

Geometry

Transformation

Transformers

Have you seen the movie?



In the movie...

The Chevy Camaro
transforms
into Bumblebee.





The Semi-Trailer Cab
transforms
into Optimus Prime.





TRANSFORMERS

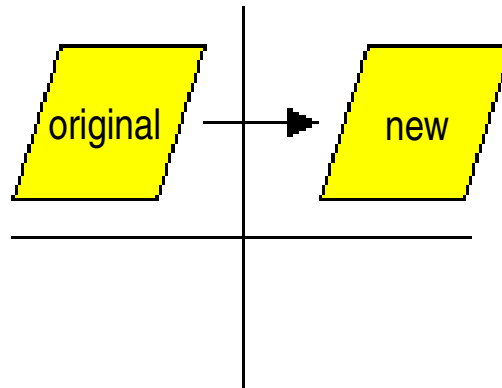
In the dictionary, the word transform means to change.

Transformations

In geometry, a transformation also means to change.

When a figure moves from one place to another on a coordinate plane a transformation has occurred.

The original figure has changed positions!



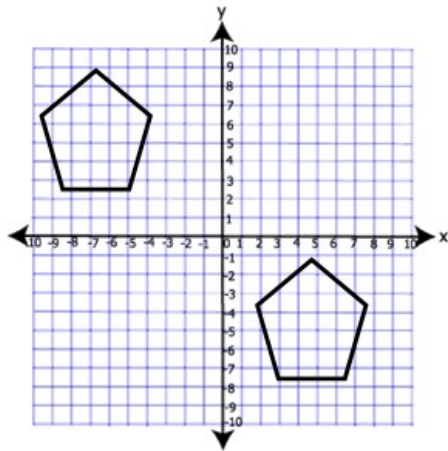
There are four basic types of transformations.

- Three of the transformations change the **position** of a shape.
- One of the transformations changes the **size** of a shape.

Translation

“Position”

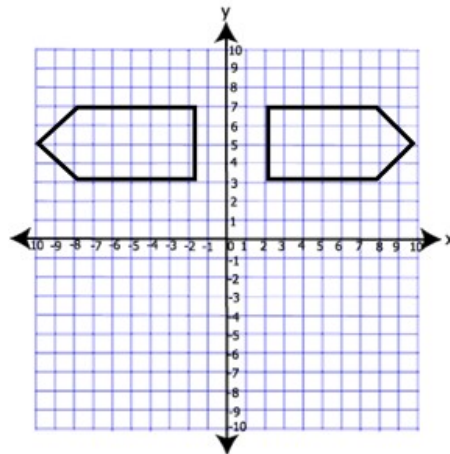
Slide



Reflection

“Position”

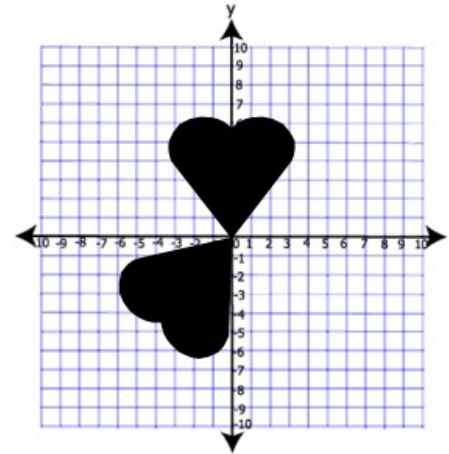
Flip



Rotation

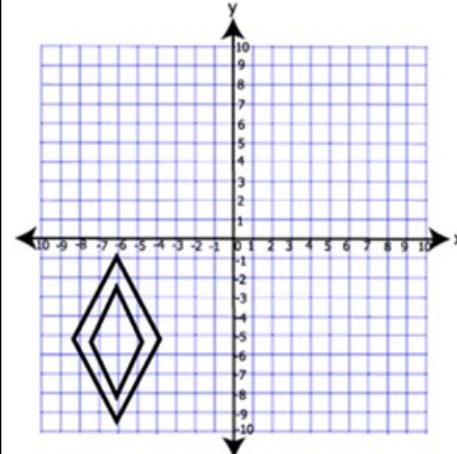
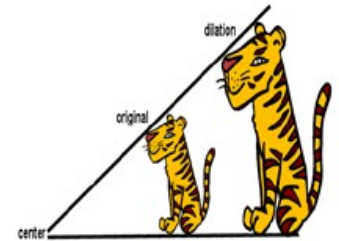
“Position”

Turn

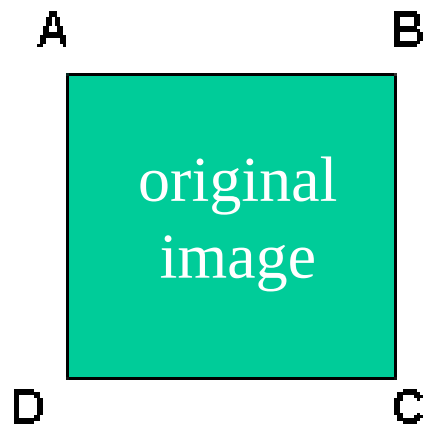


Dilation

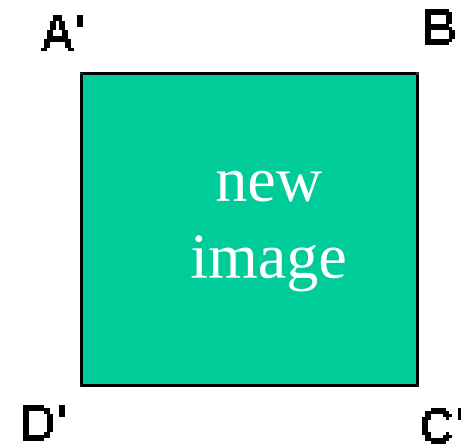
“Size”



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":



Now we will look at each type of transformation individually.

1. Translations

s

2. Reflections

3. Rotations

4. Dilations

1. Translations

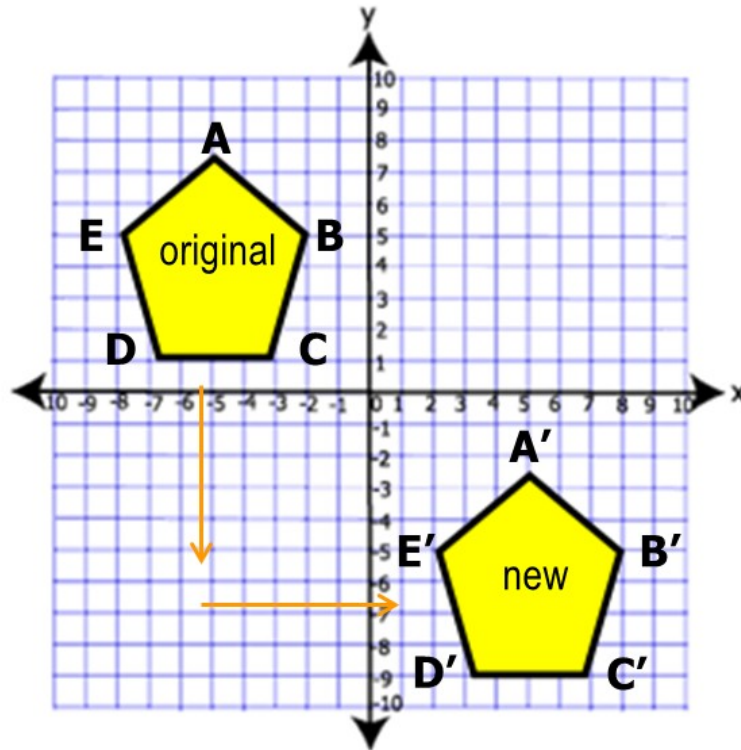


Slide

Translations



- Translation = Slide
- A Translation slides ***each*** point (or vertex) of a figure the same distance ***and*** in the same direction.



