

Warmups good

6.1

Big and Small

Dilating Triangles to Create Similar Triangles

Start here

LEARNING GOALS

In this lesson, you will:

- Prove that triangles are similar using geometric theorems.
- Prove that triangles are similar using transformations.
- Determine the image of a given two-dimensional figure under a composition of dilations.

KEY TERM

- similar triangles

get protractor

Good - Easy lesson

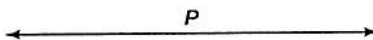
Making hand shadow puppets has a long history. This activity goes back to ancient China and India. Before the invention of television, or even radio, hand shadows were used to entertain people by telling stories.

Today, you can find tutorials online that will show you how to create really complicated and interesting shadow puppets. Groups of people can get together and create entire landscapes and scenes—all with the shadows made by their hands!

2. Explain how you located the positions of each additional marble. Label the distances between the marbles in the first row and in the second row.

Mult by 2

3. Describe the relationship between the first and second rows of marbles.
4. Use a ruler to compare the length of the line segments connecting each original marble to the line segments connecting each additional marble.
5. What can you conclude about dilating a line that does not pass through the center of a dilation?
6. Consider line P . How could you show a dilation of this line by a factor of 2 using P as the center of dilation? Explain your reasoning.

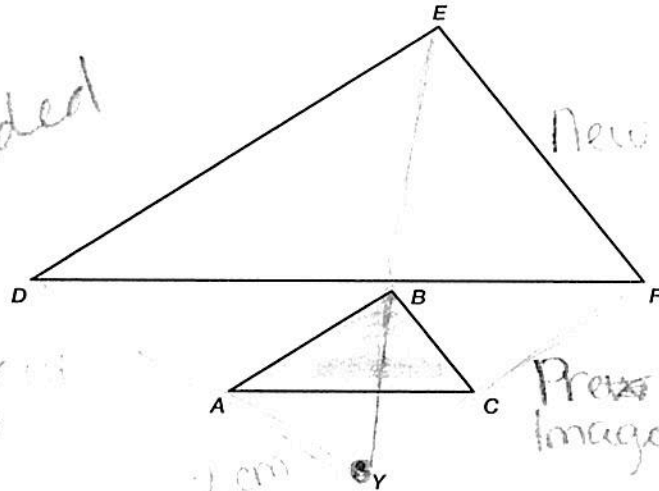


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Consider $\triangle ABC$, $\triangle DEF$, and point Y . Imagine that point Y is the flashlight and $\triangle DEF$ is the shadow of $\triangle ABC$. You can identify proportional sides in a figure and a dilation of the figure.

Use pathy paper, if needed



Enlargement

Pre-image



4. Draw the line segments \overline{YD} , \overline{YE} , \overline{YF} on the figure shown. These line segments show the path of the light from the flashlight.

Describe what these line segments connect.

Is $\triangle ABC$ an enlargement of $\triangle DEF$, or is $\triangle DEF$ an enlargement of $\triangle ABC$?

5. 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.

*YA = 2
YB = 2.4
YC = 1.8
YD = 5
YE = 4.5*

*Which vertices are corresp. vertices?
Which sides are corr. sides?
Why do you suppose the ratios are...*

The ratios are... what info would these provide?

6. Express the ratios $\frac{YD}{YA}$, $\frac{YE}{YB}$, and $\frac{YF}{YC}$ as decimals.

*$\frac{YD}{YA} = \frac{5}{2} = 2.5$
 $\frac{YE}{YB} = \frac{4.5}{2.4} = 1.875$
 $\frac{YF}{YC} = \frac{1.8}{1.8} = 1$*

The corresponding side lengths are proportional!

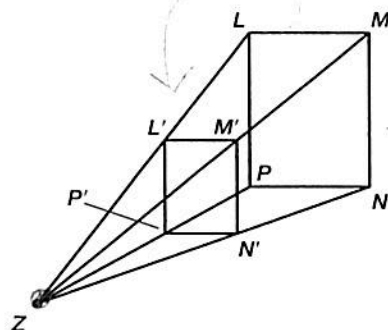


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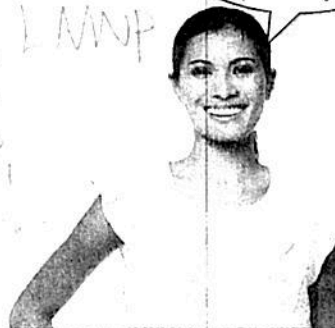
A dilation of a figure produces a similar figure. You can use this knowledge to identify similar figures that are the result of dilations.



12. Rectangle $L'M'N'P'$ is a dilation of rectangle $LMNP$. The center of dilation is point Z .



Recall that an image that is the result of a dilation is not always larger than the pre-image.



Handwritten notes:
 1/2 reduction
 fact about
 smaller

Handwritten notes:
 From LMNP
 to L'M'N'P'

- a. Use a metric ruler to determine the actual lengths of \overline{ZL} , \overline{ZN} , \overline{ZM} , \overline{ZP} , $\overline{ZL'}$, $\overline{ZN'}$, $\overline{ZM'}$, and $\overline{ZP'}$ to the nearest tenth of a centimeter.

Then express the ratios $\frac{ZL'}{ZL}$, $\frac{ZN'}{ZN}$, $\frac{ZM'}{ZM}$, and $\frac{ZP'}{ZP}$ as decimals.



- b. Are the corresponding side lengths proportional? Explain your reasoning.

13. How does the image compare to the pre-image when:

- a. the scale factor is greater than 1?

- b. the scale factor is less than 1?

The ratios that you wrote in Questions 6 and 12 are the scale factors of each dilation.



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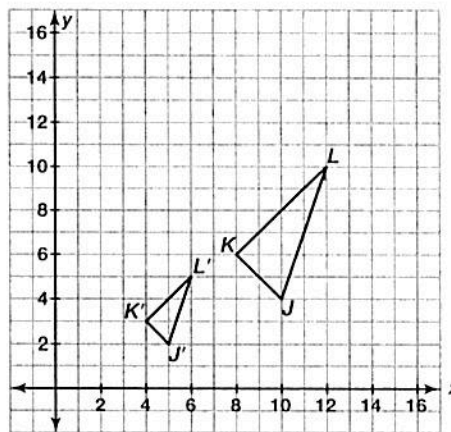
3. Use the duplicate segment construction to locate the vertices of $\triangle G'H'J'$.



4. List the coordinates of the vertices of $\triangle GHJ$ and $\triangle G'H'J'$. How do the coordinates of the image compare to the coordinates of the pre-image?



5. Triangle $J'K'L'$ is a dilation of $\triangle JKL$. The center of dilation is the origin.



$\frac{1}{2}x, \frac{1}{2}y$
 $\frac{12}{10} \quad \frac{6}{5}$

a. List the coordinates of the vertices of $\triangle JKL$ and $\triangle J'K'L'$. How do the coordinates of the image compare to the coordinates of the pre-image?

They are 1/2 of each other

b. What is the scale factor of the dilation? Explain your reasoning.

$\frac{1}{2}$

c. How do you think you can use the scale factor to determine the coordinates of the vertices of an image?

Must multiply by 2



6. Use coordinate notation to describe the dilation of point (x, y) when the center of dilation is at the origin using a scale factor of k .

(kx, ky)



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