
Transformations

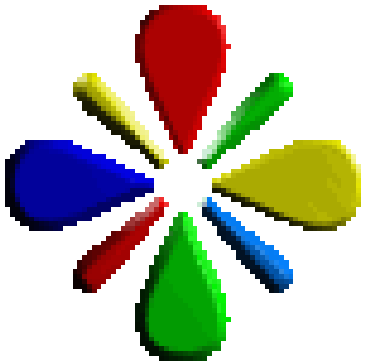
To transform something is to change it. In geometry, there are specific ways to describe how a figure is changed. The transformations you will learn about include:

Translation

Rotation

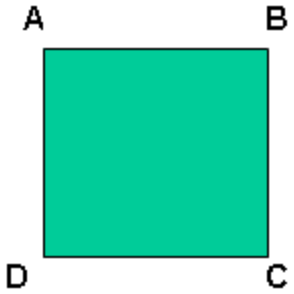
Reflection

Dilation

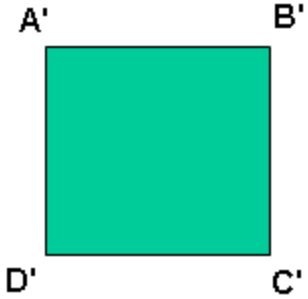


Renaming Transformations

It is common practice to name shapes using capital letters:

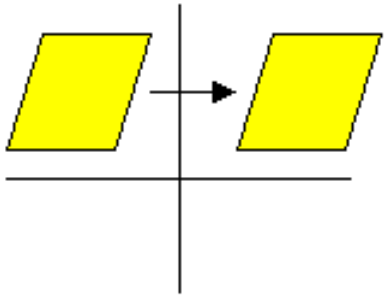


It is common practice to name transformed shapes using the same letters with a "prime" symbol:



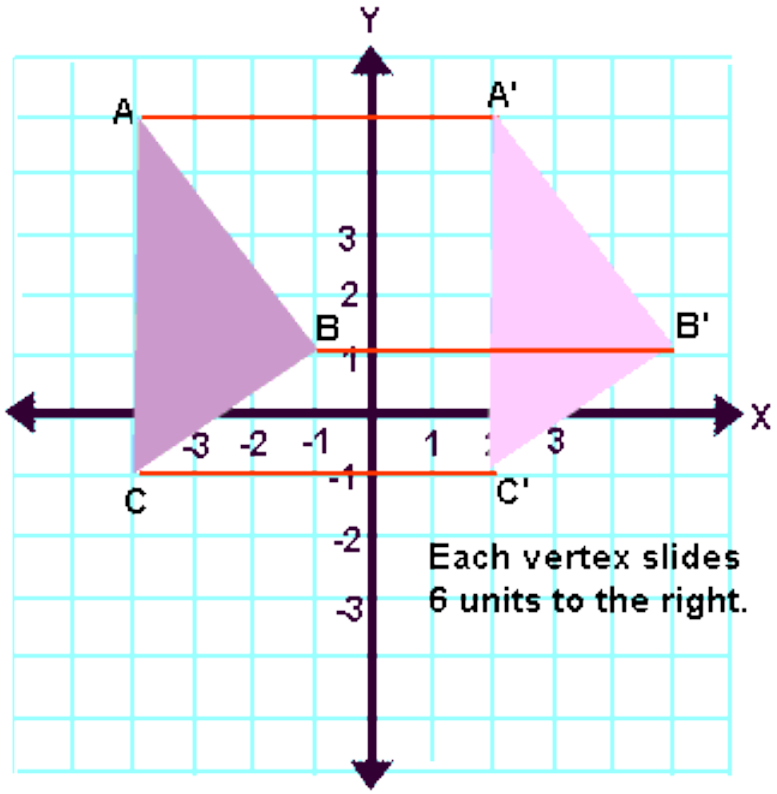
A translation "slides" an object a fixed distance in a given direction. The original object and its translation have the same shape and size, and they face in the same direction.

Translations are SLIDES.



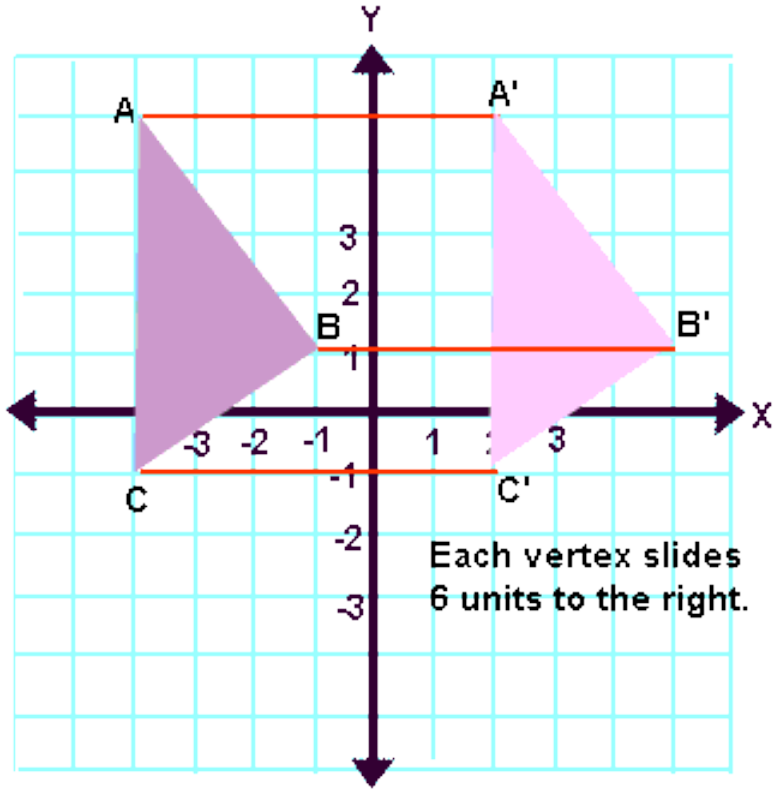
Let's examine some translations related to coordinate geometry.