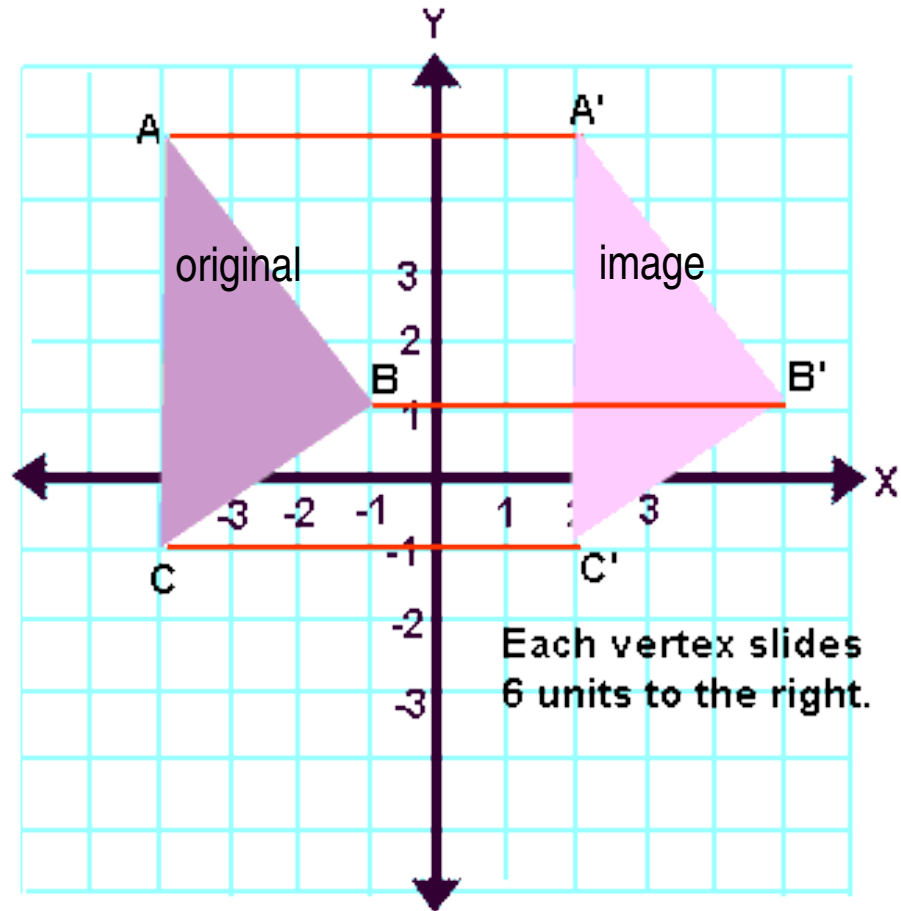
- Nothing changes about the figure except for its position on the coordinate plane. The image is the same size, the same shape and it's pointing in the same direction as the original.

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.



The translation of an object is called its image. Notice in the figure above...

If the original object was labeled with letters, such as triangle **ABC**, the image may be labeled with the same letters followed by a **prime** symbol, **A'B'C'**.

Translations are SLIDES

What are the coordinates for **A**, **B**, **C**?

A (__, __) **B** (__, __) **C** (__, __)

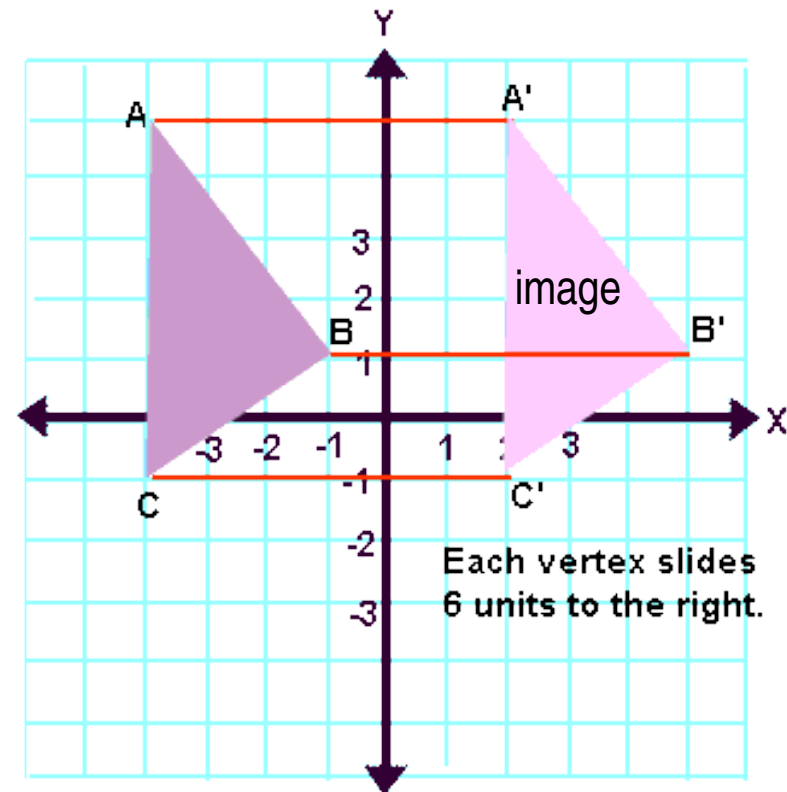
What are the coordinates for **A'**, **B'**, **C'**?

A' (__, __) **B'** (__, __) **C'** (__, __)

Did the image slide **left** or **right**?

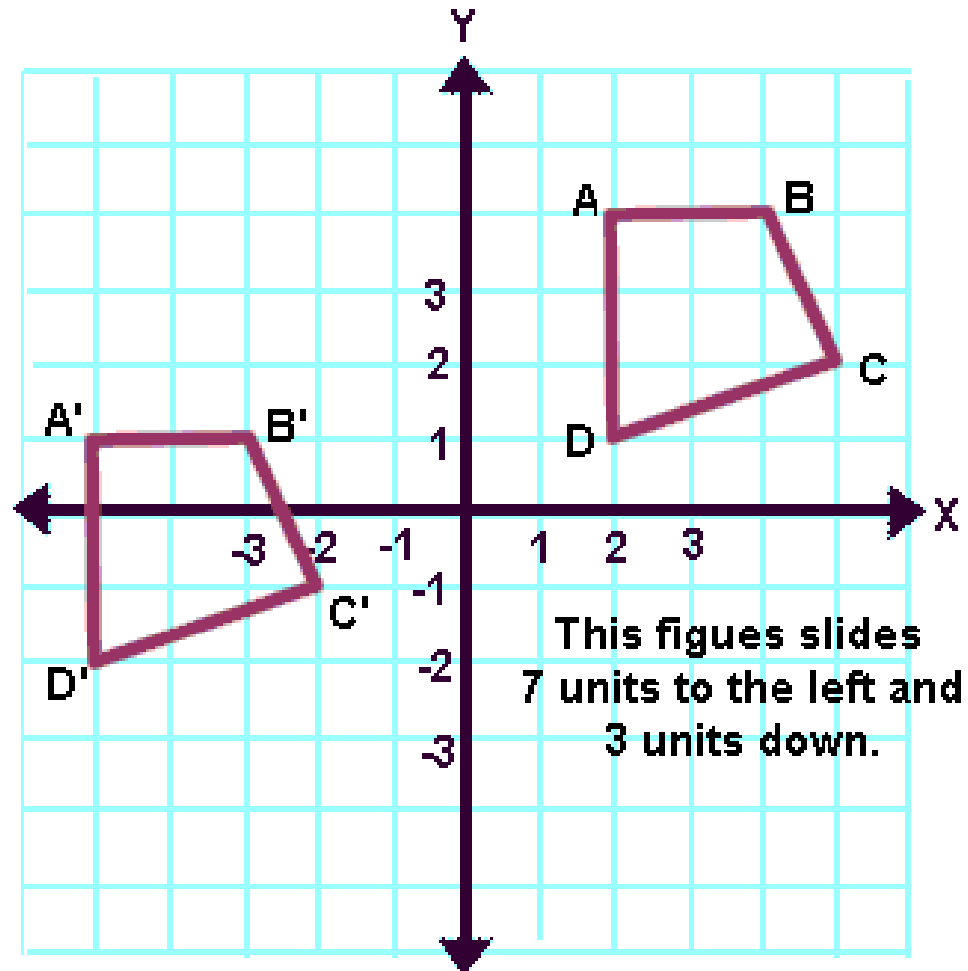
How many **units** did the figure slide?

Compare the x-coordinate on **A** and **A'**.
What do you notice?



