GSE Geometry | Unit 6 Similarity and Right Triangle Trig | Practice

Day 1 – Dilations and Scale Factors

1. Determine if the following scale factors will result in an enlargement, reduction, or congruence:

A. $\frac{5}{6}$ B. 150% C. 100% D. $\frac{5}{4}$ E. 0.4

R E C E R

2. If segment AB has a length of 3 units and is dilated by a scale factor of 2.25, what is the length of AB? Is this an enlargement or reduction?

A'B' = 6.75

Enlargement

3. What are the side lengths of Δ D'E'F' with a scale factor of 2.5 given that DE = 1, EF = 9.2, and FD = 8.6?

D'E' = 2.5 F'D' = 21.5

E'F' = 23

4. Δ ABC has vertices D(25, 25), E(15, 10), and F(20,10). What are the vertices of the image after a dilation with a scale factor of 1/5 using the origin as the center of dilation?

D'(5,5)
E'(3,2)
F'(4,2)

5. Δ JKL has vertices J(8, 2), K(6, 0), and L(4, 10). What are the vertices of the image after a dilation with a scale factor of 250% using the origin as the center of dilation?

J'(20,5) L'(10,25)

K'(15,10)

250%

2.5

6. Determine if the following transformations preserve similarity, congruence, or both

A. Rotation of 90 degrees clockwise then a dilation by scale factor of 3.

S (~)

B. Dilation with a scale factor of 5, then a translation of 5 units down, and then a dilation with scale factor of 1/5.

S (~)

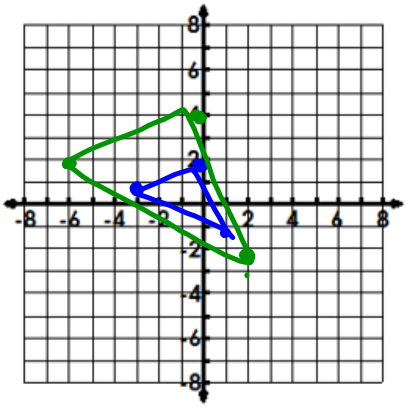
C. Reflection across x-axis followed by a rotation of 270 degrees clockwise

C (≅)

D. Dilation by 250% followed by a dilation of 40%

S (~)

7. A triangle has vertices G(2, -2), H(-6, 2), and J(0, 4). If the triangle is dilated by a scale factor of 0.5 through the center (0,0), what are the image vertices? Draw the pre-image and image on the coordinate plane.



G'(1,-1)

H'(-3,1)

J'(0,2)

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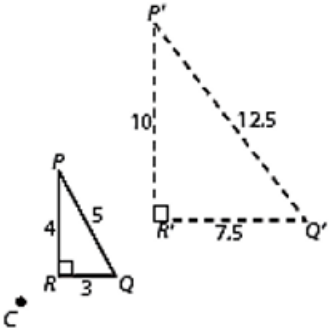
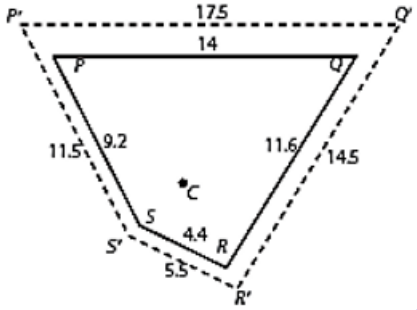
8. Determine the scale factor and whether the dilation is an enlargement, reduction, or congruency transformation. The dotted figure is the new image.

A.



Enlargement
2.5

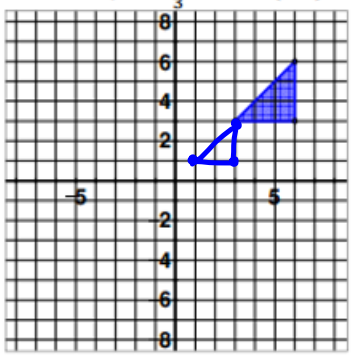
B.



