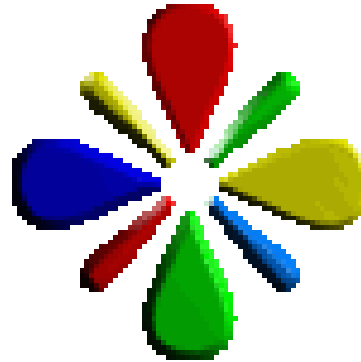


# Transformations

- Translation
- Rotation
- Reflection
- Dilation

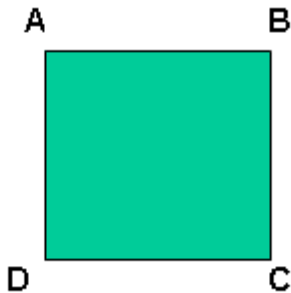
To transform something is to change it. In geometry, there are specific ways to describe how a figure is changed. The transformations you will learn about include:

- Translation
- Rotation
- Reflection
- Dilation

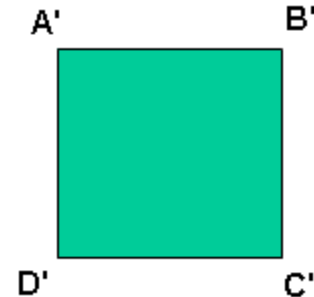


# Renaming Transformations

It is common practice  
to name shapes  
using capital letters:

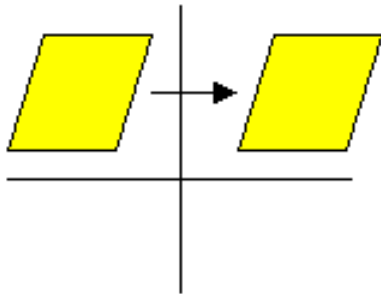


It is common practice  
to name  
transformed shapes  
using the same  
letters with a  
“prime” symbol:



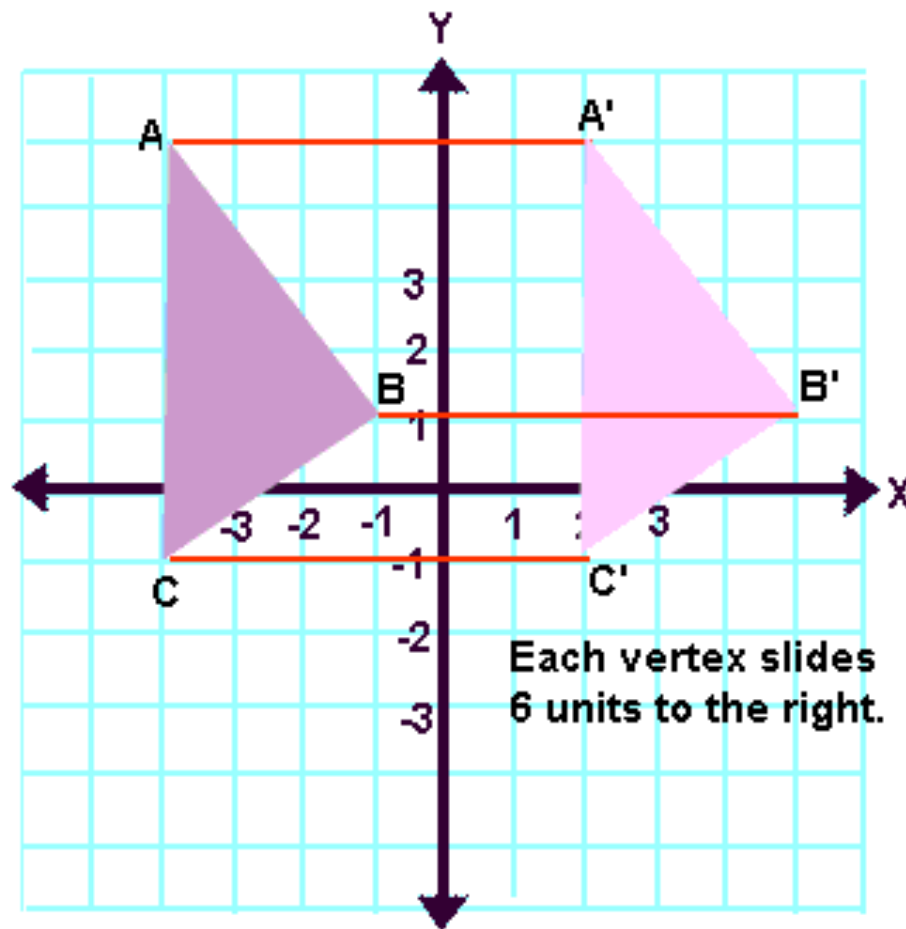
A **translation** "slides" an object a fixed distance in a given direction. The original object and its translation have the **same shape and size**, and they **face in the same direction**.

