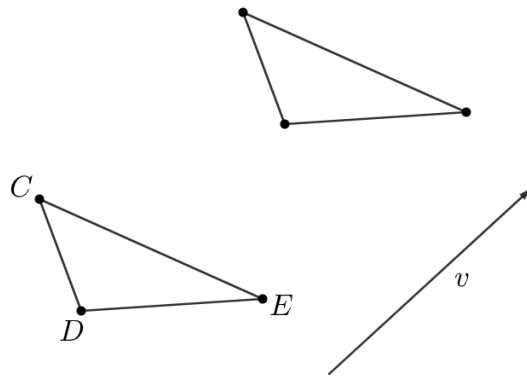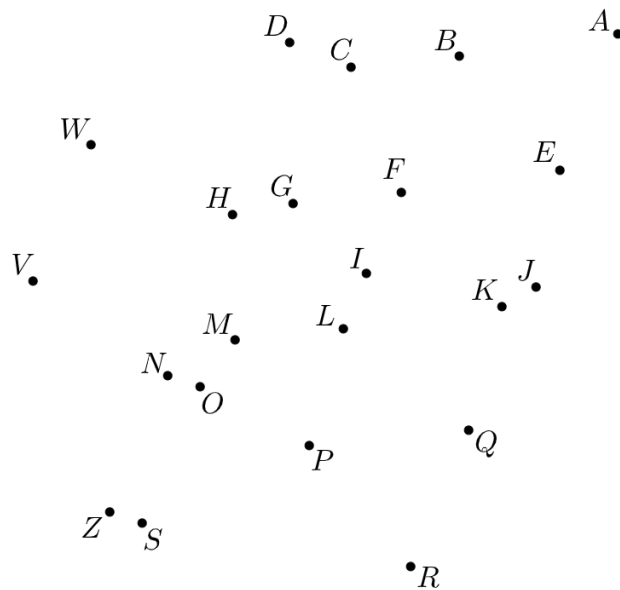# Lesson 1.09
Translations

Geometry GT

Analyze

What do you notice? What do you wonder?

Explore

A. After a translation, the image of V is W. Find at least 3 other points that are taken to a labeled point by that translation.
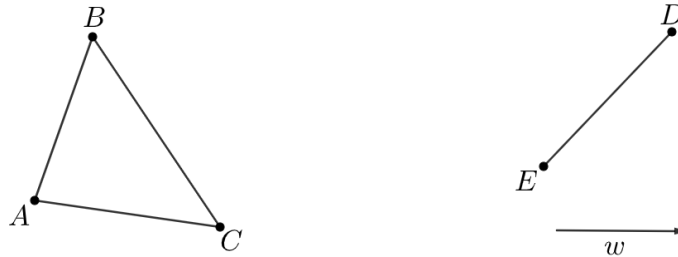
B. Write at least 1 conjecture about translations.

C. In a new translation, the image of V is Z. Find at least 3 other points that are taken to a labeled point by that translation.

D. Are your conjectures still true for the new translation?

Definition

Directed line segment: a line segment with a direction to it; conveys the direction and distance that each point is translated

Discuss

Translate $\triangle ABC$ by the directed line segment from A to C.

    A. What is the relationship between $\overleftrightarrow{BC}$ and $\overleftrightarrow{B'C'}$? Explain your reasoning.

    B. How does the length of $\overline{BC}$ compare to the length of $\overline{B'C'}$? Explain your reasoning.

Translate $\overline{DE}$ by the directed line segment w. Label the new endpoints D' and E'.

    A. Connect D to D' and E to E'.

    B. What kind of shape did you draw? What properties does it have? Explain your reasoning.

Definition

Translation: a rigid transformation that takes a point to another point so that the directed line segment from the original point to the image is parallel to the given line segment and has the same length and direction
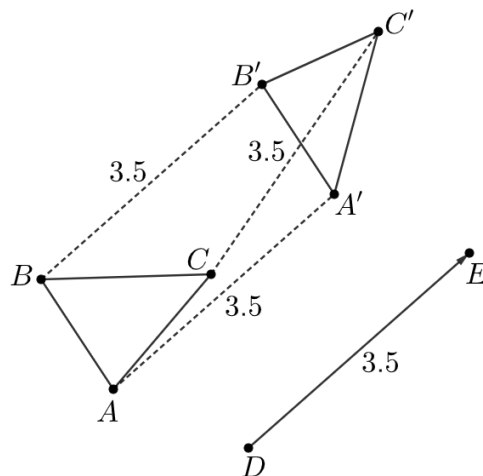
Assertion

