6.2.3 Are they similar?

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Identifying Similar Shapes

Have you ever noticed how many different kinds of cell phones there are? Sometimes you might have a cell phone that is similar to one of your friends' cell phones because it is the same brand, but it might be a different model or color. Occasionally, two people will have the exact same cell phone, including brand, model, and color. Sorting objects into groups based on what is the same about them is also done in math. As you work with your team to sort shapes, ask the following questions:

How do the shapes grow or shrink?

What parts can we compare?

How can we write the comparison?

6-64. **WHICH SHAPES ARE SIMILAR?**

If two shapes appear to have the same general relationship between sides, how can you decide for sure if the shapes are similar? Work with your team to:

- Carefully cut out the original shape and shapes A through G from one copy of the Lesson 6.2.3 Resource Page.

- Decide how each shape is related to the original shape. (Each person should use an uncut copy of the resource page and the team's cut out shapes to help decide.)

- Compare the angles and the sides of shapes A through G to the original shape.

Comparing Shapes
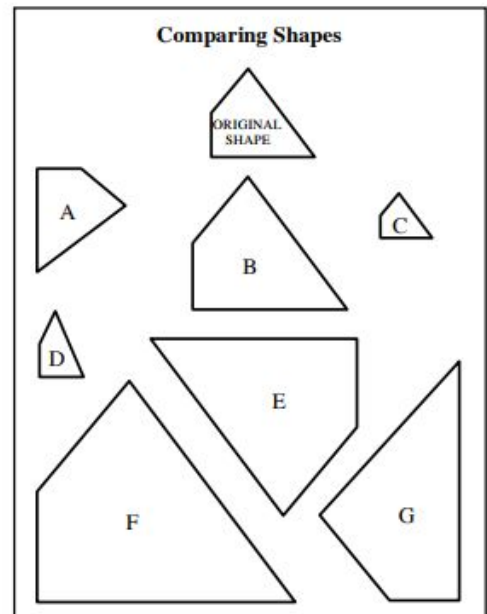
a. Which shapes are similar to the original shape? Give specific reasons to justify your conclusions.

A, B, C, E, F
They all had the same angles.

b. Now look only at the shapes that are similar to the original shape. What do these shapes have in common? What is different about them? Be specific.

Same angles. Different side lengths.

c. When two shapes are similar, the scale factor is the number you multiply the length of the side of one shape by to get the length of the corresponding side of the new shape. What is the scale factor between the original shape and shape E? Is each side of the shape enlarged the same number of times? Use a ruler to help you decide, if needed.
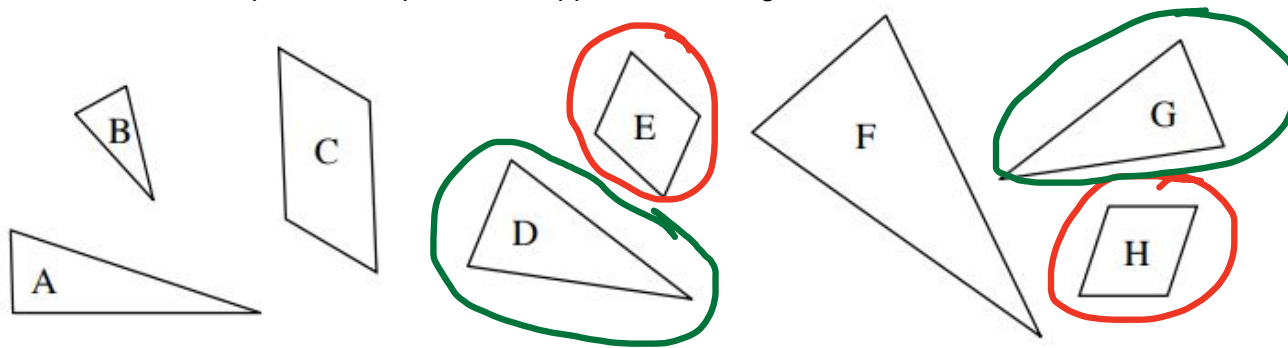
Scale Factor : 2

d. What is the scale factor between the original shape and shape C? Why is it less than 1?