**Translations are SLIDES.**



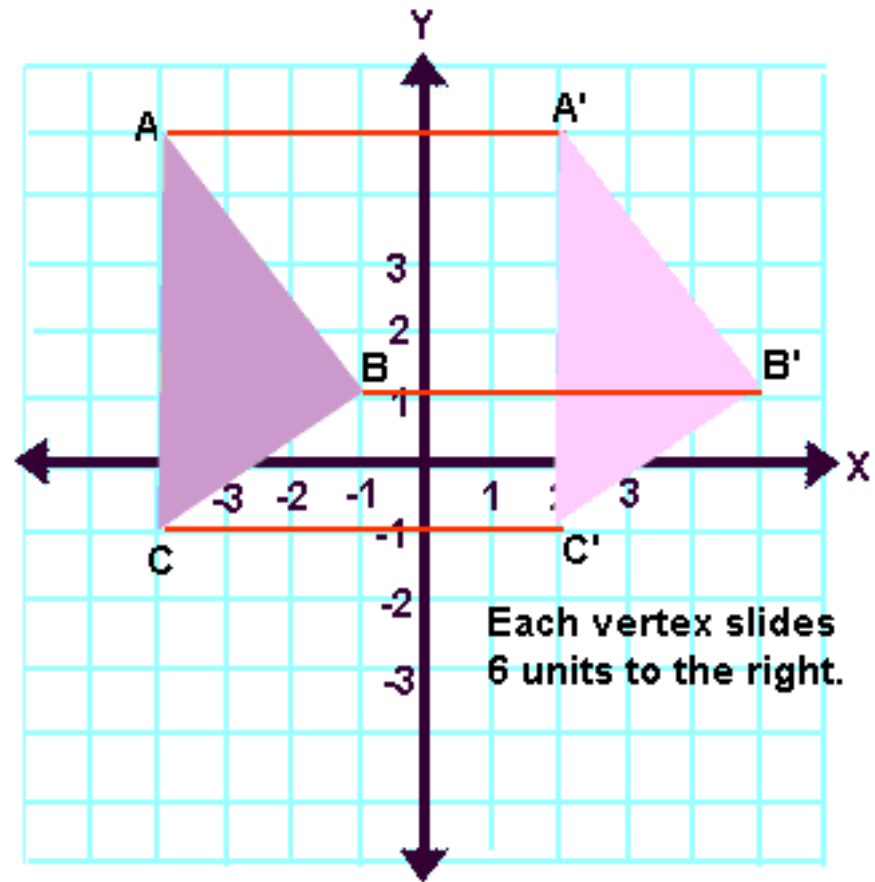
**Let's examine  
some translations  
related to  
coordinate  
geometry.**

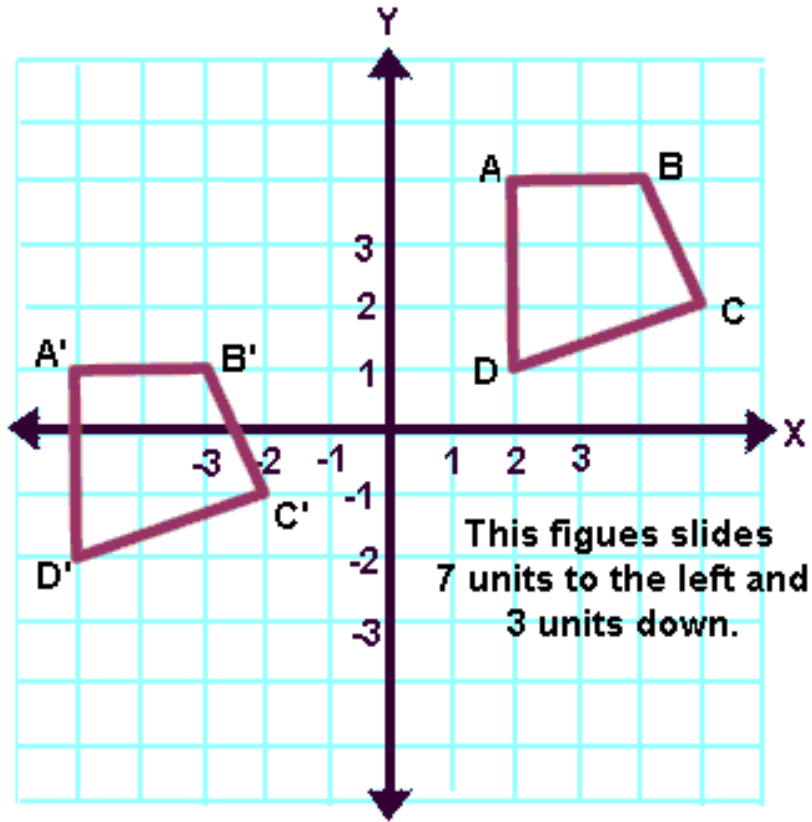
The example shows  
how each vertex  
moves the same  
distance in the  
same direction.