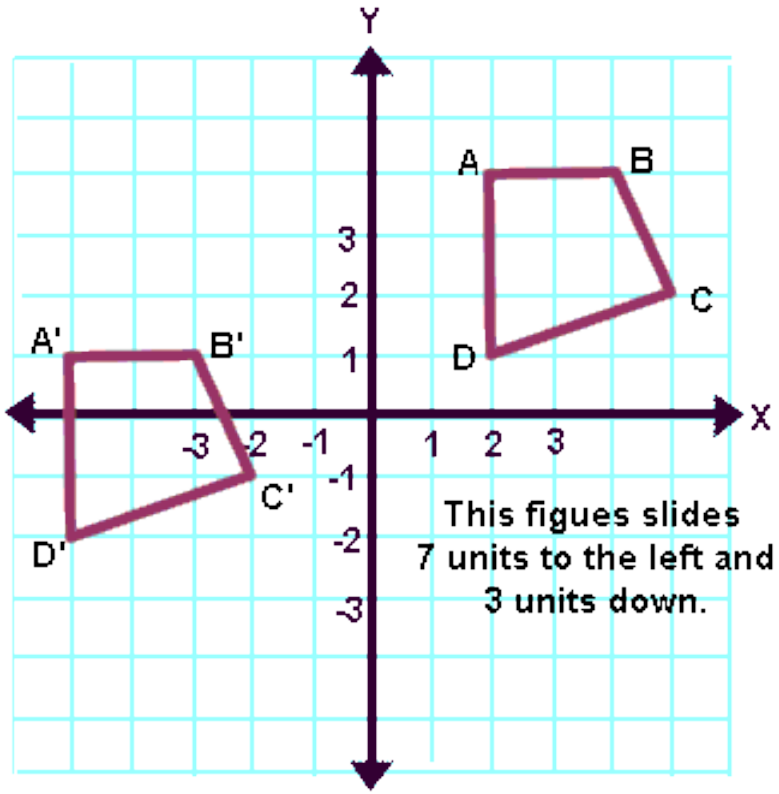
The example shows how each vertex moves the same distance in the same direction.



Write the Points

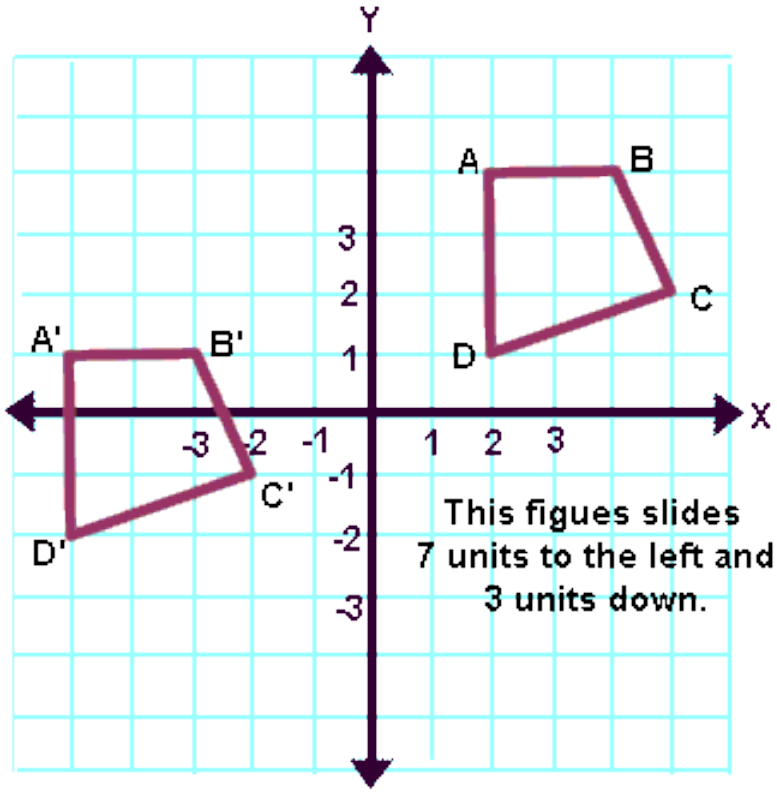
- What are the coordinates for A, B, C?
- What are the coordinates for A', B', C'?
- How are they **alike**?
- How are they **different**?





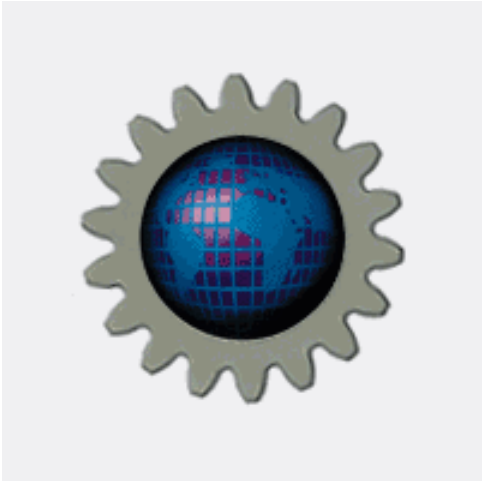
In this example, the "slide" moves the figure 7 units to the left and 3 units down. (or 3 units down and 7 units to the left.)

Write the points



- What are the coordinates for A, B, C?
- What are the coordinates for A’, B’, C’?
- How did the transformation change the points?

