

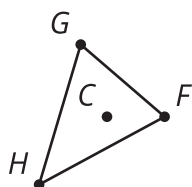


Measuring Dilations

Let's dilate polygons.

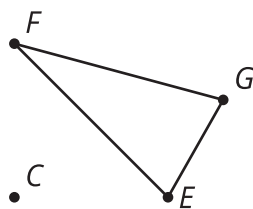
3.1 Dilating Out

Dilate triangle FGH using center C and a scale factor of 3.



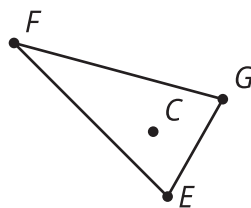
3.2 All the Scale Factors

Here is a center of dilation and a triangle.



1. Measure the sides of triangle EFG (to the nearest mm).
2. Your teacher will assign you a scale factor. Predict the relative lengths of the original figure and the image after you dilate by your scale factor.
3. Dilate triangle EFG using center C and your scale factor.
4. How does your prediction compare to the image you drew?
5. Use tracing paper to copy point C , triangle EFG , and your dilation. Label your tracing paper with your scale factor.
6. Align your tracing paper with your partner's. What do you notice?

💡 Are you ready for more?

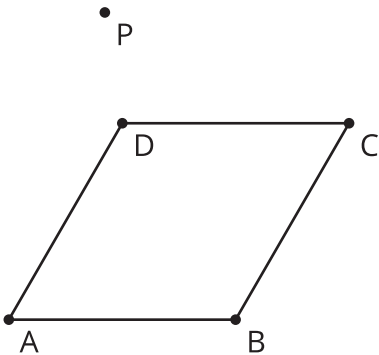


1. Dilate triangle EFG using center C and scale factors:
 - a. $\frac{1}{2}$
 - b. 2
2. What scale factors would cause some part of triangle $E'F'G'$ to intersect some part of triangle EFG ?

3.3

What Stays the Same?

1. Dilate quadrilateral $ABCD$ using center P and your scale factor.



2. Complete the table.

Ratio	$\frac{PA'}{PA}$	$\frac{PB'}{PB}$	$\frac{PC'}{PC}$	$\frac{PD'}{PD}$
Value				

3. What do you notice? Can you prove your conjecture?

4. Complete the table.

Ratio	$\frac{B'A'}{BA}$	$\frac{C'B'}{CB}$	$\frac{D'C'}{DC}$	$\frac{A'D'}{AD}$
Value				

5. What do you notice? Does the same reasoning you just used also prove this conjecture?

Lesson 3 Summary

We know that a *dilation* with center P and positive *scale factor*, k , takes a point A along the ray PA to another point whose distance is k times farther away from P than A is.

The triangle $A'B'C'$ is a dilation of the triangle ABC with center P and with a scale factor of 2. So A' is 2 times farther away from P than A is, B' is 2 times farther away from P than B is, and C' is 2 times farther away from P than C is.

Because of the way dilations are defined, all of these quotients give the scale factor:

$$\frac{PA'}{PA} = \frac{PB'}{PB} = \frac{PC'}{PC} = 2.$$

If triangle ABC is dilated from point P with scale factor $\frac{1}{3}$, then each vertex in $A''B''C''$ is on the ray from P through the corresponding vertex of ABC , and the distance from P to each vertex in $A''B''C''$ is one-third as far as the distance from P to the corresponding vertex in ABC .

$$\frac{PA''}{PA} = \frac{PB''}{PB} = \frac{PC''}{PC} = \frac{1}{3}$$

The dilation of a line segment is longer or shorter according to the same ratio given by the scale factor. In other words, if segment AB is dilated from point P with a scale factor of k , then the length of segment AB is multiplied by k to get the corresponding length of $A'B'$.

$$\frac{A'B''}{AB} = \frac{B''C''}{BC} = \frac{A''C''}{AC} = k.$$

Corresponding side lengths of the original figure and dilated image are all in the same proportion, and are related by the same scale factor, k .

