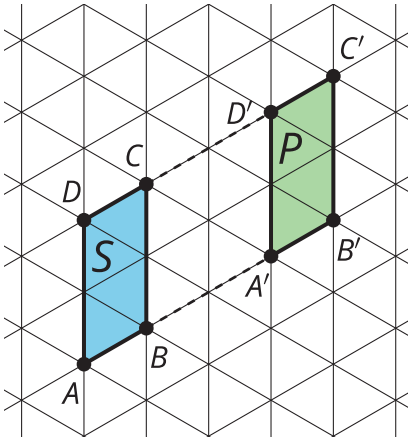
Rigid Transformations

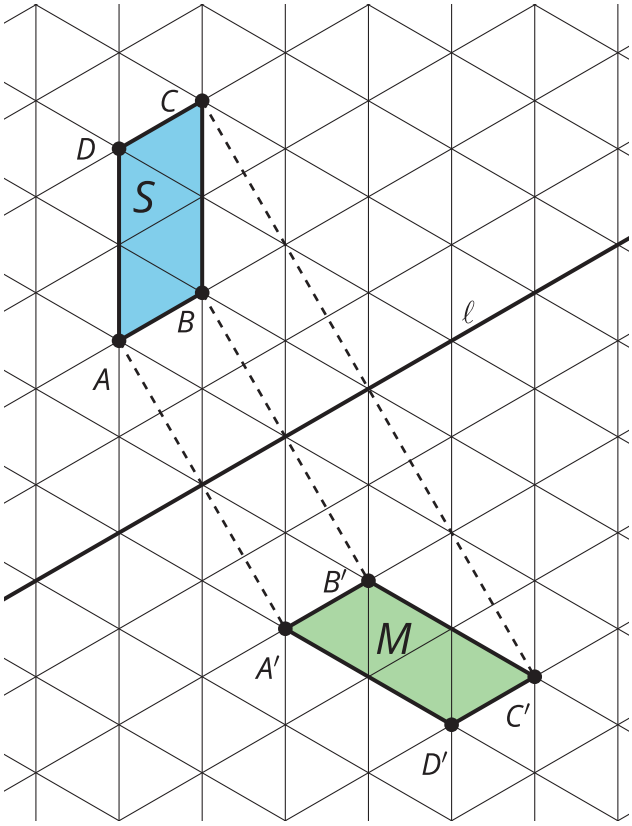
Let's draw some transformations.

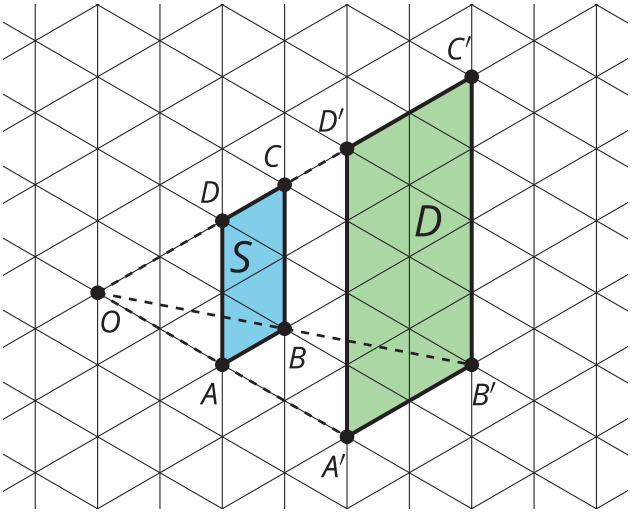
10.1 Transformed

Use the images to complete each statement.

