



This is a resource from CPALMS (www.cpalms.org) where all educators go for bright ideas!
Resource ID#: 70891

Primary Type: Formative Assessment

Central and Inscribed Angles

Students are asked to describe the relationship between a central angle and an inscribed angle that intercept the same arc.

General Information

Subject(s): Mathematics

Grade Level(s): 9, 10, 11, 12

Intended Audience: [Educators](#)

Freely Available: Yes

Keywords: MFAS, circle, central angle, inscribed angle, arc, intercepted arc, center of a circle, radius, radii, angle measure, arc measure, vertex, Central Angle Theorem

Instructional Component Type(s): [Formative Assessment](#)

Resource Collection: MFAS Formative Assessments

Attachment

[MFAS_CentralAndInscribedAngles_Worksheet.docx](#)

[MFAS_CentralAndInscribedAngles_Worksheet.pdf](#)

Formative Assessment Task

Instructions for Implementing the Task

This task can be implemented individually, with small groups, or with the whole class.

1. The teacher asks the student to complete the problem on the Central and Inscribed Angles worksheet.
2. The teacher asks follow-up questions, as needed.

TASK RUBRIC

Getting Started

Misconception/Error

The student is unable to draw or distinguish between an inscribed angle and a central angle of a circle.

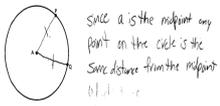
Examples of Student Work at this Level

The student does not correctly relate the location of the vertex for each type of angle with the parts of the circle.

The student:

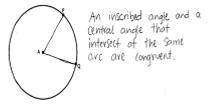
- Draws a central angle but does not identify it as such (and uses incorrect terminology).

Describe the relationship between an inscribed angle and a central angle that intercept the same arc. Use the circle below to illustrate your reasoning.



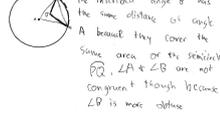
- Indicates that a central and an inscribed angle are the same angle.

Describe the relationship between an inscribed angle and a central angle that intercept the same arc. Use the circle below to illustrate your reasoning.



- Draws the inscribed angle incorrectly (places the vertex in the circle).

Describe the relationship between an inscribed angle and a central angle that intercept the same arc. Use the circle below to illustrate your reasoning.



Questions Eliciting Thinking

What is a central angle? Did you draw one?

What is an inscribed angle? Did you draw one?

What does it mean for an angle to intercept an arc?

What arcs do your angles intercept?

Instructional Implications

Review terminology related to angles of a circle (e.g., central angle, inscribed angle, intercepted arc, semicircle, diameter, and center) and the definitions and theorems that describe angle measures in relation to intercepted arcs. Illustrate the differences between a central and an inscribed angle by emphasizing the location of their vertices with respect to the circle (e.g., the vertex of a central angle is the center of a circle and the vertex of an inscribed angle is a point on the circle).

Consider using one of the following sites which enable the student to explore the relationships between angle measure and arc measure:

- Math Open Reference: <http://www.mathopenref.com/>.
- Direct link to explore the Central Angle: <http://www.mathopenref.com/arcangle.html>. Select the box marked "Show central angle measure" to visualize how the central angle measure changes when the arc is adjusted.
- Direct link to explore the Inscribed Angle: <http://www.mathopenref.com/circleinscribed.html>. The student is able to move the vertex of the inscribed angle around the circle (while the intercepted arc remains fixed) and to observe how the measure of the angle remains the same regardless of its location.
- Direct link to explore the relationship between an inscribed and a central angle that intercept the same arc: <http://www.mathopenref.com/arccentralangletheorem.html>.

If needed, provide instruction on using correct notation when naming angles and arcs. Address the differences in naming minor and major arcs of a circle.

Making Progress

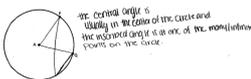
Misconception/Error

The student is unable to correctly describe the relationship between the measures of a central and inscribed angle that intercept the same arc.

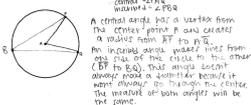
Examples of Student Work at this Level

The student correctly draws and identifies a central angle and an inscribed angle and may describe the location of the vertex for each angle type. However, the student either is unable to describe the relationship between their measures or describes the relationship incorrectly. For example, the student says the two angles have the same measure.

Describe the relationship between an inscribed angle and a central angle that intercept the same arc. Use the circle below to illustrate your reasoning.



Describe the relationship between an inscribed angle and a central angle that intercept the same arc. Use the circle below to illustrate your reasoning.



Questions Eliciting Thinking

What do you know about the measure of a central angle in relation to its intercepted arc?

Does the inscribed angle that you drew look like it has the same measure as the central angle?

If the vertex of the inscribed angle is labeled B and the measure of arc PQ = 60° , then what are the measures of $\angle PAQ$ and $\angle PBQ$? What do you think, in general, is the relationship between the measures of an inscribed angle and a central angle that intercept the same arc?

Instructional Implications

Review the relationship between central angles and their intercepted arcs and inscribed angles and their intercepted arcs. Using the student's illustration, suggest a measure for one of the two angles or the intercepted arc and ask the student to find the other two measures. Then ask the student to describe the relationship between the measure of a central angle and an inscribed angle that intercept the same arc.

Provide the student with a variety of practice problems in which a central angle and an inscribed angle intercept the same arc. In each problem, give the student only the central angle measure, the inscribed angle measure, or the intercepted arc measure and ask the student to find the other two measures. Include a problem in which the measure of the intercepted arc is given as x° , and the student is asked to write expressions representing the measures of the central angle and the inscribed angle. Then ask the student to verbally describe the relationship between the measures of a central angle and an inscribed angle that intercept the same arc.

If needed, provide instruction on using correct notation when naming angles and arcs. Address the differences in naming minor and major arcs of a circle.

Consider implementing other MFAS tasks for G-C.1.2.

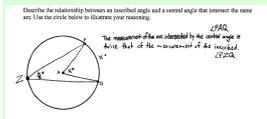
Got It

Misconception/Error

The student provides complete and correct responses to all components of the task.

Examples of Student Work at this Level

The student correctly draws a central angle and an inscribed angle that intercept \overline{PQ} . The student explains that the measure of the central angle is the same as the measure of the intercepted arc, but the measure of the inscribed angle is half the measure of the intercepted arc. Consequently, the measure of an inscribed angle is half the measure of a central angle when both intercept the same arc.



Questions Eliciting Thinking

Suppose the vertex of an inscribed angle is on the circle between points P and Q (on \overline{PQ}) and its sides contain points P and Q. How is the measure of this inscribed angle related to the measure of the inscribed angle you drew?

Instructional Implications

Ask the student to prove that the measure of an inscribed angle is half the measure of its intercepted arc.

Consider implementing other MFAS tasks for G-C.1.2.

Accommodations & Recommendations

Special Materials Needed:

- Central and Inscribed Angles worksheet

Source and Access Information

Contributed by: MFAS FCRSTEM

Name of Author/Source: MFAS FCRSTEM

District/Organization of Contributor(s): Okaloosa

Is this Resource freely Available? Yes

Access Privileges: Public

License: [CPALMS License - no distribution - non commercial](#)

Aligned Standards

Name	Description
MAFS.912.G-C.1.2:	Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.