

Circle Scale Moves

Use translations and dilations to compare any two circles.

HIGH SCHOOL • HSG-C.A.1

CCSS.Math.Content.HSG-C.A.1 "Prove that all circles are similar."

NAME _____

DATE _____

ONE CIRCLE TO ANOTHER

Translate one circle so its center matches the other center. Then dilate by target radius/source radius. This maps one circle onto the other, so all circles are similar.

WORKED EXAMPLE

Circle P has radius 4. Circle Q has radius 10. Show a similarity transformation that maps P to Q.

1. Translate circle P so its center matches circle Q's center.
2. Find the scale factor: $10/4 = 5/2$.
3. Dilate the translated circle by $5/2$ about the common center.

Answer: Translate, then dilate by $5/2$.

PRACTICE 5 problems

- 1** Circle A has radius 3. Circle B has radius 12. What scale factor maps A to B?

ANSWER _____

- 2** Circle C has diameter 16. Circle D has diameter 6. What scale factor maps C to D?

ANSWER _____

- 3** Circle E has circumference 14π . Circle F has circumference 42π . What scale factor maps E to F?

ANSWER _____

- 4** Circle G has area 49π . Circle H has area 196π . What scale factor maps G to H?

ANSWER _____

- 5** Circle M has radius 9. Circle N has radius 15. Name the transformations that map M to N.

ANSWER _____

APPLY IT Show your work

- 1** A student enlarges a circular profile icon from radius 8 mm to radius 20 mm. What scale factor is used?

WORK SPACE

ANSWER _____

- 2** A gaming club prints a circular button from a design with circumference 24π cm to a button with circumference 36π cm. What scale factor maps the design to the button?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Circle A has radius a and Circle B has radius b , where a and b are positive. Explain why the circles are similar.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Circle A has radius 3. Circle B has radius 12. What scale factor maps A to B?	4
2	Circle C has diameter 16. Circle D has diameter 6. What scale factor maps C to D?	3/8
3	Circle E has circumference 14π . Circle F has circumference 42π . What scale factor maps E to F?	3
4	Circle G has area 49π . Circle H has area 196π . What scale factor maps G to H?	2
5	Circle M has radius 9. Circle N has radius 15. Name the transformations that map M to N.	Translate M's center to N's center, then dilate by $5/3$.

PART 2 • APPLY IT

1. **5/2** Divide the new radius by the original radius: $20/8 = 5/2$.
2. **3/2** Circumference changes by the same factor as radius: $36\pi/(24\pi) = 3/2$.

CHALLENGE

Translate circle A so its center matches circle B's center. Then dilate by b/a about the common center. Points b/a times a units from the center are b units away, so circle A maps onto circle B.

Accept equivalent fraction forms for scale factors. For transformation responses, accept a translation that matches centers followed by a dilation with the correct target-to-source radius ratio.