

ANSWER MAZE

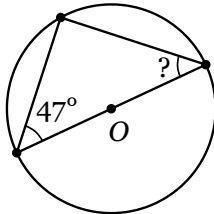


INSCRIBED ANGLES ON A DIAMETER AND INSCRIBED POLYGONS

The Angle in a Semicircle, Both Ways

Inscribed angles on a diameter · one page · 10–15 minutes · nothing to prepare

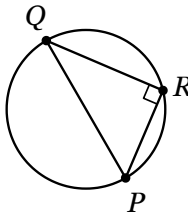
FREE



5 O is the center. Find the angle marked ?.

$133^\circ \rightarrow$ go to box 3
 $43^\circ \rightarrow$ go to box 2

Hint: Look at the corner of the triangle on the circle. What angle stands there?



2 $PR = 18$ and $QR = 24$. Find the radius.

$12 \rightarrow$ go to box 6
 $15 \rightarrow$ go to box 7

Hint: Which side is across from the square? Name it before any arithmetic.

1. **Hand out page 3**, one per student. A calculator helps with the squares.
2. **Say this once:** *“Start at box 5. In each box, first decide: were you given a diameter, or a right angle? 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 4 1 8**: six boxes, then out.

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

Two kinds of box are mixed along the route. In the first kind the center O is on a chord, so the chord is a diameter. The angle at the third point of the circle is then 90° , and the two other angles add to 90° . That right angle is not marked on purpose. In the second kind a right triangle has its corners on the circle and its right angle marked. The side across from the right angle is a diameter, and the radius is half of it.

Every wrong answer comes from one mistake of its kind. In the first kind the student leaves the right angle out and takes 180° minus the given angle. These answers send the student to box 3. In the second kind the student gives the whole diameter as the radius, or takes the longer leg as the diameter and halves it. These answers send the student to box 6. Boxes 3 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 smaller 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 — a diameter or a right angle?

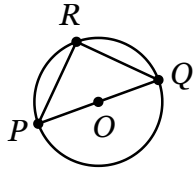
Start at box 5

Name _____

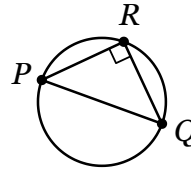
Period _____

Date _____

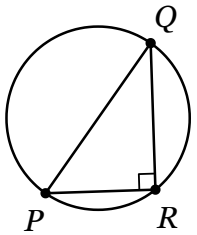
Start at box 5. Pick one answer and go to the box it names. Angles are whole degrees. Lengths are whole numbers. Write each box number in the row at the bottom as you go.



A diameter gives a right angle. O is the center and it is on PQ, so PQ is a diameter. R is on the circle. So the angle at R is 90° .



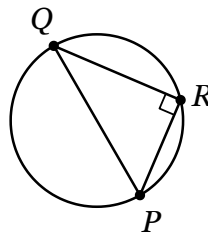
A right angle gives a diameter. The angle at R is 90° and P, Q and R are on the circle. So PQ, the side across from the square, is a diameter. The radius is half of PQ. The three angles of a triangle add to 180° .



1 $PR = 36$ and $QR = 48$. Find the radius.

24 → go to box 6
30 → go to box 8

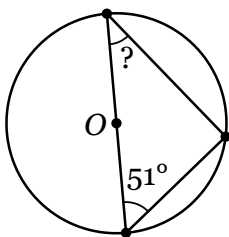
Hint: Which side stays away from the square? What is that side in this circle?



2 $PR = 18$ and $QR = 24$. Find the radius.

12 → go to box 6
15 → go to box 7

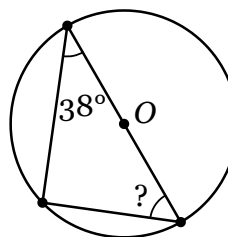
Hint: Which side is across from the square? Name it before any arithmetic.



3 O is the center. Find the angle marked ?.

129° → go to box 5
 39° → go to box 2

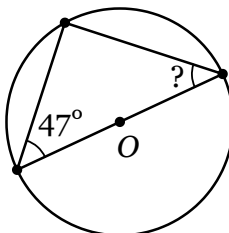
Hint: Find the angle at the corner on the circle with no mark. Put it in the sum.



4 O is the center. Find the angle marked ?.

52° → go to box 1
 142° → go to box 3

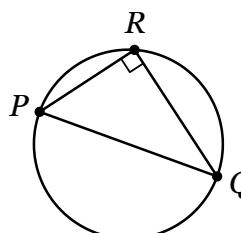
Hint: O sits on the long side. What does that make the angle at the third corner?