Translations are SLIDES

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



2. Reflection



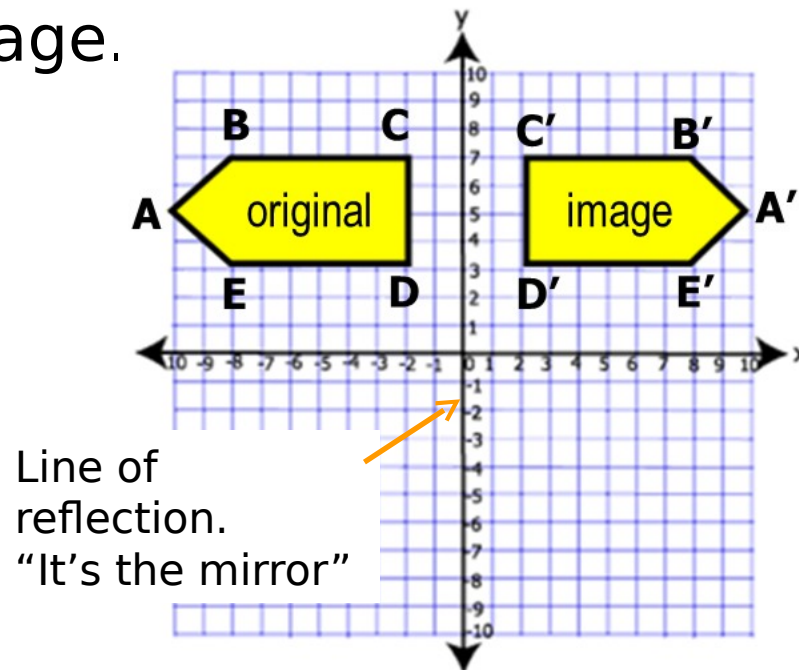
Flip

Reflections

- Reflection = Flip
- A reflection **flips** a figure over line called a line of reflection.



- A figure and its reflection have the same shape and size, but the figures face in opposite directions-like a mirror image.

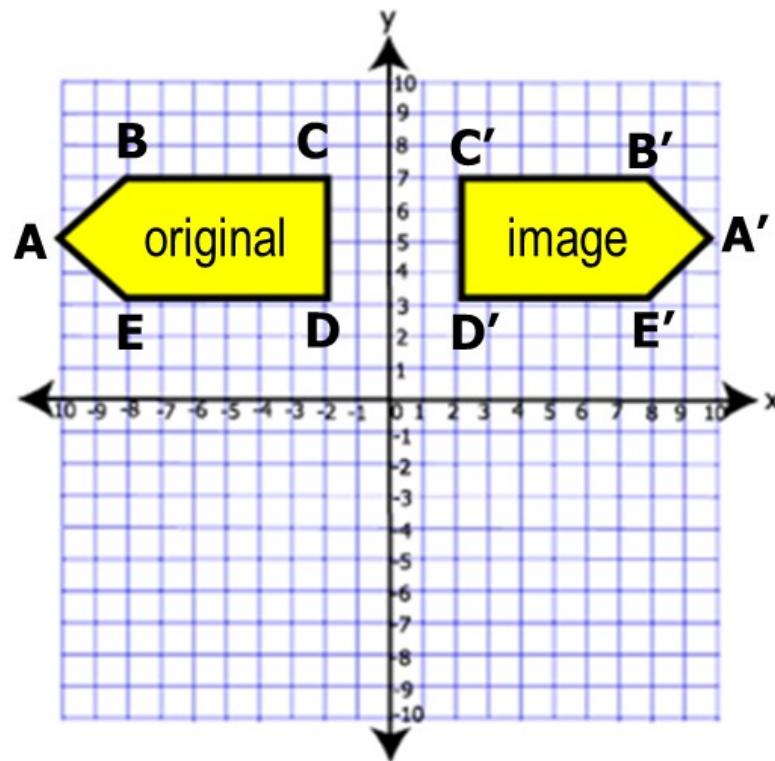


Reflections are Flips

The reflection of an object is called its **image**.

Notice in the figure below...

If the original object was labeled with letters, such as polygon ***ABCDE***, the image may be labeled with the same letter followed by a ***prime*** symbol, ***A'***, ***B'***, ***C'***, ***D'***,



Reflections are Flips

Reflections can be seen in water, in a mirror, in glass, or on a shiny surface.

Same shape and size. Figures face in opposite directions.

In a mirror, for example, right and left are switched.



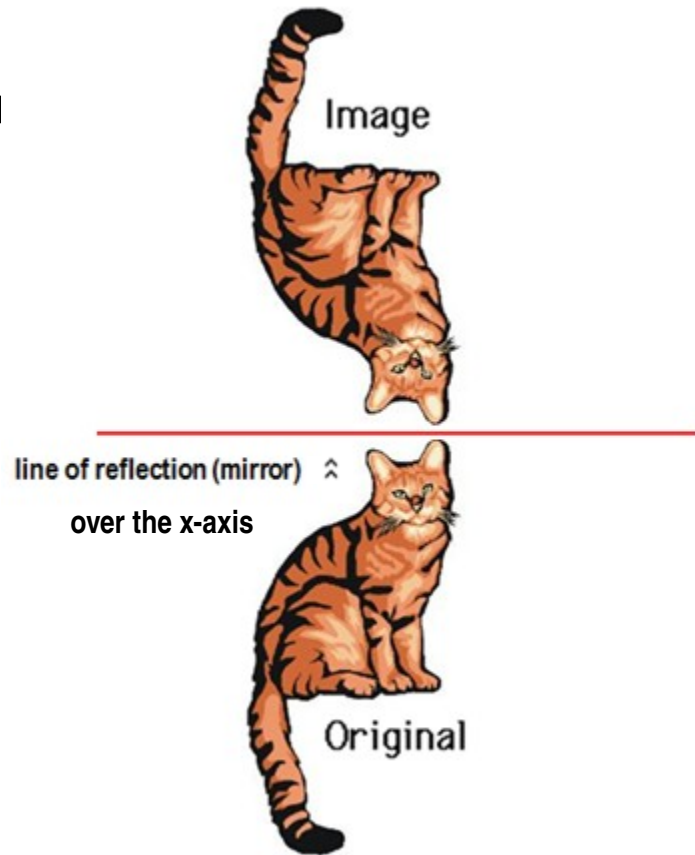
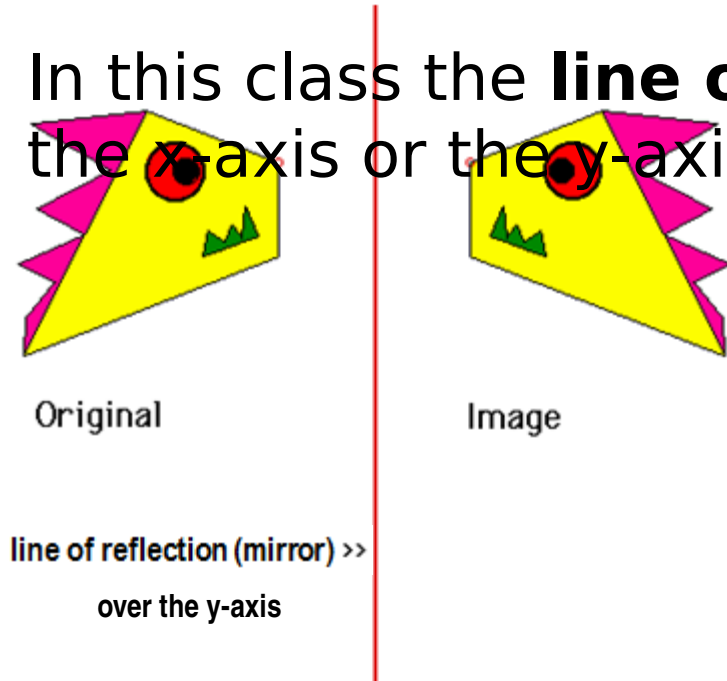
Look at each picture.

- Can you find the “line of reflection” (mirror)?
- Can you tell the original object from its reflection?
- Is the reflection across the x-axis or y-axis?

Reflections are Flips

The line (where a mirror may be placed) is called the **line of reflection**. A reflection can be thought of as a "flipping" of an object over the line of reflection.

In this class the **line of reflection** is the **x-axis** or the **y-axis**.



Reflections are Flips

What are the coordinates for **A**, **B**,
C?

