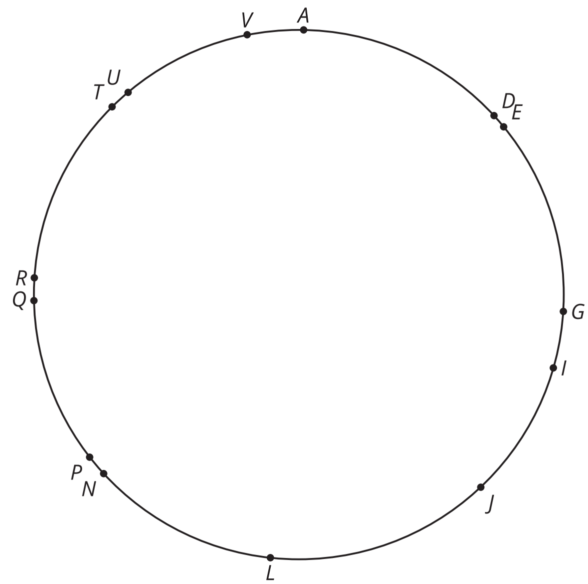
Unit 1, Lesson 11

Defining Reflections

Let's reflect some figures.

11.1 What Do You Want to Know?

Triangle TDG has been reflected so that the vertices of its image are labeled points. What is the image of triangle TDG?



What specific information do you need to be able to solve the problem?

11.2 Info Gap: What's the Point: Reflections

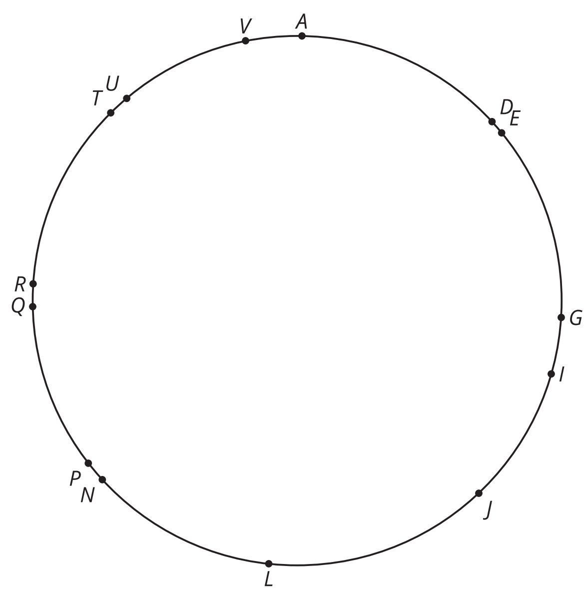
Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.

If your teacher gives you the problem card:

1. Silently read your card and think about what information you need to answer the question.
2. Ask your partner for the specific information that you need. "Can you tell me ________?"
3. Explain to your partner how you are using the information to solve the problem. "I need to know ________ because . . . ."
   Continue to ask questions until you have enough information to solve the problem.
4. When you have enough information, share the problem card with your partner, and solve the problem independently.
5. Read the data card, and discuss your reasoning.

If your teacher gives you the data card:

1. Silently read the information on your card. Wait for your partner to ask for information.
2. Before telling your partner any information, ask, "Why do you need to know ________?"
3. Listen to your partner's reasoning and ask clarifying questions. Only give information that is on your card. Do not figure out anything for your partner!
   These steps may be repeated.
4. Once your partner says they have enough information to solve the problem, read the problem card, and solve the problem independently.
5. Share the data card, and discuss your reasoning.



Are you ready for more?

