LESSON MAKER PRO

# Circle Angle Detective

*Use inscribed angles, diameters, and cyclic quadrilaterals to solve circle problems.*

**HIGH SCHOOL · MA.912.GR.6.3**

**MA.912.GR.6.3** "Solve mathematical problems involving triangles and quadrilaterals inscribed in a circle."

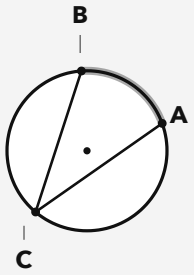
NAME _____ DATE _____

## ANGLES ON A CIRCLE

An inscribed angle measures half the measure of its intercepted arc. In a quadrilateral inscribed in a circle, opposite angles add to 180°. An angle that intercepts a diameter measures 90°.

### WORKED EXAMPLE

In the labeled circle, $m\angle ACB = 37°$. Find the measure of highlighted minor arc AB that does not contain C.

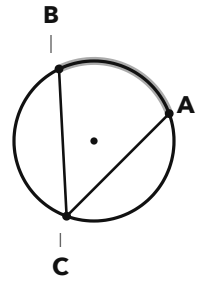



1. The inscribed angle measures half its intercepted arc.
2. m arc AB = 2(37°) = 74°.

**Answer: 74°**

## PRACTICE 6 problems

**1** Given m∠ACB = 48°, find the measure of highlighted minor arc AB that does not contain C.

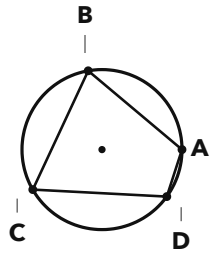



**ANSWER** _____

**2** Points P, Q, and R lie on a circle. If m∠PRQ = 63°, find m arc PQ.

**ANSWER** _____

**3** ABCD is a cyclic quadrilateral. Given m∠A = 112°, find m∠C.




**ANSWER** _____

**4** WXYZ is a quadrilateral inscribed in a circle. If m∠W = 3x + 12 and m∠Y = 5x - 8, find x, m∠W, and m∠Y.

**ANSWER** _____

_____

**5** Triangle ABC is inscribed in a circle, and AC is a diameter. If m∠A = 35°, find m∠B.

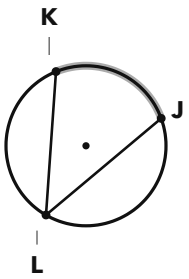
**ANSWER** _____

**6** Triangle ABC is inscribed in a circle. If m arc BC = 94°, find m∠BAC.

**ANSWER** _____

## APPLY IT Show your work

**1** A student designs a circular playlist cover. The points J, K, and L are on the cover's edge, and the highlighted arc JK will hold the playlist title. Find the measure of arc JK. The inscribed angle JLK measures 46°; the highlighted minor arc JK does not contain L.




**ANSWER** _____

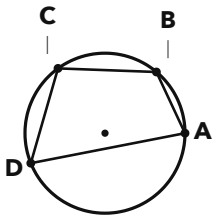
**2** An esports club places four light sensors A, B, C, and D around the edge of a circular display, forming a cyclic quadrilateral. The measures of opposite angles A and C are 7x - 5 and 4x + 20. Find x and the measures of angles A and C.

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

ABCD is inscribed in the circle. The opposite angle measures are $m\angle A = 4x + 8$ and $m\angle C = 7x - 15$ (in degrees). Find x, then explain why these two expressions must add to 180°.




WORK SPACE AND ANSWER

**ANSWER KEY**

# Circle Angle Detective

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## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Given m∠ACB = 48°, find the measure of highlighted minor arc AB that does not contain C. | **96°** |
| 2 | Points P, Q, and R lie on a circle. If m∠PRQ = 63°, find m arc PQ. | **126°** |
| 3 | ABCD is a cyclic quadrilateral. Given m∠A = 112°, find m∠C. | **68°** |
| 4 | WXYZ is a quadrilateral inscribed in a circle. If m∠W = 3x + 12 and m∠Y = 5x - 8, find x, m∠W, and m∠Y. | **x = 22; m∠W = 78°; m∠Y = 102°** |
| 5 | Triangle ABC is inscribed in a circle, and AC is a diameter. If m∠A = 35°, find m∠B. | **90°** |
| 6 | Triangle ABC is inscribed in a circle. If m arc BC = 94°, find m∠BAC. | **47°** |

## PART 2 · APPLY IT

1. **92°** The inscribed angle JLK intercepts arc JK. Double 46° to get m arc JK = 92°.
2. **x = 15; m∠A = 100°; m∠C = 80°** Opposite angles in a cyclic quadrilateral are supplementary, so (7x - 5) + (4x + 20) = 180. Solving gives x = 15, then substitute to find the two angle measures.

## CHALLENGE

**x = 17. Angles A and C are opposite angles of a quadrilateral inscribed in a circle, so they are supplementary. Their measures are 76° and 104°, and 76° + 104° = 180°.**

Accept equivalent algebraic work and angle measures written with or without the degree symbol when the unit is clear. For the challenge explanation, accept any correct statement that opposite angles of a cyclic quadrilateral are supplementary.