# Reflections

# What is a reflection?

# Try this:

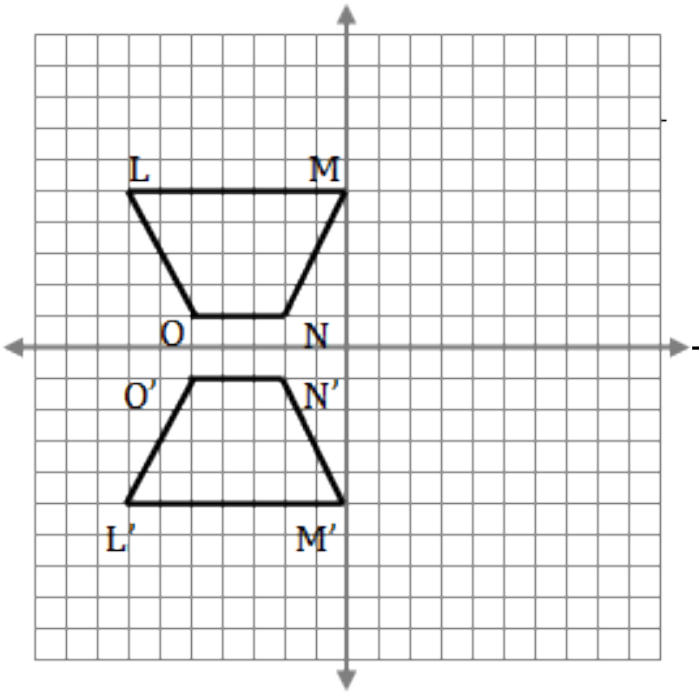
- Fold a sheet of paper in half. Without opening the paper draw a quadrilateral that is not regular and label it ABCD.
- Turn the folded paper over and trace the image of ABCD onto the opposite side of the paper. Label the vertex corresponding to A as A'. (continue with B, C, and D.)
- Open the paper and draw line *l* along the fold between the two quadrilaterals. Line *l* is the *line of reflection*.

# Try this continued:

- How do you think the measures of each side compare with its reflection? The angles?
- Draw a line from A to A', B to B', C to C' and D to D'.
- What angle is created when $\overline{AA'}$ and *l* intersect.
- If you measure from A to line *l*, how does that distance compare to the distance from A' to line *l*? How about for the other points?

# What is a reflection?

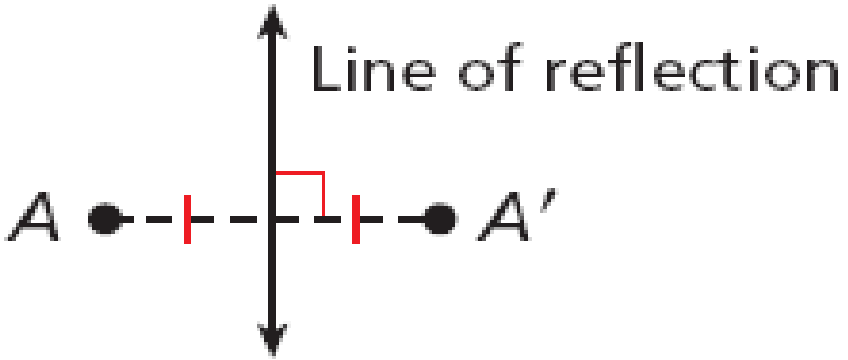
- A reflection is a transformation that **flips** all points of an image over a line called the ***line of reflection (LOR)***.




line of reflection (the x-axis in this example)

# Properties of Reflections

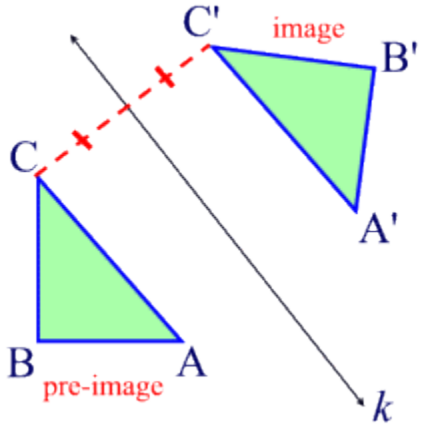
- The line of reflection is the perpendicular bisector of each segment joining each point and its image.
- Point and its image are equidistant from the line of reflection.