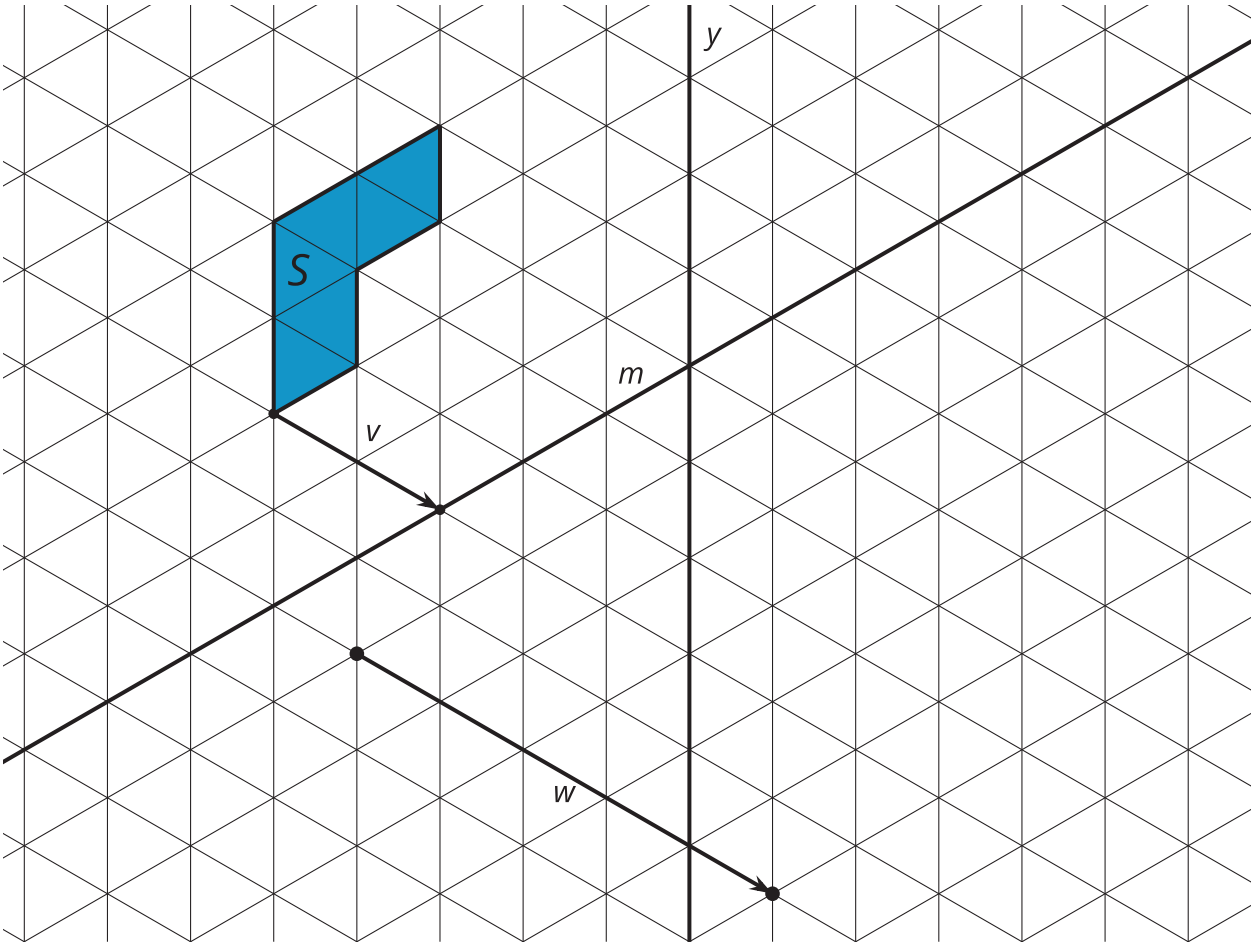


1. Figure S is reflected over line _____ to create Figure _____.
2. Figure S is translated _____ units to create Figure _____.
3. Figure S is dilated by a scale factor of _____ to create Figure _____.





10.2 What's the Same?



Draw each **rigid transformation** in a different color.

1. Translate Figure S along the line segment v in the direction shown by the arrow. Color: _____
2. Reflect Figure S across line y. Color: _____
3. Reflect Figure S across line m. Color: _____
4. Translate Figure S along the directed line segment w in the direction shown by the arrow. Reflect this **image** across line y. Color: _____
5. How are the images the same? How are they different?

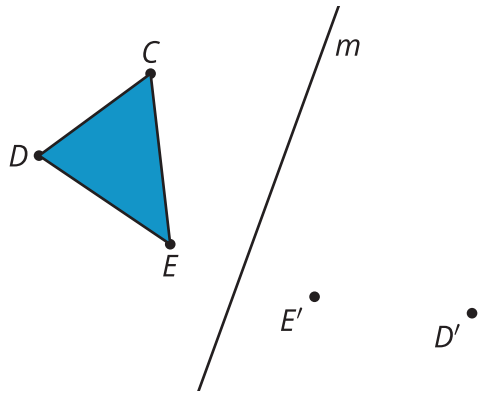
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10.3 Triangle in the Mirror

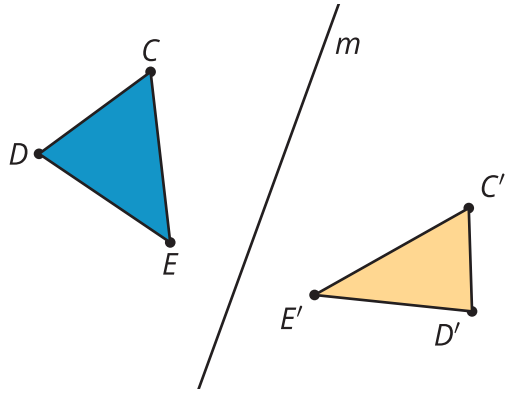
Kiran started reflecting triangle CDE across line m. So far, he knows that the image of D is D' and the image of E is E'.

1. Annotate Kiran's diagram to show how he reflected point D.
2. Use straightedge and compass moves to determine the location of C'. Then lightly shade in triangle $C'D'E'$.
3. Write a set of instructions for how to reflect any point P across a given line ℓ.

Kiran's Diagram



Elena's Diagram



4. Elena found C' incorrectly. Elena is convinced that triangle $C'D'E'$ "looks fine." Explain to Elena why her C' is not a reflection of point C across line m.

Are you ready for more?

1. Using your response from the second question (with the correct location of C'):
   a. Draw the line CC'.
   b. Reflect triangle $C'D'E'$ across line CC'.
   c. Label the image $C''D''E''$.
2. Find a single rigid motion that takes CDE to $C''D''E''$.

Lesson 10 Summary

Two figures are **congruent** if there is a sequence of translations, rotations, and reflections that takes one figure onto the other. This is because translations, rotations, and reflections are rigid motions. Any sequence of rigid motions is called a **rigid transformation**. A rigid transformation is a transformation that doesn't change measurements on any figure. With a rigid transformation, figures like polygons have corresponding sides of the same length and corresponding angles of the same measure. The fact that rigid transformations always take lines to lines, angles to angles of the same measure, and segments to segments of the same length seems to be true, but there is no way to prove or disprove this. This means rigid transformations are an **assertion**—an observation that seems to be true, but is not proven.

The result of any transformation is called the **image**. The points in the original figure are the inputs for the transformation sequence and are named with capital letters. The points in the image are the outputs and are named with capital letters and an apostrophe, which is referred to as "prime."

Each step in this sequence of rigid transformations creates a triangle that is congruent to triangle ABC.