A **rotation** is a transformation that turns a figure about a fixed point called the center of rotation. An object and its rotation are the **same shape and size**, but the **figures may be turned in different directions.**

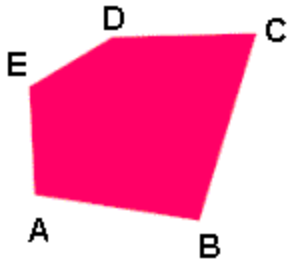


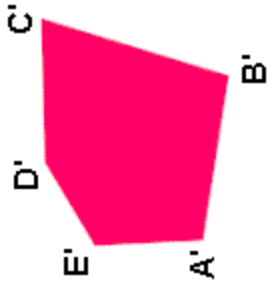
$R \cdot R$

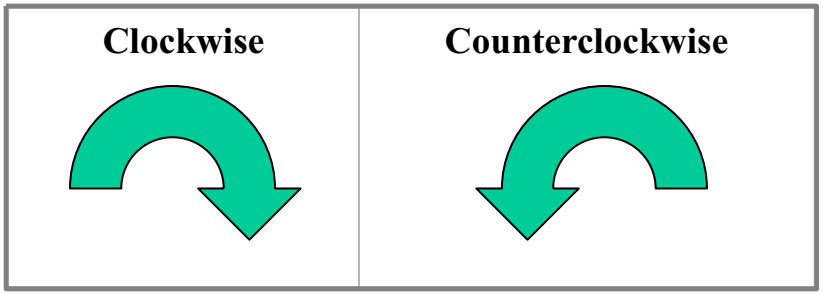
The concept of rotations can be seen in wallpaper designs, fabrics, and art work.

Rotations are TURNS!!!

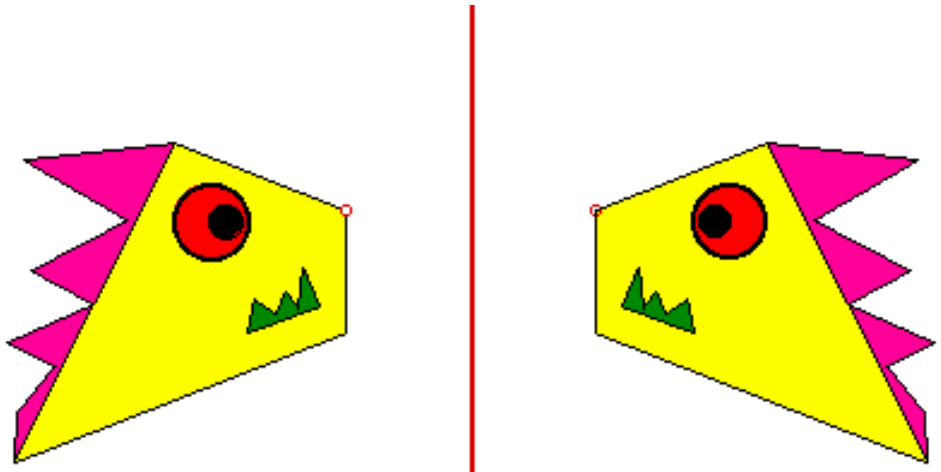
This rotation is 90 degrees counterclockwise.



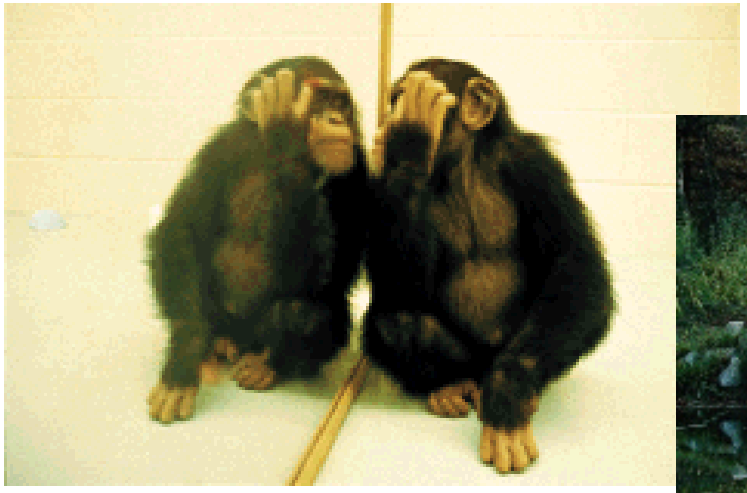




A **reflection** can be seen in water, in a mirror, in glass, or in a shiny surface. An object and its reflection have the **same shape and size**, but the **figures face in opposite directions**. In a mirror, for example, right and left are switched.

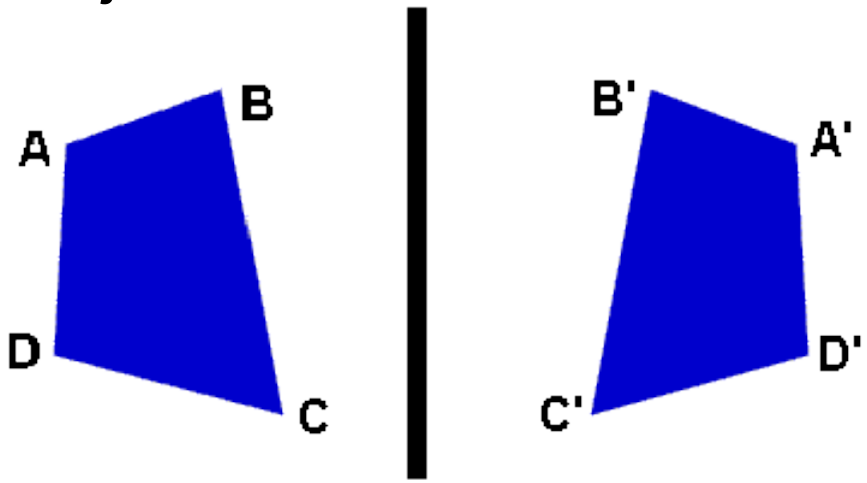


Line reflections are FLIPS!!!



