

ANSWER MAZE

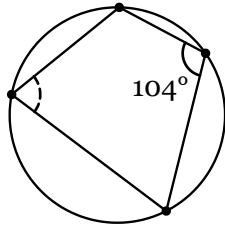
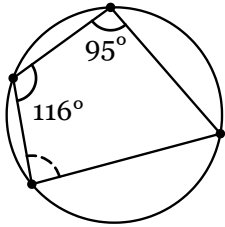


INSCRIBED (CYCLIC) QUADRILATERALS

Cyclic Quadrilaterals: Opposite Angles

Four corners on a circle · one page · 10–15 minutes · nothing to prepare

FREE

	5 Find the angle with the dashed arc. $104^\circ \rightarrow$ go to box 4 $76^\circ \rightarrow$ go to box 2 <i>Hint: Look at the corner across from the dashed arc. Read the first rule on the strip.</i>		2 Find the angle with the dashed arc. $85^\circ \rightarrow$ go to box 7 $64^\circ \rightarrow$ go to box 6 <i>Hint: Two angles are given. Which one is at the corner across from the dashed arc?</i>
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1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 5. All four corners are on the circle. Find the angle with the dashed arc. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **5 2 7 1 8 3**: six boxes, then out.

Student sheet	page 3, one per student, and scrap paper for working.
Answers	page 4.

Every box shows a circle with four points on it, joined to make a quadrilateral. This sheet calls a quadrilateral *cyclic* when all four of its corners lie on one circle, and its angles are the angles inside it. Some textbooks use other definitions, so tell the class which ones this sheet uses. Opposite angles of a cyclic quadrilateral add to 180° . A given angle has a solid arc and its number. The angle to find has a dashed arc. One box carries a side on past a corner: the exterior angle there equals the angle at the opposite corner. One box has a diagonal that cuts an angle into two parts, which must be added first.

Every wrong answer comes from one of two mistakes. In the first, the student treats two opposite angles as equal, or takes an exterior angle as the angle inside the shape. These wrong answers send the student to box 4. In the second, the student uses an angle next to the dashed one as if it were across from it. These wrong answers send the student to box 6. Boxes 4 and 6 ask the same kind of question again, and both of their answers lead back to the route.

The row at the bottom is the check. A clean run is six numbers. Each wrong answer adds at least one more. Guessing does not get a student out: every simple guessing rule, such as always taking the larger number, goes wrong within the first three boxes.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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Answer Maze — opposite angles

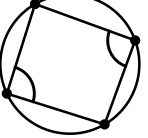
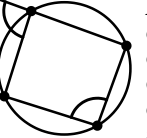
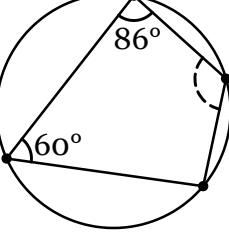
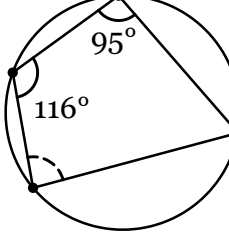
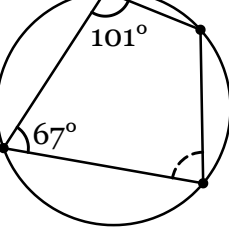
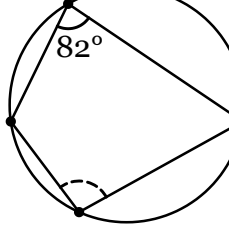
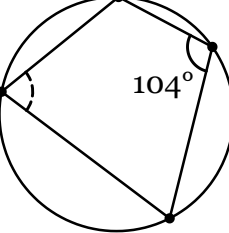
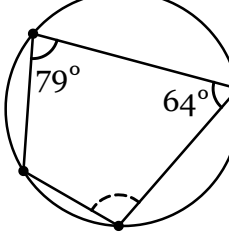
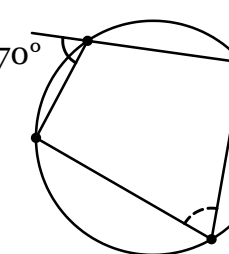
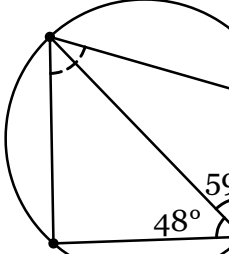
Start at box 5

Name _____

Period _____

Date _____

Start at box 5. All four corners are on the circle in every box. Find the angle with the dashed arc. Pick one answer and go to the box it names. Write each box number in the row at the bottom as you go.