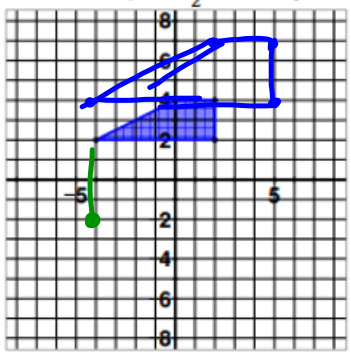
Enlargement
1.25

9. Perform the given dilation on each given pre-image with the given center of dilation.

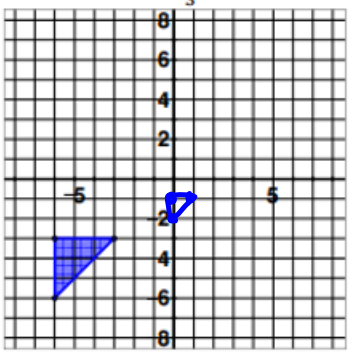
7. Dilate by $c = \frac{1}{3}$, center $(0,0)$



14. Dilate by $c = \frac{3}{2}$, center $(-4,-2)$



16. Dilate by $c = \frac{1}{3}$, center $(3,0)$

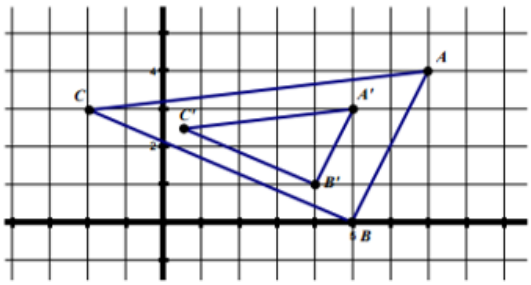


up 4 · $\frac{3}{2}$ up 6

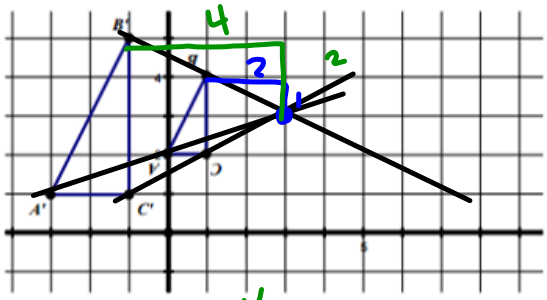
Rt 6 · $\frac{3}{2}$ Rt 9

10. Work backwards to find the cneter of dilation and also determine the scale factor.

a. Center of Dilation: (3,2)
Scale Factor: 1/2



b. Center of Dilation: (3,3)
Scale Factor: 2



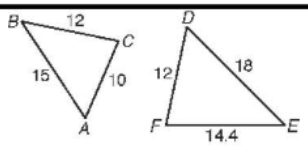
$\frac{4}{2} = 2$

Day 2 – Similar Triangles and Proportions

Side – Side – Side (SSS) Similarity Statement

If the measures of the corresponding sides of two triangles are proportional, the figures are similar.

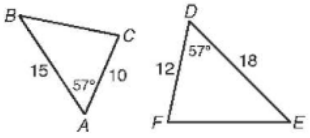
Scale factor



△ABC ~ △DEF

Side – Angle – Side (SAS) Similarity Statement

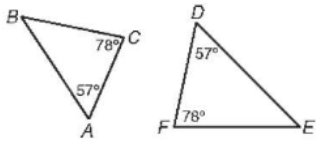
If the measures of two sides of a triangle are proportional to the measures of two corresponding sides of another triangle and the included angles are congruent, the figures are similar.



△ABC ~ △DEF

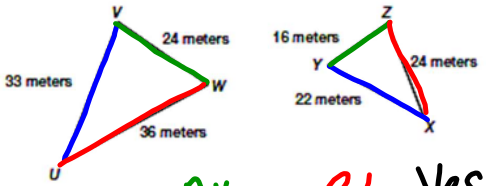
Angle – Angle (AA) Similarity Statement

If two angles of one triangle are congruent to two angles of another triangle, the triangles are similar.



△ABC ~ △DEF

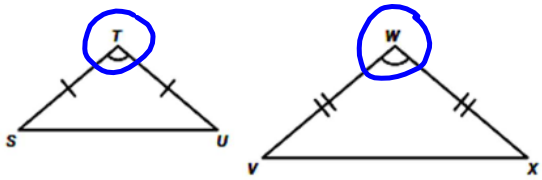
Example 1: Prove ΔUVW ~ ΔXYZ are similar.