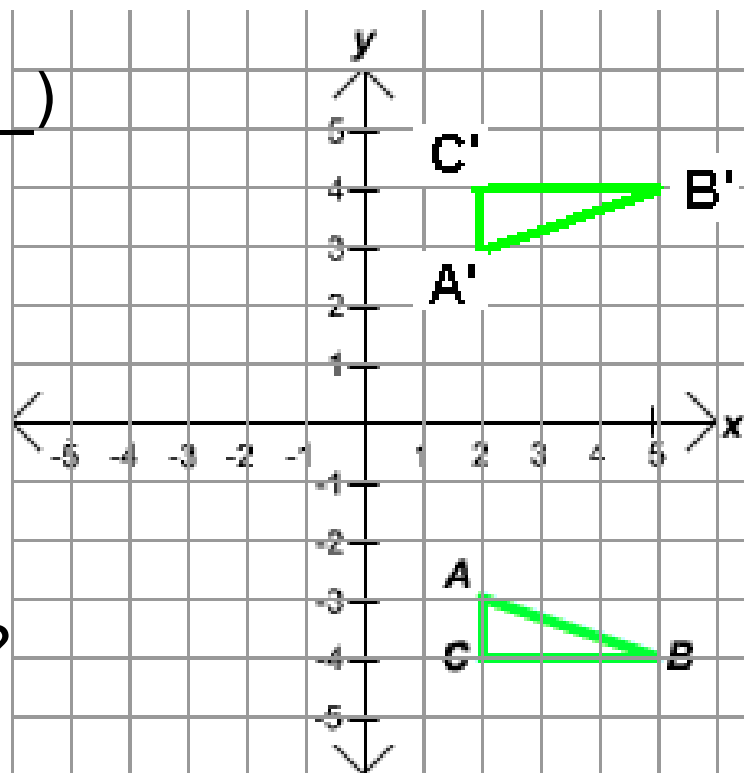
A(__, __) **B** (__, __) **C** (__, __)

What are the coordinates for **A'**, **B'**,
C'?

A' (__, __) **B'** (__, __) **C'** (__, __)

What is the line of reflection?

How did the points change
from the original to the reflection?



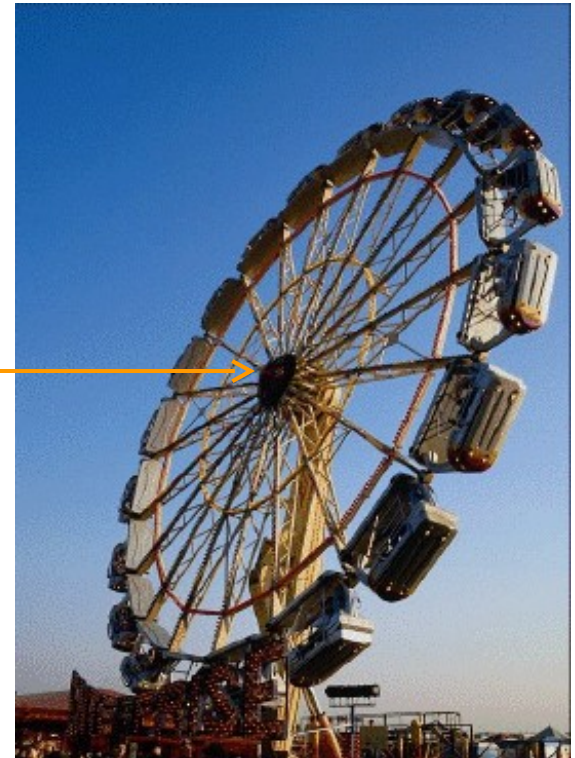
3. Rotation



Turn

Rotations

- Rotation = Turn
- 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 are turned in different directions.

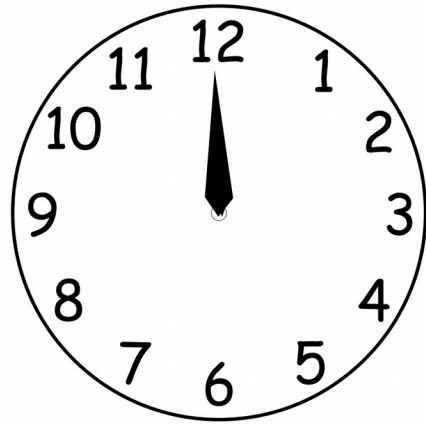


R • R

Rotations are Turns

Rotations can occur in either a clockwise or *counter-clockwise* direction.

Clockwise



Same direction as the hands of a clock.

Counter-clockwise

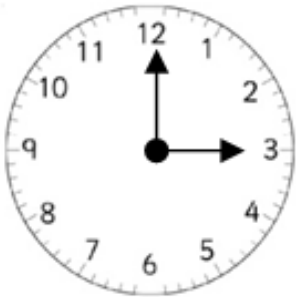


Opposite direction

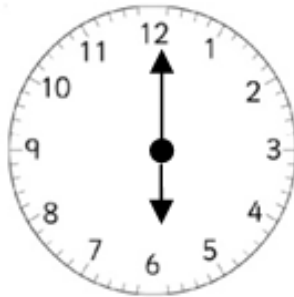
Rotations are Turns

To work with **rotations**, you need to be able to recognize angles of certain sizes. A clock is a good example that illustrates the different angles we'll be working with when looking at rotations:

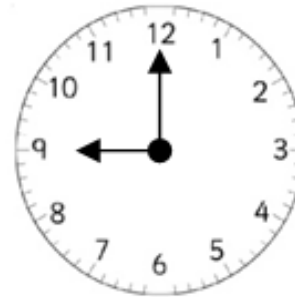
90°



180°



270°



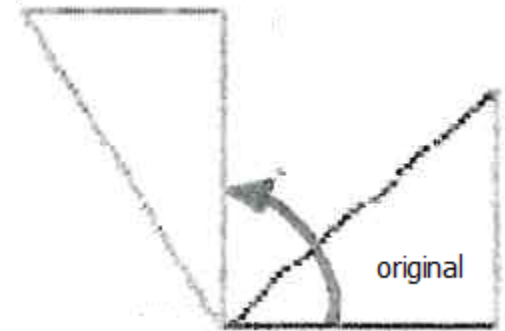
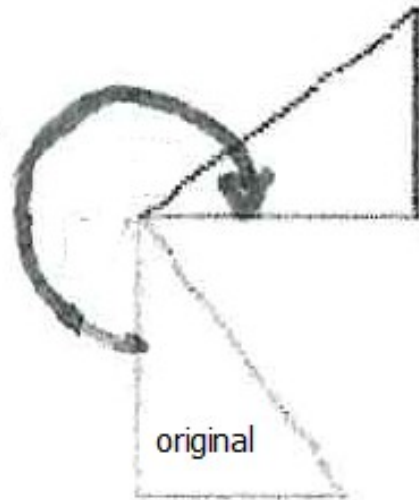
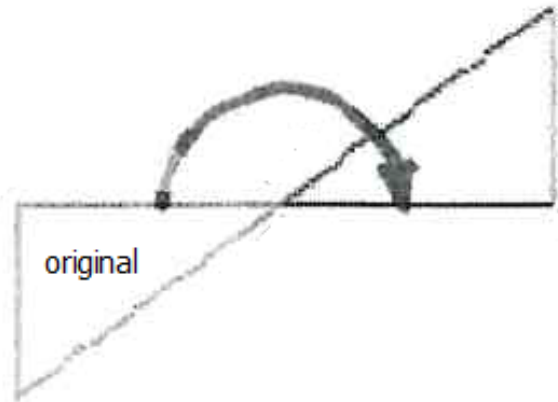
360°



Rotations are Turns

You Try! Write your answer on a piece of paper.