The line (where a mirror may be placed) is called the **line of reflection**. The distance from a point to the line of reflection is the same as the distance from the point's image to the line of reflection.

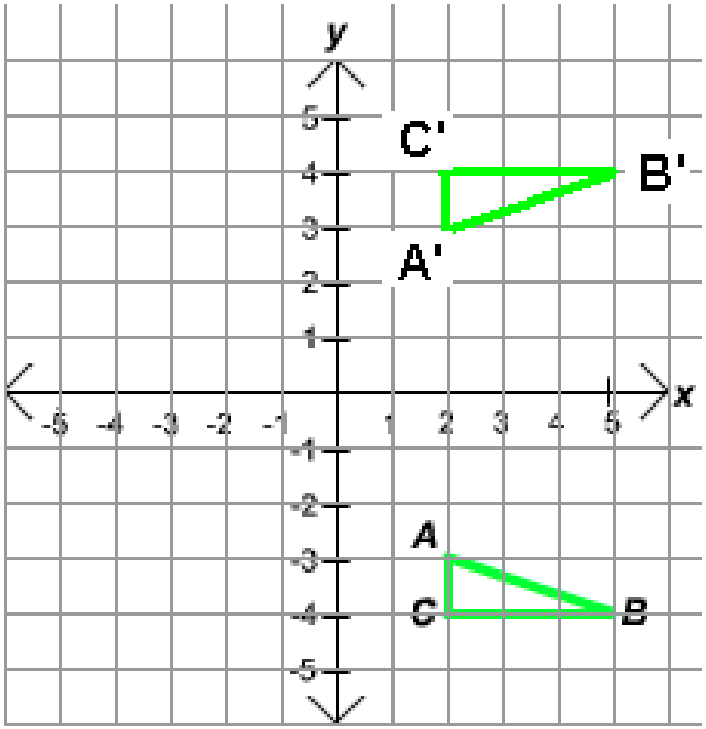
A reflection can be thought of as a "flipping" of an object over the line of reflection.



If you folded the two shapes together **line of reflection** **the two shapes would overlap exactly!**

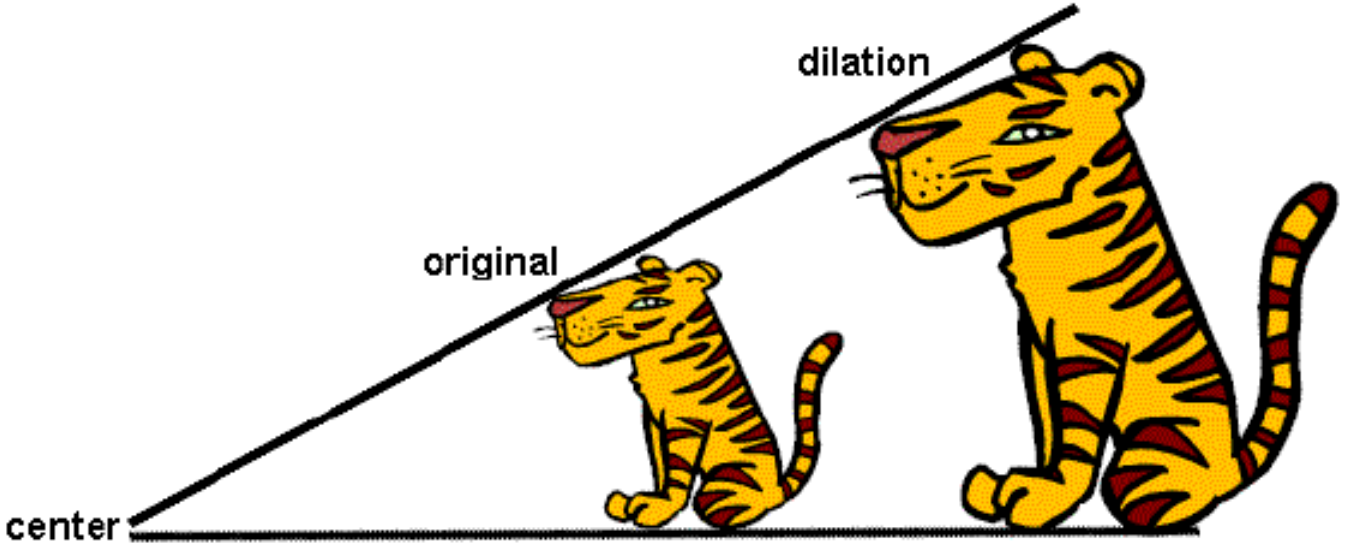
What happens to points in a Reflection?

- Name the points of the original triangle.
- Name the points of the reflected triangle.
- What is the line of reflection?
- How did the points change from the original to the reflection?



