

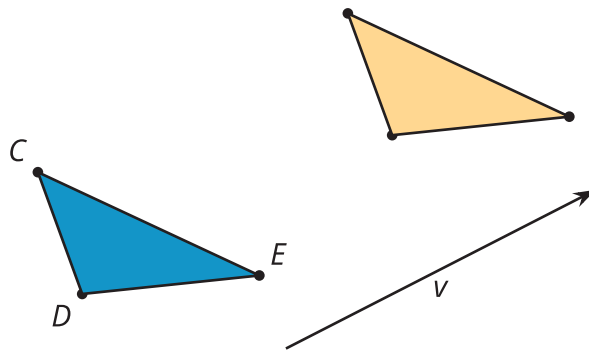


Defining Translations

Let's translate some figures.

12.1 Notice and Wonder: Two Triangles and an Arrow

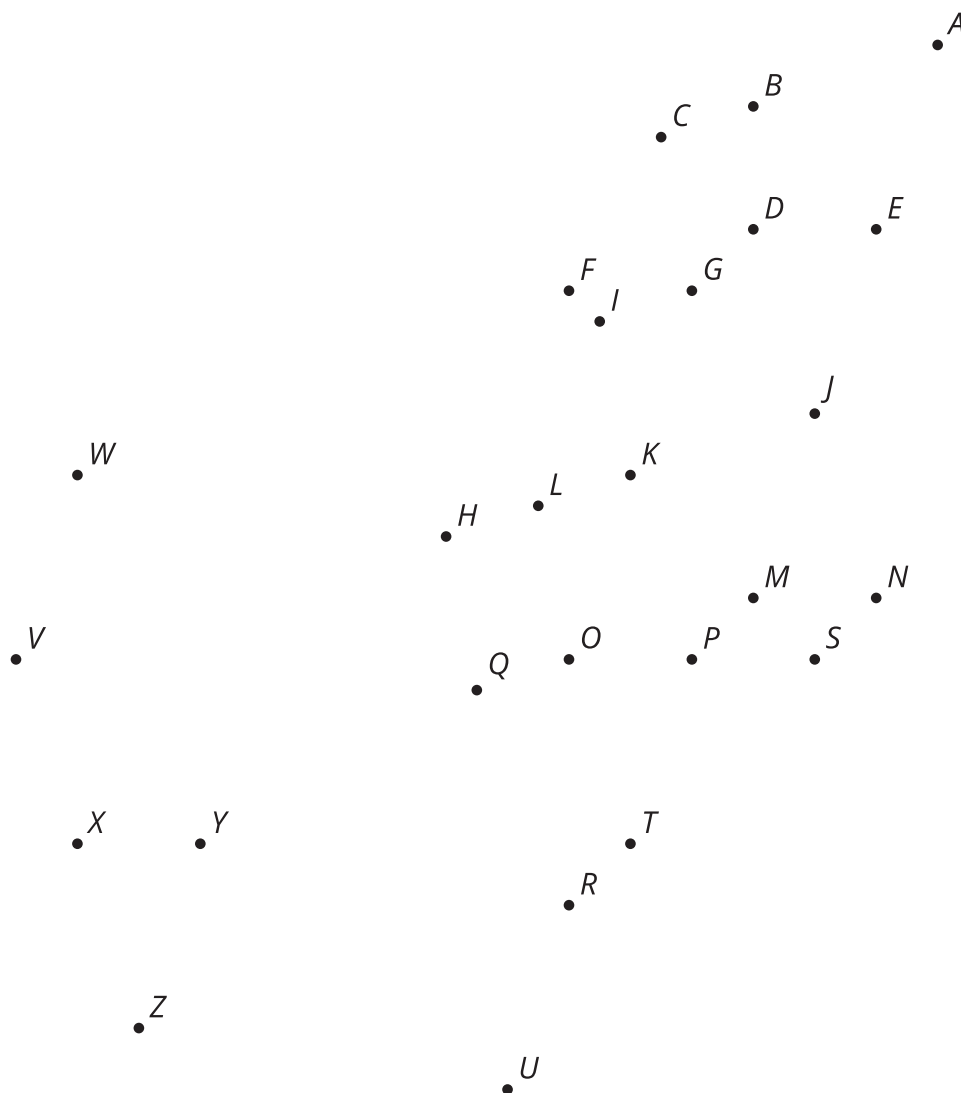
What do you notice? What do you wonder?



