

Arc Angle Detectives

Use intercepted arcs to measure inscribed angles.

HIGH SCHOOL • HSG-C.A

CCSS.Math.Content.HSG-C.A "Understand and apply theorems about circles"

NAME _____

DATE _____

ARC ANGLE RULE

An inscribed angle has its vertex on a circle and its sides are chords. Its measure is half the measure of its intercepted arc. To find an intercepted arc from an inscribed angle, double the angle measure.

WORKED EXAMPLE

An inscribed angle intercepts an arc measuring 118 degrees. Find the angle measure.

1. The angle is inscribed, so take half of its intercepted arc.
2. $m \angle = 118 / 2$
3. $m \angle = 59$ degrees

Answer: 59 degrees

PRACTICE 6 problems

- 1** An inscribed angle intercepts an arc measuring 86 degrees. Find the angle measure.

ANSWER _____

- 2** An inscribed angle measures 37 degrees. Find the measure of its intercepted arc.

ANSWER _____

- 3** An inscribed angle measures 47 degrees and intercepts an arc measuring $5x + 9$ degrees. Find x .

ANSWER _____

- 4** An inscribed angle measures $5x + 8$ degrees and intercepts an arc measuring 86 degrees. Find x .

ANSWER _____

- 5** An inscribed angle intercepts a semicircle. What is the angle measure?

ANSWER _____

- 6** Both inscribed angles intercept the same arc. One angle measures 31 degrees, and the other measures $x + 6$ degrees. Find x .

ANSWER _____

APPLY IT Show your work

- 1** Three stage lights A, B, and C are placed on the rim of a circular concert set. The measure of angle BAC is 38 degrees. What is the measure of arc BC that does not contain A?

WORK SPACE

ANSWER _____

- 2** A circular running track has checkpoints A, B, and C on its edge. Arc BC that does not contain A measures 146 degrees. A runner at A looks along straight sight lines to B and C. What is the measure of angle BAC?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Points A, B, C, and D lie on the same circle. Angles ACB and ADB both intercept arc AB. If $m \angle ACB = 7x - 9$ and $m \angle ADB = 4x + 18$, find x and $m \text{ arc AB}$. Explain in one sentence why the two angle expressions are equal.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	An inscribed angle intercepts an arc measuring 86 degrees. Find the angle measure.	43 degrees
2	An inscribed angle measures 37 degrees. Find the measure of its intercepted arc.	74 degrees
3	An inscribed angle measures 47 degrees and intercepts an arc measuring $5x + 9$ degrees. Find x .	$x = 17$
4	An inscribed angle measures $5x + 8$ degrees and intercepts an arc measuring 86 degrees. Find x .	$x = 7$
5	An inscribed angle intercepts a semicircle. What is the angle measure?	90 degrees
6	Both inscribed angles intercept the same arc. One angle measures 31 degrees, and the other measures $x + 6$ degrees. Find x .	$x = 25$

PART 2 • APPLY IT

1. **76 degrees** Angle BAC is an inscribed angle, so its intercepted arc is twice the angle measure. 38 times 2 equals 76.
2. **73 degrees** Angle BAC is an inscribed angle that intercepts arc BC. Divide 146 by 2 to get 73.

CHALLENGE

$x = 9$; $m \text{ arc AB} = 108$ degrees. The angle expressions are equal because both inscribed angles intercept arc AB.

No degree symbol is required when the measure is clear. Accept correct equivalent equations and, for the challenge, any one-sentence statement that inscribed angles intercepting the same arc have equal measure.