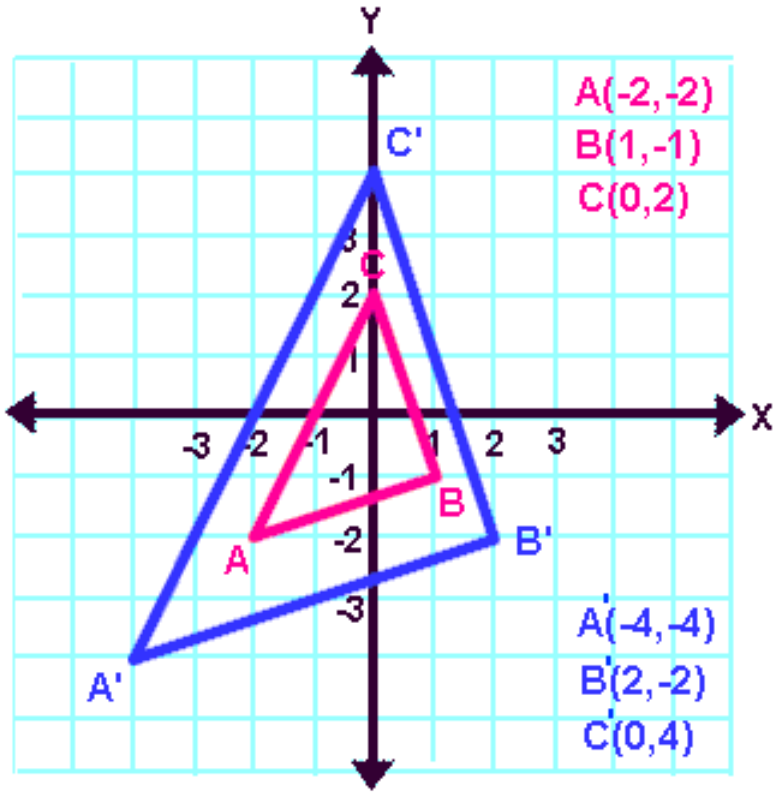
A **dilation** is a transformation that produces an image that is the **same shape** as the original, but is a **different size.**

A dilation used to create an image **larger** than the original is called an **enlargement**. A dilation used to create an image **smaller** than the original is called a **reduction**.



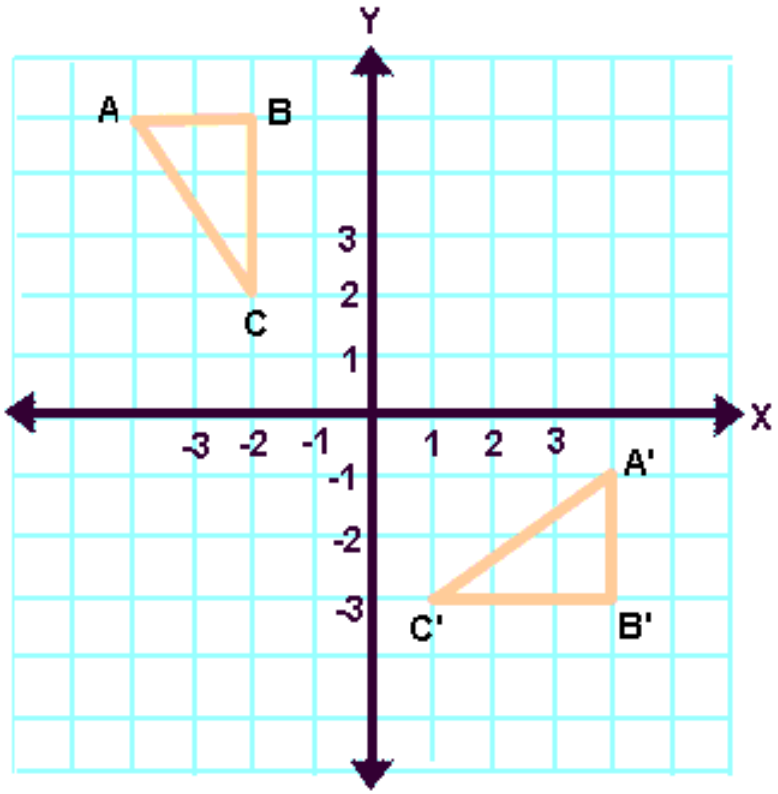
Dilations always involve a change in size.

Dilations



Notice how EVERY coordinate of the original triangle has been multiplied by the scale factor (x2).

REVIEW: Answer each question……..



Does this picture show a translation, rotation, dilation, or reflection?

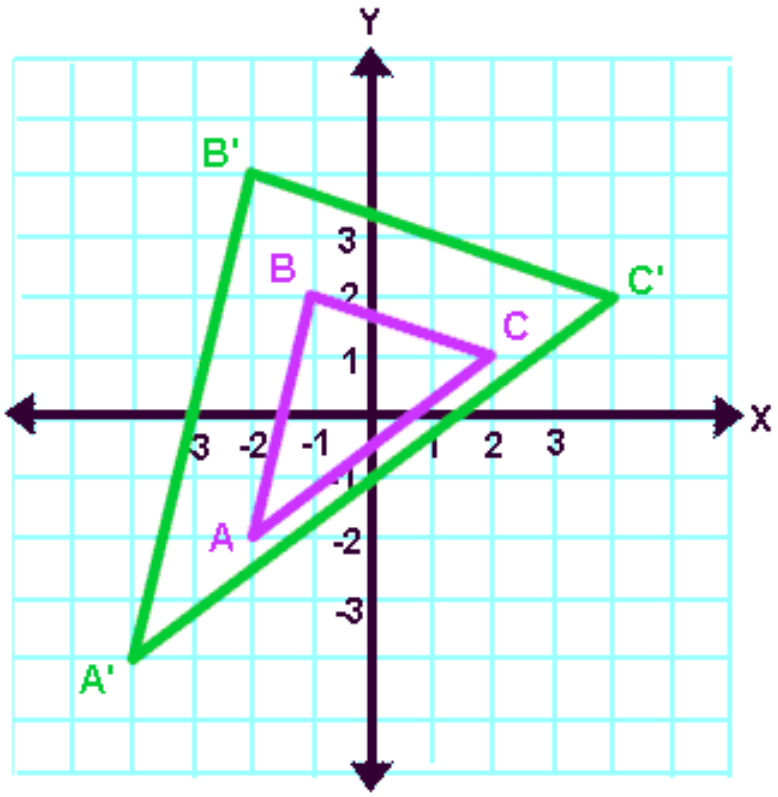
How do you know?

Rotation

Does this picture show a translation, rotation, dilation, or reflection?

