

TRANSLATION

DEFINITION-WRITING

ACTIVITY

A Hands-On and Cooperative Activity

Protocol

1. There are six translations in total. Within your four-student group, two students perform translations #1–3 and two students perform translations #4–6.
2. Upon completion, compare your translations with other members of your group.
3. Scaffolds and supports were included in the last two definition-writing activities to help you build momentum and confidence. They have been removed from this activity. Part 2 asks that you brainstorm individually for a few minutes, record your ideas, and then collaborate on writing a precise definition of “Translation.”
4. When you settle upon the final version of your definition, please write it on chart paper and be prepared to defend it.

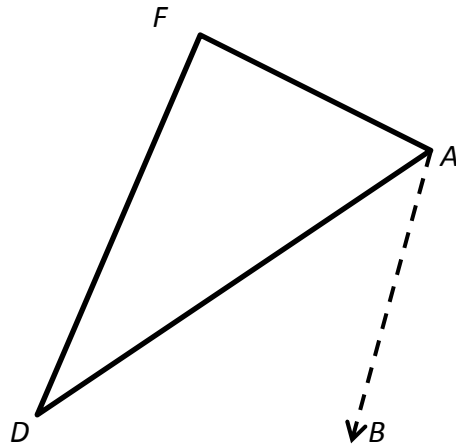
Translations Along a Vector.

Part 1. Exercises

#1. Vector v is defined by \overrightarrow{AB} .

Translate $\triangle FAD$ along \vec{v} .

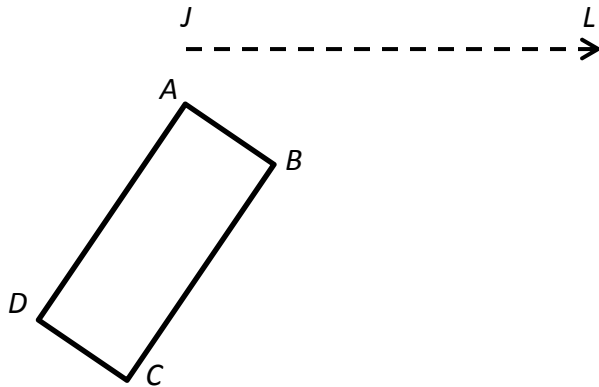
Then explain to your table partners how you translated the triangle.



#2. Vector v is defined by \overrightarrow{JL} .

Translate rectangle $ABCD$ along \vec{v} .

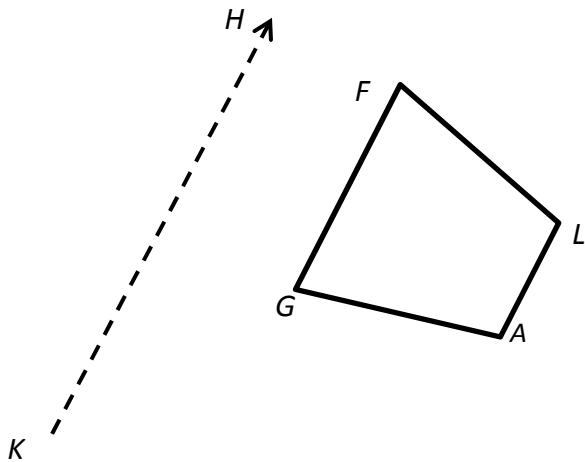
Then explain to your table partners how you translated the rectangle.



#3. Vector v is defined by \overrightarrow{KH} .

Translate trapezoid $FLAG$ along \vec{v} .

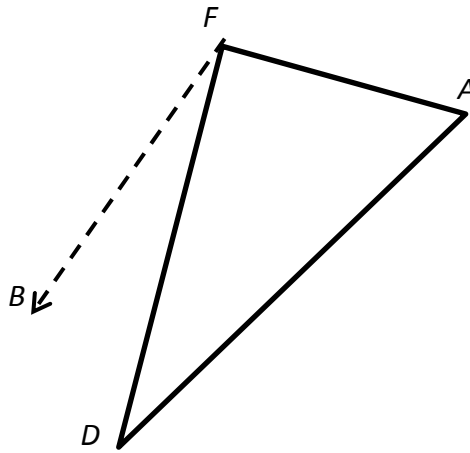
Then explain to your table partners how you translated the trapezoid.



#4. Vector v is defined by \overrightarrow{FB} .

Translate $\triangle FAD$ along \vec{v} .

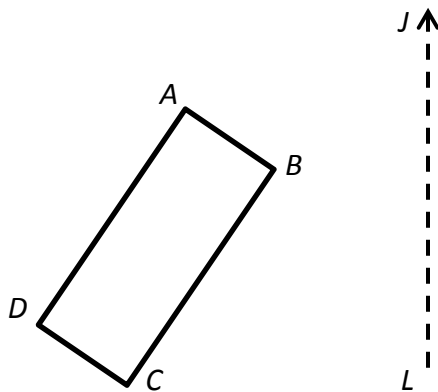
Then explain to your table partners how you translated the triangle.



#5. Vector v is defined by \overrightarrow{LJ} .

Translate rectangle $ABCD$ along \vec{v} .

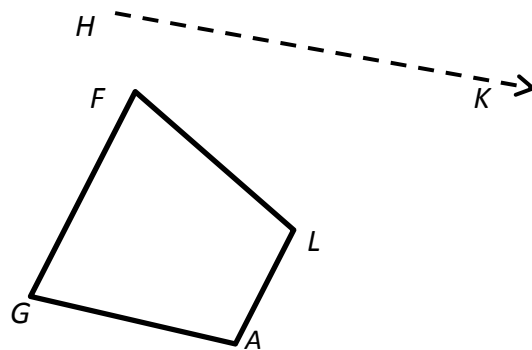
Then explain to your table partners how you translated the rectangle.



#6. Vector v is defined by \overrightarrow{HK} .

Translate trapezoid $FLAG$ along \vec{v} .

Then explain to your table partners how you translated the trapezoid.



Translations Along a Vector

Part 2. Write a Precise Definition of Translation

**A thorough definition will include references to

- Translating a point that does not lie on the vector
- Translating a point that does lie on the vector
- Translating a point along the zero vector
- Parallel lines
- Congruent segments

The Target Definition

The translation T along a given vector \vec{v} assigns the point D to a given point C .

Let the starting point and endpoint of \vec{v} be A and B , respectively. Assume C does not lie on \overleftrightarrow{AB} . Draw the line l parallel to \overleftrightarrow{AB} passing through C .* The line passing through B and parallel to \overleftrightarrow{AC} then intersects line l at a point D ; we call the line \overleftrightarrow{BD} .**

By definition, T assigns the point D to C ; that is, $T(C) = D$.

If C lies on \overleftrightarrow{AB} , then the image D is by definition the point on \overleftrightarrow{AB} such that the direction from C to D is the same direction as from A to B such that $|CD| = |AB|$.

If the vector \vec{v} is $\vec{0}$, the zero vector (i.e., the vector with zero length), then the translation along $\vec{0}$ is the identity transformation I .

Teacher to Teacher

A Note about the Translation Definition—Writing Activity

This activity introduces another way of describing a translation, that is, by describing the vector along which the figure must be translated (this is the same as translating the figure vertically and then horizontally). Learners should note that the line joining a point and its image under the translation is parallel to the translation vector. So each point is translated along a line parallel and congruent to the translation vector. This approach to describing a translation is used in the software Sketchpad. Co-ordinates can also be used to explore this further.

<http://academic.sun.ac.za/mathed/malati/Sec02.pdf>