# Reflections Notation

- Reflection of Δ ABC to Δ A'B'C' is written:

$$r_k\,(\Delta\,ABC\,) = \Delta\,A'B'C'$$

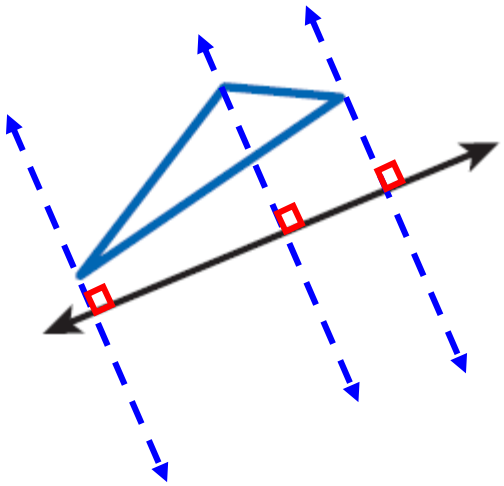



Note that reflections are written with a lower case r.

## Example: Drawing Reflections

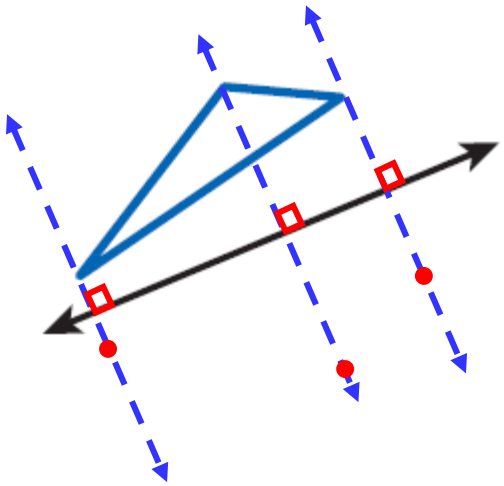
**Copy the triangle and the line of reflection. Draw the reflection of the triangle across the line.**

**Step 1** Through each vertex draw a line perpendicular to the line of reflection.



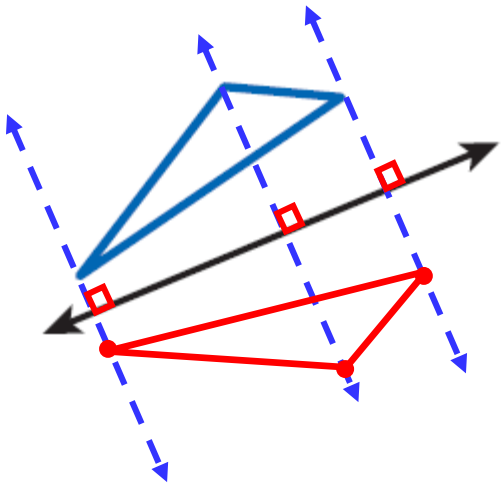
# Example Continued

**Step 2** Measure the distance from each vertex to the line of reflection. Locate the image of each vertex on the opposite side of the line of reflection and the same distance from it.



# Example Continued

**Step 3** Connect the images of the vertices.

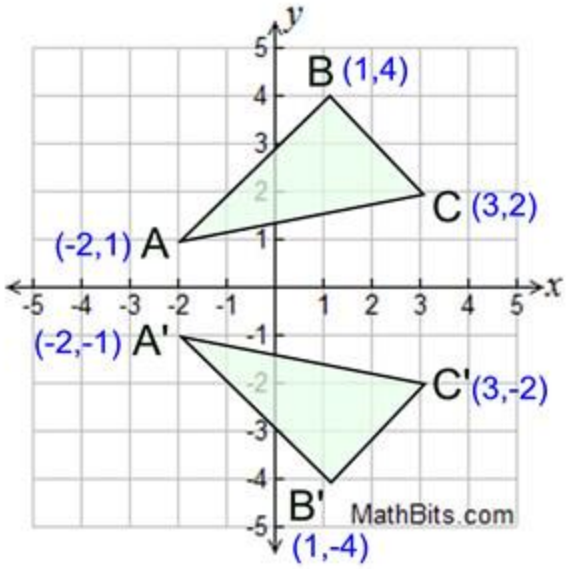


# Reflections across the x-axis

The reflection of the point
**(*x*, *y*)** across the *x*-axis is the point **(*x*, -*y*)**.