Parallel Postulate: given a line and a point not on the line, there is exactly one line that goes through the point that is parallel to the given line

Theorem

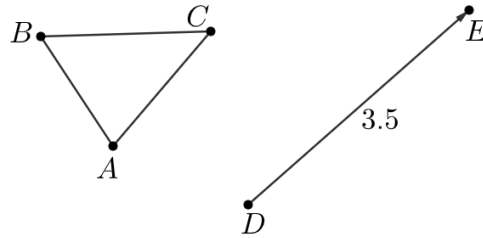Translations take lines to parallel lines or to themselves

Demonstrate

Noel tried to translate ΔABC by the directed line segment from D to E. He knows something went wrong because the image isn't congruent to the original figure.

    A. What is one idea that Noel does not understand about translations?
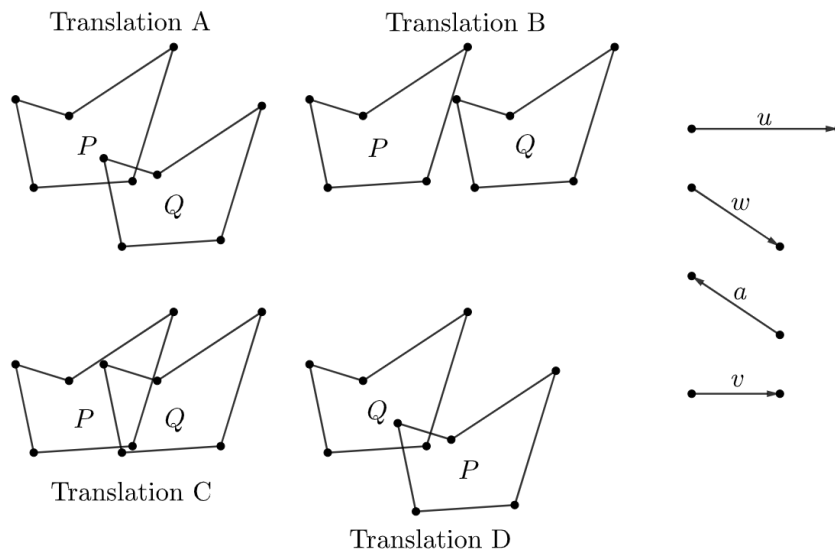
B. Translate ΔABC correctly.
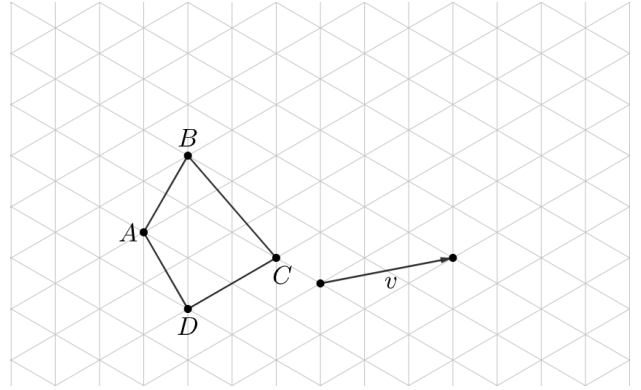
Practice

1. Which statement is true about a translation?

    A. A translation takes a line to a parallel line or itself

    B. A translation takes a line to a perpendicular line

    C. A translation requires a center of translation

    D. A translation requires a line of translation

2. Match the directed line segment with the image of Polygon P being transformed to Polygon Q by translation by that directed line segment.

Translation A   Translation B

Translation C

Translation D

3. Draw the image of quadrilateral $ABCD$ when translated by the directed line segment v. Label the image of A as A', the image of B as B', the image of C as C', and the image of D as D'.

4. Highlight **all** the points that stay in the same location after being reflected across line l.