Defining Similarity (5.3.1)

March 14th, 2019

Similar Figures

- Have the same shape, but different sizes and position.

- Have corresponding angles that are congruent.

- Have corresponding side lengths that are proportional, or have a constant ratio (called the ratio of similitude or scale factor).

- $\triangle ABC \sim \triangle DEF$ means “triangle ABC is similar to triangle DEF.

$\triangle ABC \sim \triangle DEF$

since

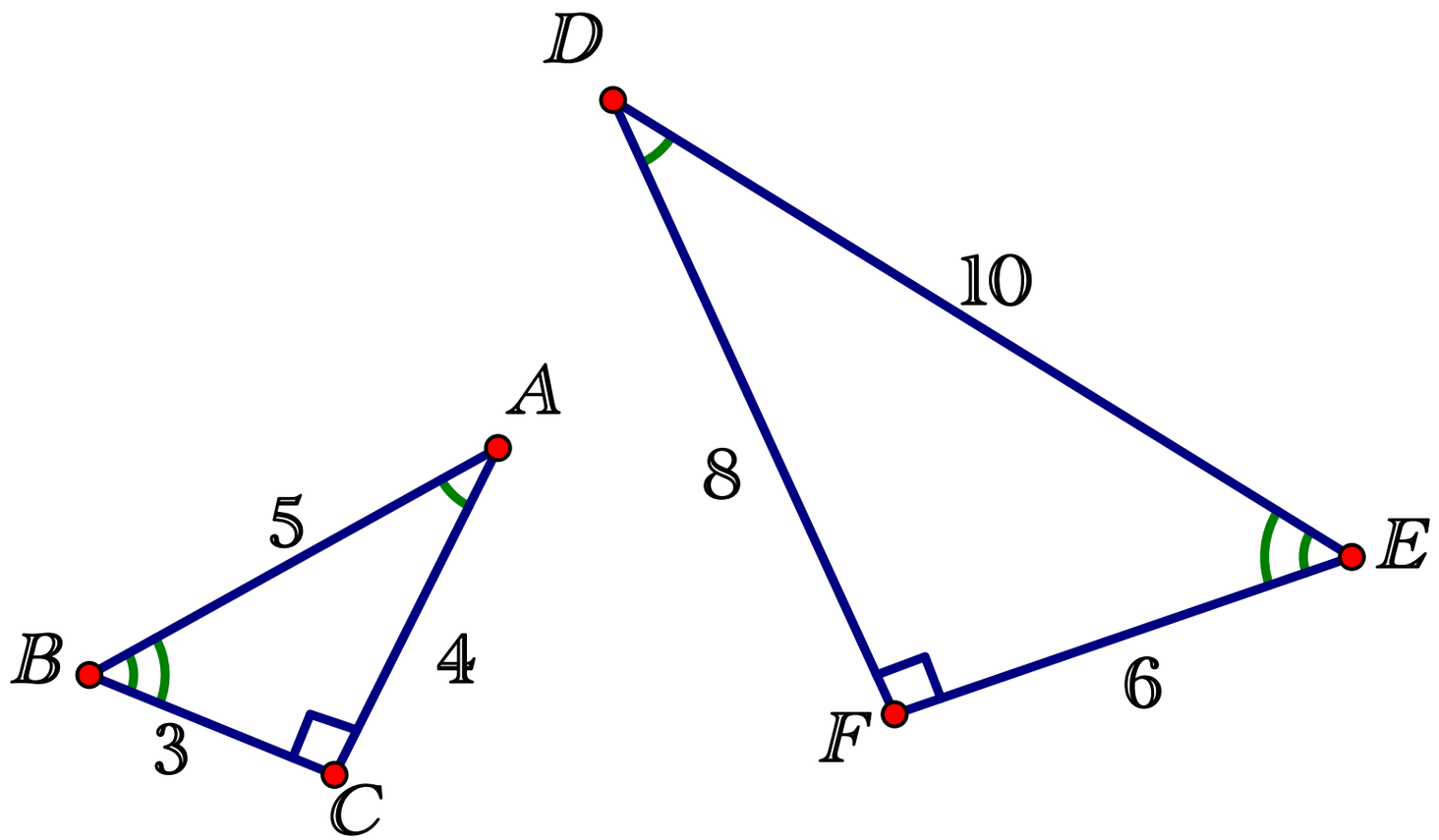
$\angle A \cong \angle D$

$\angle B \cong \angle E$

$\angle C \cong \angle F$

and

$$\frac{DE}{AB} = \frac{EF}{BC} = \frac{DF}{AC} = 2$$