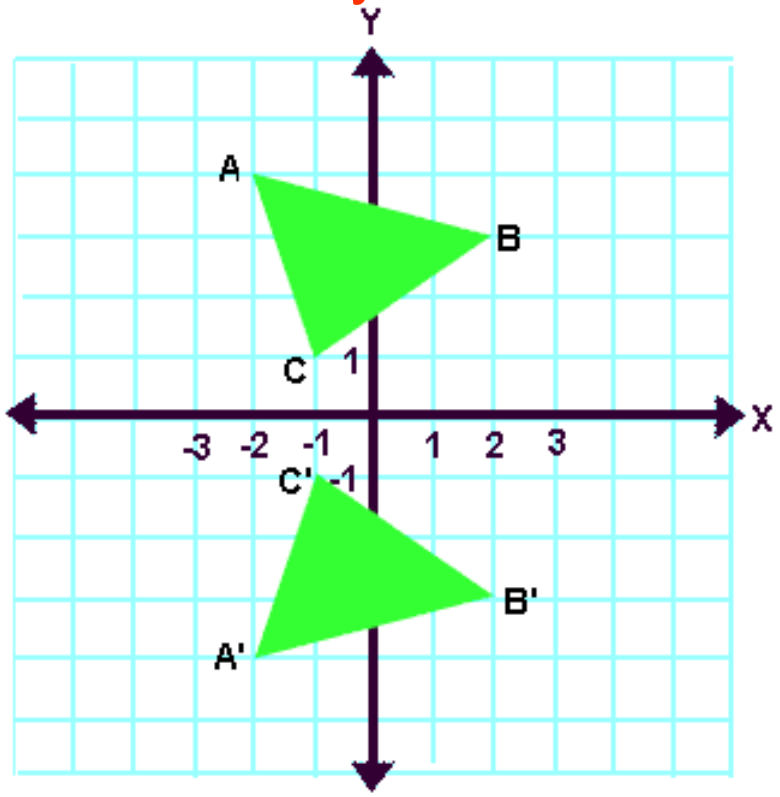
How do you know?

Dilation



Does this picture show a translation, rotation, dilation, or reflection?

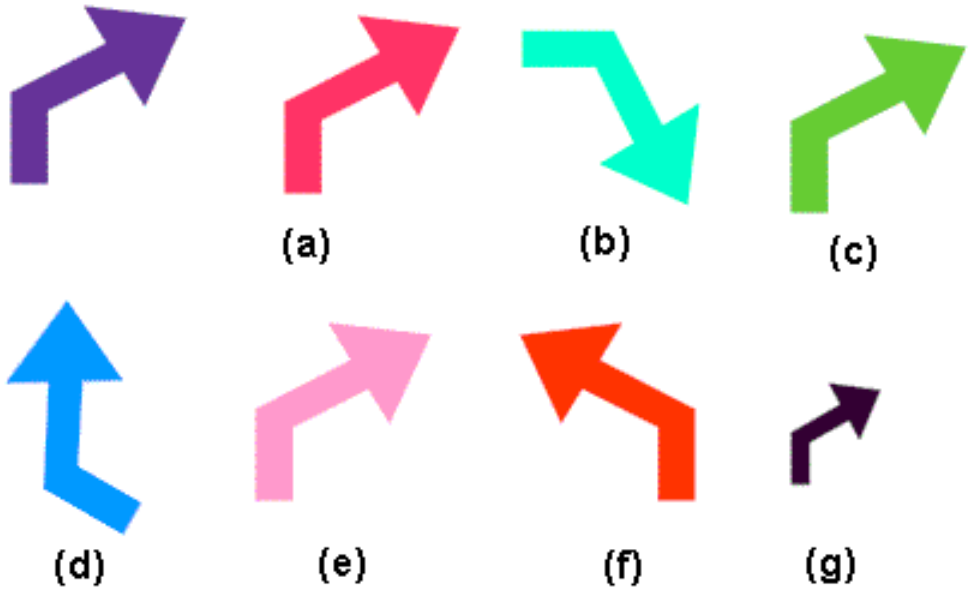
How do you know?



(Line) Reflection

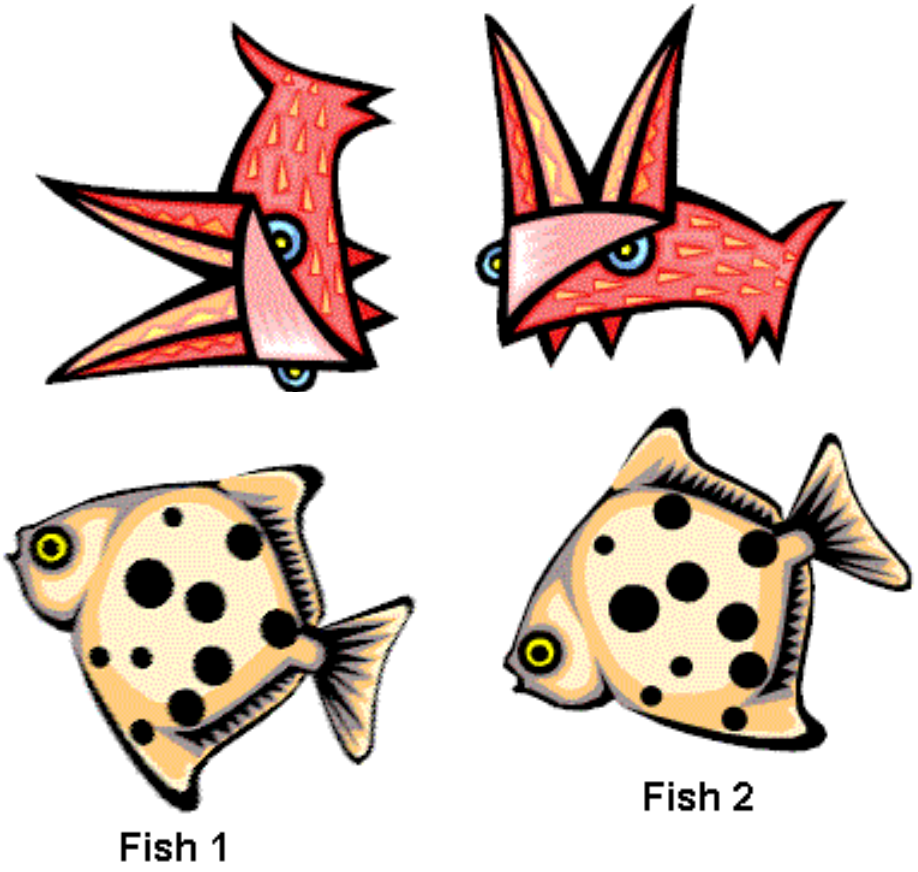
Which of the following lettered figures are translations of the shape of the **purple arrow**? **Name ALL that apply.**

