



INVESTIGATION 2

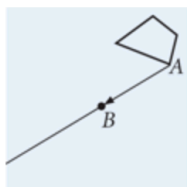
The Basic Properties of a Translation

In this investigation you'll model translation with patty paper and discover important properties of this transformation.



▼ Step 1

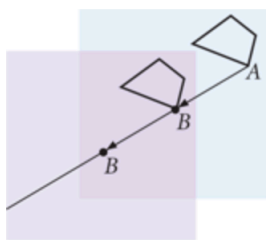
Draw a quadrilateral in one corner of your patty paper. From one of your vertices (label it A), draw a ray to the edge of your patty paper. Place a point B on that ray. The distance from A to B is the translation distance. This distance, together with its direction is called the translation vector \overline{AB} .



Step 1

▼ Step 2

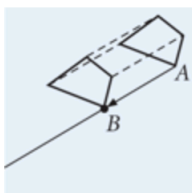
Place a second patty paper on top of the first and make a copy of the quadrilateral, the ray, and the translation vector. Place your copy beneath the original and, using the translation vector as a guide, translate the second copy, keeping the rays aligned until the point A of the quadrilateral copy is over the point B on the original ray. Copy the image of the bottom quadrilateral onto the top patty paper.



Step 2

▼ Step 3

Draw segments connecting each vertex with its image point.



Step 4

Use your patty paper investigation to explain to other members of your group what things are the same in both the original figure and its image. Lengths? Angles? Orientation?

Step 5

In your group discuss which of the following statements are true. If true, demonstrate an example to the other group members. If false, sketch a counterexample. Explain to other group members why your counterexample demonstrates that the statement is false.

- a. If \overline{PQ} is translated creating the image $\overline{P'Q'}$ then $\overline{PQ} \cong \overline{P'Q'}$.
- b. If $\angle R$ is translated creating the image $\angle R'$ then $\angle R \cong \angle R'$.
- c. If polygon S is translated creating the image polygon S' then polygon $S \cong$ polygon S' .
- d. A translation transformation is a rigid transformation or isometry.
- e. If a set of points are collinear, then their translated images are also collinear.
- f. If point N is between A and B , then the translated image of N is between the images of A and B .
- g. If point A is translated by the translation vector \overline{PQ} creating image B , then the image of B translated by the translation vector \overline{QP} is A .
- h. If the clockwise order of the vertices of a quadrilateral $ABCD$ are A , then B , then C , then D , and back to A , then the clockwise order of points of the translated image $A'B'C'D'$ is the same: A' , then B' , then C' , then D' , and back to A' .
- i. Any point and its translated image point are the same distance apart as any other pair of points and corresponding image points.
- j. All the segments connecting a point to its translated image point are parallel.