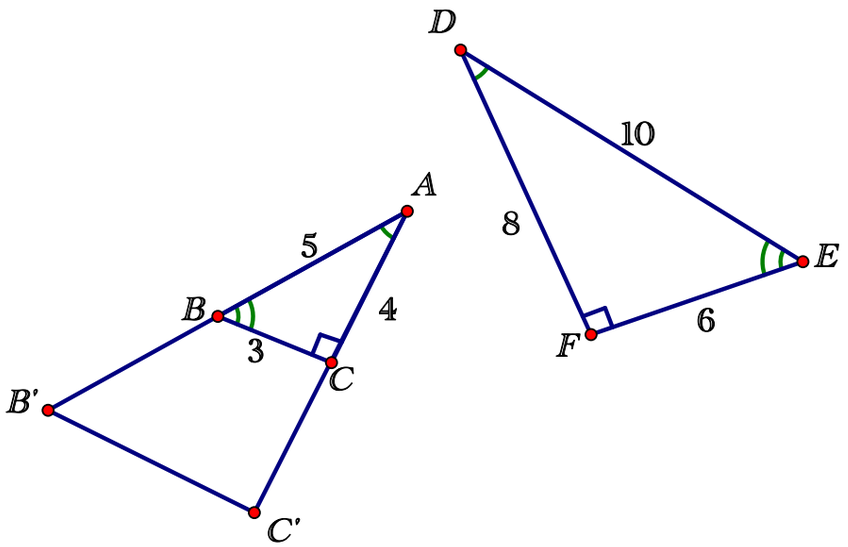


Similarity Transformations

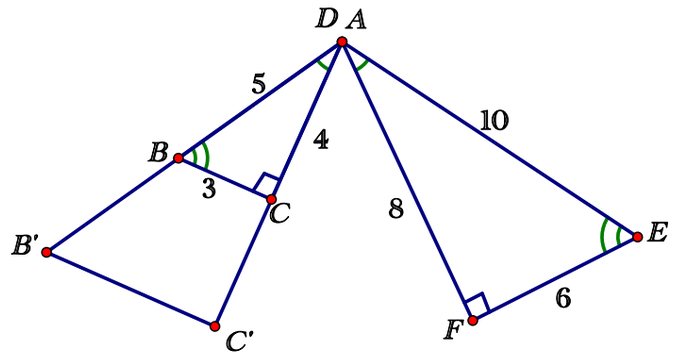
- The combination of a rigid motion (reflection, rotation, or translation) with a dilation is called a <u>similarity transformation.</u>

- You can prove two figures are similar by finding a similarity transformation that maps one figure onto the other.

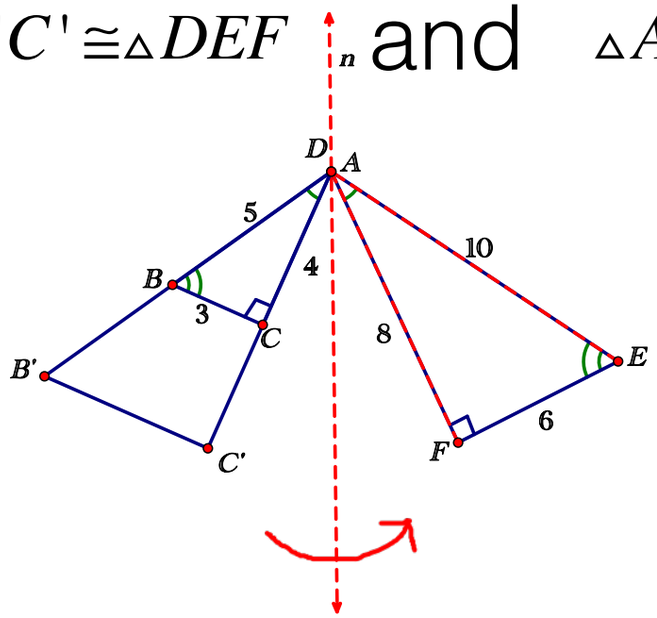
1) Start with a dilation of $\triangle ABC$ with center A and scale factor 2. Since dilations preserve angle measure, $\triangle ABC \sim \triangle AB'C'$