- Estimate the degree of each rotation: 90° , 180° , 270°
- Name the direction of the rotation: *clockwise* or *counter-clockwise*



1. Degree: _____

Direction: _____

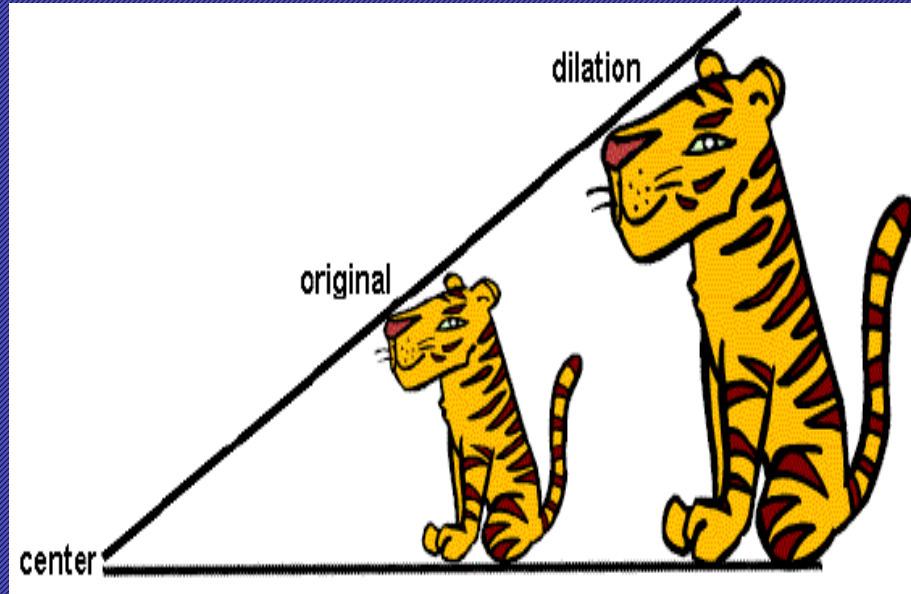
2. Degree: _____

Direction: _____

3. Degree: _____

Direction: _____

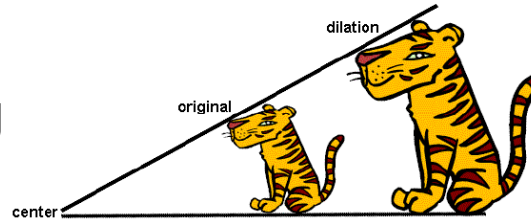
4. Dilations



Size Change

Dilations

- Dilation = Size Change



- A dilation is a transformation that produces an image that is the same shape as the original, but is a different size.
- A good real-life illustration of dilation would be our pupils and how they react to sunlight.

Our pupils *reduce* in size (or get smaller) when we are in the sunlight.

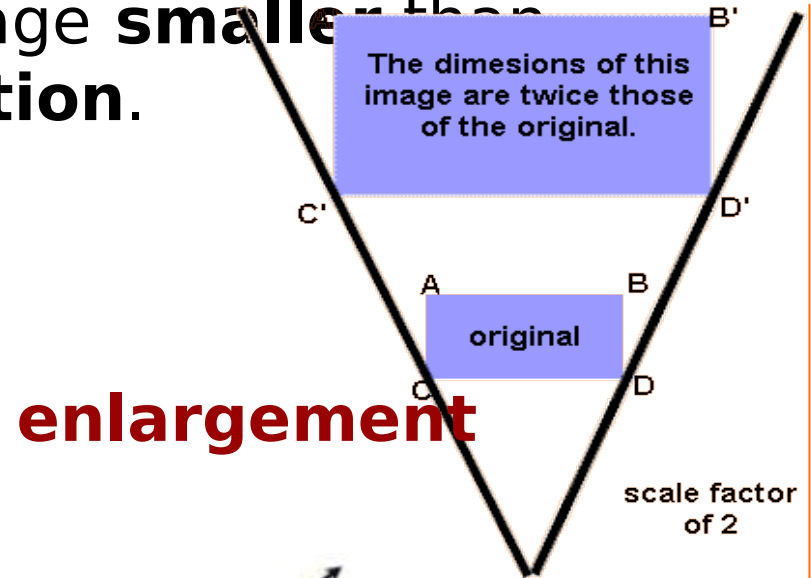
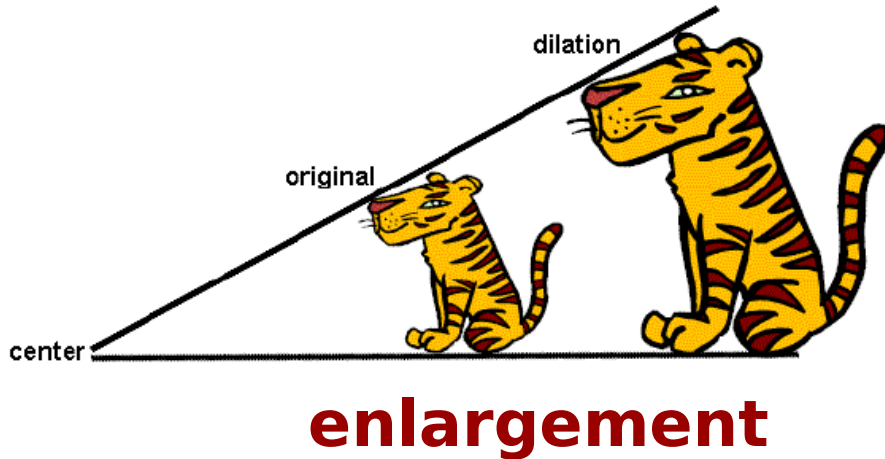


Our pupils enlarge in size (or get bigger) when it's dark.

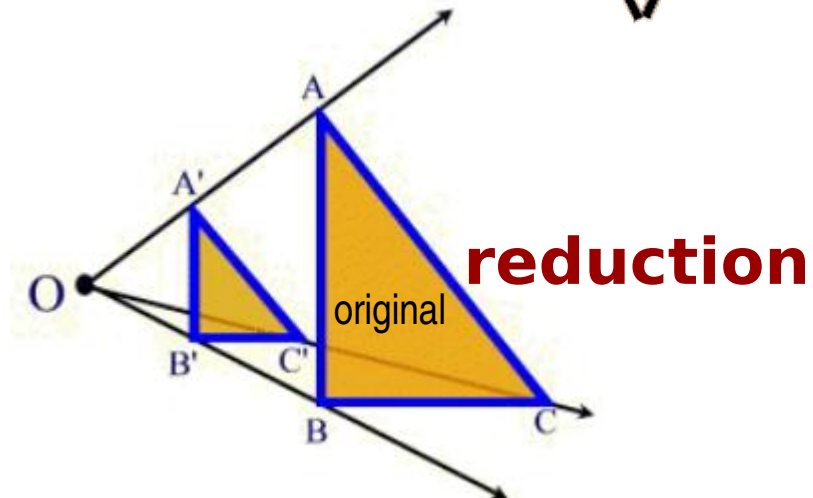


Dilations are Size Changes

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**.



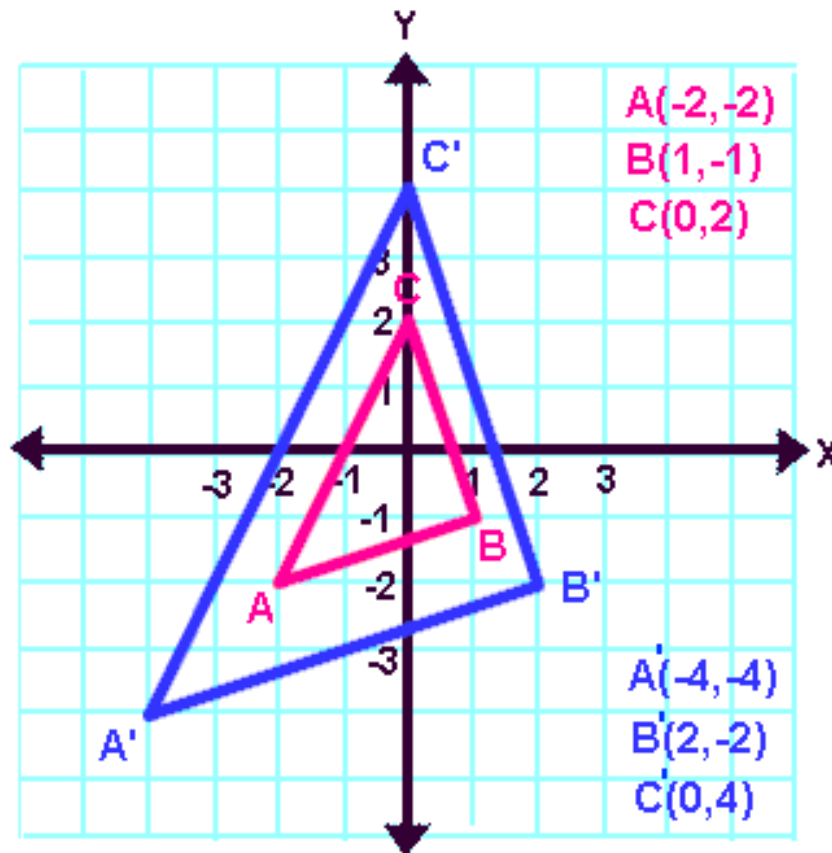
A **scale factor** is used to create the enlarged or reduced image.



