Dilations

Vocabulary

● Review

Complete each statement with *ratio* or *similar*.

1. The __?__ of corresponding parts of similar figures is the *scale factor*.

2. You can use a *scale factor* to make a larger or smaller copy that is __?__ to the original figure.

3. Circle the *scale factor* that makes an image larger than the preimage.

$\frac{2}{3}$ $\frac{4}{3}$ $\frac{7}{8}$ $\frac{1}{10}$

4. Circle the *scale factor* that makes an image smaller than the preimage.

$\frac{5}{2}$ $\frac{9}{2}$ $\frac{1}{4}$ 3

● Vocabulary Builder

dilation (noun) **dy LAY shun**

Definition: A **dilation** is the widening of an object such as the pupil of an eye or a blood vessel.

Math Usage: A **dilation** is a transformation that reduces or enlarges a figure so that the image is similar to the preimage.

Related Words: reduction, enlargement, scale factor, center of dilation

Examples: an enlargement of a photograph, a model of the solar system

● Use Your Vocabulary

5. Underline the correct word to complete the sentence.

   A *dilation* is an enlargement if the figure decreases / increases in size.

6. Cross out the transformation that does NOT have a center.

   reflection   rotation   dilation

7. Circle the transformations that are isometries.

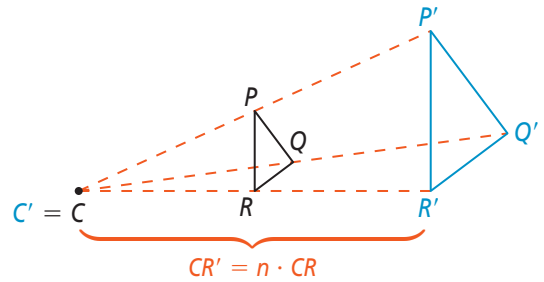   reflection   rotation   dilation

take note

Key Concept Dilation

A **dilation** with center C and **scale factor n, $n > 0$,** is a transformation with these two properties:

- The image of C is itself (that is, $C' = C$).
- For any other point R, R' is on $\overrightarrow{CR}$ and
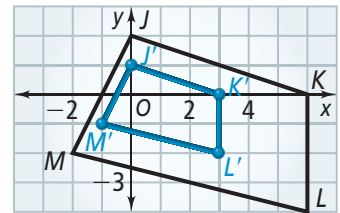 $CR' = n \cdot CR$, or $n = \dfrac{CR'}{CR}$.

The image of a dilation is similar to its preimage.

8. For a dilation of $\triangle PQR$ with **scale factor 2,** $CR' = \boxed{} \cdot CR$.

$CR' = n \cdot CR$

Problem 1 Finding a Scale Factor

Got It? *$J'K'L'M'$ is a dilation image of $JKLM$. The center of dilation is O. Is the dilation an enlargement or a reduction? What is the scale factor of the dilation?*

Underline the correct word to complete each sentence.

9. The image is larger / smaller than preimage.

10. The dilation is a(n) enlargement / reduction .

11. How can you tell which segments are corresponding sides of $JKLM$ and $J'K'L'M'$?

12. Circle the side that corresponds to $\overline{JK}$.

$\overline{J'K'}$ $\overline{J'M'}$ $\overline{L'K'}$

13. Find the length of each side.

$JK = \sqrt{(\boxed{} - \boxed{})^2 + (\boxed{} - \boxed{})^2} = \sqrt{\boxed{}}$

$J'K' = \sqrt{(\boxed{} - \boxed{})^2 + (\boxed{} - \boxed{})^2} = \sqrt{\boxed{}}$

14. Find the scale factor.

$\dfrac{J'K'}{JK} = \dfrac{\boxed{}}{\boxed{}} = \sqrt{\dfrac{\boxed{}}{\boxed{}}} = \dfrac{\boxed{}}{\boxed{}}$

15. The scale factor is $\boxed{}$.

Problem 2 Finding a Dilation Image

Got It? What are the images of the vertices of $\triangle PZG$ for a dilation with center (0, 0) and scale factor $\frac{1}{2}$?
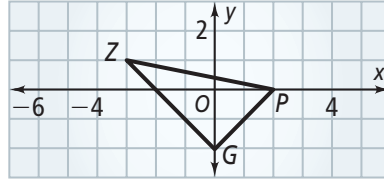
16. Complete the problem-solving model below.

Know
Coordinates of vertices:
$P(2, 0)$, $Z(\boxed{}, \boxed{})$,
and $G(\boxed{}, \boxed{})$
Center of dilation:
$(\boxed{}, \boxed{})$
Scale factor: $\boxed{}$

Need
Coordinates of the images of the vertices

Plan
Substitute the coordinates of the vertices into the dilation rule: $(x, y) \rightarrow$
$(\boxed{} \cdot x, \boxed{} \cdot y)$
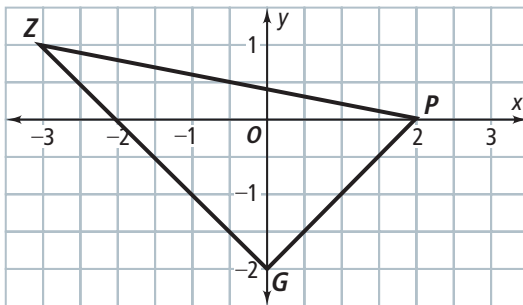
17. Use the dilation rule to find the coordinates of the images of the vertices.

$P(\boxed{}, \boxed{}) \rightarrow P'(\boxed{}, \boxed{})$

$Z(\boxed{}, \boxed{}) \rightarrow Z'(\boxed{}, \boxed{})$

$G(\boxed{}, \boxed{}) \rightarrow G'(\boxed{}, \boxed{})$

18. Graph the images of the vertices of $\triangle PZG$ on the coordinate plane. Graph $\triangle P'Z'G'$.

Problem 3 Using a Scale Factor to Find a Length

Got It? The height of a document on your computer screen is 20.4 cm. When you change the zoom setting on your screen from 100% to 25%, the new image of your document is a dilation of the previous image with scale factor 0.25. What is the height of the new image?

19. Underline the correct word to complete the sentence.

The scale factor 0.25 is less than 1, so the dilation is a(n) enlargement / reduction .

20. Image length $=$ scale factor $\cdot$ original length, so image height $= \boxed{} \cdot \boxed{}$,
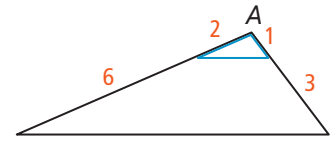
or $\boxed{}$ cm.

Lesson Check • Do you UNDERSTAND?

Error Analysis The blue figure is a dilation image of the black figure for a dilation with center *A.*

Two students made errors when asked to find the scale factor. Explain and correct their answers.

A.

$$n = \frac{2}{6} = \frac{1}{3}$$

B.

$$n = \frac{4}{1} = 4$$

Write T for *true* or F for *false.*

_____ **21.** The dilation is an enlargement.

_____ **22.** The side lengths of the black triangle are 6 and 3.

_____ **23.** The side lengths of the blue triangle are 2 and 1.

_____ **24.** The scale factor is between 0 and 1.

25. Explain the error the student made in solution A.

_____

_____

26. Explain the error the student made in solution B.

_____

_____

27. The correct scale factor is ____ .

Math Success

Check off the vocabulary words that you understand.

☐ dilation   ☐ center of dilation   ☐ scale factor of a dilation

☐ enlargement   ☐ reduction

Rate how well you *understand dilation images of figures.*

Need to review 0   2   4   6   8   10   Now I get it!