

Transformations

Standard:

G.3.18 using transformational geometry, create a reflection, translation, rotation, glide reflection and dilation of a figure; and apply transformations and use symmetry to analyze mathematical situations.

Materials: Geometer's Sketchpad, Activity sheet

Prerequisites:

Students should be familiar with Geometer's Sketchpad basics, such as; Drawing points, lines, circles, polygons, constructing interiors, changing colors, and hiding objects.

Activity:

1. Define and discuss transformations. Show examples of the uses of transformations such as logos, wallpaper, artwork, etc.
2. Discuss the different types of transformations and the key elements for each.
Translation: vector
Rotation: center of rotation and angle of rotation
Reflection: line of reflection or mirror
3. Give students the activity sheet and allow them to use Geometer's sketchpad to complete the activity. **Some students may need to work in pairs, or you may need to lead the class through the first section on translations.**
4. Discuss the activity sheet questions. **Have blank copy on the projector and fill in answers while you're discussing for those students who had trouble.**

Evaluation:

1. Have students design their own wallpaper, logo or artwork. They must use at least two transformations in their design.
2. Have students write about their design process. They should discuss the transformations they used and the key elements they used for each transformation.

Performance Descriptors:

Novice: Design is incomplete. It does not contain any transformations. Paragraph does not show understanding of transformations.

partial mastery: Design shows some type of transformation. It may lack the two required transformations, or a purpose. Paragraph uses some of the key terms discussed with transformations, but does not demonstrate a clear understanding of the concepts.

Mastery: Design includes the two required transformations. Its purpose is recognizable. The paragraph describes the transformations used, citing the key elements used for each one.

Above mastery: Design contains the two required transformations. It is interesting, colorful creative, and purposeful. The paragraph gives clear explanation of the transformations, and relates the key elements needed for each.

Distinguished: The design fulfills all requirements and more. It contains more than the required number of transformations. It shows creativity, uses color effectively, and is interesting. It is done in a professional manner and could be used in a professional setting. The paragraph shows a complete understanding of all transformations and the key elements of each. It could be used to instruct others in transformations.

<http://www.shodor.org/interactivate/activities/transform/index.html>

http://matti.usu.edu/nlvm/nav/frames_asid_300_g_4_t_3.html?open=activities&id=314

<http://mathforum.org/sum95/suzanne/symsusan.html>

Transformations on Geometer's sketchpad

A. Translations

1. Graph the triangle A(2,3) B(-1,5) C(-2,-2)
2. Construct the interior of the triangle.
3. Place points at (0,6) (4,6)
4. Highlight these points and go to the transform menu
5. Select Mark vector
6. Select the triangle
7. Go to transform menu and select translate.
8. Select by vector.

Questions:

1. What are the coordinates of the new triangle?
2. Which direction was the triangle slid?
3. What would have happened if you would have selected the vector points in the other order?
4. What happens if you click and drag one of the vertices of the triangle?
5. Do the triangles remain the congruent?
6. Is the orientation preserved?

B. Reflections

1. On a new sketch, graph the triangle from part A.
2. Draw a line at $x=3$
3. Select mark mirror from the transform menu
4. Select the triangle
5. Select reflect from the transform menu

Questions

1. What are the coordinates of the new triangle?
2. What would have happened if your line was at $y=3$?
3. What happens if you click and drag one of the vertices of the triangle?
4. Do the triangles remain congruent?
5. Is the orientation preserved?

A. Rotation

1. On a new sketch, graph the triangle from part A.
2. Highlight the point (2,3)
3. Select mark center from the transform menu
4. Select the triangle
5. Select rotate from the transform menu
6. Set angle at 90

Questions:

1. Give the coordinates of the new triangle?
2. What would happen you selected a different center?
3. What would happen if you rotated 180?
4. What would happen if you rotated -90 ?
5. Does the shape remain congruent?
6. Is the orientation preserved?