Explain your thinking.



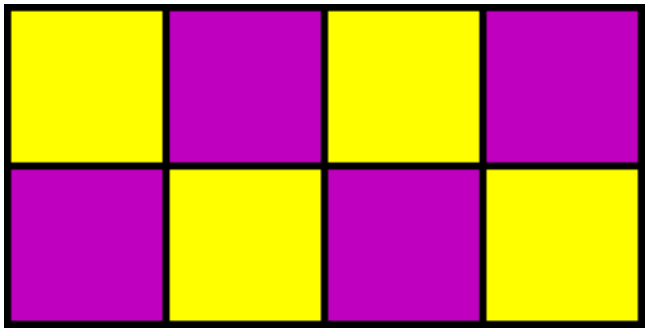
Letters a, c, and e are translations of the purple arrow.

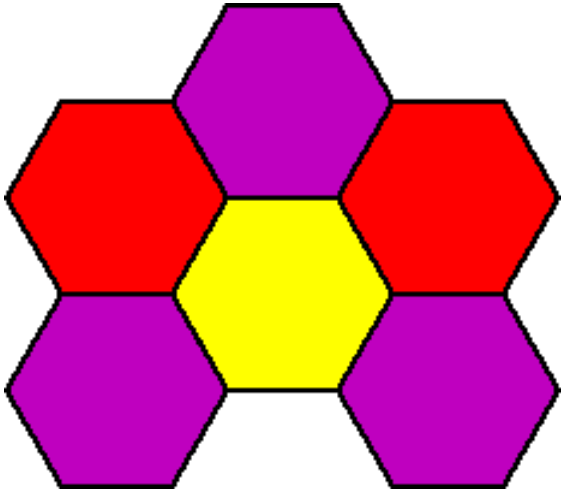
Has each picture been rotated in a clockwise or counter-clockwise direction?

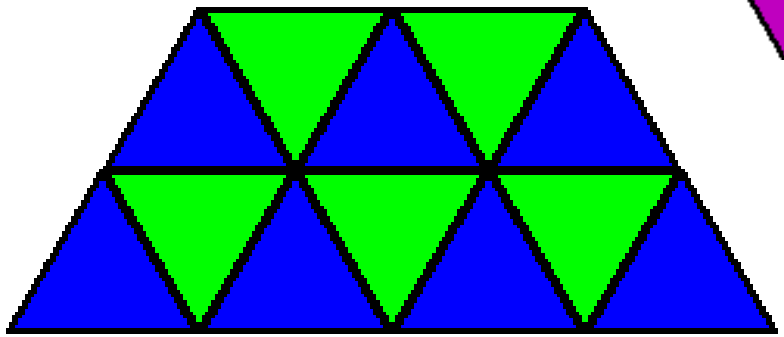


The birds were rotated clockwise and the fish counterclockwise.

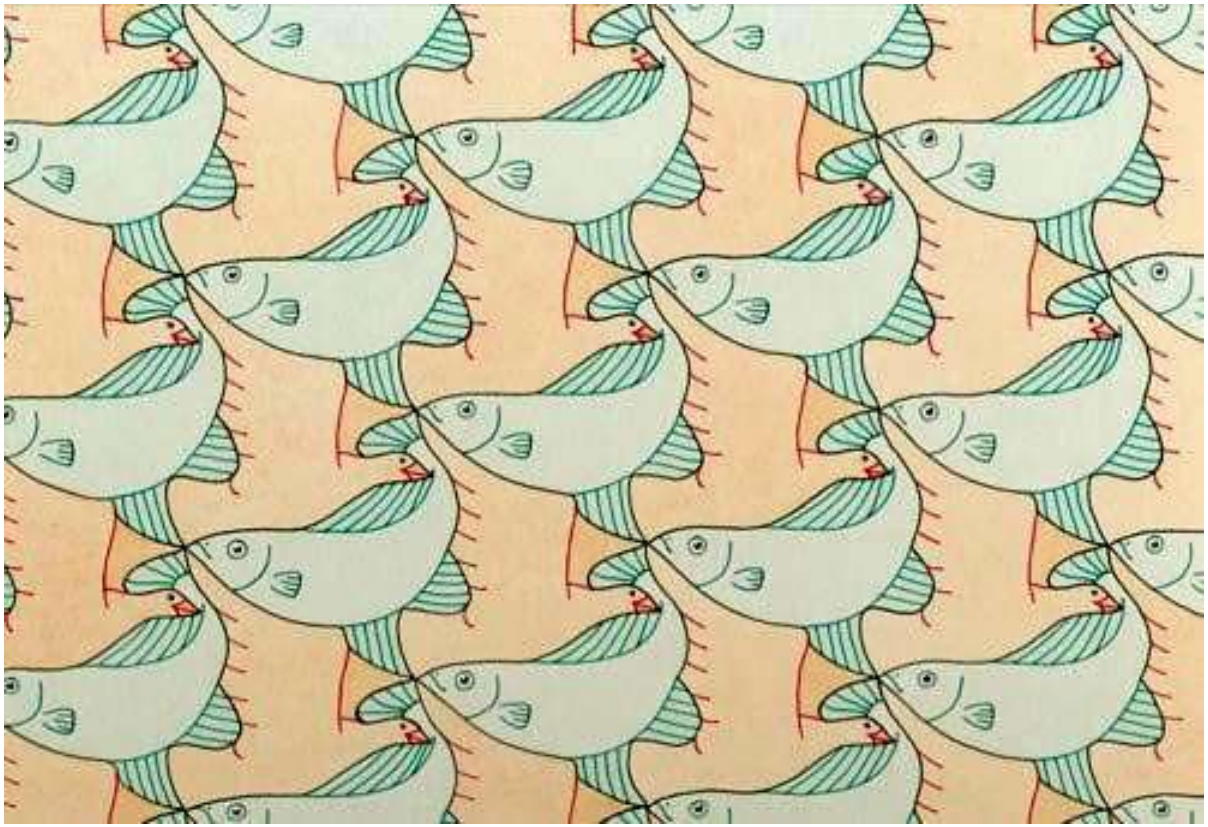
Basically, a tessellation is a way to tile a floor (that goes on forever) with shapes so that there is no overlapping and no gaps.



