angle that has its vertex on a circle and its sides are chords of the same circle. The **vertex** of an inscribed angle can be anywhere on the circle as long as its sides intersect the circle.

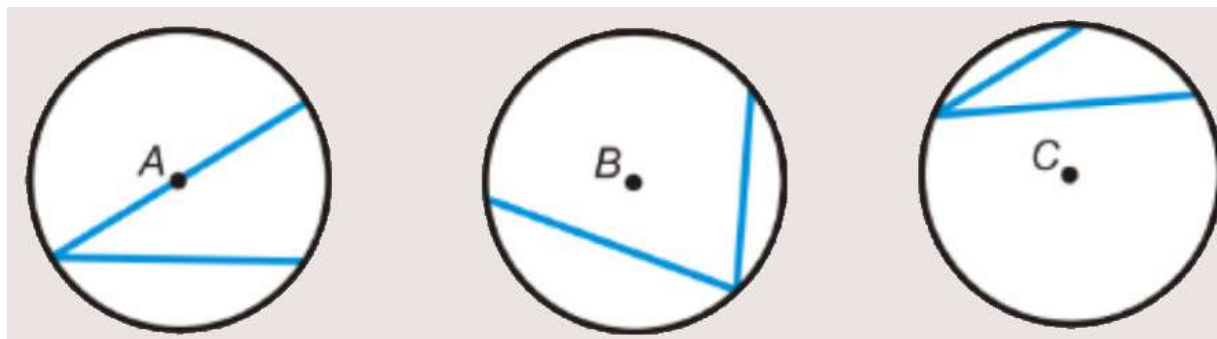
Click on the word [Inscribed Angle](#) to practice moving the arc.



The arc that is on the interior of the inscribed angle and whose endpoints are on the angle is the **intercepted arc**. If you look at the above image *arc ADC* is the arc intercepted by *angle ABC*.

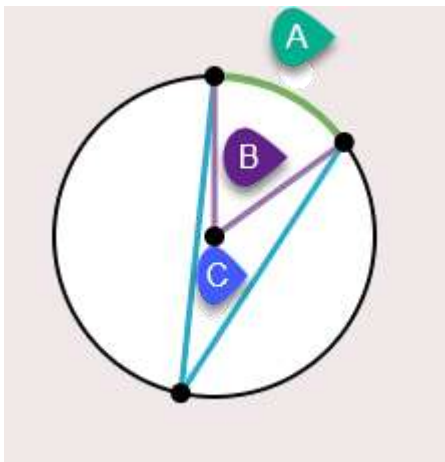
Click on the word [Intercepted Arc](#) to practice moving the arc.

The center of the circle can be on the side of the inscribed angle, or it can be either inside or outside the angle. Look at the examples below.



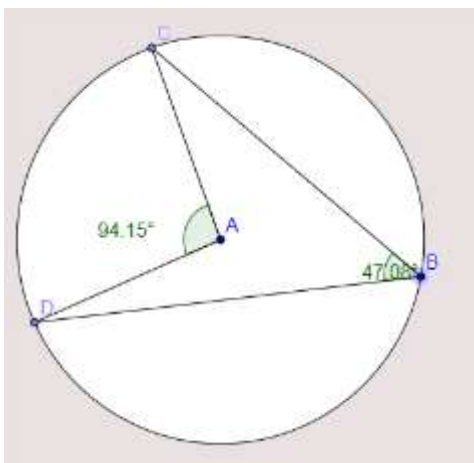
## Let's Practice – Arcs and Inscribed Angles

Look at the circle below and identify the variable with its correct term for Questions 1-3.



- 1.) Variable Green (Intercepted Arc)
- 2.) Variable Purple B (Central Angle)
- 3.) Variable Blue C (Inscribed Angle)

Look at the circle below and identify the following angles as either central or inscribed for Questions 4-5.



- 4.)  $\angle CBD$  (Inscribed angle)
- 5.)  $\angle CAD$  (Central Angle)

Fill in the blank for Questions 6-7.

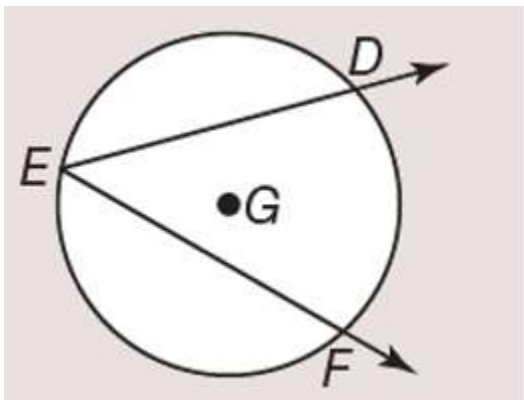
6.) An angle whose vertex is on a circle and whose sides contains chords of the circle is an inscribed angle.