# Write the Points

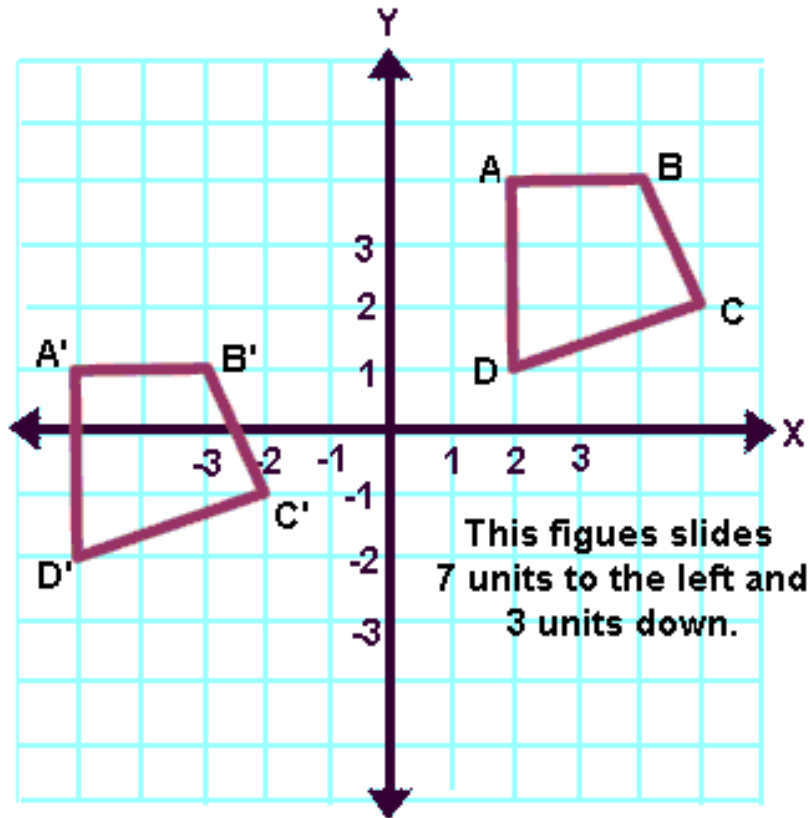
- What are the coordinates for **A**, **B**, **C**?
- What are the coordinates for **A'**, **B'**, **C'**?
- How are they **alike**?
- How are they **different**?





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.)

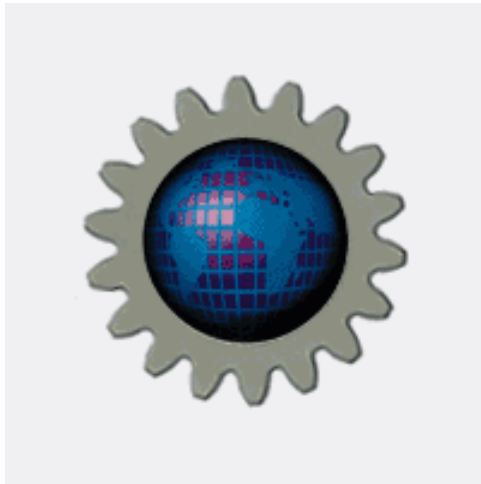
# Write the Points



- 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 • R

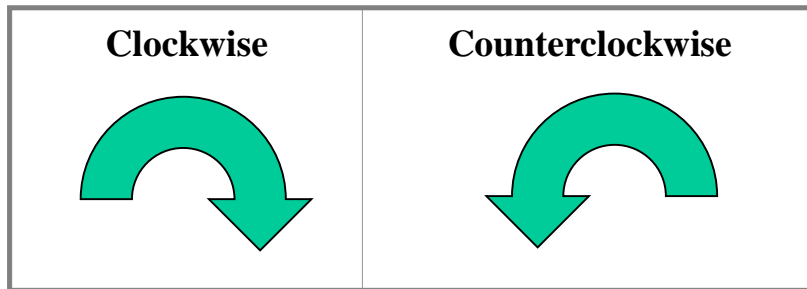
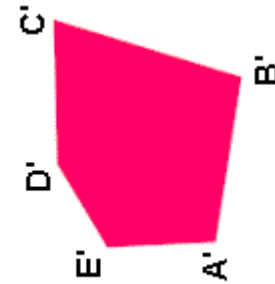
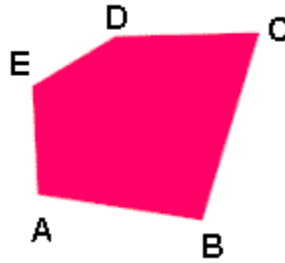


**The concept of rotations can be seen in wallpaper designs, fabrics, and art work.**



**Rotations are URNS!!!**

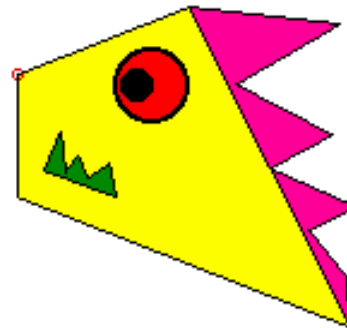
This rotation  
is 90 degrees  
counterclockwise.



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.