Dilations are Size Changes

Remember, **dilations** always involve a change in size

Dilations



Notice how **EVERY** coordinate of the original triangle has been multiplied

Almost Done!

Let's practice...

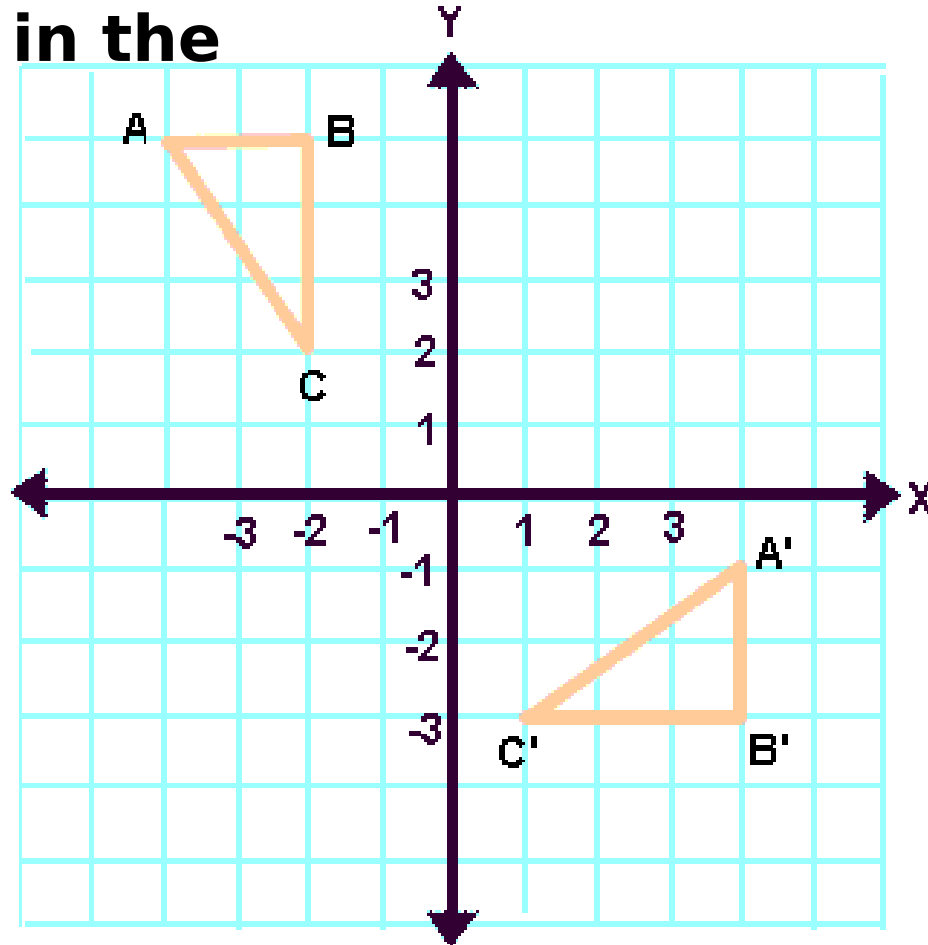
Name the transformation in the picture.

Translation

Reflection

Rotation

Dilation



What is the degree of rotation clockwise?

How about counter-clockwise?

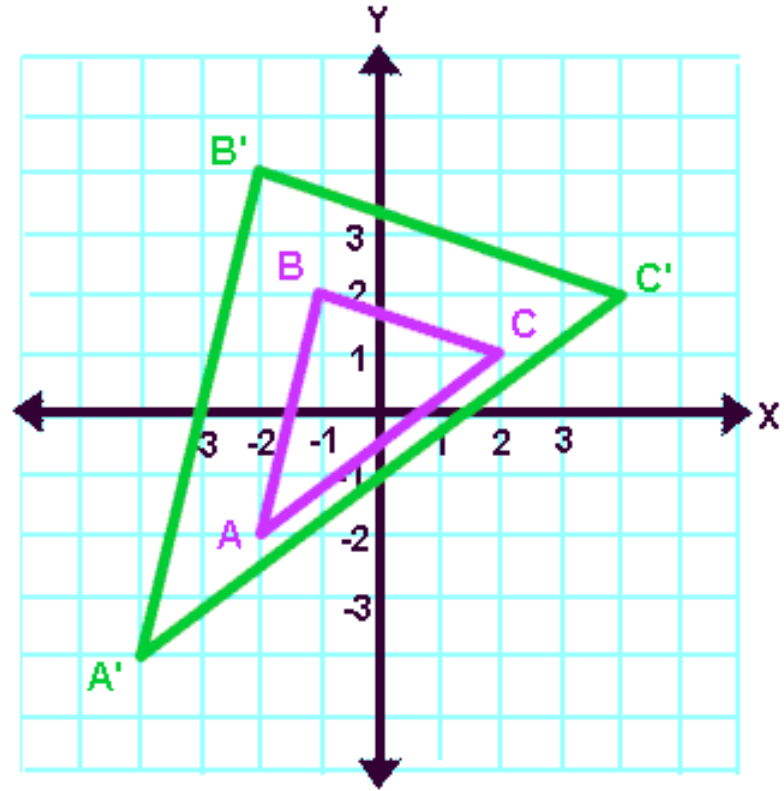
Name the transformation in the picture.

Translation

Reflection

Rotation

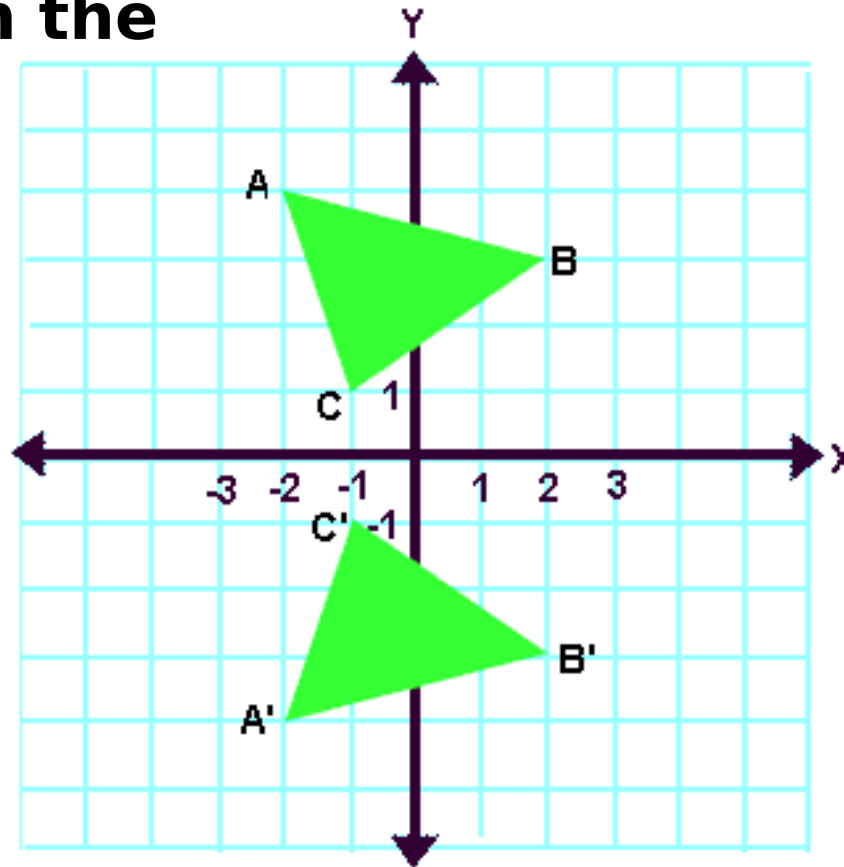
Dilation



Is the dilation an enlargement or reduction?