7.) An angle whose vertex is the center of a circle is a central angle.

## Measures of Inscribed Angles

- The *measure of an inscribed angle* is equal to half the measure of its intercepted arc.  
Look at the theorem formula below.

$$\text{measure } \angle DEF = \frac{1}{2} \text{ measure of minor arc } DF$$



### Example A

*In Circle G above, measure of minor arc DF = 90. Find measure  $\angle DEF$ .*

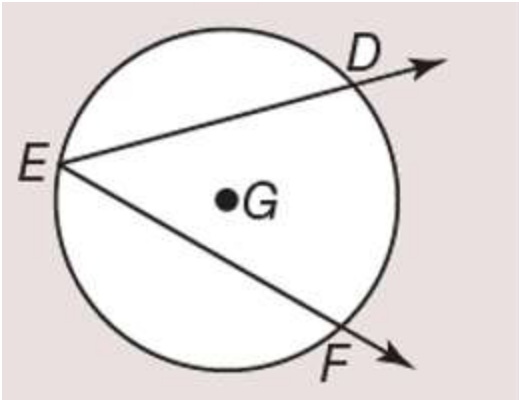
Step 1: the measure of  $\angle DEF = \frac{1}{2}$  measure of minor arc DF.

Step 2:  $\frac{1}{2}$  (90)  $\rightarrow$  divide 90 by 2

Step 3: 45

- The *measure of an intercepted arc* is equal to twice the measure of its inscribed angle.  
Look at the theorem formula below.

$$2 (\text{measure of } \angle DEF) = \text{measure of minor arc } DF$$



### Example B

In Circle  $G$  above, the measure of  $\angle DEF = 42$ , find the measure of minor arc  $DF$ .

Step 1: the measure of *minor arc*  $DF = 2(\text{measure of } \angle DEF)$

Step 2:  $2(42) \rightarrow$  multiply 2 by 42

Step 3: 84

Click on the word [angle measures](#) to view the relationship between a central and inscribed angles.

### Let's Practice – Measures of Inscribed Angles

Fill in the blank for Questions 8-10.

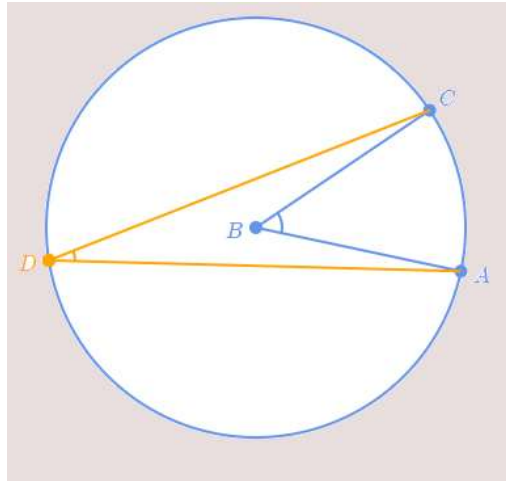
8.) The central angle is equal to the intercepted arc.

9.) The inscribed angle is half of the intercepted arc.

10.) The intercepted arc is doubled the inscribed angle.

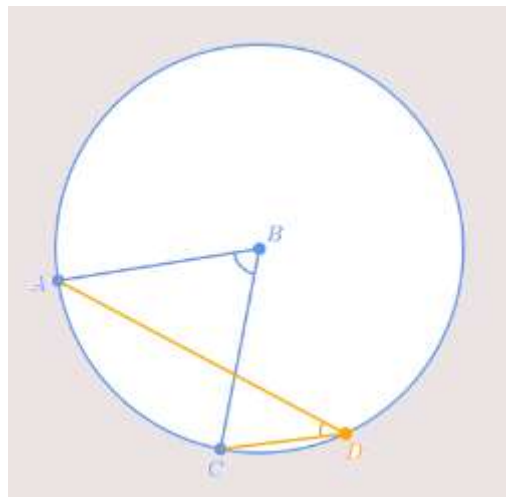
Find the measure of Inscribed angles for Questions 11-15.

11.) If  $\angle ADC = 23^\circ$ , what does  $\angle ABC$  measure?



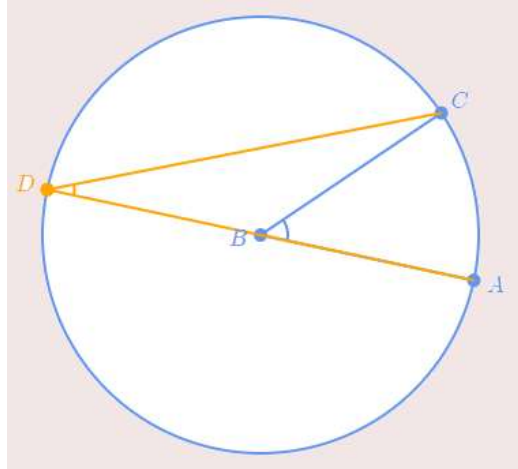
( $46^\circ \rightarrow$  angle ABC is a central angle so it's double the inscribed angle)

12.) If  $\angle ADC = 35^\circ$ , what does  $\angle ABC$  measure?