12.2

What's the Point: Translations

1. After a translation, the image of V is W . Find at least 3 other points that are taken to a labeled point by this same translation.
2. Write at least 1 conjecture about translations.
3. In a new translation, the image of V is Z . Find at least 3 other points that are taken to a labeled point by the new translation.
4. Are your conjectures still true for the new translation?



12.3 Translating Triangles



1. Translate triangle ABC by the **directed line segment** from A to C .
 - a. What is the relationship between line BC and line $B'C'$? Explain your reasoning.
 - b. How does the length of segment BC compare to the length of segment $B'C'$? Explain your reasoning.

2. Translate segment DE by 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.

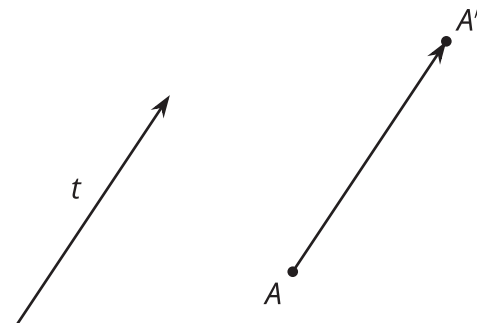
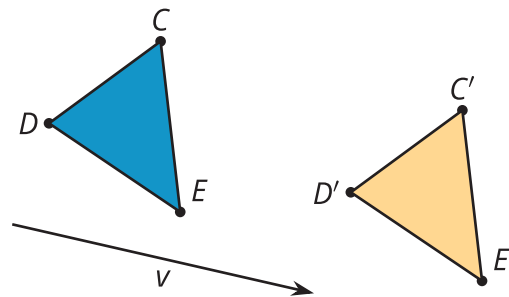
Are you ready for more?

1. On triangle ABC in the task, use a straightedge and compass to construct the line which passes through A and is perpendicular to AC . Label it ℓ . Then construct the perpendicular bisector of AC and label it m . Draw the reflection of ABC across the line ℓ . Since the label $A'B'C'$ is used already, label it DEF instead.
2. What is the reflection of DEF across the line m ?
3. Explain why this is cool. What does it tell you about translations?

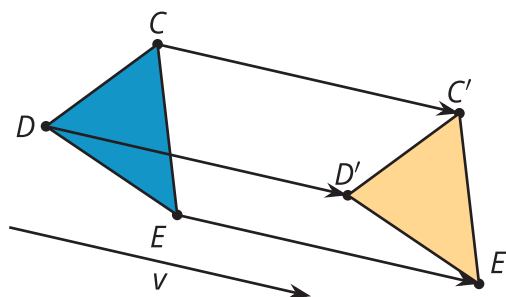
Lesson 12 Summary

A translation slides a figure a given distance in a given direction with no rotation. The distance and direction are given by a **directed line segment**. The arrow of the directed line segment specifies the direction of the translation, and the length of the directed line segment specifies how far the figure gets translated.

More precisely, a **translation** of a point A by a directed line segment t is a transformation that takes A to A' so that the directed line segment AA' is parallel to t , goes in the same direction as t , and is the same length as t .



Here is a translation of 3 points. Notice that the directed line segments CC' , DD' , and EE' are each parallel to v , go in the same direction as v , and are the same length as v .



Also notice that segment CD is parallel to segment $C'D'$. We proved that this would always be true, so we can write a theorem that says translations take lines to parallel lines or to themselves. A **theorem** is a statement that has been proved mathematically.