$P(x,y) \rightarrow P'(x, -y)$

$r_{x\text{-axis}}\ (x,y) \rightarrow (x, -y)$

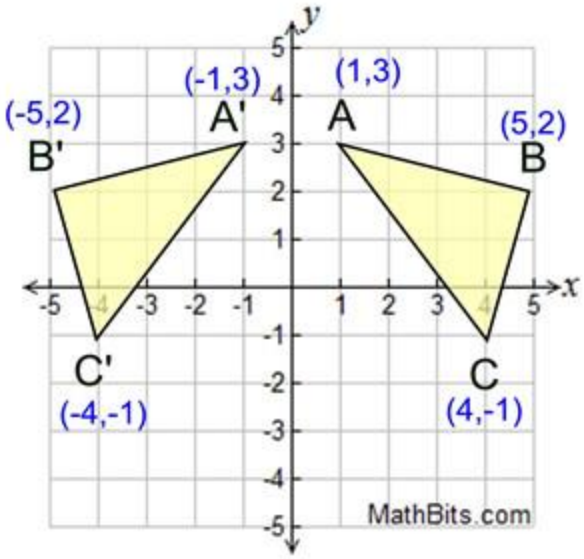


# Reflections across the y-axis

The reflection of the point
$(x, y)$ across the $x$-axis is the point $(-x, y)$.

$P(x,y) \rightarrow P'(-x, y)$

$r_{y\text{-axis}}\ (x,y) \rightarrow (-x, y)$



# Reflections across the y=x or y=-x

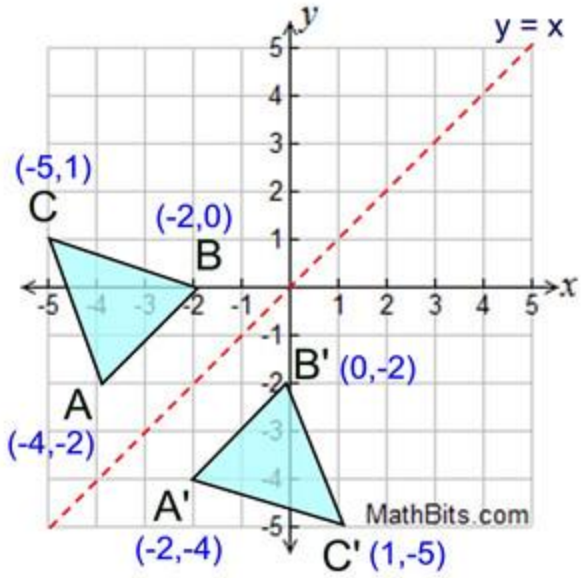
The reflection of the point $(x, y)$ across the line y = x is the point $(y, x)$.

$P(x,y) \rightarrow P'(y, x)$ $\quad r_{y=x}(x,y) \rightarrow (y, x)$

The reflection of the point $(x, y)$ across the line y = -x is the point $(-y, -x)$.

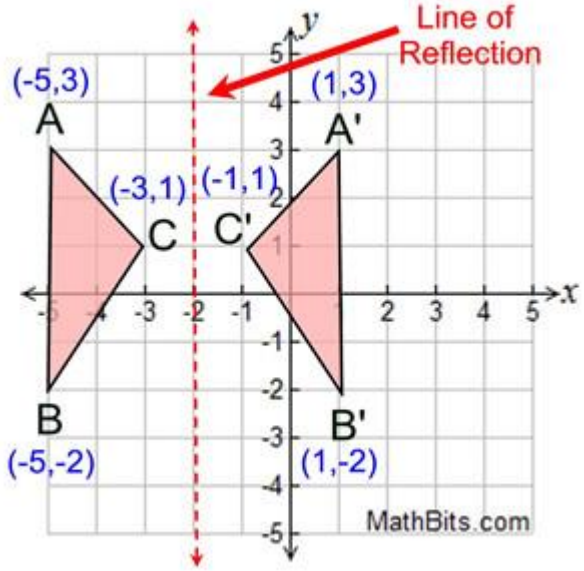
$P(x,y) \rightarrow P'(-y, -x)$

$r_{y=-x}(x,y) \rightarrow (-y, -x)$



# Options for the line of reflection

- A reflection can occur across any line.
- It is not limited just to the x-axis, y-axis, and line $y=x$.



http://www.regentsprep.org/Regents/math/geometry/GT1/PracRefl.htm

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