## 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 that 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 $C$.
	1. What is the relationship between line $BC$ and line $B^{′}C^{′}$? Explain your reasoning.
	2. 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 $E^{′}$.
	1. Connect $D$ to $D^{′}$ and $E$ to $E^{′}$.
	2. 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.

### Lesson 12 Summary

A translation slides a figure in a given direction for a given distance with no rotation. The distance and direction is 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 $A$ along 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 $v$, going in the same direction as $v$, and the same length as $v$.





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