

ANSWER MAZE



CIRCLE VOCABULARY AND SIMILAR CIRCLES

All Circles Are Similar: Find the Scale Factor

Radius or diameter? Which way? · one page · 10–15 minutes · nothing to prepare

FREE

	5 Carry circle P onto circle Q. Factor 3.4 → go to box 4 Factor 1.7 → go to box 2 <i>Hint: Follow each segment from end to end. Does it pass through the center?</i>		2 Carry circle J onto circle K. Factor 1.64 → go to box 7 Factor 0.61 → go to box 6 <i>Hint: Read the question again. Which circle moves onto which?</i>
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1. **Hand out page 3**, one per student, and a calculator. Nothing else is needed.
2. **Say this once:** *“Start at box 5. Check each segment: radius or diameter? If a segment is a diameter, halve it to get the radius. The circle named first is the one that moves. Divide the other circle’s radius by its radius. 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 two circles drawn to scale, each with one segment and its length: a radius (from the center to the circle) or a diameter (across the circle through the center). No word says which. In each box the circle named first, P in “Carry circle P onto circle Q”, is the circle that moves. The scale factor is the radius of the circle it lands on $\div$ the radius of the circle that moves, written as a decimal and rounded to two decimal places when it does not stop. This sheet uses these definitions: a radius and a diameter are segments, and the same words also name their lengths. 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 turns the factor upside down. These wrong answers send the student to box 6. In the second, the student uses a diameter as if it were a radius. These wrong answers send the student to box 4. Boxes 6 and 4 ask the same kind of question again, and both of their answers lead back to the route. In box 7 the two circles are congruent: the factor is 1, and they are similar too.

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 four 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 — find the scale factor

Start at box 5

Name _____

Period _____

Date _____

Start at box 5. In each box, translate the first circle so its center lands on the center of the second. Then dilate about that center. Which scale factor carries the first circle onto the second? Pick one answer and go to the box it names. Write each box number in the row at the bottom as you go.



radius



diameter

A **radius** runs from the center to the circle. A **diameter** runs across the circle through the center. A diameter is twice as long as a radius.

To carry circle A onto circle B: translate A so its center lands on B's center. Then dilate about that center. **Scale factor = radius of B ÷ radius of A.**

Write the factor as a decimal. If it has more than two decimal places, round it to two: $7 \div 3 = 2.333\ldots$ gives 2.33.

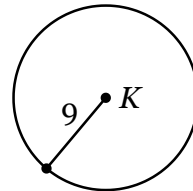


1 Carry circle E onto circle F.

Factor 1.58 → go to box 6

Factor 0.63 → go to box 8

Hint: Name the circle that moves. Its radius goes in the bottom of the fraction.

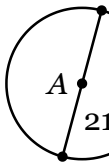


2 Carry circle J onto circle K.

Factor 1.64 → go to box 7

Factor 0.61 → go to box 6

Hint: Read the question again. Which circle moves onto which?

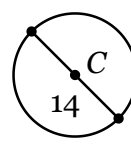


3 Carry circle A onto circle B.

Factor 0.76 → you are out

Factor 1.31 → go to box 6

Hint: Does the circle grow or shrink? Check the factor against the drawing.



4 Carry circle C onto circle D.

Factor 1.43 → go to box 2

Factor 0.71 → go to box 5

Hint: A segment through the center reaches across the whole circle. Find its radius first.

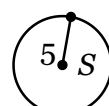


5 Carry circle P onto circle Q.

Factor 3.4 → go to box 4

Factor 1.7 → go to box 2

Hint: Follow each segment from end to end. Does it pass through the center?

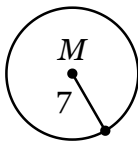


6 Carry circle R onto circle S.

Factor 1.8 → go to box 2

Factor 0.56 → go to box 7

Hint: In the question, the circle that moves is named before the other one. Its radius goes in the bottom.



7 Carry circle M onto circle N.

Factor 1 → go to box 1

Factor 2 → go to box 4

Hint: Look at each segment. Is it a radius or a diameter?



