Similarity and Transformation Notes

Similar figures have the same SHAPE, but may have different sizes.

Figures are considered similar if they meet **BOTH** criteria:

- If figure 1 can be made to look like figure 2 using a series of transformations (translations, reflections, rotations, and/or dilations)

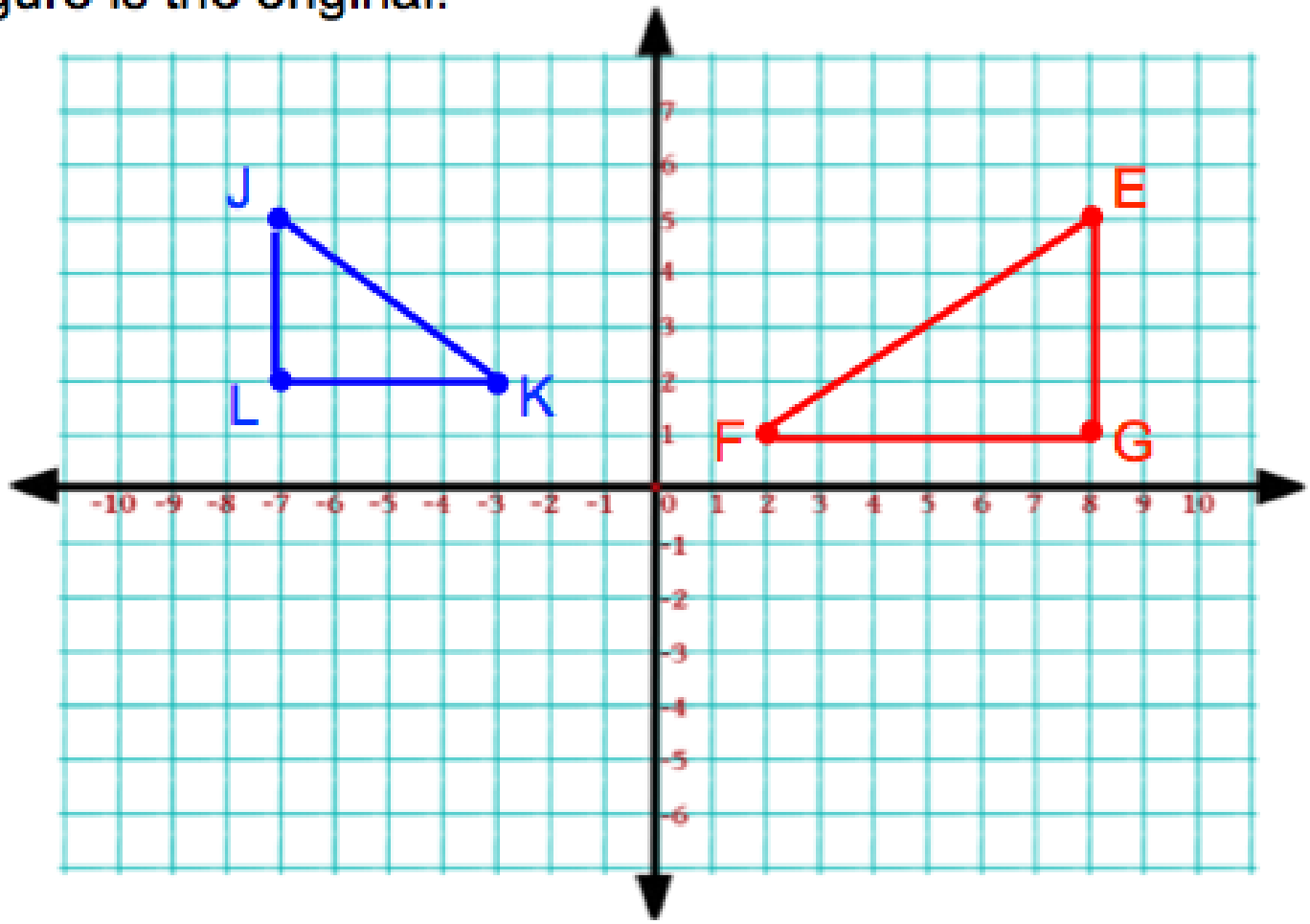
- If figure 1 and figure 2 have the same scale factor exist between **ALL** corrsponding sides.

Similar figures are related based on the scale factor used. For example, one figure can be twice as large as the other if the scale factor is k = 2.

Using a Scale Factor

- The dimensions of a figure being dilated can be found by multiplying the original side lengths by the scale factor.

1) Determine if the two figures are similar using transformations. Explain your reasoning. Blue figure is the original.