$\frac{33}{22} = \frac{24}{16} = \frac{36}{24}$ Yes by SSS

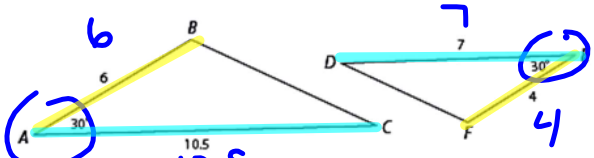
1.5 1.5 1.5

Example 2: Is ΔTSU ~ ΔWVX ? Prove why or why not.



SAS ✓

Example 3: Prove ΔABC ~ ΔEFD.



10.5

∠E ≅ ∠A

SAS ✓

4

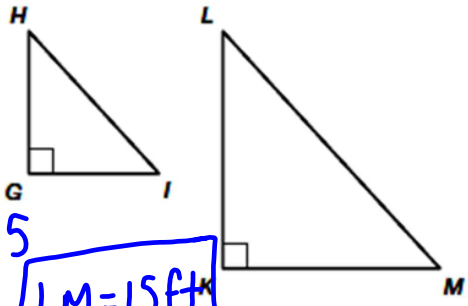
$\frac{6}{4} = \frac{10.5}{7}$ ✓

1.5 1.5

Example 4:
When two figures are similar, the ratio of their corresponding sides are the same, which means we can use proportions to find missing side lengths.
In the figure below, $\Delta GHI \sim \Delta KLM$.

1. Write 3 different ratios that compare a side length from ΔGHI to a corresponding side length of ΔKLM.

$$\frac{GH}{KL} = \frac{GI}{KM} = \frac{HI}{LM}$$



2. Suppose GH = 3 feet, KL = 9 feet, and HI = 5 feet.
Write a proportion to calculate LM.

$$\frac{GH}{KL} = \frac{HI}{LM} \quad \frac{3}{9} = \frac{5}{LM}$$

$3 \cdot LM = 9 \cdot 5$

$\frac{3LM}{3} = \frac{45}{3}$

$LM = 15 ft$

3. Suppose you know KM = 12 feet. Find GI.

$$\frac{GI}{12} = \frac{5}{15}$$

$15 \cdot GI = 5 \cdot 12$

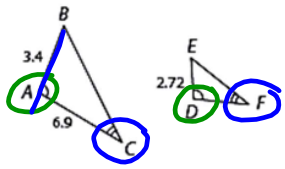
$15GJ = 60$

$GI = 4ft$

4. Calculate the ratio of the height of triangle ΔGHI to the height of ΔKLM. Then calculate the ratio of the length of the base of ΔGHI to the length of the base of ΔKLM. What do you notice?

Equal b/c figures are similar

Example 5: Prove $\Delta ABC \sim \Delta DEF$ and then find the length of DF.



$$\frac{3.4}{2.72} = \frac{6.9}{DF}$$

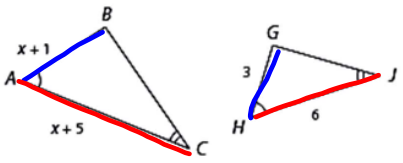
AA b/c $\angle A \cong \angle D$
$\angle C \cong \angle F$

$3.4DF = 6.9 \cdot 2.72$

$\frac{3.4}{3.4} DF = \frac{18.768}{3.4}$

$DF = 5.52$

Example 6: Determine if the triangles are similar and then create a similarity statement. Then find the value of x.



$$\frac{x+1}{3} = \frac{x+5}{6}$$

AA b/c $\angle A \cong \angle H$
$\angle C \cong \angle J$

$6 \cdot (x+1) = 3 \cdot (x+5)$

$6x + 6 = 3x + 15$

$-3x \quad -3x$

$3x + 6 = 15$

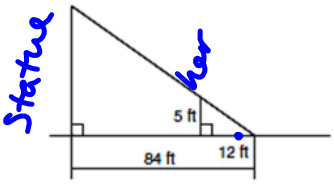
$-6 \quad -6$

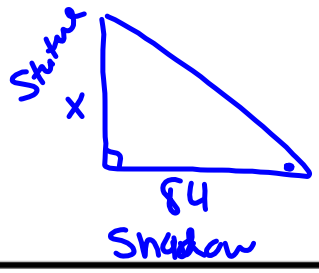
$3x = 9$

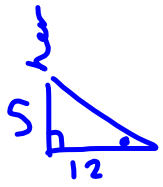
$\frac{3x}{3} = \frac{9}{3}$

$x = 3$

Example 7: Minh wanted to measure the height of a statue. She lined herself up with the statue's shadow so that the tip of her shadow met the tip of the statue's shadow. She marked the spot where she was standing. Then she measured the distance from where she was standing to the tip of the shadow, and from the statue to the tip of the shadow. Are the two triangles similar? What is the height of the statue?





