

ANSWER MAZE



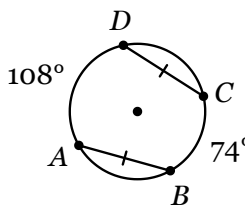
ARCS AND CHORDS

Congruent Chords, Congruent Arcs

Arc measures in a circle · one page · 10–15 minutes · nothing to prepare

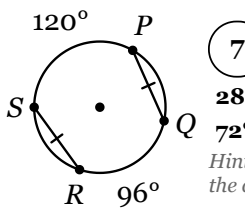
FREE

4 Find arc AB .
 $178^\circ \rightarrow$ go to box 3
 $89^\circ \rightarrow$ go to box 7



Hint: Look at the two chords with tick marks. How many arcs share what is left of the circle?

7 Find arc RQS .
 $288^\circ \rightarrow$ go to box 2
 $72^\circ \rightarrow$ go to box 6



Hint: Count the letters in the name of the arc. Which way around does it go?

1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 4. Chords with tick marks are congruent, so their arcs have the same measure. The four arcs around a circle add to 360° . Two letters mean the short way. Three letters mean the long way. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **4 7 2 5 8 1**: six boxes, then out.

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

Every box shows one circle with four points in order around it. Two chords have one tick mark each, so they are congruent. In one circle, congruent chords cut congruent arcs. So the two arcs under those chords have the same measure, and they share what is left of 360° after the two printed arcs. Some boxes ask for that short arc. The others ask for the long way around, named with three letters, which is 360° minus the short arc.

This sheet names an arc by its two endpoints when it is the short way around (a minor arc), and by three letters when it is the long way around (a major arc). Arc *ACB* goes from *A* to *B* through *C*. Some textbooks use other definitions, so tell the class which ones this sheet uses.

Every wrong answer comes from one of two mistakes. In the first, the student does not share out the two congruent arcs and gives both of them together. These wrong answers send the student to box 3. In the second, the box asks for the long way around and the student gives the short arc. These wrong 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 larger number, goes wrong within the first two 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 — arcs and chords

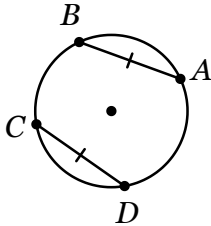
Start at box 4

Name _____

Period _____

Date _____

Start at box 4. Find the arc the box asks for, in degrees, like 145° . Pick that answer and go to the box it names. Write each box number in the row at the bottom as you go.

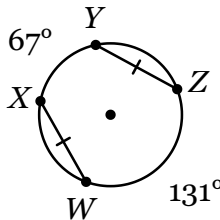


Tick marks: chord AB and chord CD are congruent.

Arc AB (two letters) is the short way from A to B . **Arc ACB** (three letters) is the long way, through C .

In one circle, congruent chords cut congruent arcs. So arc AB and arc CD have the same measure.

The four arcs around a circle add to 360° . Check your answer with this.

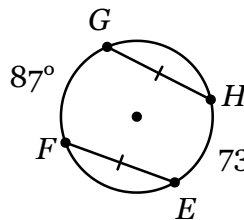


1 Find arc YXZ .

$279^\circ \rightarrow$ you are out

$81^\circ \rightarrow$ go to box 6

Hint: Three letters name this arc. Put a finger on each letter in turn.

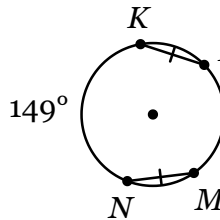


2 Find arc GH .

$100^\circ \rightarrow$ go to box 5

$200^\circ \rightarrow$ go to box 3

Hint: Add the four arcs around the circle. What must they make?

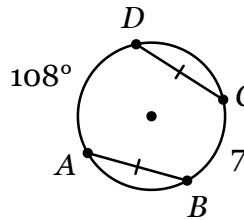


3 Find arc MN .

$56^\circ \rightarrow$ go to box 7

$112^\circ \rightarrow$ go to box 4

Hint: Two arcs sit under the chords with tick marks. Each one gets a share.

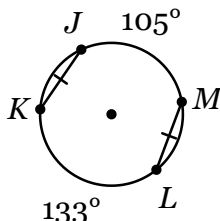


4 Find arc AB .

$178^\circ \rightarrow$ go to box 3

$89^\circ \rightarrow$ go to box 7

Hint: Look at the two chords with tick marks. How many arcs share what is left of the circle?

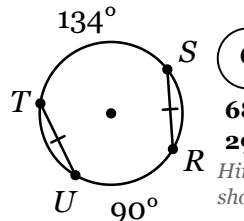


5 Find arc JMK .

$61^\circ \rightarrow$ go to box 6

$299^\circ \rightarrow$ go to box 8

Hint: Find the middle letter of the arc's name on the circle. Trace the arc through it.

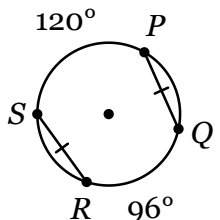


6 Find arc RTS .

$68^\circ \rightarrow$ go to box 7

$292^\circ \rightarrow$ go to box 2

Hint: Look at the middle letter. Is the arc the short way or the long way?