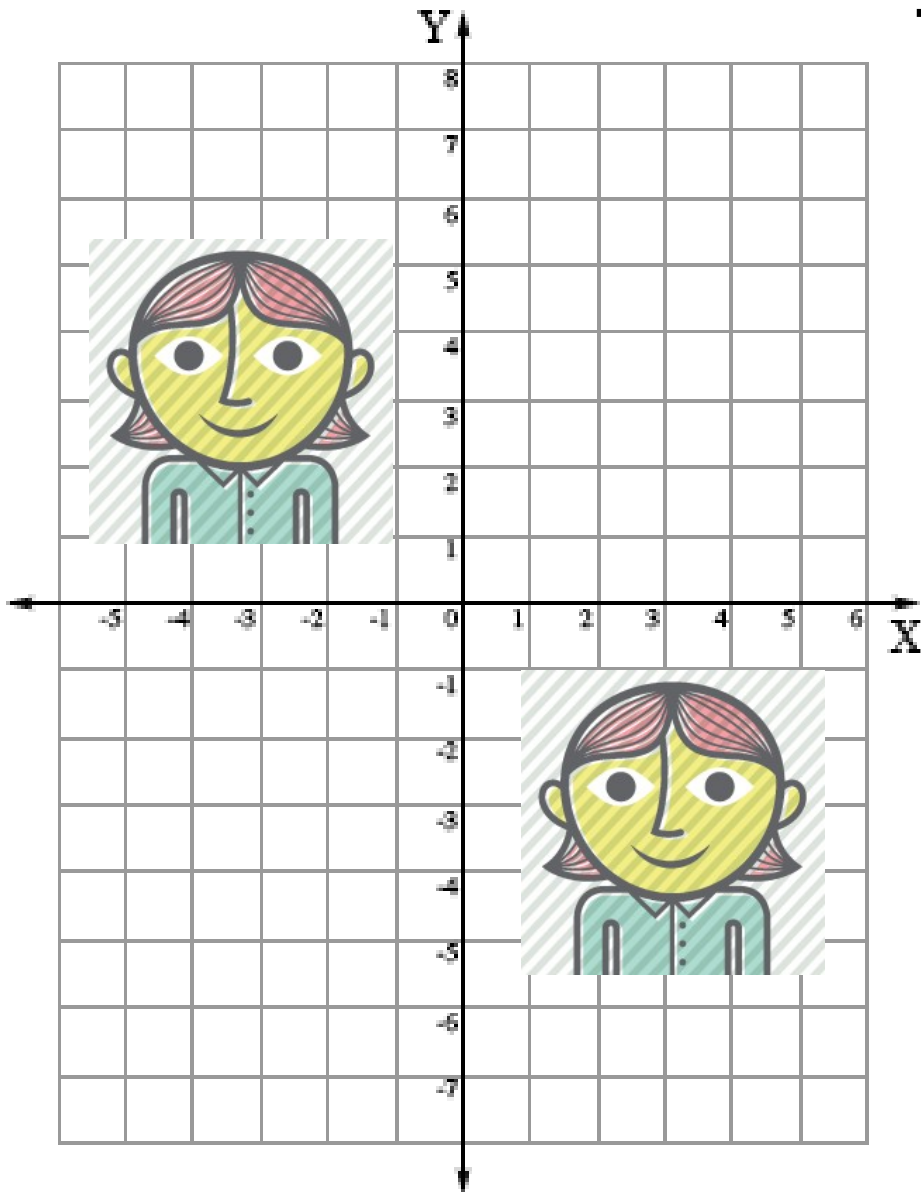
Name the transformation in the picture.

- Translation
- Reflection
- Rotation
- Dilation



Is the reflection across the x-axis or y-axis?

Name the transformation in the picture.



Translation

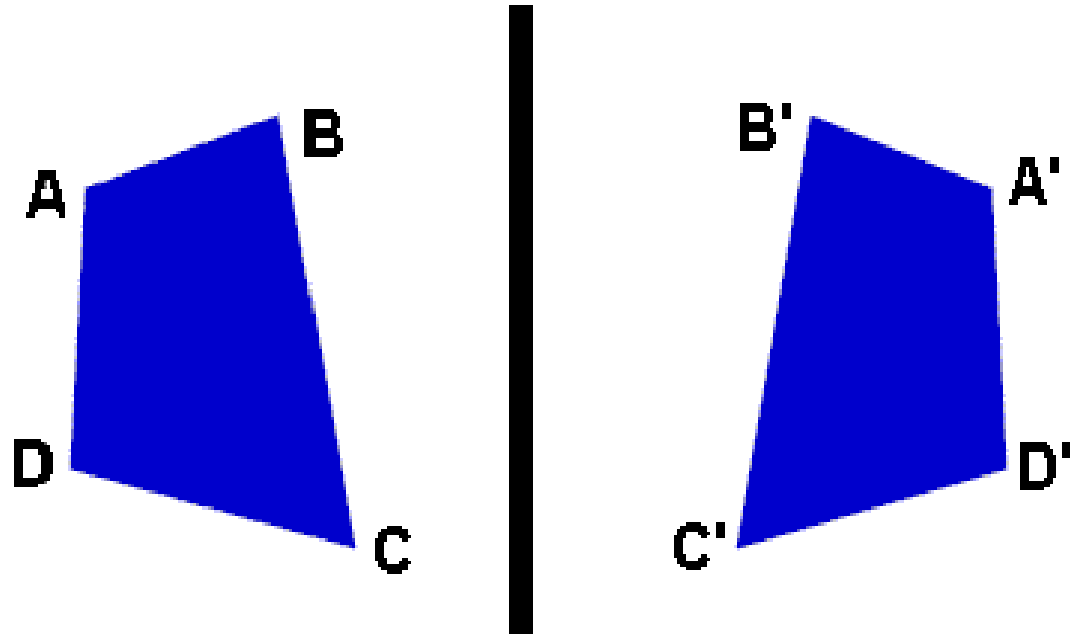
Reflection

Rotation

Dilation

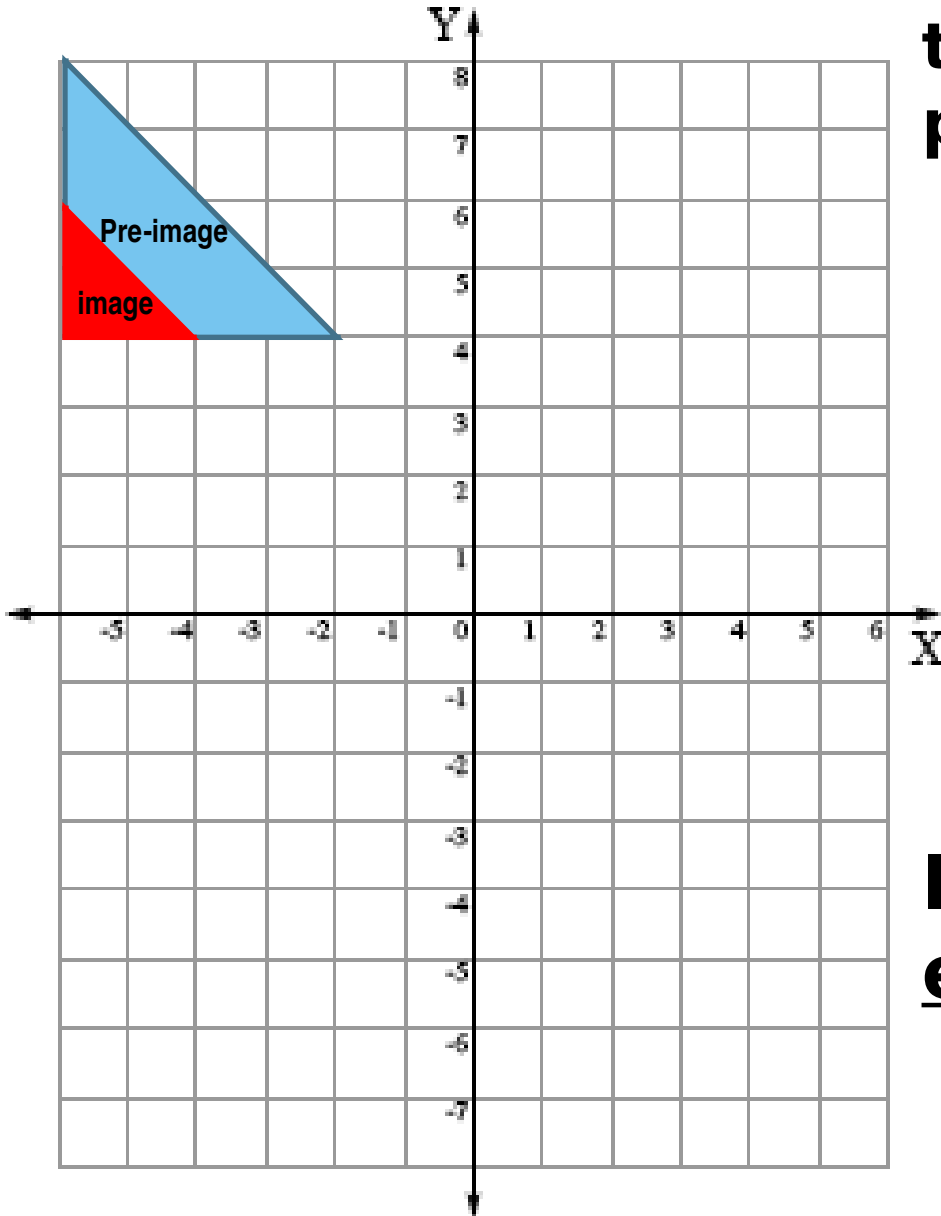
Name the transformation in the picture.