 All four corners on one circle: opposite angles (across from each other) add to 180°.	 An exterior angle is outside the shape, where one side goes on past a corner. With all four corners on one circle, it equals the angle at the opposite corner.	 A diagonal cuts an angle into two parts. Add the two parts to get the whole angle.
 1 Find the angle with the dashed arc. $120^\circ \rightarrow$ go to box 8 $94^\circ \rightarrow$ go to box 6 <i>Hint: Trace the two sides of the dashed angle. Which of the other corners touches neither side?</i>	 2 Find the angle with the dashed arc. $85^\circ \rightarrow$ go to box 7 $64^\circ \rightarrow$ go to box 8 <i>Hint: Two angles are given. Which one is at the corner across from the dashed arc?</i>	
 3 Find the angle with the dashed arc. $113^\circ \rightarrow$ go to box 6 $79^\circ \rightarrow$ you are out <i>Hint: Put a finger on the dashed arc. Move across the shape to the corner opposite it.</i>	 4 Find the angle with the dashed arc. $82^\circ \rightarrow$ go to box 5 $98^\circ \rightarrow$ go to box 2 <i>Hint: Opposite corners of the shape: supplementary or congruent? Read the strip.</i>	
 5 Find the angle with the dashed arc. $104^\circ \rightarrow$ go to box 4 $76^\circ \rightarrow$ go to box 2 <i>Hint: Look at the corner across from the dashed arc. Read the first rule on the strip.</i>	 6 Find the angle with the dashed arc. $101^\circ \rightarrow$ go to box 7 $116^\circ \rightarrow$ go to box 2 <i>Hint: Each corner has two corners beside it and one across. Which corners face each other?</i>	
 7 Find the angle with the dashed arc. One side goes on past a corner. $110^\circ \rightarrow$ go to box 4 $70^\circ \rightarrow$ go to box 1 <i>Hint: Find the side that goes on past a corner. Is the given angle inside the shape or outside it?</i>	 8 Find the angle with the dashed arc. A diagonal cuts one angle into two parts. The arc with no number covers the whole angle, both parts. $73^\circ \rightarrow$ go to box 3 $107^\circ \rightarrow$ go to box 4 <i>Hint: Put the two parts of the cut angle together first.</i>	

Write every box number here, in order.

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The route, in order. Boxes 4 and 6 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table. In every box all four corners are on the circle.

5 → 2 → 7 → 1 → 8 → 3 → out

	The box's question	Right answer, and why	Wrong answer, and why a student picks it
1	Box 5 Find the angle with the dashed arc. One angle is 104° . The dashed arc is at the corner across from it.	76°. All four corners are on the circle, so opposite angles add to 180° : $180^\circ - 104^\circ = 76^\circ$.	" 104° " goes to box 4. The two opposite angles are taken as equal. They add to 180° .
2	Box 2 Find the angle with the dashed arc. Two angles next to each other are 116° and 95° . The dashed arc is across from the 95° .	85°. The dashed angle is across from the 95° , so it is $180^\circ - 95^\circ = 85^\circ$. The 116° is next to it.	" 64° " goes to box 6. $180^\circ - 116^\circ$: the 116° is next to the dashed angle, not across from it.
3	Box 7 Find the angle with the dashed arc. One side goes on past a corner. The angle outside there is 70° . The dashed arc is at the opposite corner.	70°. The angle inside at that corner is $180^\circ - 70^\circ = 110^\circ$. The dashed angle is across from it: $180^\circ - 110^\circ = 70^\circ$. The exterior angle equals the angle at the opposite corner.	" 110° " goes to box 4. $180^\circ - 70^\circ$: the 70° is taken as the angle inside the shape at its corner. It is outside.
4	Box 1 Find the angle with the dashed arc. Two angles next to each other are 86° and 60° . The dashed arc is across from the 60° .	120°. The dashed angle is across from the 60° , so it is $180^\circ - 60^\circ = 120^\circ$. The 86° is next to it.	" 94° " goes to box 6. $180^\circ - 86^\circ$: the 86° is next to the dashed angle, not across from it.
5	Box 8 Find the angle with the dashed arc. A diagonal cuts one angle into parts of 48° and 59° . The dashed arc is at the other end of the diagonal.	73°. The whole angle is $48^\circ + 59^\circ = 107^\circ$. The dashed angle is across from it: $180^\circ - 107^\circ = 73^\circ$.	" 107° " goes to box 4. 107° is the whole angle across from it, copied. Opposite angles add to 180° .
6	Box 3 Find the angle with the dashed arc. Two angles next to each other are 67° and 101° . The dashed arc is across from the 101° .	79°. The dashed angle is across from the 101° , so it is $180^\circ - 101^\circ = 79^\circ$. The 67° is next to it.	" 113° " goes to box 6. $180^\circ - 67^\circ$: the 67° is next to the dashed angle, not across from it.
	Box 4 Find the angle with the dashed arc. One angle is 82° . The dashed arc is at the corner across from it.	98°. All four corners are on the circle, so opposite angles add to 180° : $180^\circ - 82^\circ = 98^\circ$.	" 82° " goes to box 5. The two opposite angles are taken as equal. They add to 180° .
	Box 6 Find the angle with the dashed arc. Two angles next to each other are 64° and 79° . The dashed arc is across from the 79° .	101°. The dashed angle is across from the 79° , so it is $180^\circ - 79^\circ = 101^\circ$. The 64° is next to it.	" 116° " goes to box 2. $180^\circ - 64^\circ$: the 64° is next to the dashed angle, not across from it.

How to check any box. Find the corner across from the dashed arc: it shares no side with it. The two angles at opposite corners add to 180° . An exterior angle equals the angle at the opposite corner. The four angles of the quadrilateral add to 360° , which checks the answer.

A student can find the last four boxes of the route by following the arrows backward from "you are out." So ask a student with a clean row to explain one box.