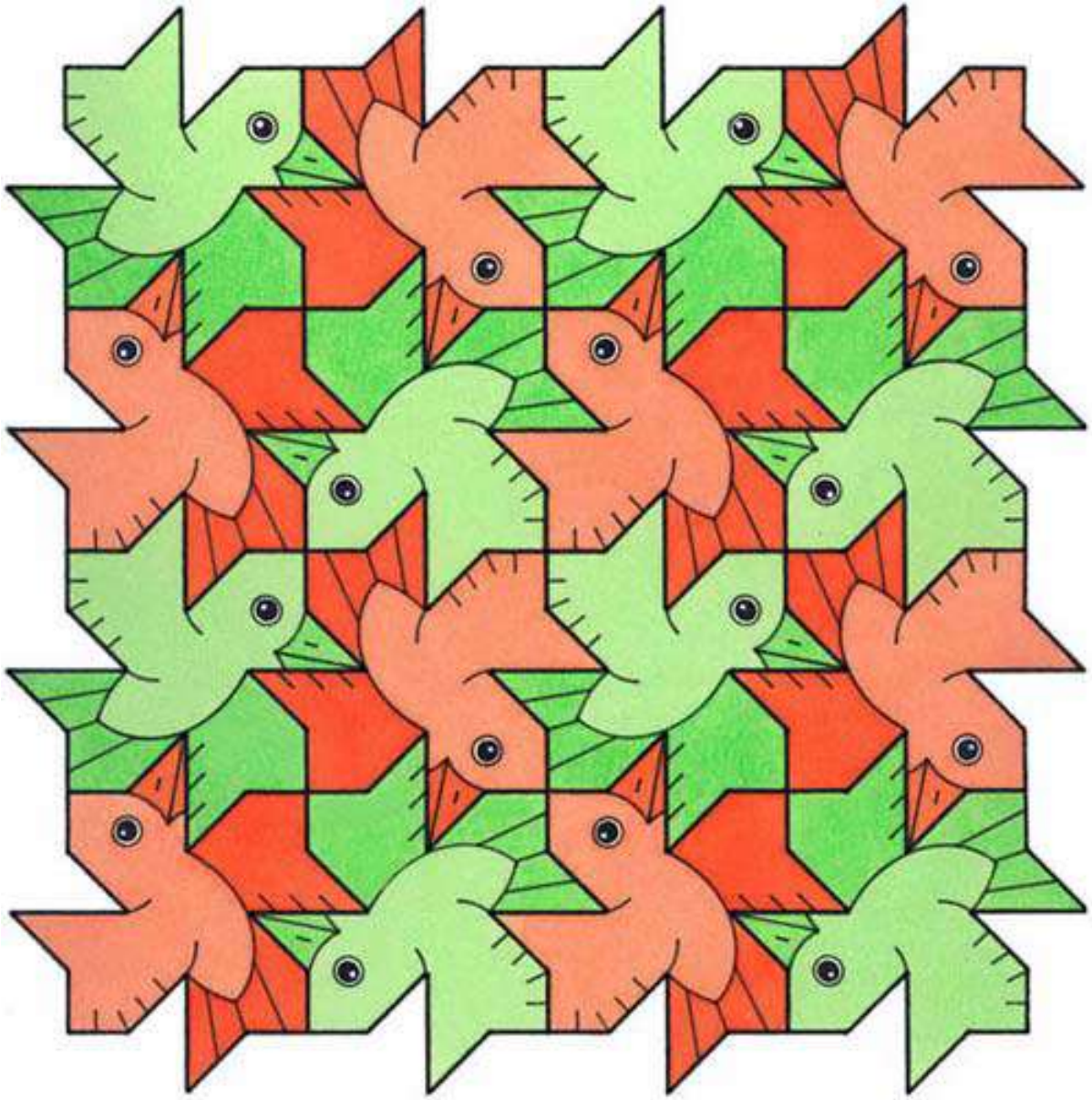




Dutch graphic artist M. C. Escher (1898-1972) is known for his creative use of tessellations in his work. What transformations can you see in this picture?



The birds and fish have been translated here.



What transformations can you see in this Escher print?

Some birds have been translated and some have been rotated.

Can you name examples in real life of each transformation?

Translation

Rotation

Reflection

Dilation

Check out these sites:

http://www.farraguttn.com/fhs/math/nctm/index.htm

http://www.mathsnet.net/transformations/index.html

http://www.mcescher.com/