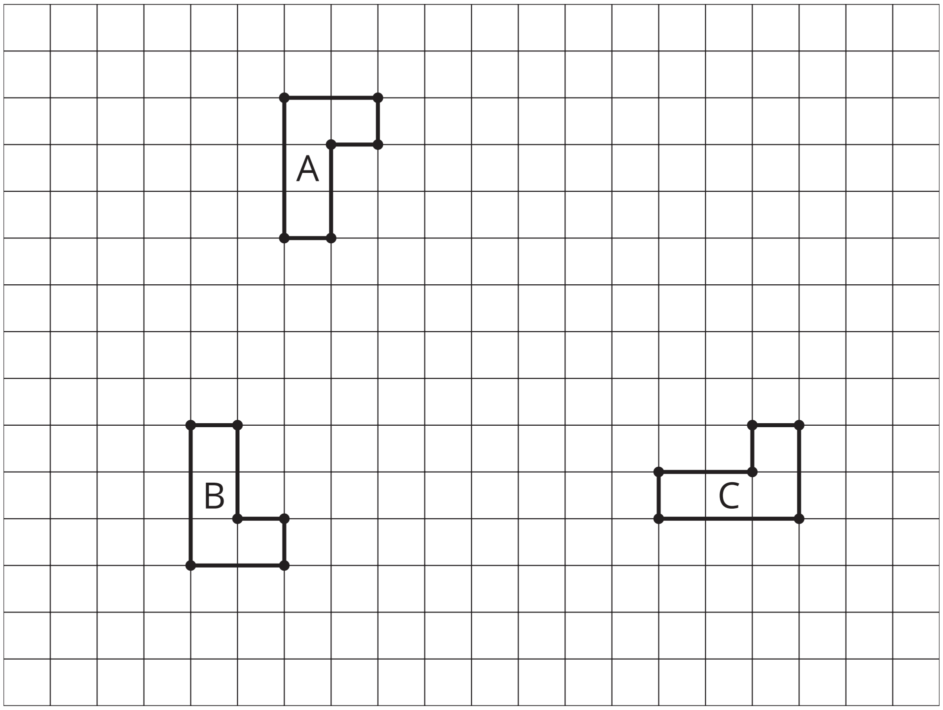
Draw and label 3 points A, B, and C. Draw a line ℓ. Reflect the points over the line, and label them so that:

- The image of A is D.
- The image of B is E.
- The image of C is F.

Can you draw a new line of reflection m so that there are 3 different pairs of points that are images of each other? Add this line to your drawing to make this true, or explain why it's impossible.

11.3 Does Order Matter?

Here are three congruent L shapes on a grid.



1. Describe a sequence of transformations that will take Figure A onto Figure B.

2. If you reverse the order of your sequence, will the reverse sequence still take Figure A onto Figure B?

3. Describe a sequence of transformations that will take Figure A onto Figure C.

4. If you reverse the order of your sequence, will the reverse sequence still take Figure A onto Figure C?

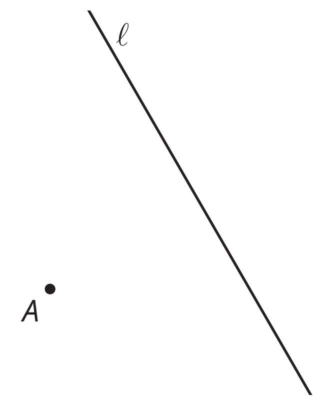
Are you ready for more?

1. Construct some examples of sequences of two rigid transformations that take Figure A to a new Figure D where reversing the order of the sequence also takes Figure A to Figure D.

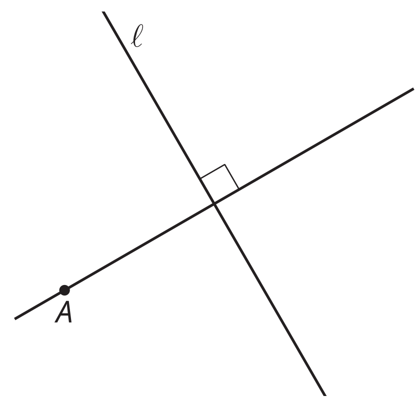
2. Make some conjectures about when reversing the order of a sequence of two rigid transformations still takes a figure to the same place.

Lesson 11 Summary

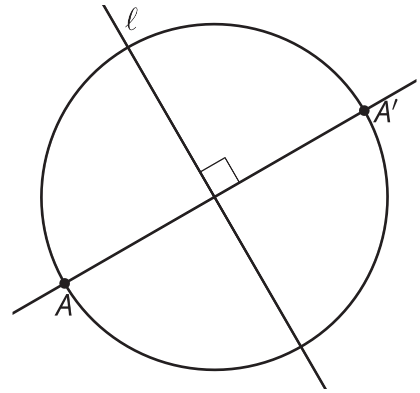
Think about reflecting the point A across line ℓ:



The image A' is somewhere on the other side of ℓ from A. The line ℓ is the boundary between all the points (not drawn) that are closer to A and all the points that are closer to A'. In other words, ℓ is the set of points that are the same distance from A as from A'. In a previous lesson, we conjectured that a set of points that are the same distance from A as from A' is the perpendicular bisector of the segment AA'. Using a construction technique from a previous lesson, we can construct a line perpendicular to ℓ that goes through A:



A' lies on this new line at the same distance from ℓ as A:



We define the **reflection** across line ℓ as a transformation that takes each point A to a point A' as follows: A' lies on the line through A that is perpendicular to ℓ, is on the other side of ℓ, and is the same distance from ℓ as A. If A happens to be on line ℓ, then A and A' are both at the same location (they are both a distance of zero from line ℓ).

$\overline{AA'} \perp \ell$