LESSON MAKER PRO

Circle Angle Connections

Use arcs, angles, diameters, and tangents to find exact measures.

HIGH SCHOOL · HSG-C.A.2

CCSS.Math.Content.HSG-C.A.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..."

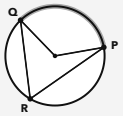
NAME _____ DATE _____

THE BIG IDEA

A central angle has its vertex at the center, and its measure equals the measure of its intercepted arc. An inscribed angle has its vertex on the circle, and its measure is half the measure of its intercepted arc. An inscribed angle that intercepts a diameter is 90°, and a radius to a point of tangency is perpendicular to the tangent.

WORKED EXAMPLE

The highlighted minor arc PQ measures 124°. Find m∠POQ and m∠PRQ in the figure.

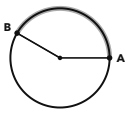


1. m∠POQ equals the measure of intercepted arc PQ.
2. m∠POQ = 124°.
3. m∠PRQ is half of intercepted arc PQ, so 124/2 = 62°.

Answer: m∠POQ = 124°; m∠PRQ = 62°

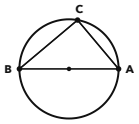
PRACTICE 6 problems

1 The minor arc AB measures 150°. Find m∠AOB in the figure.



ANSWER _____

2 In the figure, AB is a diameter. Find m∠ACB.



ANSWER _____

3 Radius OT meets tangent line t at T. Find m∠OTt.

ANSWER _____

4 An inscribed angle intercepts an arc measuring 74°. Find the measure of the inscribed angle.

ANSWER _____

5 Central angle ∠AOB and inscribed angle ∠ACB intercept the same arc AB. If m∠AOB = 6x + 12 and m∠ACB = 2x + 18, find x.

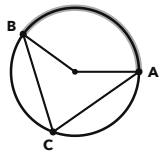
ANSWER _____

6 Inscribed angles ∠ADB and ∠ACB intercept the same arc AB. If m∠ADB = 48°, find m∠ACB.

ANSWER _____

APPLY IT Show your work

1 A concert venue uses the circular stage map shown. The lighted arc from A to B forms central angle ∠AOB, which measures 144°. A camera position at C on the edge of the map forms inscribed angle ∠ACB. What is m∠ACB?



ANSWER _____

2 A bike wheel has a radius of 8 inches. When the wheel touches level pavement at T, the radius to T is perpendicular to the pavement. A reflector on the pavement is 15 inches from T. How far is the reflector from the center of the wheel?

WORK SPACE

ANSWER _____

CHALLENGE One step up

AB is a diameter of a circle. Points C and D are on the circle. If m∠ACB = 4x + 10 and m∠ADB = 3x + 30, find x and the measure of each angle. Explain why both angles have that measure.

WORK SPACE AND ANSWER

ANSWER KEY

Circle Angle Connections

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The minor arc AB measures 150°. Find m∠AOB in the figure.	**150°**
2	In the figure, AB is a diameter. Find m∠ACB.	**90°**
3	Radius OT meets tangent line t at T. Find m∠OTt.	**90°**
4	An inscribed angle intercepts an arc measuring 74°. Find the measure of the inscribed angle.	**37°**
5	Central angle ∠AOB and inscribed angle ∠ACB intercept the same arc AB. If m∠AOB = 6x + 12 and m∠ACB = 2x + 18, find x.	**x = 12**
6	Inscribed angles ∠ADB and ∠ACB intercept the same arc AB. If m∠ADB = 48°, find m∠ACB.	**48°**

PART 2 · APPLY IT

1. **72°** ∠ACB is an inscribed angle that intercepts the same arc as the 144° central angle. Its measure is 144/2 = 72°.
2. **17 inches** The radius and the pavement form a right angle at T, making an 8-15 right triangle. The distance from the center to the reflector is sqrt(8^2 + 15^2) = 17 inches.

CHALLENGE

x = 20; m∠ACB = 90° and m∠ADB = 90°. Each inscribed angle intercepts diameter AB, so each is a right angle.

Accept equivalent notation for angle measures, including answers written with or without the degree symbol when the unit is clear. For the challenge, students should state that an inscribed angle intercepting a diameter is a right angle.