6-65. Shapes that are similar but do not grow or shrink are called congruent shapes.

a. Which shape from problem 6-64 is exactly equal to the original shape in every way?

A

b. Which pairs of shapes below appear to be congruent to each other?

c. Get a piece of tracing paper from your teacher and use it to check that the shapes you identified as congruent have exactly the same size and shape. Were you correct? If not, why not?

6-66. Quan enlarged shape Q to make shape P, below. Are his shapes similar? If they are similar, identify the scale factor (multiplier). If they are not, demonstrate that at least one pair of sides does not share the scale factor.
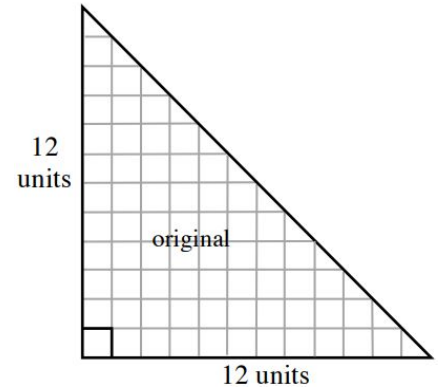
Similar

Scale Factor: 2

P

Q
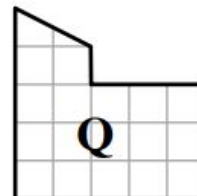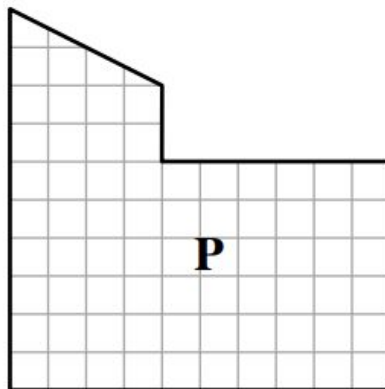
6-67. Color-code the corresponding sides on each shape using the colors suggested by your teacher.

a. Compare the green sides of each shape. What do you notice about those sides?

b. Compare each of the other five sides of shape P with their corresponding sides on shape Q. What do you notice about those pairs of sides?

c. Imagine enlarging shape P to make a new shape R that has a base 25 units long. If shape R is similar to shape P, predict the length of the shorter vertical side of shape R without drawing the shape. What is the scale factor in this situation?

6-68. Using the triangle shown at right as the original figure, **predict which of the scale factors below** would enlarge (make bigger) or reduce (make smaller) the shape. (Do not actually make a new shape.)

$$\frac{5}{3} \quad \frac{3}{4} \quad \frac{7}{6} \quad \frac{2}{3}$$

L   S   L   S

12 units

original

12 units

After you write down your prediction, decide which scale factor each member of your team will use. **My scale factor:**_____

Then copy the original figure on GRAPH PAPER and draw a similar triangle using your scale factor.

a. Show your new triangle to your teammates and check your predictions. Which scale factors made the triangle larger? Which made the triangle smaller? Is there a pattern?

    Scale Factors that made the triangle **LARGER**:_improper fractions_

    Scale Factors that made the triangle **SMALLER**:_Standard fractions_

b. Which parts of the new triangles remained the same as the original triangle? Which parts changed? How do you know?

c. Each of the new triangles is similar to the original triangle used to create it. Compare the corresponding (matching) sides and angles to each other. Describe the relationship or explain why you think there is no relationship.

d. What scale factor could you use to create a triangle that is congruent to the original? Explain.

1 because multiplying by 1 won't change anything.

e. Additional Challenge: Find a scale factor that will make a similar shape that is larger than the original but has a scale factor less than 2.

Any number between 1 and 2.