Original

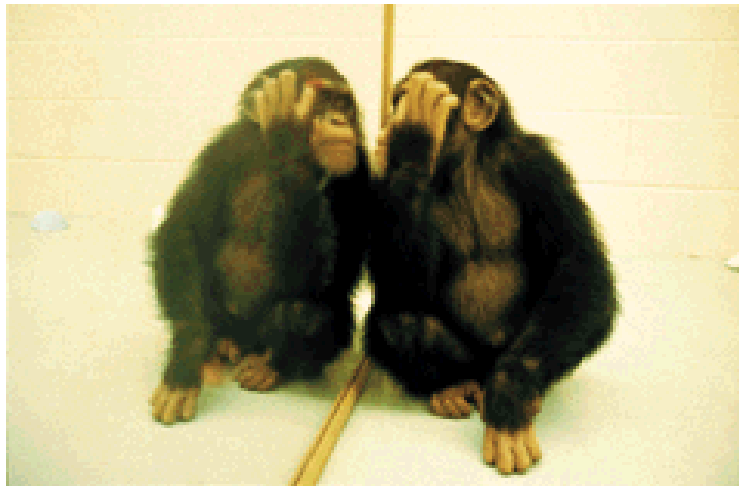


Image

line of reflection >>

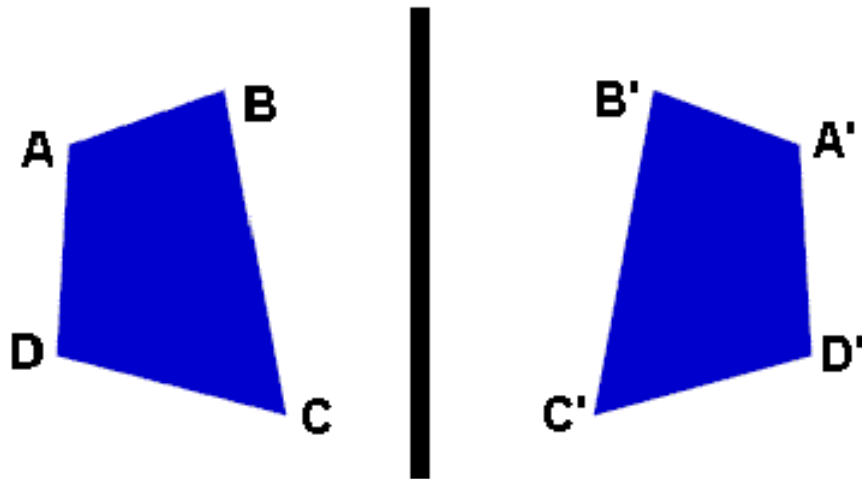


Line reflections are **FLIPS!!!**



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.

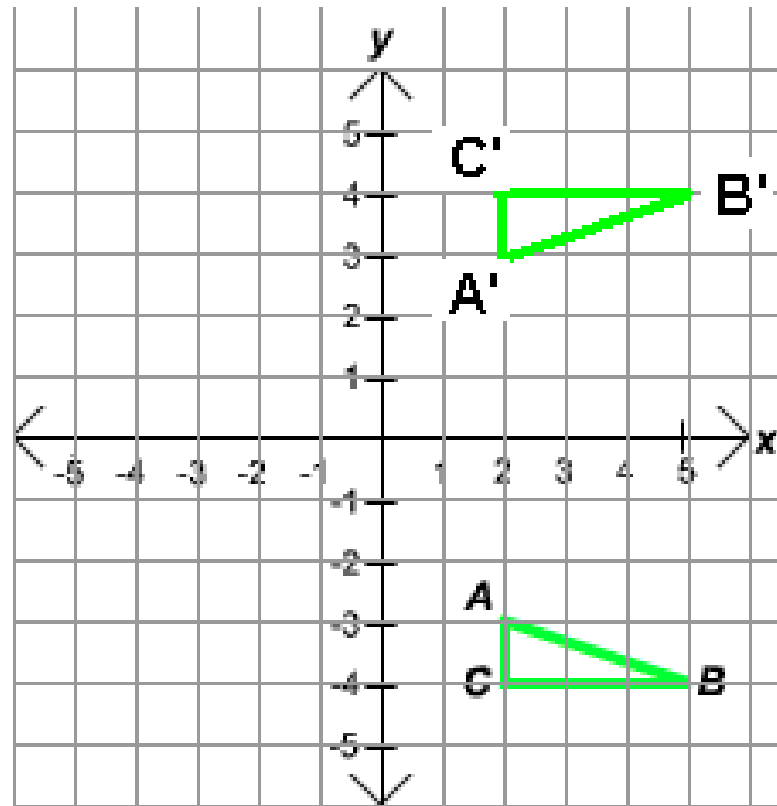
A reflection can be thought of as a "flipping" of an object over the line of reflection.



