

WAX PAPER TRANSFORMATIONS

Objective: Explore transformational geometry using wax paper.

Materials: Transformations Activity Sheet and Transparency
Wax paper
Several Blank Transparencies

Procedures:

1. Tear off wax paper pieces (each piece should be longer than it is wide). Give one piece of wax paper and an activity sheet to each participant.
2. Have the participants tear a notch at one end of the wax paper (while the wax paper is held lengthwise).
3. Demonstrate each step on the overhead, as the participants do it on their worksheets.
4. Suggest to the participants that they first ask their students if they have ever played on a playground. Ask them if they have ever played on a slide. Ask them if they have ever just turned around, and around, and around. Ask them if they have ever done flips or cartwheels. Tell them that geometric figures can play too. Tell them that when geometric figures move we call it transformational geometry.
5. Steps:
 - a. Place the wax paper lengthwise (in the trainer's case one of the blank transparencies) on top of the worksheet. Trace Triangle A by pressing down with a pen and making an imprint in the wax paper. Carefully slide the imprint to Point B (using Point B as the new uppermost vertex, and being careful to move all of the points the same amount). Trace over the imprint, then remove the wax paper, and fill in this imprint with the pen. You have translated Triangle A to Triangle B. You may want to have the participants write "translate means to slide" on their activity sheets for future reference.
 - b. Have the participants stand beside their chairs. Ask them to plant their right foot firmly down. Instruct them to turn 90 degrees to the right; and then 180 degrees to the left; and 360 degrees to the right, etc. Have the participants sit down. Instruct the participants to place the

notched end of the wax paper at the top of the activity sheet for the next exercise. Next, have them trace Triangle X. Tell them to place their pen firmly down on Point X, while turning the wax paper 90 degrees to the right (clockwise). If they turn the wax paper 90 degrees, the notched end will now be to the right side of the activity sheet. Trace over the imprint of the triangle, remove the wax paper, and fill in the imprint on the activity sheet. The participants have now rotated Triangle X, 90 degrees with respect to, or about, Point X.

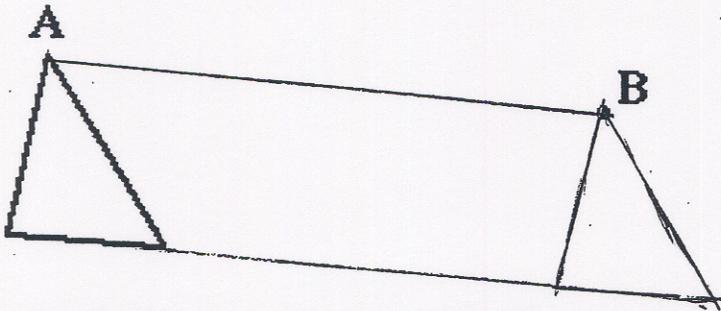
- c. Tell the participants they do not have to rotate a figure about a point that is one of its own points. They can rotate a figure about any point, even if it is way out in space. Instruct them to put their wax paper over the activity sheet, with the notched end at the top of the activity sheet. Trace Triangle Y. Instruct them to rotate it 180 degrees, by placing their pen firmly down on Point Z, and turning only the wax paper, not the activity sheet. The notch will now be at the bottom of the activity sheet. Using their pen trace over the imprint in the wax paper, leaving an imprint in the activity sheet. Remove the wax paper, and fill in the indentation in the activity sheet. They have now rotated Triangle Y 180 degrees about Point Z. You may want them to write "rotate means to turn" on their activity sheet.
- d. Next, tell the participants they are going to reflect, or flip, a geometric shape. Put a large dot anywhere on Line N on the activity sheet. Place the wax paper over the activity sheet, and trace the line N, the dot, and the triangle. Lift the wax paper up, turn the wax paper over, then lay it back on top of the activity sheet, lining up the dot and line. Trace over the triangle, leaving an imprint on the activity sheet. Take the wax paper off, and fill in the imprint. The participants have now reflected the triangle with respect to, or over, Line N. You may want to have them write "reflect means to flip" on the activity sheet.
- e. Next, challenge the participants to reflect Triangle E about Line D by themselves. Move around the room reminding them to start by making a dot somewhere on Line D. After the participants have had ample time, demonstrate this on the overhead projector.

Notes:

1. You may want to pre-tear the pieces of wax paper and pre-cut the notches to save time during the training session.

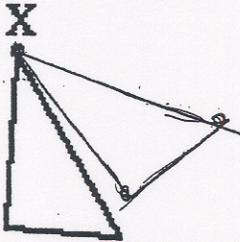
Transformations

1.



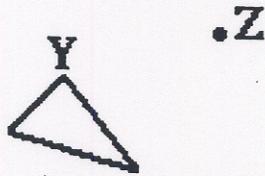
Translate triangle A to point B so that the top vertex of the triangle is point B.

2.



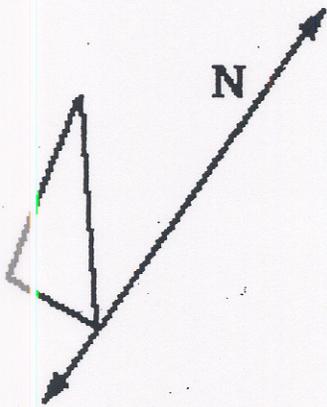
Rotate triangle X about point X.

3.



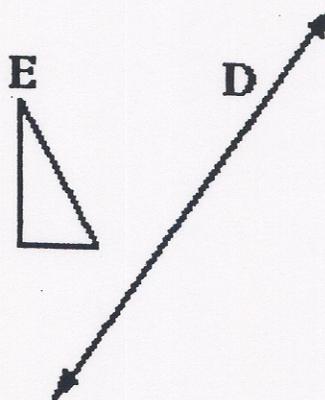
Rotate triangle Y about point Z.

4.



Reflect the triangle over line N.

5.



Reflect triangle E over line D.