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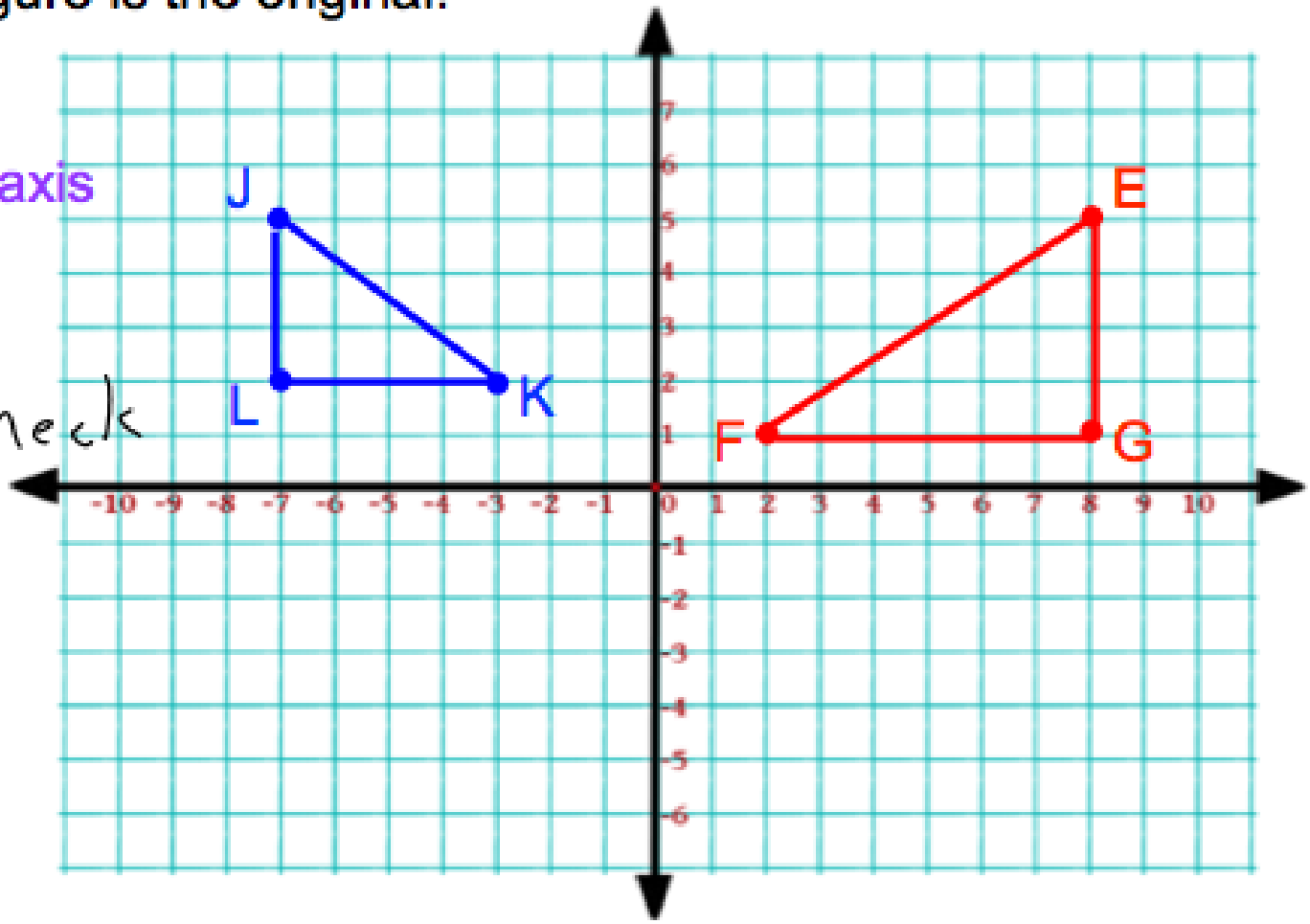