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

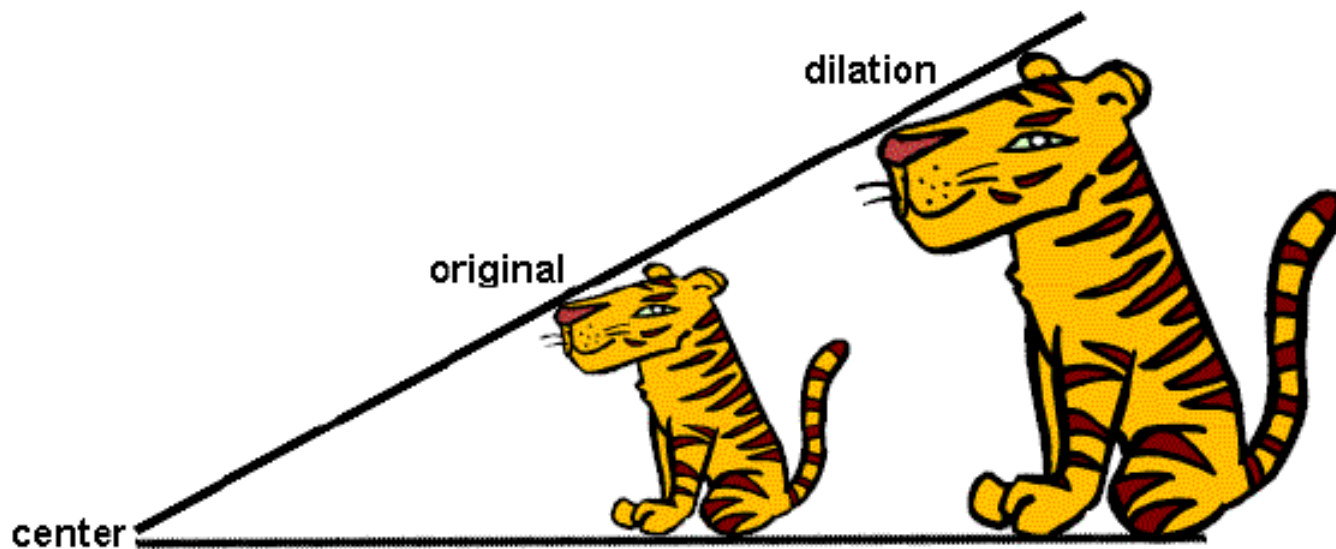
# What happens to points in a Reflection?

- 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**.

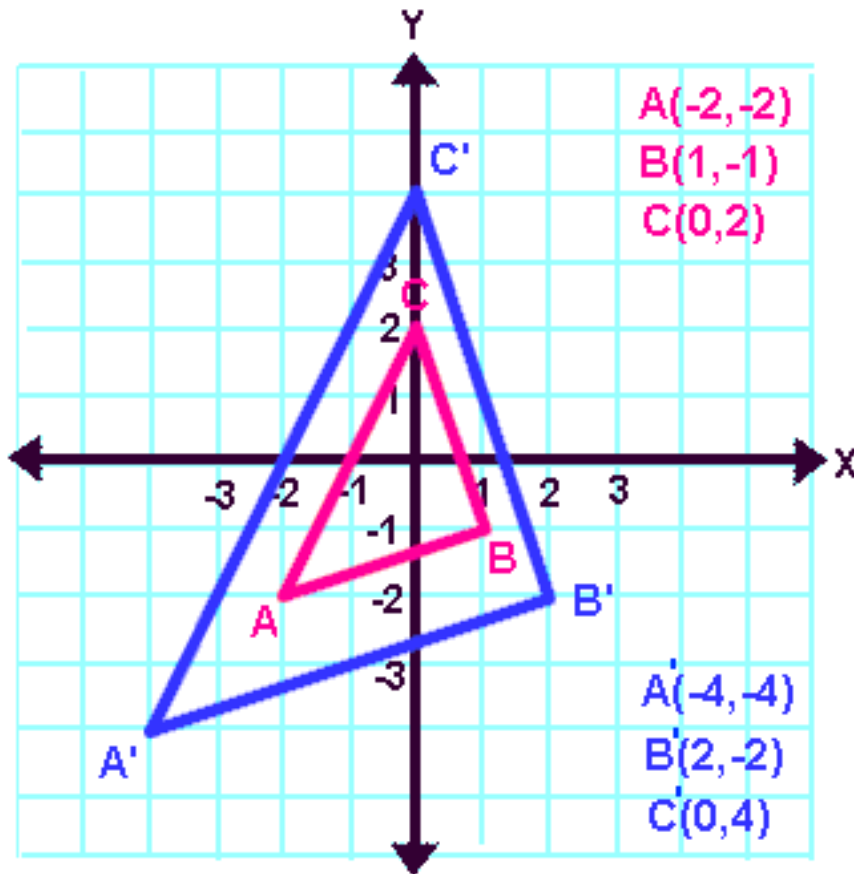
A dilation used to create an image **larger** than the original is called an **enlargement**. A dilation used to create an image **smaller** than the original is called a **reduction**.





