LESSON MAKER PRO

Circle Angle Connections

Use arcs, tangents, radii, and diameters to find angle 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 _____

CIRCLE ANGLE RULES

A chord joins two points on a circle and determines the arcs named by its endpoints. A central angle has its vertex at the center and equals its intercepted arc, while an inscribed angle has its vertex on the circle and is half its intercepted arc. An angle made by two tangents outside a circle is half the difference of its intercepted arcs, a radius to a tangent point is perpendicular to the tangent, and an inscribed angle that intercepts a diameter is a right angle.

WORKED EXAMPLE

An inscribed angle intercepts an arc that measures 122°. Find the angle measure.

1. An inscribed angle is half its intercepted arc.
2. m∠ACB = 1/2(122°).
3. m∠ACB = 61°.

Answer: 61°

PRACTICE 6 problems

1 In circle O, chord AB has central angle m∠AOB = 84°. Find m(arc AB).

ANSWER _____

2 An inscribed angle intercepts an arc measuring 146°. Find the angle measure.

ANSWER _____

3 AB is a diameter of a circle, and C is another point on the circle. Find m∠ACB.

ANSWER _____

4 Radius OT ends at T. Point P is on the tangent line at T. Find m∠OTP.

ANSWER _____

5 Two tangents from P touch a circle at A and B. The minor arc AB measures 110°. Find m∠APB.

ANSWER _____

6 A central angle measures 132° and an inscribed angle intercepts the same arc. Find the inscribed angle measure.

ANSWER _____

APPLY IT Show your work

1 At a music festival, a circular light ring has center O. Lights A and B are separated by a central angle of 150°. A camera at C is on the major arc AB and records ∠ACB. What is m∠ACB?

WORK SPACE

ANSWER _____

2 For a game streaming graphic, two straight border lines PA and PB touch a circular icon at A and B. The minor arc AB measures 128°, and the major arc AB measures 232°. Find m∠APB.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Two tangents PA and PB touch a circle at A and B. The minor arc AB measures x + 24 degrees, and m∠APB = 3x degrees. Find x and the measure of minor arc AB.

_____

_____

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In circle O, chord AB has central angle m∠AOB = 84°. Find m(arc AB).	**84°**
2	An inscribed angle intercepts an arc measuring 146°. Find the angle measure.	**73°**
3	AB is a diameter of a circle, and C is another point on the circle. Find m∠ACB.	**90°**
4	Radius OT ends at T. Point P is on the tangent line at T. Find m∠OTP.	**90°**
5	Two tangents from P touch a circle at A and B. The minor arc AB measures 110°. Find m∠APB.	**70°**
6	A central angle measures 132° and an inscribed angle intercepts the same arc. Find the inscribed angle measure.	**66°**

PART 2 · APPLY IT

1. **75°** The central angle shows that minor arc AB measures 150°. An inscribed angle that intercepts this arc measures half of 150°, so m∠ACB = 75°.
2. **52°** An angle formed by two tangents equals half the difference of the intercepted arcs. m∠APB = (232° - 128°) / 2 = 52°.

CHALLENGE

x = 39; m(minor arc AB) = 63°

Accept equivalent arc notation, such as m(arc AB) = 84°, and degree symbols may be omitted if the unit is clear. For the challenge, accept the equation 3x = 180 - (x + 24) or an equivalent equation.