

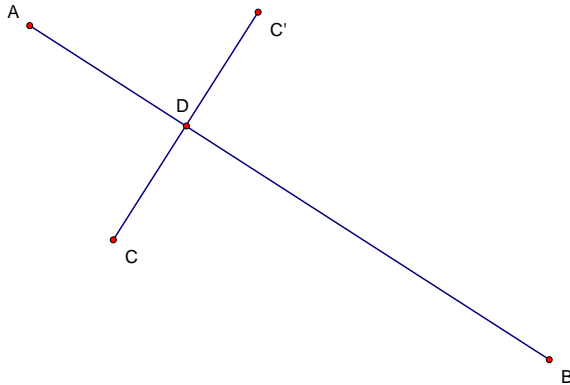
Transformation geometry worksheet

Reflections

Directions: Follow the steps below carefully and answer the questions. *If I catch you doing anything else on your workstation you'll get a zero for the day. No kidding!*

Simple reflections of a point over a line.

1. Double click on Geometer Sketchpad
2. Go to "File" "New Sketch".
3. Before you begin, go to <Edit><Preferences> and go to the <Text> tab. Make sure you check the box labeled "For all new points".
4. Using the straightedge tool on the left, draw a diagonal line segment AB.
5. Using the point tool, on the left side of the line segment draw a point called C.
6. Double click on line segment AB to mark it as the line of reflection.
7. Left-click on point C so that it's highlighted. Click on <Transform><Reflect>. You should now see point C' reflected in line segment AB.
8. Using the straightedge tool draw a line connecting C and C'. Then using the point tool, place a point D at the intersection point of AB and CC'. Your figure should now look like this:



9. Measure the distance from C to D: *click on points C and D, click on <measure><distance>*. Then measure the distance between points C' & D. What do you notice about the distances of points C & C' from the line of reflection AB? _____
10. Left click on either C or C' and drag it around the screen. What do you notice about the distances between both the pre-image and image and the line of reflection? They are always _____.
- 11. Theorem: The distances of the pre-image and the reflected image to the line of reflection are always _____.** *Write this theorem in your notes!*
12. Measure angles CDB and CDA: click on points C,D,A. Click on <Measure><Angle>. Do the same for angle CDB. What was the measure of the angles formed by the line joining the pre-image and image and the line of reflection? They are _____ degrees.
13. Move point C around the page. Has the angle measure changed? _____
- 14. Theorem: Lines joining a point and its reflection are _____ to the line of reflection.** *Write this theorem in your notes!*
15. Close the current sketch and click on <File><New Sketch>. Make the screen as large as possible to maximize your screen real-estate.
16. Click on "Graph" "Grid Form" "Square Grid". If you need to place the point of origin in the center of your page, left click on the origin and drag it to the center of your page.

17. Plot point A(4,2) by going to <Graph><Plot Points>. Make sure “Rectangular” is checked. Do not use the point tool on the left to plot your point. You **must** use the <Graph><Plot Points> function.
18. Highlight point A with your left mouse button. Go to <Measure><Coordinates> to display the coordinates of point A.
19. You are now going to reflect point A over the Y axis.
 - a) Click anywhere on the grid to un-highlight everything.
 - b) Double click on the Y-axis to mark it as the axis of reflection
 - c) Left click on the dot you plotted
 - d) Go to “Transform” “Reflect”
 - e) Measure the coordinates of A'. What is the coordinate of the new point?

Point A' is now in quadrant _____.

When you reflect a point over the Y axis, does the Y value change? _____

What did you multiply the X value of your pre-image by in order to get your reflected image? _____.

20. Now reflect A' over the X-axis by double-clicking the X-axis (making sure that neither point is highlighted!).
21. Highlight the point in QII, go to “Transform” and “Reflect”. Highlight point A'' and go to <Measure><Coordinates>. What is the coordinate of A''? _____.
22. When you reflect a point over the X axis, does the X value change? _____
23. What did you multiply the Y value of A' by in order to get your reflected image A''? _____.

Reflecting a Polygon Over the Axis

1. Close your page and start a new GSP page and Graph a square grid.
2. Create a triangle by plotting points A B C of your choice and using your straightedge tool to connect the vertices of your polygon.
3. Highlight the vertices only (not the line segments connecting them) and go to <Construct><Triangle Interior>. You can change the color by highlighting the triangle interior and going to <Display><Color> and choosing your favorite color.
4. Now reflect the entire polygon (including the vertices, line segments and the triangle interior) over the Y axis.
5. Measure and compare the lengths of line segments AB and A'B'. Do the same with BC & B'C' and CA & C'A'. What do you notice about the lengths of the corresponding sides? They are _____.
6. What can you conclude about $\triangle ABC$ and the new $\triangle A'B'C'$? They are _____ to each other.
7. You can therefore conclude that a reflection is an _____.
8. Now compare the direction of points ABC and A'B'C'. What do you notice about the direction of points in the pre-image? They move in a _____ direction.
9. What do you notice about the the direction of points in the image A'B'C'? They move in a _____ direction.
10. Therefore, does a reflection preserve orientation? _____.
11. **Theorem: A reflection is an isometry, however it does NOT preserve orientation.** (write this theorem in your notes!