8 Carry circle G onto circle H.

Factor 0.27 → go to box 4

Factor 0.53 → go to box 3

Hint: Compare radius with radius. Check where each segment starts and stops.

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. A factor is rounded to two decimal places when it does not stop.

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 Carry circle P onto circle Q. Circle P: radius 5. Circle Q: diameter 17.	1.7. Circle P shows a radius of 5, and circle Q shows a diameter of 17, so its radius is 8.5. Scale factor = $8.5 \div 5 = 1.7$.	"3.4" goes to box 4. The 17 on circle Q is a diameter, used as a radius: $17 \div 5 = 3.4$. The segment passes through the center, so the radius is half of it.
2	Box 2 Carry circle J onto circle K. Circle J: diameter 11. Circle K: radius 9.	1.64. Circle J shows a diameter of 11, so its radius is 5.5, and circle K shows a radius of 9. Scale factor = $9 \div 5.5 = 1.64$.	"0.61" goes to box 6. Turned upside down: $5.5 \div 9 = 0.61$. That carries K onto J. Circle K is bigger, so the factor must be more than 1.
3	Box 7 Carry circle M onto circle N. Circle M: radius 7. Circle N: diameter 14.	1. Circle M shows a radius of 7, and circle N shows a diameter of 14, so its radius is 7. Scale factor = $7 \div 7 = 1$. The radii are equal, so the circles are congruent, and they are still similar.	"2" goes to box 4. The 14 on circle N is a diameter, used as a radius: $14 \div 7 = 2$. The segment passes through the center, so the radius is half of it.
4	Box 1 Carry circle E onto circle F. Circle E: diameter 19. Circle F: radius 6.	0.63. Circle E shows a diameter of 19, so its radius is 9.5, and circle F shows a radius of 6. Scale factor = $6 \div 9.5 = 0.63$.	"1.58" goes to box 6. Turned upside down: $9.5 \div 6 = 1.58$. That carries F onto E. Circle F is smaller, so the factor must be less than 1.
5	Box 8 Carry circle G onto circle H. Circle G: diameter 15. Circle H: radius 4.	0.53. Circle G shows a diameter of 15, so its radius is 7.5, and circle H shows a radius of 4. Scale factor = $4 \div 7.5 = 0.53$.	"0.27" goes to box 4. The 15 on circle G is a diameter, used as a radius: $4 \div 15 = 0.27$. The segment passes through the center, so the radius is half of it.
6	Box 3 Carry circle A onto circle B. Circle A: diameter 21. Circle B: radius 8.	0.76. Circle A shows a diameter of 21, so its radius is 10.5, and circle B shows a radius of 8. Scale factor = $8 \div 10.5 = 0.76$.	"1.31" goes to box 6. Turned upside down: $10.5 \div 8 = 1.31$. That carries B onto A. Circle B is smaller, so the factor must be less than 1.
	Box 4 Carry circle C onto circle D. Circle C: diameter 14. Circle D: radius 10.	1.43. Circle C shows a diameter of 14, so its radius is 7, and circle D shows a radius of 10. Scale factor = $10 \div 7 = 1.43$.	"0.71" goes to box 5. The 14 on circle C is a diameter, used as a radius: $10 \div 14 = 0.71$. The segment passes through the center, so the radius is half of it.
	Box 6 Carry circle R onto circle S. Circle R: radius 9. Circle S: radius 5.	0.56. Circle R shows a radius of 9, and circle S shows a radius of 5. Scale factor = $5 \div 9 = 0.56$.	"1.8" goes to box 2. Turned upside down: $9 \div 5 = 1.8$. That carries S onto R. Circle S is smaller, so the factor must be less than 1.

How to check any box. Find each circle's radius. A segment from the center to the circle is a radius. A segment across the circle through the center is a diameter, and the radius is half of it. Then the factor is the radius of the circle it lands on $\div$ the radius of the circle that moves. A circle that grows has a factor more than 1.

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.