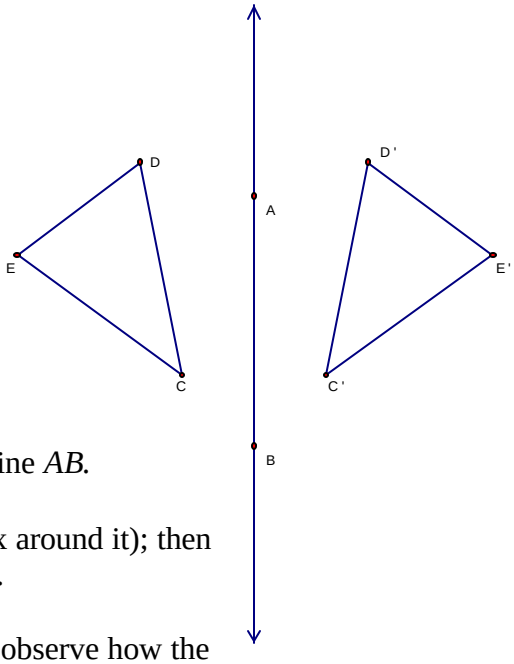
Investigating Reflections

Using the guided steps below, you will be investigating the properties of reflections.

Part 1: Reflecting Triangles



1. Construct a vertical line AB.

2. Mark *AB* as a mirror.

    - Select the line; then in the **Transform** menu, choose **Mark Mirror**.

3. Construct ΔCDE to the left of line *AB*.

4. Reflect ΔCDE (both its sides and vertices) over line *AB*.

    - Select the entire figure (by drawing a box around it); then in the **Transform** menu, choose **Reflect**.

5. Drag the vertices and sides of either triangle and observe how the triangles are related. Also, drag the mirror line. Comment on your findings.

6. Measure the lengths of the sides of triangles ΔCDE and ΔC′D′E′.

7. Measure one angle in ΔCDE and measure the corresponding angle in ΔC′D′E′.

8. What effect does reflection have on side lengths and angle measures?

9. Are a figure and its mirror image always congruent? State your answer as a conjecture.

10. Naming the vertices alphabetically in ΔCDE, are the vertices in a clockwise or counter clockwise direction? In what direction are vertices C′, D′, and E′ oriented in the reflected triangle? Is this always the case in a reflected image?

11. Construct dashed segments connecting each point and its image: C to C′, and D to D′, and E to E.

    - Select the segments; then in the **Display** menu, choose **Line Style**, then **Dashed**.

12. Drag the vertices and sides of the triangle around the sketch window and observe relationships between the dashed segments and the mirror line.

13. How is the mirror related to a segment connecting a point and its reflected image?

Part 2: Reflections in the Coordinate Plane

In this exploration, you will investigate what happens to the coordinates of points when you reflect them across the x- and y- axes in the coordinate plane.

1. Start with a new sketch in Sketchpad®.

    - Go to **File**; then choose **New Sketch**.

2. Show the grid.

    - In the **Graph** menu, choose **Show Grid**. Make sure **Snap Points** is checked in the **Graph** menu.

3. Draw ΔABC with vertices on the grid in quadrant II.

4. Measure the coordinates of each vertex.

    - Select the vertex; then in the **Measure** menu, choose **Coordinates**.

5. Mark the *y-axis* as a mirror and reflect the triangle.

6. Measure the coordinates of the image's vertices.

7. Drag the vertices to different points on the grid and look for a relationship between a point's coordinates and the coordinates of the reflected image across the *y-axis*.

8. Describe any relationship you observe between the coordinates of the vertices of your original triangle and the coordinates of the reflected image vertices across the *y-axis*.

9. Now mark the *x-axis* as a mirror and reflect your original triangle.

10. Before you measure coordinates, can you predict what they'll be? Measure to confirm your predictions.

11. Describe any relationship you observe between the coordinates of the original vertices and coordinates of their reflected image vertices across the *x-axis*.

12. Draw a line on the grid that passes through the origin and makes a 45-degree angle with the *x-axis* (in other words, the line x=y). Reflect your triangle across this line. Describe any relationship you observe between the coordinates of the original vertices and coordinates of their reflected image vertices across the line x=y.