

## 4.2.2 How does it change? Page 189

Date \_\_\_\_\_

### Enlarging and reducing figures

From background define these words:

Enlargements:

Reductions:

Similar:

#### 4-52. THE BROKEN COPIER

The Social Studies teachers at CPM Middle School are working together to plan a geography unit. They are using all of the school's copy machines to **enlarge** (make larger) and **reduce** (make smaller) images from books to make them convenient sizes. The teachers think that some of the copy machines might be broken and are making incorrect copies.

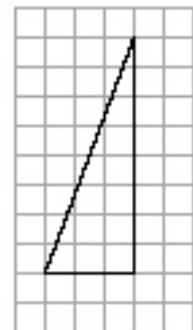
**Your task:** Get the Lesson 4.2.2 Resource Page from your teacher. Work with your team to identify which, if any, of the images have been made using a broken copier. Be ready to explain how you can tell if any of the copies are incorrect.

1.

2.

3.

**4-53.** Carmen and Dolores want to enlarge the triangle at right. Its base is three units long. They want the base of their new triangle to be 12 units long, and they want the shape of the new triangle to stay the same. However, they disagree about what the new triangle's height should be.



a. Work with your team to predict the height of the new triangle.

b. Carmen noticed that the new base is 9 units longer than the original one, so she thinks that the height of the new triangle should be 9 units longer, or 17 units high. Dolores noticed that the new base is 4 times longer, so she thinks that the height of the new triangle should be 4 times longer, or 32 units high.

i. On graph paper, draw the original triangle as well as the triangles that Carmen and Dolores describe. **Make sure to label each.**

ii. Who is correct?

How can you tell?

Original  
Triangle

- c. What if Carmen and Dolores wanted to reduce the shape so that the base of the new smaller triangle is 1 unit long.  
How tall should the triangle be to keep its original shape?  
How did you figure this out?

Draw the new shape on the graph paper above and label!

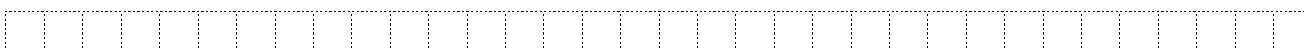
**4-54.** Since some of the copiers at CPM Middle School are broken, the math teachers plan to do all of their reductions and enlargements by hand. They need your team's help.

Using the graph paper below, draw each of the original figures described in parts (a) and (b) below and enlarge or reduce them as described. Label the lengths!

- Draw a rectangle that measures 5 units by 3 units. Enlarge it so that each side is four times as long as the original.
- Draw a right triangle with a base of 2 units and a height of 3 units. Make three "copies" so that the lengths of the new sides are 50%, 300%, and 500% of the original.

Original  
Rectangle

Original  
Right  
Triangle



### Extension

**4-55.** Draw a coordinate grid with four quadrants. Label the x- and y-axes from  $-10$  to  $10$  and then use it to do the following tasks.

- Plot the following ordered pairs and connect them.  $(-2, -4)$ ,  $(-2, 4)$ ,  $(2, 4)$  and  $(2, -4)$ . What is the shape that you have made?
- What is the length of each of the sides of the shape that you have made?
- Draw a figure that is enlarged by a factor of  $1.5$  and still has one corner (or **vertex**) at  $(-2, -4)$ . What are the coordinates of the corners (or **vertices**) for the new shape? What are the lengths of the sides now?
- Now draw a figure that is  $\frac{3}{4}$  the size of the original, again with one vertex still  $(-2, -4)$ . What are the coordinates of the vertices of the reduced shape? What are its side lengths?

2. **4-56. Additional Challenge:** Copy the diagram at right onto graph paper. Then draw a smaller copy with sides that are  $\frac{2}{3}$  the lengths of the original.