5 O is the center. Find the angle marked ?.

133° → go to box 3
 43° → go to box 2

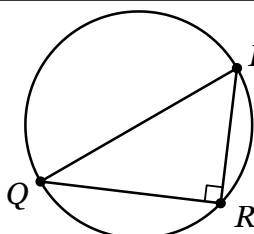
Hint: Look at the corner of the triangle on the circle. What angle stands there?



6 $PR = 30$ and $QR = 40$. Find the radius.

25 → go to box 7
50 → go to box 2

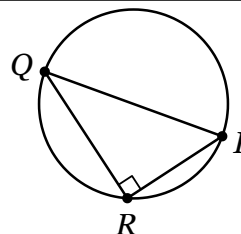
Hint: Name the hypotenuse first. How does a radius compare with it?



7 $PR = 12$ and $QR = 16$. Find the radius.

10 → go to box 4
20 → go to box 6

Hint: The radius goes from the center to the circle. Where is the center here?



8 $PR = 48$ and $QR = 64$. Find the radius.

80 → go to box 6
40 → you are out

Hint: Two radii lie end to end along the side across from the square.

Write every box number here, in order.

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Answer Maze — answers

For the teacher

The route, in order. Boxes 3 and 6 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table.

5 → 2 → 7 → 4 → 1 → 8 → out

	The box's question	Right answer, and why	Wrong answer, and why a student picks it
1	Box 5 O is the center, on the chord. The angle at one end of the diameter is 47° . Find the angle marked ? at the other end.	43°. O is on the chord, so it is a diameter and the angle at the third point is 90° . So ? = $180^\circ - 90^\circ - 47^\circ = 43^\circ$.	"133°" goes to box 3. $180^\circ - 47^\circ$ leaves out the right angle at the third point.
2	Box 2 A right triangle with its corners on the circle and the right angle at R. $PR = 18$ and $QR = 24$. Find the radius.	15. PQ is across from the right angle, so it is a diameter. $PQ^2 = 18^2 + 24^2 = 900$, so $PQ = 30$ and the radius is 15.	"12" goes to box 6. 12 is half of $QR = 24$. QR is a leg: it touches the right angle, so it is not the diameter.
3	Box 7 A right triangle with its corners on the circle and the right angle at R. $PR = 12$ and $QR = 16$. Find the radius.	10. PQ is across from the right angle, so it is a diameter. $PQ^2 = 12^2 + 16^2 = 400$, so $PQ = 20$ and the radius is 10.	"20" goes to box 6. 20 is the whole diameter PQ, not the radius.
4	Box 4 O is the center, on the chord. The angle at one end of the diameter is 38° . Find the angle marked ? at the other end.	52°. O is on the chord, so it is a diameter and the angle at the third point is 90° . So ? = $180^\circ - 90^\circ - 38^\circ = 52^\circ$.	"142°" goes to box 3. $180^\circ - 38^\circ$ leaves out the right angle at the third point.
5	Box 1 A right triangle with its corners on the circle and the right angle at R. $PR = 36$ and $QR = 48$. Find the radius.	30. PQ is across from the right angle, so it is a diameter. $PQ^2 = 36^2 + 48^2 = 3600$, so $PQ = 60$ and the radius is 30.	"24" goes to box 6. 24 is half of $QR = 48$. QR is a leg: it touches the right angle, so it is not the diameter.
6	Box 8 A right triangle with its corners on the circle and the right angle at R. $PR = 48$ and $QR = 64$. Find the radius.	40. PQ is across from the right angle, so it is a diameter. $PQ^2 = 48^2 + 64^2 = 6400$, so $PQ = 80$ and the radius is 40.	"80" goes to box 6. 80 is the whole diameter PQ, not the radius.
	Box 3 O is the center, on the chord. The angle at one end of the diameter is 51° . Find the angle marked ? at the other end.	39°. O is on the chord, so it is a diameter and the angle at the third point is 90° . So ? = $180^\circ - 90^\circ - 51^\circ = 39^\circ$.	"129°" goes to box 5. $180^\circ - 51^\circ$ leaves out the right angle at the third point.
	Box 6 A right triangle with its corners on the circle and the right angle at R. $PR = 30$ and $QR = 40$. Find the radius.	25. PQ is across from the right angle, so it is a diameter. $PQ^2 = 30^2 + 40^2 = 2500$, so $PQ = 50$ and the radius is 25.	"50" goes to box 2. 50 is the whole diameter PQ, not the radius.

How to check any box. Ask first: is the student given a diameter, or a right angle? If O is on the chord, the chord is a diameter and the angle at the third point is 90° . If a right angle is marked at a point of the circle, the side across from it is a diameter, and the radius is half of that side.

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.