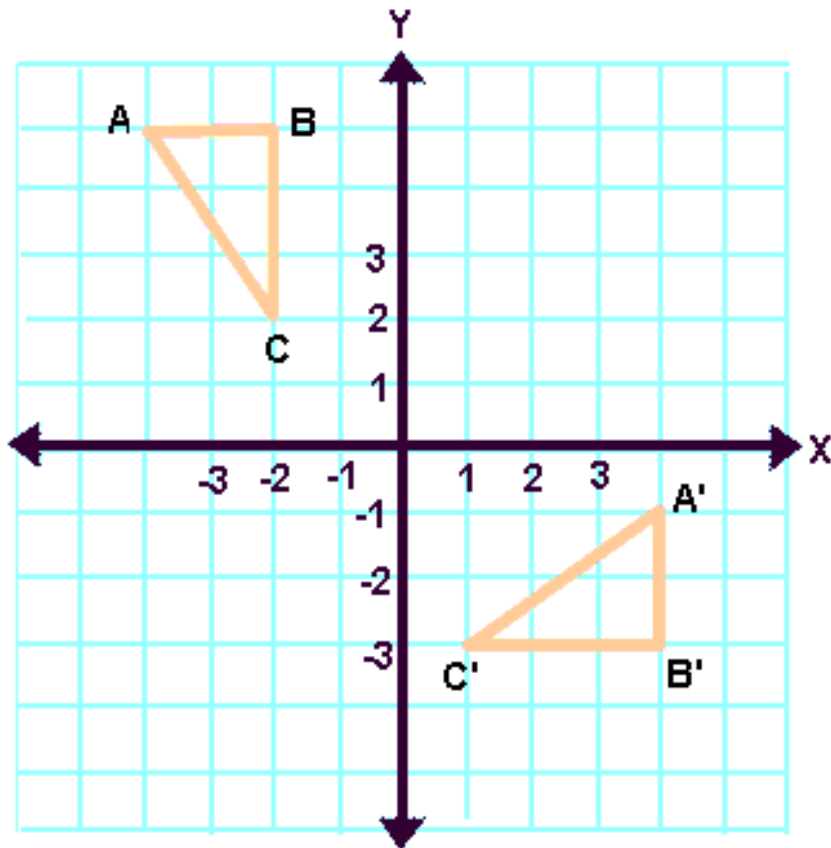
# Dilations

**Dilations always involve a change in size.**



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?

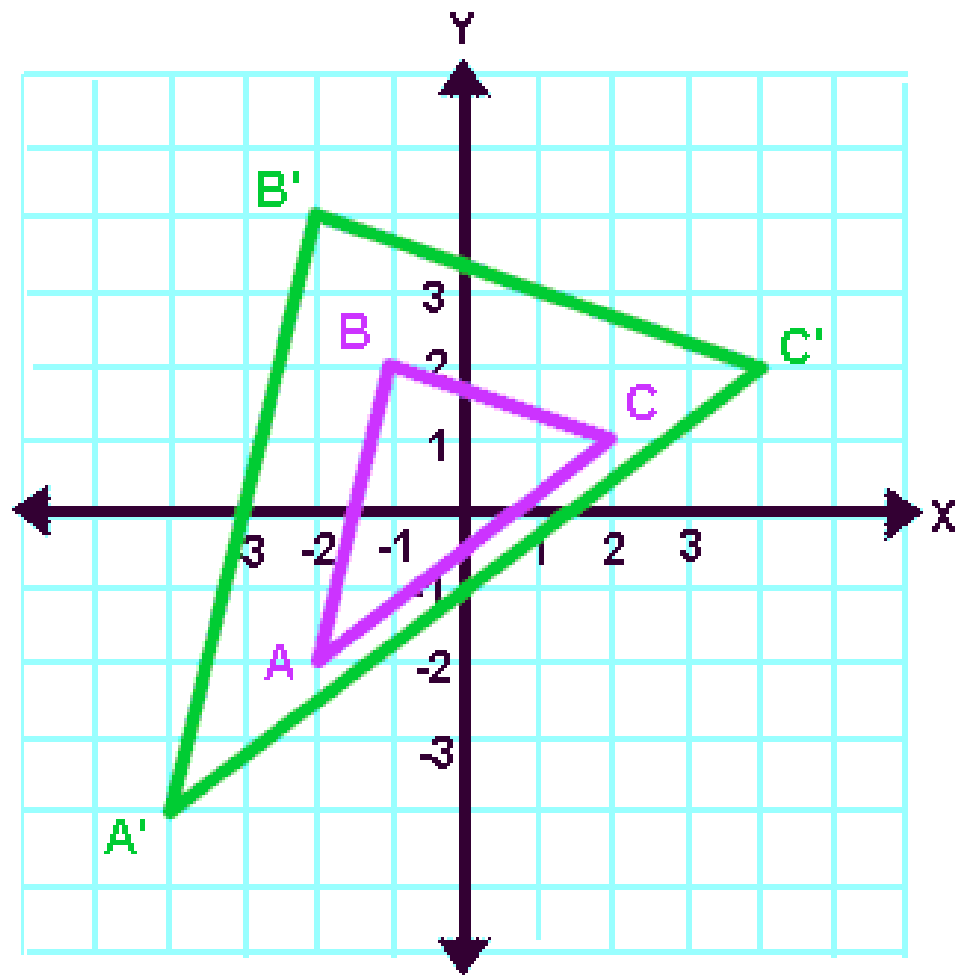
How do you know?

