**Activity 1.5.2 Composition – Two Reflections II**

**Construction Steps**

1. Open a new GeoGebra file and set labeling to New Points Only.

**Hint: (Options/Labeling/New Points Only)**

|  |  |
| --- | --- |
| 1. Hide the algebra window and the axes.
 | **Macintosh HD:Users:phubeny:Desktop:Screen Shot 2015-03-14 at 6.56.26 AM.png** |
| 1. Use the **Polygon** tool and click on the graphics window to create $∆ABC$

**Hint:(Create Point A, then B, then C, then back to A)** |  |
| 1. Use the **Line** tool (select two points) and click on the graphics window to the right of $∆ABC$ to create $\overleftrightarrow{DE}$.
 |  |
| 1. Use the **Point** tool and click to the right of $\overleftrightarrow{DE}$ to create F.
 |  |
| 1. Again, use the **Line** (select two points) tool and click on point E and the graphics window to create $\overleftrightarrow{EF}$.

$\overleftrightarrow{DE}$ and $\overleftrightarrow{EF}$ are the intersecting lines you will reflect $∆ABC$ over. |  |
| 1. Use the **Reflect about Line** tool and click on $∆ABC$ and $\overleftrightarrow{DE}$ to create $∆A'B'C'$.
2. Use the **Reflect about Line** about line tool and click on $∆A'B'C'$ and $\overleftrightarrow{EF}$to create $∆A''B''C''$.
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**Exploration Steps and Comprehension Questions**

In the previous activity you found that reflecting a figure over intersecting lines yields the same result as a rotation about the intersection point. Using GeoGebra you will experiment rotating $∆ABC$ to understand this concept in more depth.

1. Using the **Segment** tool, connect point E to a pair of corresponding vertices on the original figure ($∆ABC$) and the final image ($∆A''B''C''$).
2. ****Using the **Angle** tool, measure and record the following:
* the acute angle formed by connecting point E to a pair of corresponding vertices from the pre-image and final image
* the acute angle $∠DEF$ formed by the intersecting reflection lines $\overleftrightarrow{DE}$ and $\overleftrightarrow{EF}$.

**Record Angle Measurements Here:**

1. Measure of angle formed by vertices pre-image and the final image: \_\_\_\_\_\_\_\_\_\_\_\_

1. Measure of angle formed by intersecting lines: \_\_\_\_\_\_\_\_\_\_\_\_

**(An example of a possible scenario is shown below)**

1. What do you notice about the measure of the angle formed by the intersecting reflection lines $\overleftrightarrow{DE}$ and $\overleftrightarrow{EF}$ and the angle formed by connecting point E pair of corresponding vertices from the pre-image and the final image (the angle measured in part b).

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1. Using the **Rotate around Point** tool**,** rotate $∆ABC$ clockwise about point *E* (intersection point of $\overleftrightarrow{DE}$ and $\overleftrightarrow{EF}$)) by the degree equal to the angle formed by connecting point E pair of corresponding vertices from the pre-image and the final image (the angle measured in part b).
2. **Comment on any relationship you observe between:**
* The location of $∆ABC$ **rotated** about point E (the intersection of reflection lines $\overleftrightarrow{DE}$ and $\overleftrightarrow{EF}$) by the degree equal to the angle formed by connecting point E pair of corresponding vertices from the pre-image and the final image (the angle measured in part b).

AND

* The location of $∆ABC$ as a result of **reflecting** it over intersecting lines $\overleftrightarrow{DE}$ and $\overleftrightarrow{EF}$
1. What do you notice about the measure of the angle formed by the intersecting reflection lines $\overleftrightarrow{DE}$ and $\overleftrightarrow{EF}$ and the rotation that maps $∆ABC$ directly onto $∆A''B''C''$.