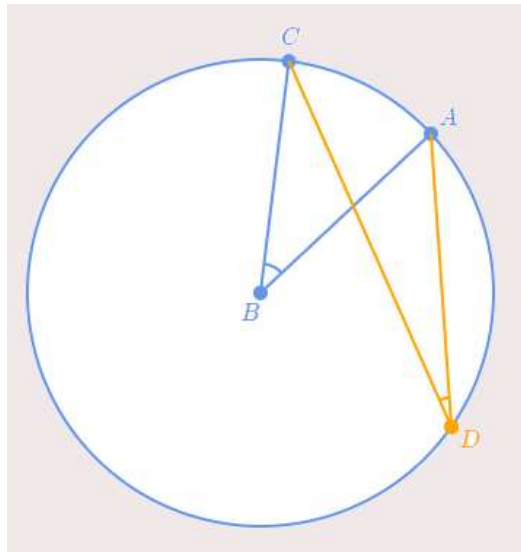
( $70^\circ \rightarrow$  angle ABC is a central angle so it's double the inscribed angle)

13.) If  $\angle ABC = 46^\circ$ , what does  $\angle ADC$  measure?



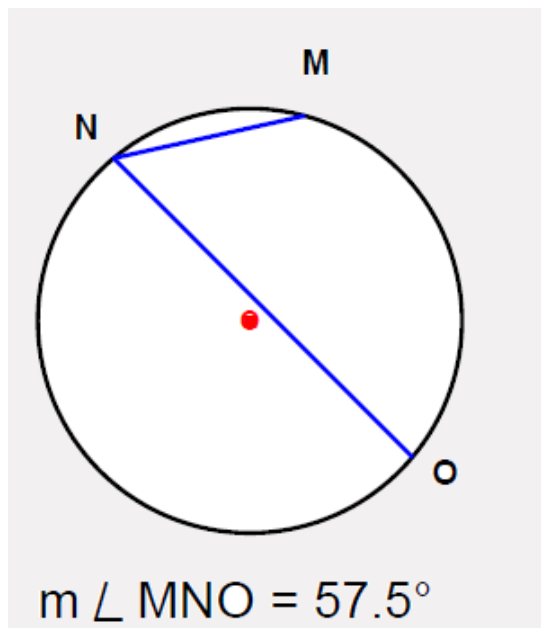
( $23^\circ \rightarrow$  angle ADC is an inscribed angle so it's  $\frac{1}{2}$  the central angle)

14.) If  $\angle ABC = 40^\circ$ , what does  $\angle ADC$  measure?



( $20^\circ \rightarrow$  angle ADC is an inscribed angle so it's  $\frac{1}{2}$  the central angle)

15.) Find the measure of the *Intercepted Arc MO*.



( $115^\circ \rightarrow$  Arc MO is an intercepted arc so it's double the inscribed angle)

## Summary – Arcs and Central Angles

An **inscribed angle** is an angle with its vertex on the circle and whose sides are chords.

The **intercepted arc** is the arc that is inside the inscribed angle and whose endpoints are on the angle. The **vertex** of an inscribed angle can be anywhere on the circle as long as its sides intersect the circle to form an intercepted arc.

An inscribed angle is **half** the measure of its intercepted arc. The intercepted arc is **equal to** the central angle. The intercepted arc is **twice** the measure of the inscribed angle.

## Let's Practice – Summary

Read the sentences carefully and answer Questions 16-20.

- 16.) An inscribed angle has a measure of  $68^\circ$ . What is the measure of the arc it intercepts? ( $136^\circ$ )
- 17.) An inscribed angle has a measure of  $160^\circ$ . What is the measure of the arc it intercepts? ( $320^\circ$ )
- 18.) An inscribed angle intercept has an arc of  $95^\circ$ . What is the measure of the inscribed angle? ( $47.5^\circ$ )
- 19.) An inscribed angle intercept has an arc of  $180^\circ$ . What is the measure of the inscribed angle? ( $90^\circ$ )
- 20.) An inscribe angle has a measure of  $94^\circ$ . What is the measure of the arc it intercepts? ( $188^\circ$ )





Below are additional educational resources and activities for this unit.



Click on the icon to the left to watch a video and complete a quiz on Circles.



Click on the icon to the left to watch a video on Inscribed Angles.

[Practice 1: Arcs and Inscribed Angles](#)

[Practice 2: Intercepted Arcs](#)