

# Warm Up

Compare the ratios in each pair.

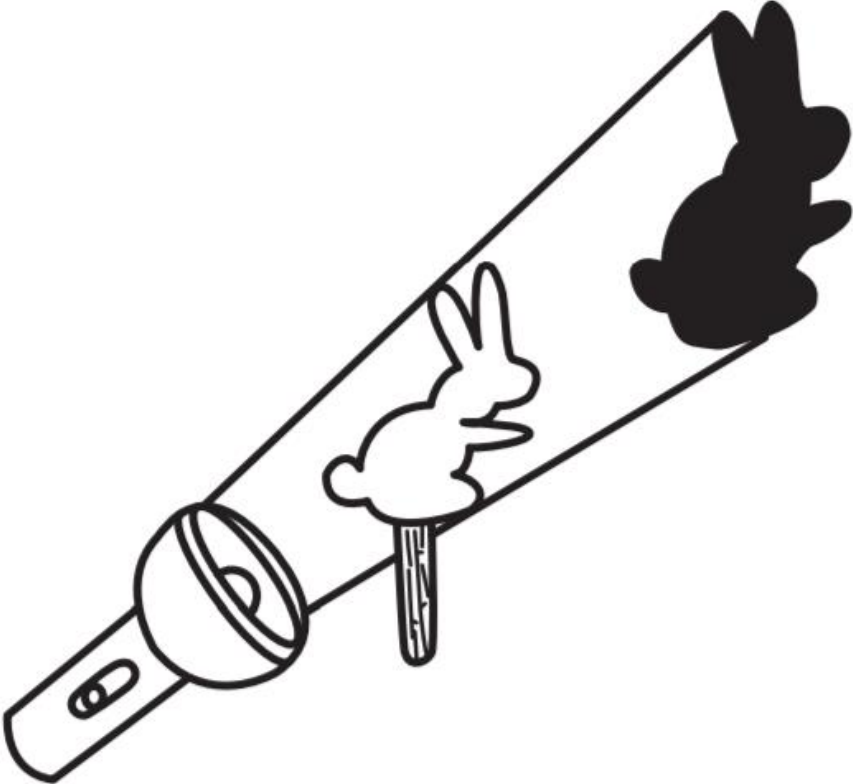
1.  $4 : 3$        $3 : 5$

2.  $\frac{5}{1}$        $\frac{1}{5}$

3.  $\frac{2}{3}$        $\frac{4}{6}$

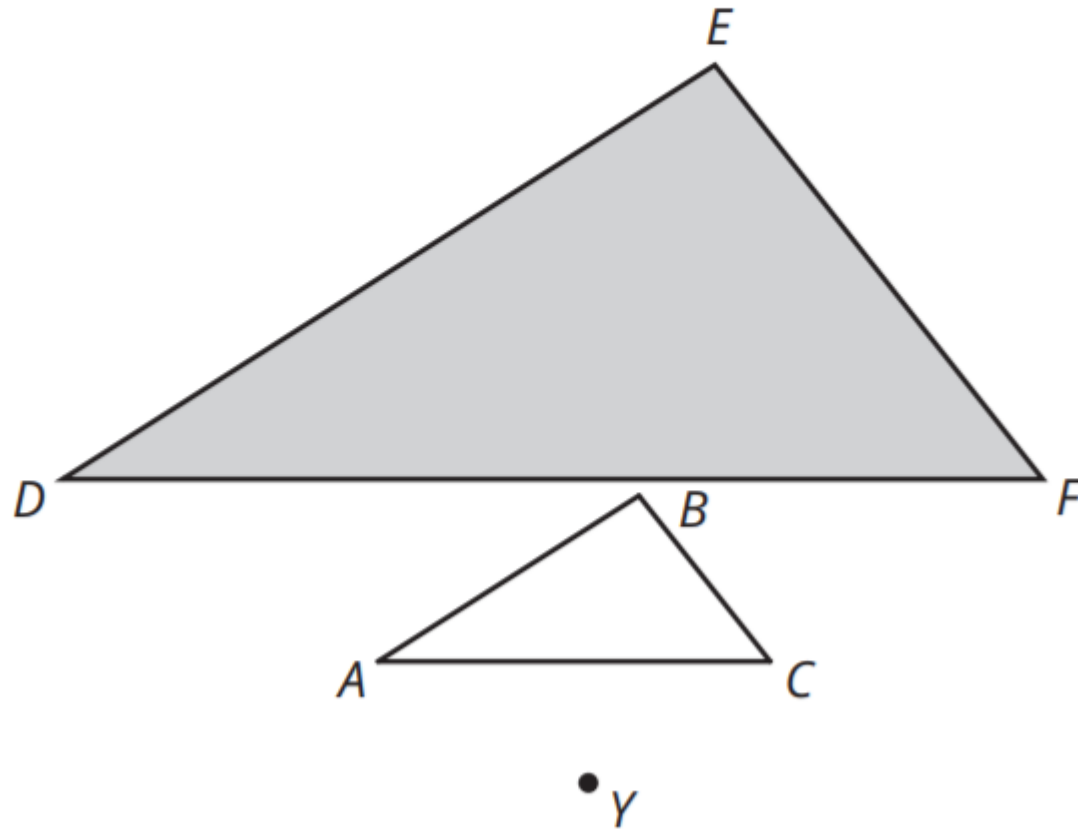
4. 3 to 4      3 to 2

You have volunteered to help at the children’s booth at an art festival. The children that visit the booth will create objects, like animals or people, out of poster board and craft sticks. Then, they will use a flashlight to create shadow puppets. Your job is to show the children how to use a flashlight and a wall to make their own puppet show.