Explanation

1) Reflection over the y-axis
2) Translate
3) Check Scale Factor

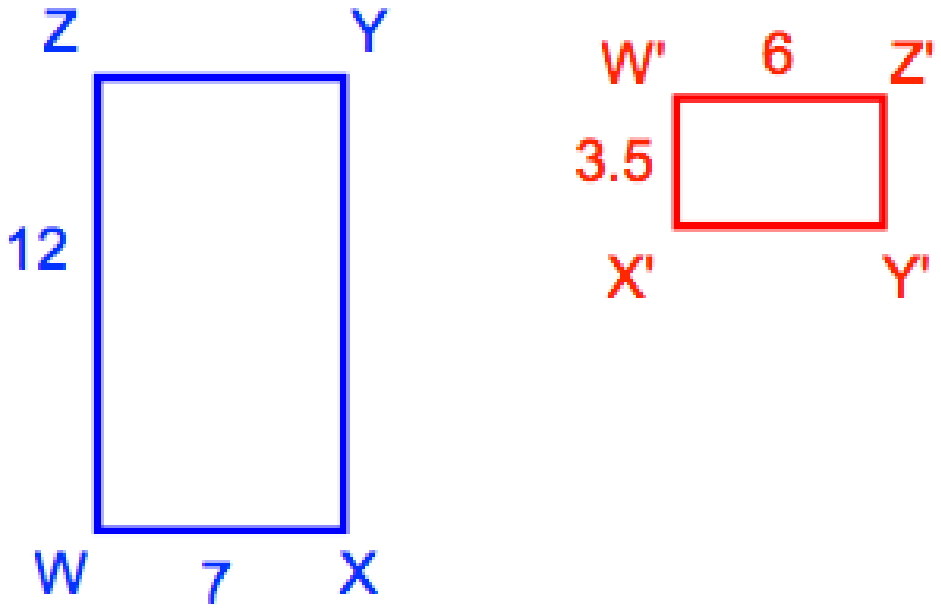
Scale Factor Check

$$\frac{FG}{LK} = \frac{6}{4} = \frac{3}{2}$$

$$\frac{EG}{JL} = \frac{4}{3}$$

Not similar. Do not share the same scale factor.

2) Determine if the two figures are similar using transformations. Explain your reasoning. Blue figure is the original.



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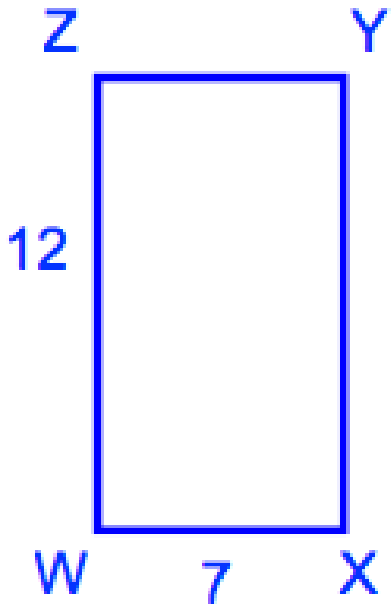

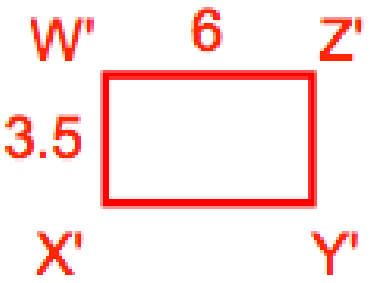

Scale Factor Check

$\frac{6}{12} = \frac{1}{2}$

$\frac{3.5}{7} = \frac{35}{70} = \frac{1}{2}$

Explanation

1) Rotate 90^0 clockwise about point; I chose point Y.
2) Translate
3) Check Scale Factor
4) Dilate k= 1/2

Similar shapes.

3) Triangle ABC has side lengths of 20mm, 10mm, and 25mm. It is related to Triangle XYZ by a scale factor of 1 4/5. What are the side lengths of Triangle XYZ?

If the shapes have a common scale factor, then multiply the side lengths by the scale factor to determine the new side lengths.

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$\overline{XY}$ $20 \times \frac{9}{5}$ or $1.8 = 36$ mm

$\overline{YZ}$ $10 \times \frac{9}{5}$ or $1.8 = 18$ mm

$\overline{XZ}$ $25 \times \frac{9}{5}$ or $1.8 = 45$ mm

4) A bakery transfers a photo image onto a birthday cake. The original photo, which is 8in-by-10in, is reduced by a scale factor of 0.75. The baker decides that the image is still too large, and reduces it by a scale factor of 0.8. What are the final dimensions of the photo? Are both reduced images similar to the original photo?

4) A bakery transfers a photo image onto a birthday cake. The original photo, which is 8in-by-10in, is reduced by a scale factor of 0.75. The baker decides that the image is still too large, and reduces it by a scale factor of 0.8. What are the final dimensions of the photo? Are both reduced images similar to the original photo?

$8 \cdot .75 = 6$ | $6 \cdot .8 = 4.8$

$10 \cdot .75 = 7.5$ | $7.5 \cdot .8 = 6$

Final dimensions

Yes, since both original dimensions are multipled by the same scale factor each time, both images are similar to the original image.