- Translation
- Reflection
- Rotation
- Dilation



Is the reflection across the x-axis or y-axis?

Name the transformation in the picture.



Translation

Reflection

Rotation

Dilation

Is the dilation an enlargement or reduction?

Name the transformation in the picture.

Translation

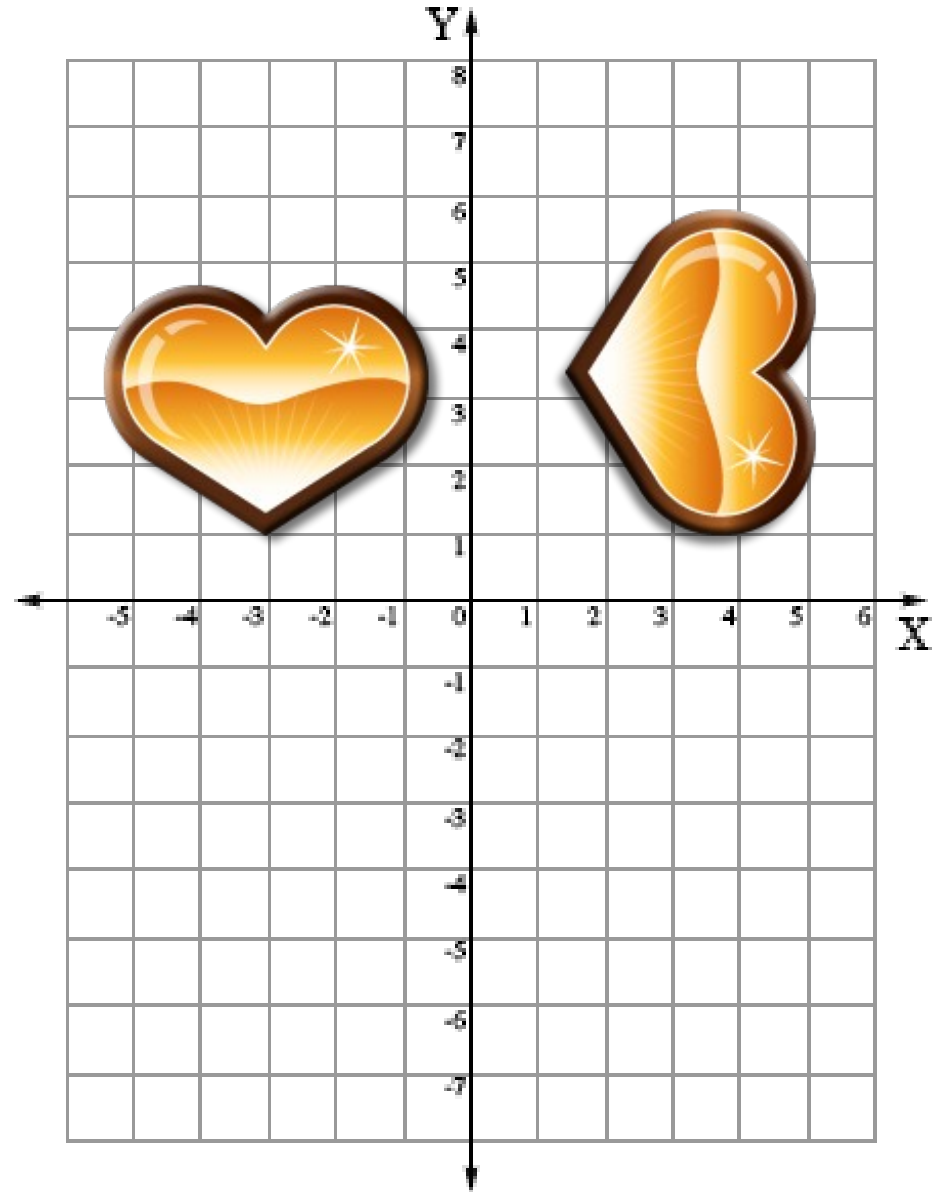
Reflection

Rotation

Dilation

What is the degree of rotation clockwise?

How about counter-clockwise?



Closure

What is a Transformation?

In geometry, a transformation means to change.

When a figure moves from one place to another on a coordinate plane a transformation has occurred.

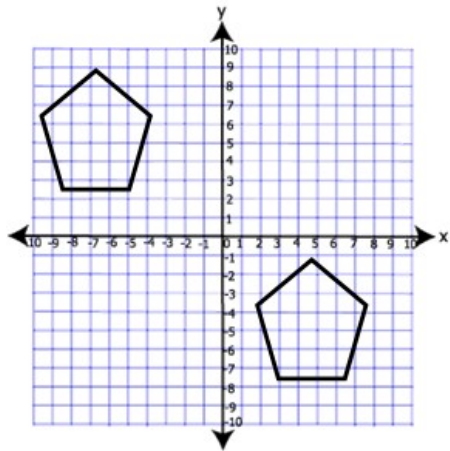
There are four basic types of transformations.

- Three of the transformations change the **position** of a shape.
- One of the transformations changes the **size** of a shape.

Translation

“Position”

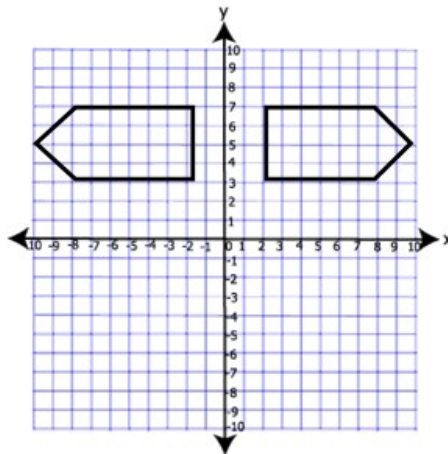
Slide



Reflection

“Position”

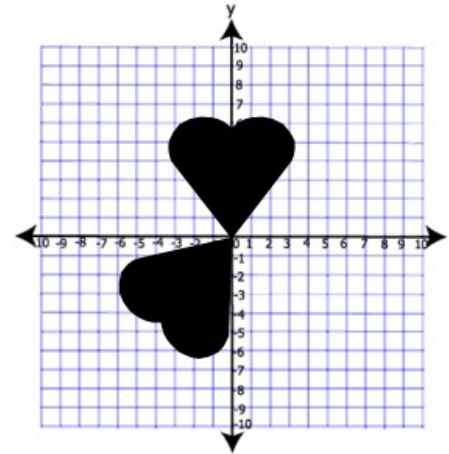
Flip



Rotation

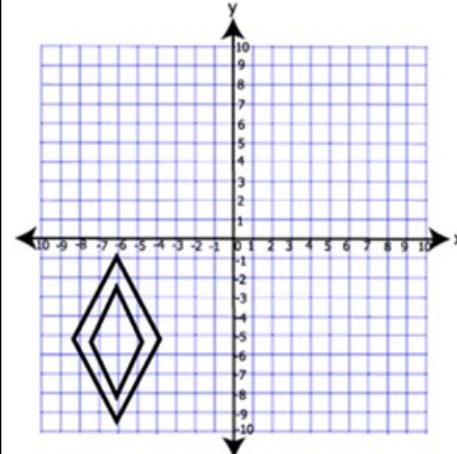
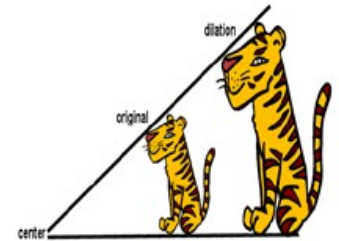
“Position”

Turn



Dilation

“Size”



End of PowerPoint