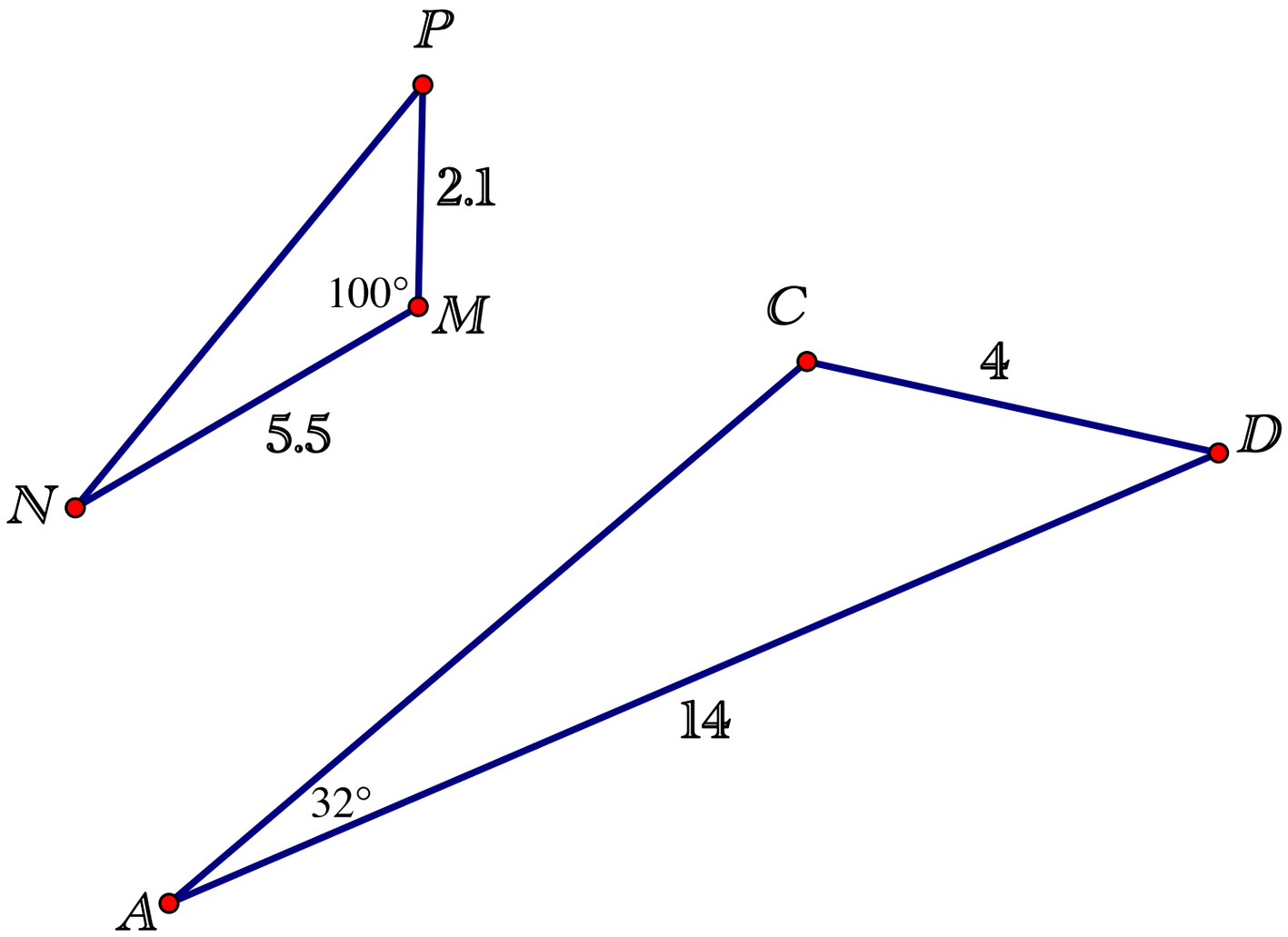
2) Then translate point D onto point A.



Finally, reflect $\triangle AB'C'$ over line n to map onto $\triangle DEF$. Since translations and reflections preserve angle measure and side length, $\triangle AB'C' \cong \triangle DEF$ and $\triangle ABC \sim \triangle DEF$



Ex. 1: Find the angle measures and side lengths for each triangle, given that $\triangle NMP \sim \triangle ACD$



*To see if two triangles are similar, first investigate if the corresponding angle measures are congruent. If they are, check to see if you can use a similarity transformation to map one triangle onto the other.

Ex. 2: Determine if the two given triangles are similar. Use the definition of similarity in terms of similarity transformations to explain your answer.

$$\triangle ABC \rightarrow A(-4,2), B(3,1), C(-1,4)$$

$$\triangle DEF \rightarrow D(-3,-5), E(11,-3), F(3,-9)$$

Ex. 3: Determine if the two given triangles are similar. Use the definition of similarity in terms of similarity transformations to explain your answer.

$$\triangle ABC \rightarrow A(4,-1), B(3,-8), C(-3,-2)$$

$$\triangle DEF \rightarrow D(-3,7), E(1,4), F(-6,3)$$