Introduction to Transformations

by – Jennifer Wilson

Activity overview

The purpose of this activity is to use the dynamic capabilities of the TI-Nspire to help students make conjectures about transformations.

Concepts

Translations, Reflections, Rotations

Teacher preparation

*The teacher should familiarize himself/herself with the file **Transformations.tns**.*

Classroom management tips

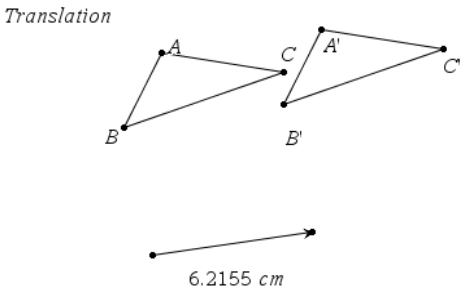
Certainly the teacher could use the student transformations file to have students perform the transformations themselves, but the activity was written with the idea of the teacher using the file to present to the whole class. Be sure to use the student file on the handheld; otherwise they will not be able to view the whole screen.

TI-Nspire Applications

Graphs & Geometry

Step-by-step directions

Problem 1: Translation

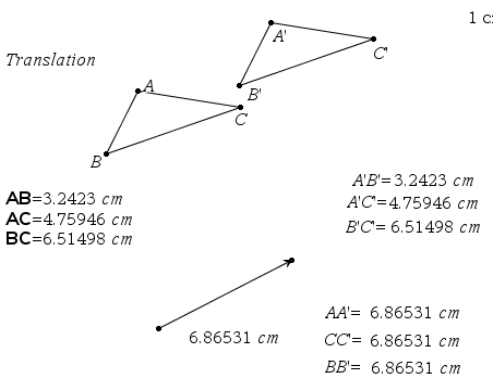


Page 1.1: Ask students what is necessary for a translation (a preimage, and the length and direction for which the preimage is to be translated). You can create a vector on this page by which to translate the triangle (b 6: Points & Lines; 8: Vector, then click to select where you want the initial and terminal points of the vector). Alternately, go to page 1.2 and use the vector that is already drawn.

Have students conjecture where the image will be translated, according to the given length and direction. To perform the translation, select b 10: Constructions; 3: Translation, select the triangle and then select the vector. Press Escape. After students decide how close their conjecture was, move the translation vector by grabbing the initial point, the terminal point, or the vector itself. What happens when the vector moves in the plane, but doesn't change length or direction? What happens when the terminal point is to the left of the initial point in

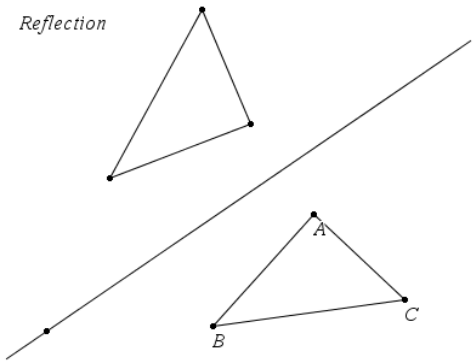
the plane?

Page 1.3: Use this page to have students discover what is true about the image and preimage? What is true about the distance of a preimage point to its image point? Hopefully students will notice that the preimage and image are congruent to each other. Go to b 1: Actions; 2: Hide/Show to reveal measurements that have already been taken (click on each measurement to show it) to speed the process during class, press escape, and then move the translation vector to show that the preimage and image remain congruent, no matter the direction and length of the translation.



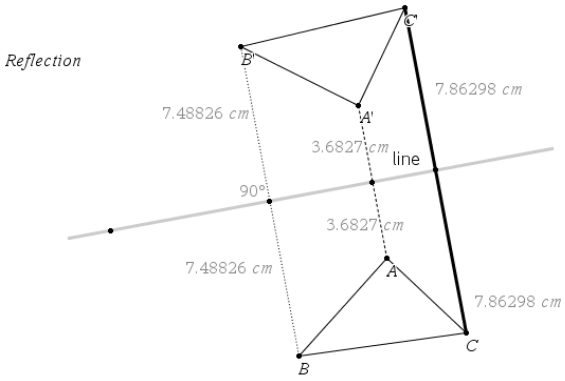
Problem 2: Reflection

Page 2.1: Ask students what is necessary for a reflection (a preimage and a line of reflection). You can create a line of reflection on this page (b 6: Points & Lines; 4: Line, then click to select where you want two of the points of the line). Alternately, go to page 2.2 and use the line that is already drawn.



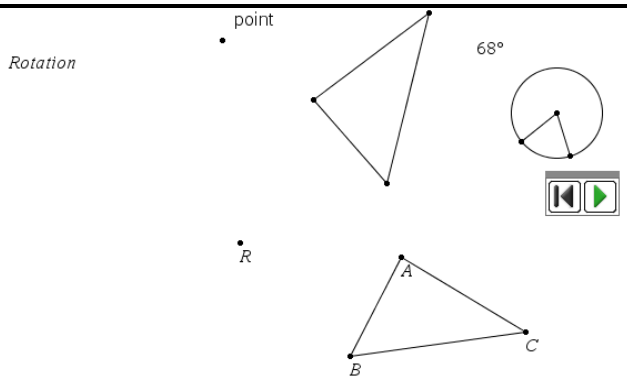
Have students conjecture where the image will be reflected, according to the given line of reflection. To perform the reflection, select b 10: Constructions; 2: Reflection, select the triangle and then select the line. Press Escape. After students decide how close their conjecture was, move the line or reflection and/or the preimage.

Page 2.3: Use this page to have students discover what is true about the image and preimage? What is true about the distance of a preimage point to its image point? Hopefully students will notice that the preimage and image are congruent to each other. Go to b 1: Actions; 2: Hide/Show to reveal measurements that have already been taken (click on each measurement to show it) to speed the process during class, press escape, and then move the line of reflection to show that line of reflection is the perpendicular bisector of each segment connecting a preimage point to its image point.



Problem 3: Rotation

Page 3.1: Ask students what is necessary for a rotation (a preimage, a point about which to rotate, and an angle and direction of rotation). Go to page 3.2 to perform the rotation.



Have students conjecture where the image will be rotated, according to the given point and angle of rotation. To perform the rotation, select b 10: Constructions; 4: Rotation, select the triangle, the point of rotation and the angle measure. Press Escape. After students decide how close their conjecture was, move the point, the preimage, and/or one of the vertices of the central angle on the circle to change the angle of rotation. You can animate one of the vertices of the central angle that is on the circle by clicking on the "Start animation" button.

Page 3.3: Use this page to have students discover what is true about the image and preimage? What is true about the distance from the point of rotation to a preimage point and to its image point? Hopefully students will notice that the distances are congruent to each other. What is true about the angle formed by a preimage point, the point of rotation, and image point? Students should notice that the angle has the same measure as the angle of rotation. Go to b 1: Actions; 2: Hide/Show to reveal measurements that have already been taken (click on each measurement to show it) to speed the process during class, press escape, and then move the point of rotation, the preimage, and/or animate the angle of rotation to show the measurements.