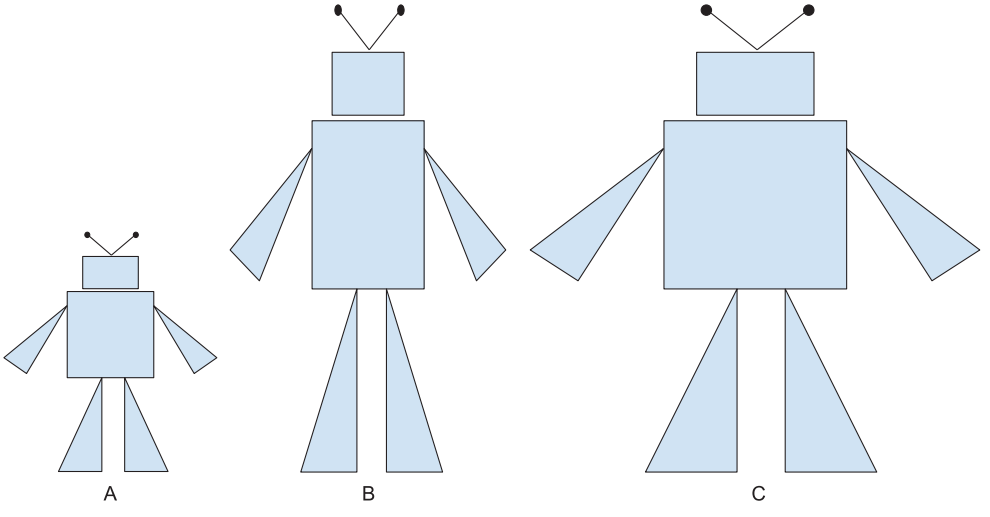
Family Support Materials

Similarity

In this unit, your student will be learning about similarity. They study a variety of similar figures and continue to write proofs about triangles. Then they use the statements they've proven to solve new problems.

Students start out with some comparisons. They look at different images to decide what stays the same and what changes with a scaled image. Imagine that you want to make a poster of a picture of a robot.

- Which image is a scaled copy of Image A?
- What happens to the shapes in the scaled copy?
- What happens to the angles in the scaled copy?
- What happens to the segments in the scaled copy?

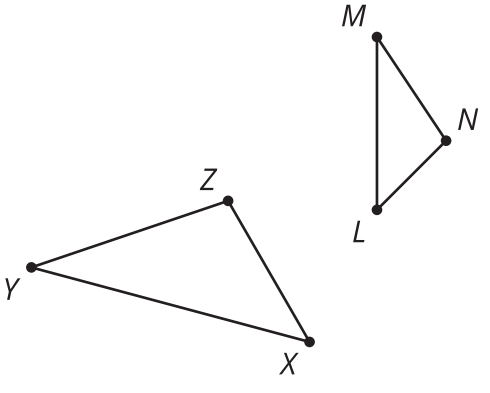


It looks like some parts of the shape stay the same no matter what. The rectangles stay rectangles in all 3 images. But in Image B, the sides of the rectangle for the head look almost the same. It might even be a square. That isn't a scaled copy of the original Image A. The triangles for the legs in the original are twice as tall as they are wide. This same ratio holds for Image C. The proportionality of corresponding sides is one of the characteristics of a scaled copy. Another characteristic of a scaled copy is that the corresponding angles stay the same.

Recall that figures are called congruent if we can find rigid transformations (translation, rotation, reflection) that take one figure exactly onto the other figure so every part lines up. Two figures are called similar if we can find any transformations (translation, rotation, reflection, dilation) that take one figure exactly onto the other figure so every part lines up. The new transformation, dilation, makes scaled copies of figures.

For the robots, Image C is a translation and dilation of Image A. To dilate an image we need to choose a scale factor. The scale factor to go from the original to the larger size is 2. Every segment will be twice as long after the dilation. The scale factor to go from a standard photo to a wallet size photo would be something less than 1, such as $\frac{1}{2}$. The new image would be smaller, but all the angle measures stay the same and the ratios of the side lengths do too, so the image is not distorted.

Here is a task to try with your student:



Triangles XYZ and LMN are similar triangles.

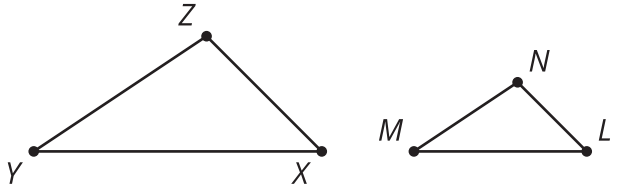
1. Redraw the triangles so the corresponding sides are easier to see. Name the corresponding sides and angles.

2. Angle X is 45 degrees and angle N is 101 degrees. What are the measures of the other angles?

3. Side XY is 5 units long and side LM is 3 units long.
   a. What is the scale factor of the dilation that takes triangle XYZ to triangle LMN?

   b. What is the scale factor of the dilation that takes triangle LMN to triangle XYZ?

Solution:



1. Angle X is corresponding to angle L.
   Angle Y is corresponding to angle M.
   Angle Z is corresponding to angle N.
   Side XY is corresponding to side LM.
   Side YZ is corresponding to side MN.
   Side ZX is corresponding to side NL.

2. Angle $L = 45^\circ$. Angle $Z = 101^\circ$. Angle $M = Y = 34^\circ$.

3.
   a. $\frac{3}{5} = 0.6$

   b. $\frac{5}{3}$