**Rotation**

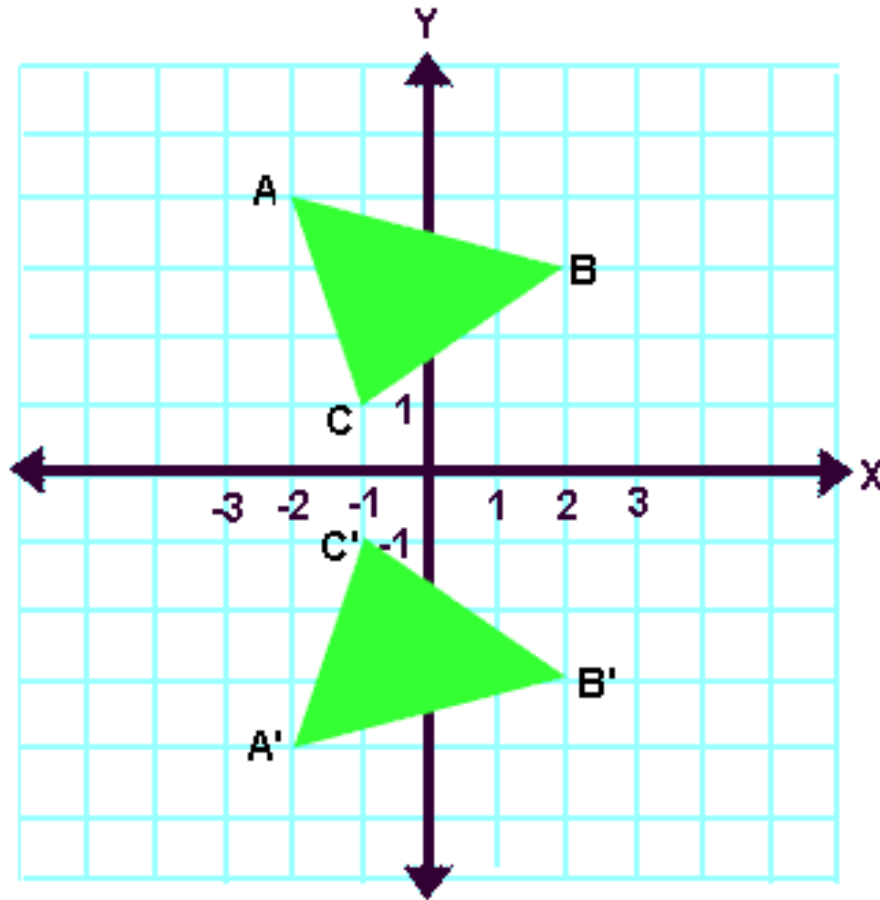
Does this picture show a translation, rotation, dilation, or reflection?

How do you know?

**Dilation**



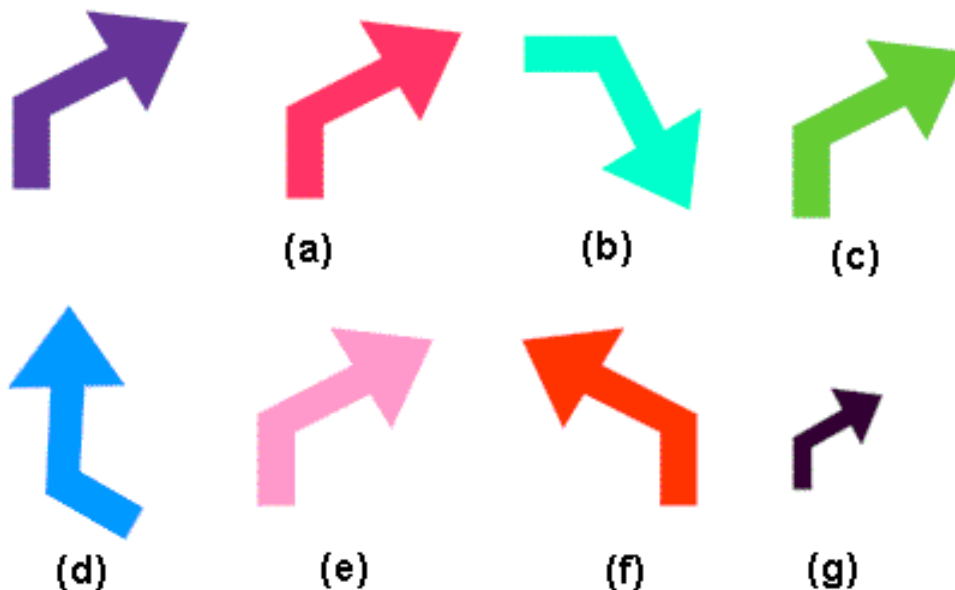
Does this picture show a translation, rotation, dilation, or reflection? How do you know?



**(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?



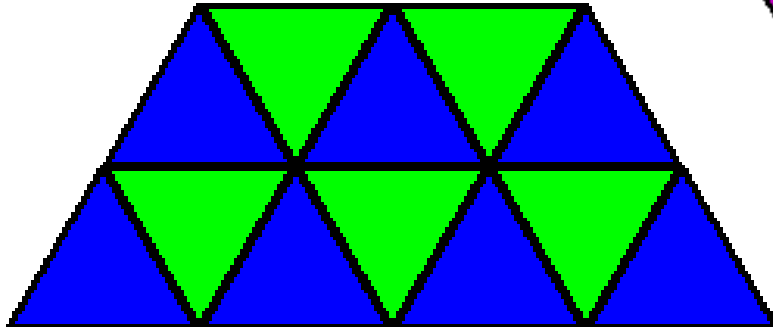
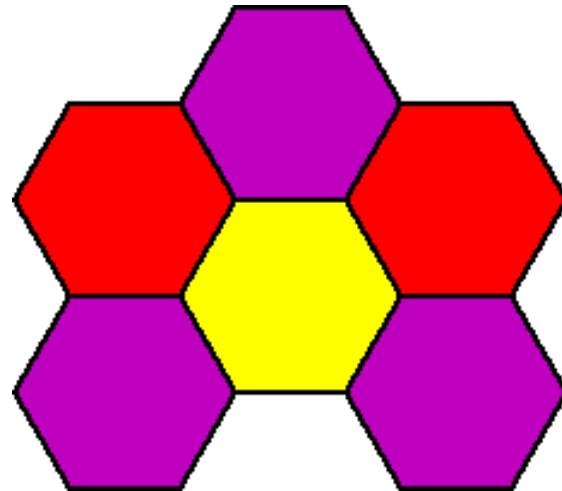
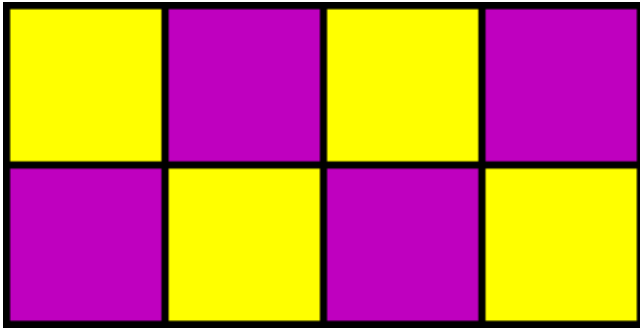
Fish 1