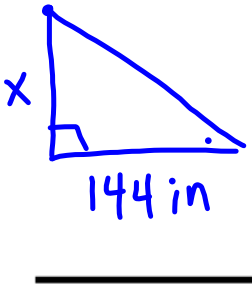


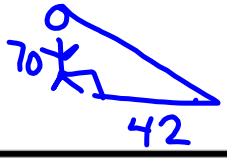
$\frac{x}{5} = \frac{84}{12}$

$\frac{12x}{12} = \frac{420}{12}$

$x = 35ft$

Example 8: Suppose a person 5 feet 10 inches tall casts a shadow that is 3 feet 6 inches tall. At the same time of the day, a flagpole casts a shadow that is 12 feet long. To the nearest foot, how tall is the flagpole?





$\frac{x}{70} = \frac{144}{42}$

$42x = 10080$

$\frac{42x}{42} = \frac{10080}{42}$

$x = 240$

$\frac{240}{12}$

3

flagpole = 20ft

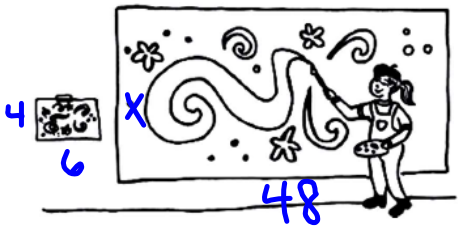
$5ft \times 12 = 60in$

$+10in$

$70in$

$\times 12 = 36 + 6 = 42$

Example 9: A wall mural is being painted from a picture that is 6 inches long and 4 inches wide. The wall mural should be 48 inches long. The picture and wall mural are similar. How wide is the width of the mural? What is the scale factor of the picture to the mural?



$\frac{x}{4} = \frac{48}{6}$

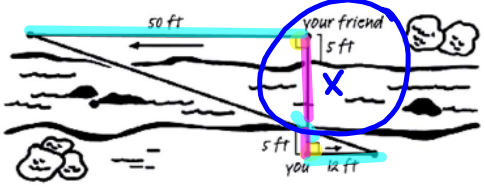
$6x = 192$

$x = 32$ inches

Scale factor

$\frac{48}{6} = 8$

Example 10: You and your friend are on opposite sides of the creek and are 5 feet from the creek bank. She walks 50 feet to the left on one side and you walk 12 feet to the right. Are the triangles similar? Find the width of the creek.



$\frac{x}{5} = \frac{50}{12}$

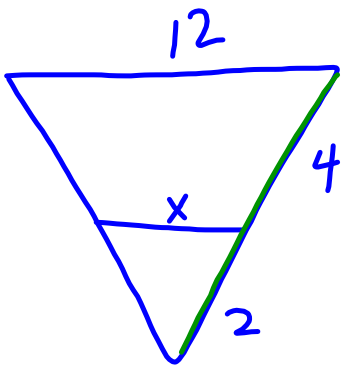
$\frac{12x}{12} = \frac{250}{12}$

$x = 20.83$

20.83

$-\ 5$ your friend

$15.83ft$



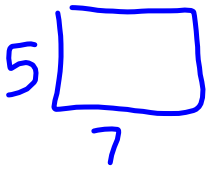
$$\frac{2}{6} = \frac{x}{12}$$

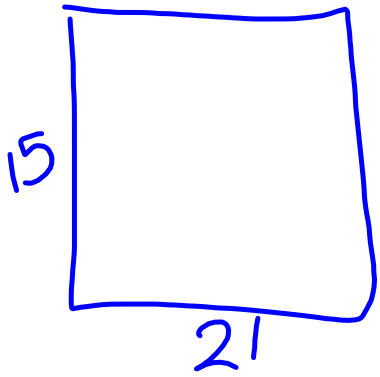
$$6x = 24$$
$$x = 4$$

(5) $\Delta PQR \sim \Delta DEF$

$$\frac{PQ}{DE} = \frac{4}{6}$$

(10)





Area = 35

Area = 315

$$\frac{315}{35} = 9$$