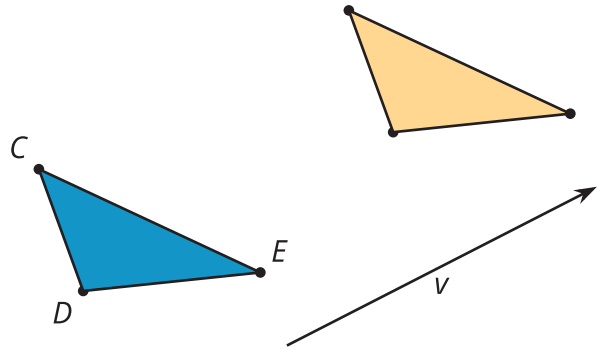
Unit 1, Lesson 12

Defining Translations

Let's translate some figures.

12.1 Notice and Wonder: Two Triangles and an Arrow

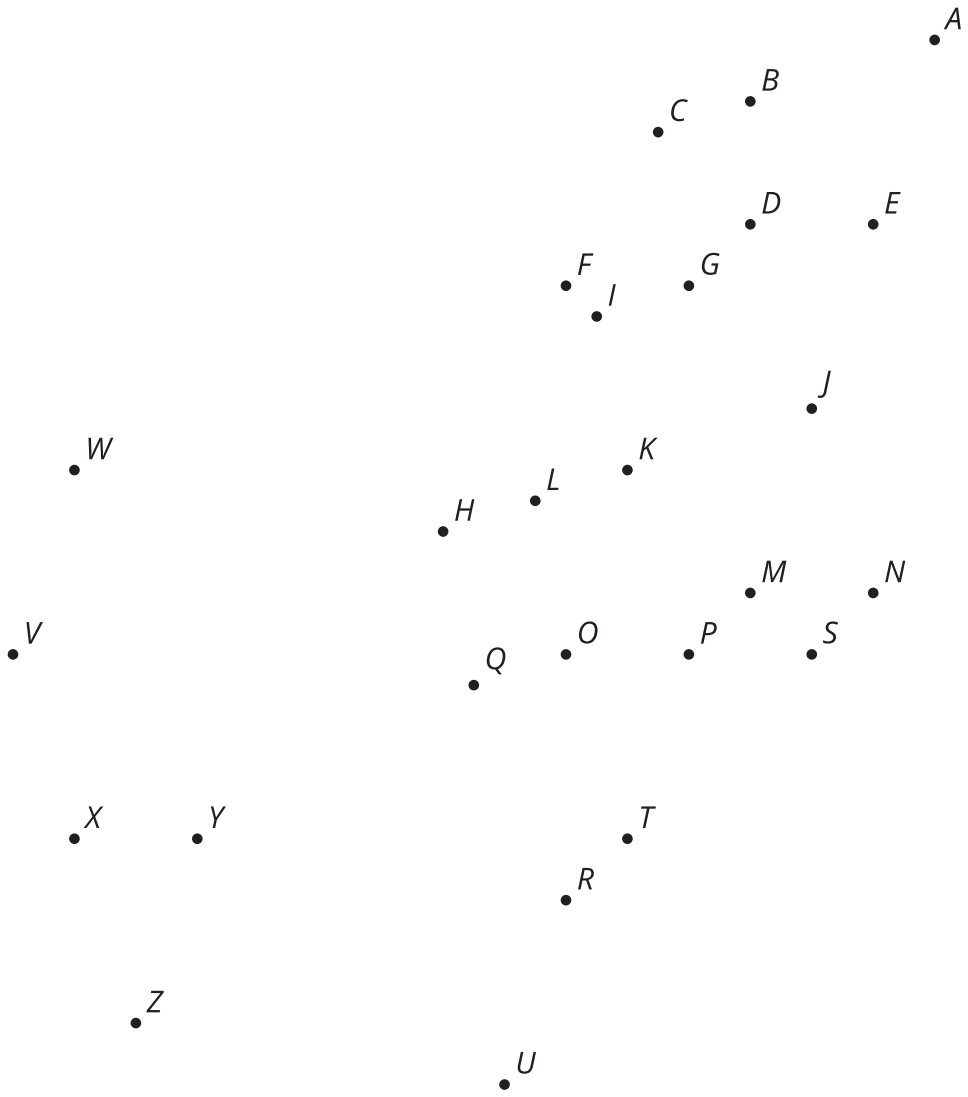
What do you notice? What do you wonder?



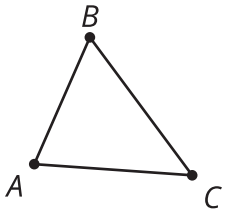
12.2 What's the Point: Translations

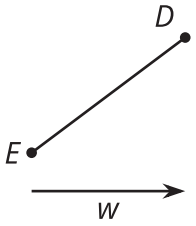
1. After a translation, the image of V is W. Find at least 3 other points that are taken to a labeled point by this same translation.
2. Write at least 1 conjecture about translations.

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.

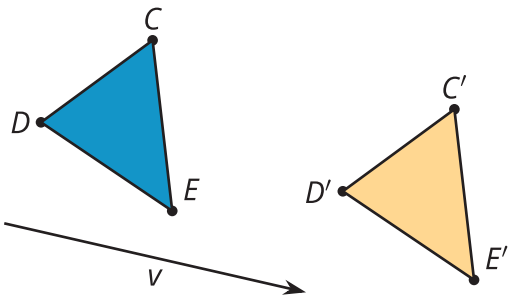
2. Translate segment DE by directed line segment w. Label the new endpoints D' and E'.
   a. Connect D to D' and E to E'.
   b. What kind of shape did you draw? What properties does it have? Explain your reasoning.

Are you ready for more?

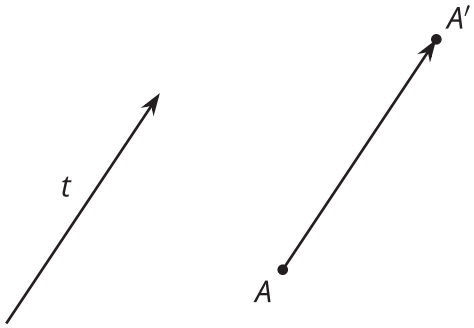
1. On triangle ABC in the task, use a straightedge and compass to construct the line which passes through A and is perpendicular to AC. Label it ℓ. Then construct the perpendicular bisector of AC and label it m. Draw the reflection of ABC across the line ℓ. Since the label $A'B'C'$ is used already, label 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

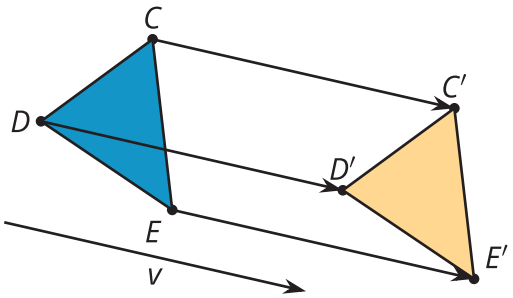
A translation slides a figure a given distance in a given direction with no rotation. The distance and direction are given by a **directed line segment**. The arrow of the directed line segment specifies the direction of the translation, and the length of the directed line segment specifies how far the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