Fish 2

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.**

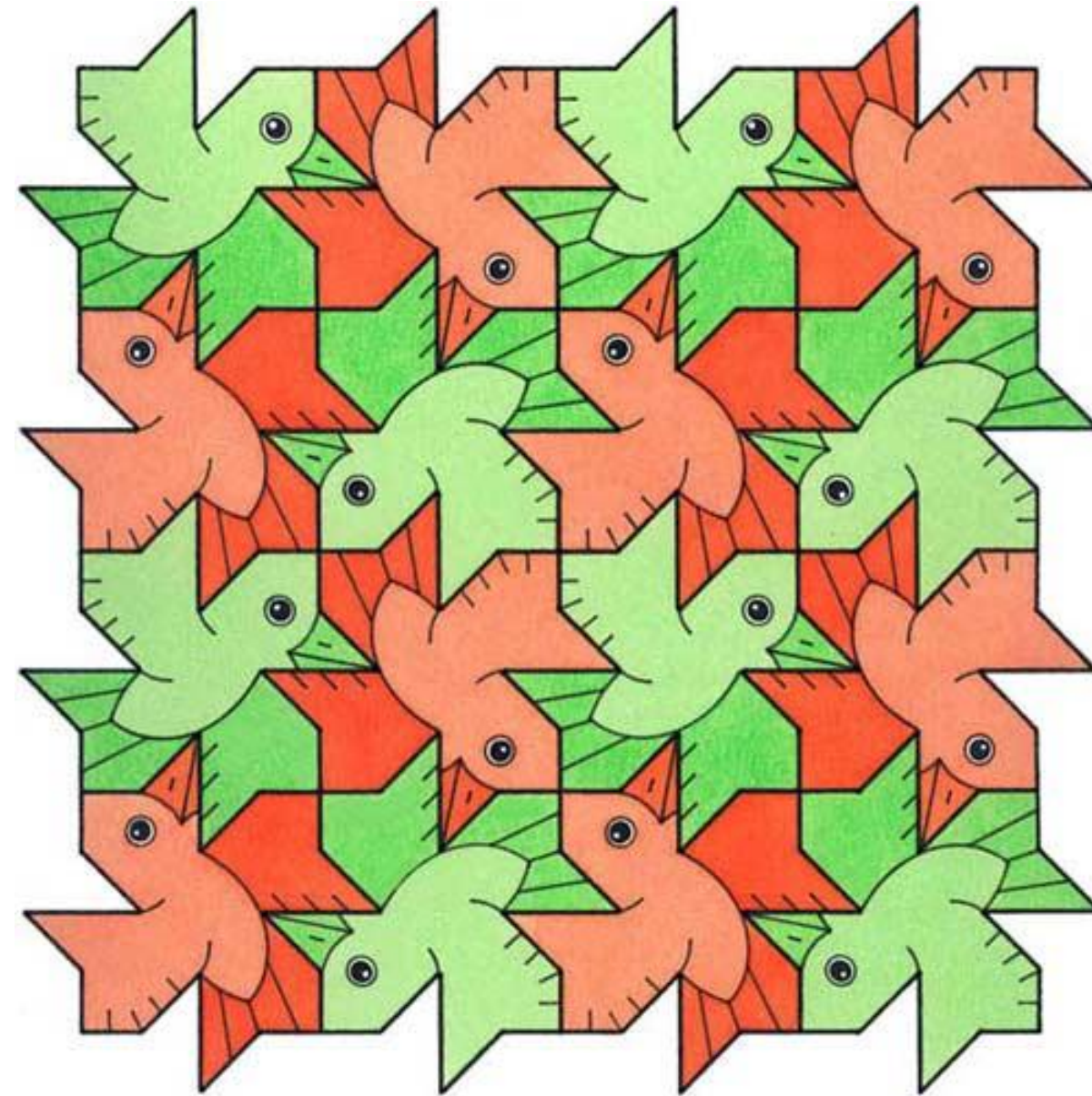


Dutch graphic artist M. C. Escher (1898-1972) is known for his creative use of tessellations in his work. What **transformations** can you see in this picture?



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/>