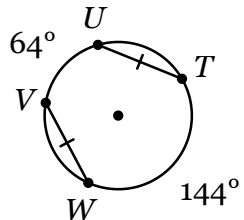


7 Find arc RQS .

$288^\circ \rightarrow$ go to box 2

$72^\circ \rightarrow$ go to box 6

Hint: Count the letters in the name of the arc. Which way around does it go?



8 Find arc TU .

$152^\circ \rightarrow$ go to box 3

$76^\circ \rightarrow$ go to box 1

Hint: Each chord with a tick mark has its own arc. Which two arcs match?

Write every box number here, in order.

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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.

4 → 7 → 2 → 5 → 8 → 1 → out

	The box's question	Right answer, and why	Wrong answer, and why a student picks it
1	Box 4 Points A, B, C, D in order. Chords AB and CD have one tick mark each. Arc BC = 74° , arc DA = 108° . Find arc AB.	89°. The tick marks make chord AB congruent to chord CD, so arc AB and arc CD have the same measure. Together they are $360^\circ - 74^\circ - 108^\circ = 178^\circ$, so each is 89° .	" 178° " goes to box 3. 178° is arc AB and arc CD together. The two arcs are congruent, so they share it: 89° each.
2	Box 7 Points P, Q, R, S in order. Chords PQ and RS have one tick mark each. Arc QR = 96° , arc SP = 120° . Find arc RQS.	288°. The tick marks make chord PQ congruent to chord RS, so arc PQ and arc RS have the same measure. Together they are $360^\circ - 96^\circ - 120^\circ = 144^\circ$, so each is 72° . Arc RQS has three letters: it goes the long way from R to S, so it is $360^\circ - 72^\circ = 288^\circ$.	" 72° " goes to box 6. 72° is arc RS, the short way. Arc RQS has three letters, so it is the long way: $360^\circ - 72^\circ = 288^\circ$.
3	Box 2 Points E, F, G, H in order. Chords EF and GH have one tick mark each. Arc FG = 87° , arc HE = 73° . Find arc GH.	100°. The tick marks make chord EF congruent to chord GH, so arc EF and arc GH have the same measure. Together they are $360^\circ - 87^\circ - 73^\circ = 200^\circ$, so each is 100° .	" 200° " goes to box 3. 200° is arc GH and arc EF together. The two arcs are congruent, so they share it: 100° each.
4	Box 5 Points J, K, L, M in order. Chords JK and LM have one tick mark each. Arc KL = 133° , arc MJ = 105° . Find arc JMK.	299°. The tick marks make chord JK congruent to chord LM, so arc JK and arc LM have the same measure. Together they are $360^\circ - 133^\circ - 105^\circ = 122^\circ$, so each is 61° . Arc JMK has three letters: it goes the long way from J to K, so it is $360^\circ - 61^\circ = 299^\circ$.	" 61° " goes to box 6. 61° is arc JK, the short way. Arc JMK has three letters, so it is the long way: $360^\circ - 61^\circ = 299^\circ$.
5	Box 8 Points T, U, V, W in order. Chords TU and VW have one tick mark each. Arc UV = 64° , arc WT = 144° . Find arc TU.	76°. The tick marks make chord TU congruent to chord VW, so arc TU and arc VW have the same measure. Together they are $360^\circ - 64^\circ - 144^\circ = 152^\circ$, so each is 76° .	" 152° " goes to box 3. 152° is arc TU and arc VW together. The two arcs are congruent, so they share it: 76° each.
6	Box 1 Points W, X, Y, Z in order. Chords WX and YZ have one tick mark each. Arc XY = 67° , arc ZW = 131° . Find arc YXZ.	279°. The tick marks make chord WX congruent to chord YZ, so arc WX and arc YZ have the same measure. Together they are $360^\circ - 67^\circ - 131^\circ = 162^\circ$, so each is 81° . Arc YXZ has three letters: it goes the long way from Y to Z, so it is $360^\circ - 81^\circ = 279^\circ$.	" 81° " goes to box 6. 81° is arc YZ, the short way. Arc YXZ has three letters, so it is the long way: $360^\circ - 81^\circ = 279^\circ$.
	Box 3 Points K, L, M, N in order. Chords KL and MN have one tick mark each. Arc LM = 99° , arc NK = 149° . Find arc MN.	56°. The tick marks make chord KL congruent to chord MN, so arc KL and arc MN have the same measure. Together they are $360^\circ - 99^\circ - 149^\circ = 112^\circ$, so each is 56° .	" 112° " goes to box 4. 112° is arc MN and arc KL together. The two arcs are congruent, so they share it: 56° each.
	Box 6 Points R, S, T, U in order. Chords RS and TU have one tick mark each. Arc ST = 134° , arc UR = 90° . Find arc RTS.	292°. The tick marks make chord RS congruent to chord TU, so arc RS and arc TU have the same measure. Together they are $360^\circ - 134^\circ - 90^\circ = 136^\circ$, so each is 68° . Arc RTS has three letters: it goes the long way from R to S, so it is $360^\circ - 68^\circ = 292^\circ$.	" 68° " goes to box 7. 68° is arc RS, the short way. Arc RTS has three letters, so it is the long way: $360^\circ - 68^\circ = 292^\circ$.

How to check any box. The two chords with tick marks are congruent, so their two arcs have the same measure. Take the two printed arcs from 360° and share what is left between those two arcs. A name with three letters is the long way around: take the short arc from 360° . The four arcs always add to 360° .

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.