- 1. How does the size of the shadow puppet compare to the size of the object made out of poster board and craft sticks?**
- 2. How does the shape of the shadow puppet compare to the shape of the object made out of poster board and craft sticks?**
- 3. Do you think that the shadow is a transformation of the object? Why or why not?**

Consider  $\triangle ABC$ ,  $\triangle DEF$ , and point  $Y$ . Imagine that point  $Y$  is the flashlight and  $\triangle DEF$  is the shadow of  $\triangle ABC$ . Thus,  $\triangle DEF$  is a *dilation* of  $\triangle ABC$ .



A **dilation** is a transformation of the figure in which the figure stretches or shrinks with respect to a fixed point, or center of dilation.

1. Draw  $\overline{YD}$ ,  $\overline{YE}$ , and  $\overline{YF}$  on the figure shown. These line segments show the path of the light from the flashlight.
2. Use a metric ruler to determine the actual lengths of  $\overline{YA}$ ,  $\overline{YB}$ ,  $\overline{YC}$ ,  $\overline{YD}$ ,  $\overline{YE}$ , and  $\overline{YF}$  to the nearest tenth of a centimeter. Then express the ratios  $\frac{YD}{YA}$ ,  $\frac{YE}{YB}$ , and  $\frac{YF}{YC}$  as decimals. What do you notice about the ratios?
3. Use a protractor to measure the corresponding angles in the triangles. What can you conclude?



### Remember:

A ratio is a comparison of two numbers using division.

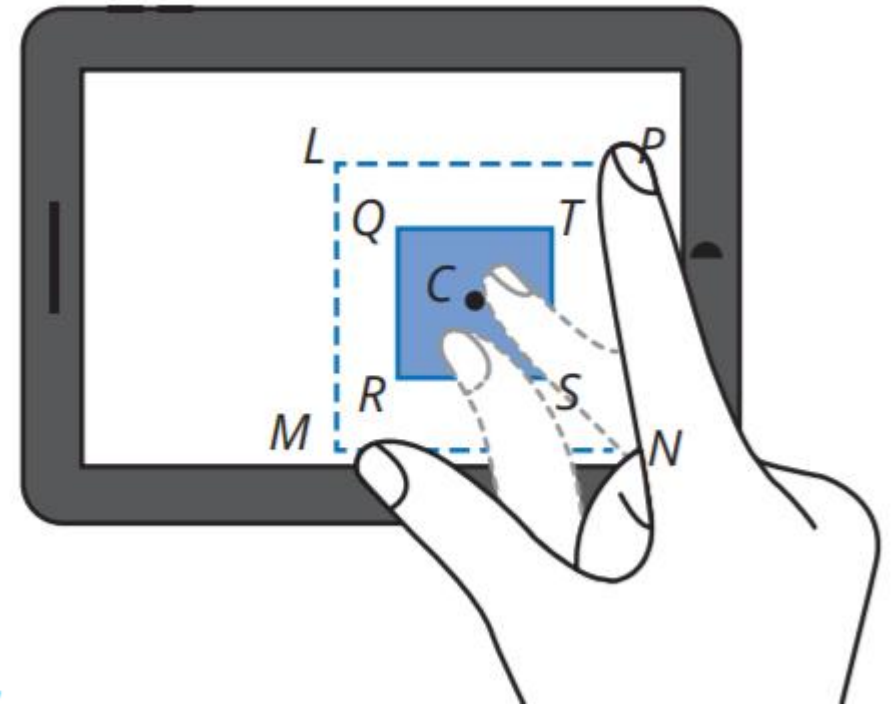
The ratio 4 : 3 can be written as  $\frac{4}{3}$  or as 4 to 3.

**4. In any dilation:**

- a. How do the measures of the corresponding angles in the image and pre-image compare?
  
  
  
  
  
  
  
  
  
  
  - b. How do the ratios of the lengths of the corresponding sides in the image and pre-image compare?
- 5. What is the center of the dilation in the model of the shadow puppet?**



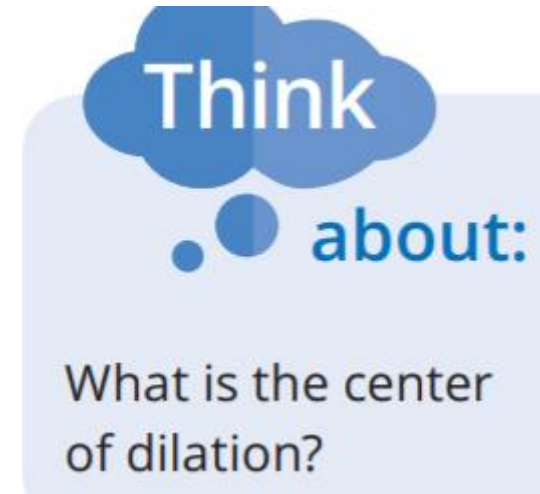
A dilation can produce an enlargement, a reduction, or a congruent figure. For example, when you pinch and zoom on a tablet computer, you can create dilations.



**6. Consider the dilations shown on the tablet.**

- a. Estimate the scale factor of the dilation produced when you “pinch” the screen to create square  $QRST$  given the pre-image of square  $LMNP$ . Show your work.**

- b. Estimate the scale factor of the dilation produced when you “zoom” to create square  $LMNP$  given the pre-image of square  $QRST$ . Show your work.



7. How does the image compare to the pre-image when:
- a. The scale factor is greater than 0 and less than 1?
- b. The scale factor is greater than 1?