Module 11a: Rigid Motion Transformations & Similarity

Math Practice(s):
   -Model with mathematics.
   -Look for & make use of structure.

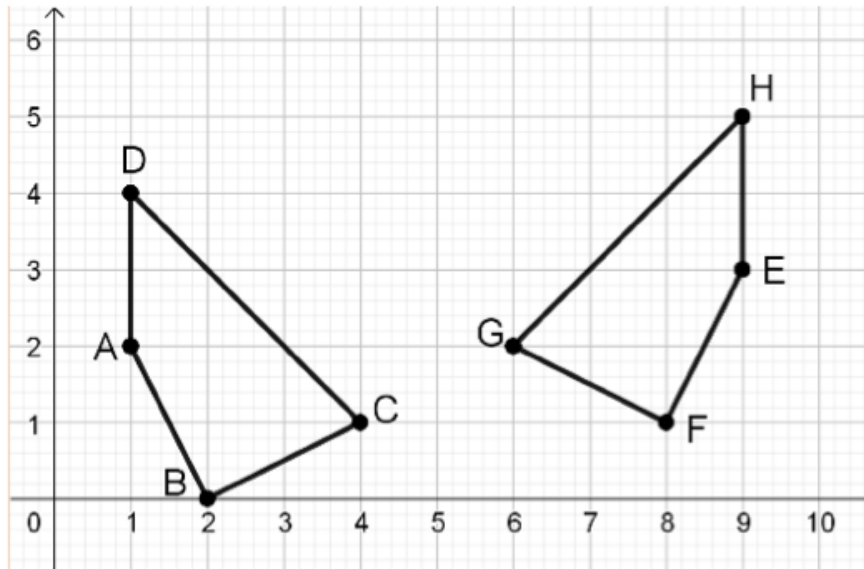**Learning Target(s):**
   - Define similarity in terms of similarity transformations.

Homework:
   HW#8: 11a #1-2

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Warm-up

1. Consider quadrilaterals *ABCD* onto *EFGH* that are shown in the coordinate plane below.

   A. Define a translation T that maps point C to point G: $T(x, y) = ($ X+2 , Y+1 $)$

   B. Demonstrate that figure *ABCD* ≅ *EFGH* by defining a rigid motion transformation that begins with T (i.e., your answer for 1A above) and maps *ABCD* onto *EFGH*.

   $T(x,y) = (x+2, y+1)$
   Reflect over x=6

   C. Define a translation, S, that maps point A to point E: $S(x, y) = ($ X+8 , Y+1 $)$

   D. Demonstrate that figure *ABCD* ≅ *EFGH* by defining a rigid motion transformation that begins with S (i.e., your answer for 1C above) and maps *ABCD* onto *EFGH*.
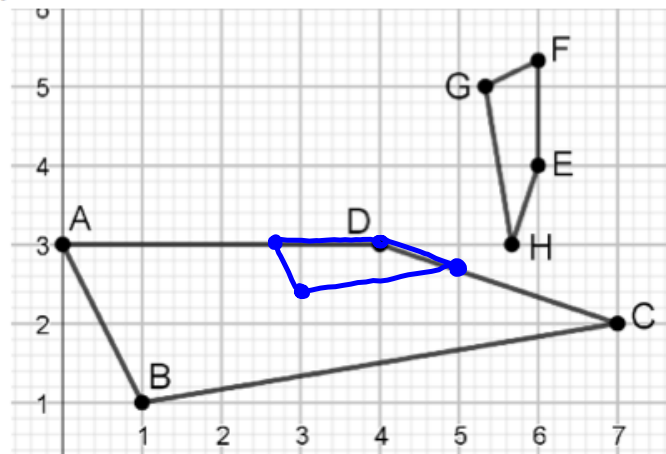
   $S(x,y) = (x+8, y+1)$
   Reflect over x=9.

Example 1: The two quadrilaterals shown in the coordinate plane below are similar

    A. Which of the following similarity statements is true?

- MABCD ~ EFGH

- MABCD ~ EHGF

- MABCD ~ FGHE   (circled)

B. Discuss with a partner how rigid motion transformations could be used to map E onto D. Write down the ideas that you discussed.

$$T(x,y) = (x-2, y-1)$$

Rotate 90° counterclockwise about (4,3)

C. Does quadrilateral ABCD seem to be a dilation of quadrilateral FGHE? If so, what is the scale factor.

The scale factor seems to be about 3.

    A **SIMILARITY TRANSFORMATION** is a rigid motion transformation <u>followed</u> by a <u>dilation</u> about a point.

- Object A in a plane is said to be *similar* to object B if and only if there is a **similarity transformation** that maps A onto B.

Example 2: The two triangles in the coordinate plane below are similar. Define a similarity transformation that maps ΔNOP onto ΔQRS.

$T(x,y)=(x+8,y+1)$
Reflect over $x=9$
Dilate about
 $(9,1)$ with a
 scale factor
 of $\frac{3}{2}$.
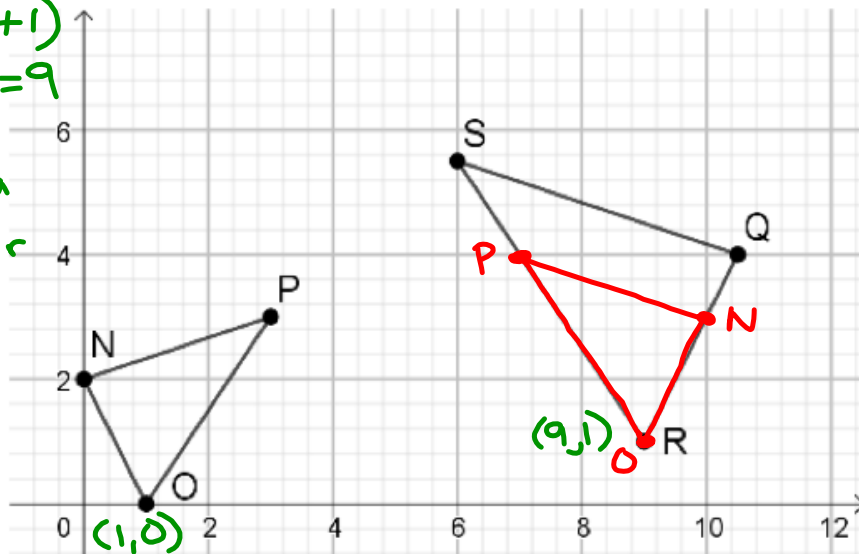
Example 3: Use transformations to determine if ABCD is similar to FGHE. If they are similar, define a similarity transformation that maps ABCD onto FGHE. If they are not similar explain why not.

$D \Rightarrow E$
$T(x,y)=(x+2,y+1)$
Rotate 90° cw
 about $(6,4)$
Dilate about $(6,4)$
 w/ scale factor of $\frac{1}{3}$
$m_{AB}=\frac{1}{2}$ $m_{FG}=\frac{2}{5}$
ABCD is not
similar to FGHE
because the slopes
of corresponding segments are not all the same,
which means corresponding angles are not congruent

Jan 29-12:14 PM

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