LESSON 2

TRANSFORMATIONS — TRANSLATIONS AND REFLECTIONS

Model

Foundational Concepts

Some students may still need to acquire some of the following Foundational Concepts. Remember to seize teachable moments during the lesson by embedding these concepts and terms as opportunities arise. This allows students to practice their emerging numeracy skills while also having access to high school–level materials and standards.

- A coordinate plane is a plane containing an x-axis and a y-axis.
- Numbers can be positive or negative on the coordinate plane.
- Points can be plotted on a coordinate plane.
- Coordinates are pairs of numbers that tell an exact location on a coordinate plane.
- *Horizontal, vertical, diagonal, clockwise,* and *counterclockwise* are direction words.

Essential Understandings / Big Ideas

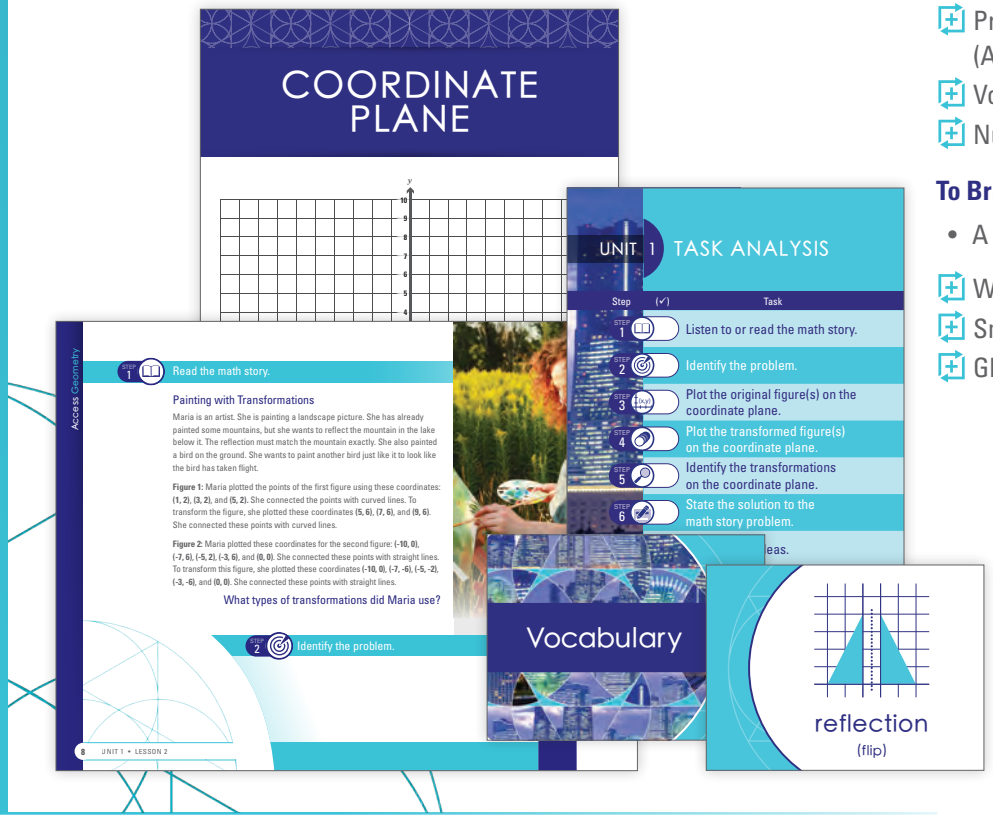
- A transformation is a movement of a shape on a plane.
- A translation slides and a reflection flips.

Learning Objectives

- Identify two types of transformations: translations and reflections
- Demonstrate a translation by sliding a figure
- Demonstrate a reflection by flipping a figure

Challenge Objective

- Given origin points and directions for movement, complete a translation and a reflection and determine the ending points



Materials

Supplied

- *Access Geometry* Student Workbook (pgs. 7–10)
- Vocabulary cards: *reflection, rotation, transformation, translation*
- Coordinate Plane poster
- Student Workbook pages for Lesson 2 (project from the digital files)
- Shapes: triangles, rectangles, and squares
- Dry-erase marker

- Problem statement for Lesson 2 (Appendix C or print from the digital file)
- Vocabulary cards: *slide, flip, vertical, horizontal, diagonal*
- Number stamps

To Bring From Home

- A toy Transformer or an item to demonstrate a transformation

- Wikki Stix
- Small removable circle stickers to plot points
- Glue stick

Lesson Preparation

1. Project Lesson 2 from the Student Workbook onto a whiteboard.
2. If needed for students who have difficulty writing, print the problem statement for Lesson 2 from the digital file (or photocopy Appendix C.) Copy and cut out enough problem statements to have on hand for these students to use as they work.
3. Program AAC devices with response options: Vocabulary words; yes and no; Lesson 2 problem statement and big ideas; flip, slide; birds, mountain; things seen sliding.
4. Review sign language for *flip* and *slide* by searching the terms: *sign language for flip* and *sign language for slide*.
5. Build a coordinate plane with an origin point and x- and y-axes using masking tape on the floor of the classroom.
6. Search online for examples of transformations. At the time of publication, the following resources were active:
   www.mathsisfun.com/geometry/translation.html
   www.mathsisfun.com/geometry/reflection.html
   www.geogebra.org/geometry?lang=en
   www.nctm.org/Classroom-Resources/Illuminations/Interactives/Shape-Cutter/

Prompts for Modeling

Model each step of the Task Analysis in the Student Workbook. Have students follow your model. If needed, prompt using the least intrusive prompt (LIP) as follows:

1 If a student does not respond, give a verbal prompt (e.g., **Write the problem in your Student Workbook**).

2 If the student still does not respond or responds incorrectly, model the step again and repeat your verbal prompt to give the student another opportunity to respond.

3 If still no response, physically guide the student to complete the step.

ENGAGE THE STUDENTS

1 Engage the students and introduce the lesson.

Teacher Instructions	Student Response
Set up the day's lesson: **Today we are going to learn about *transformations*! Let's clap that long word out.** Clap the syllables in *trans-for-ma-tion.*	**Responds by clapping out the syllables** Responds by clapping, tapping, moving to the syllables
Excellent! Now say that word with me: *transformation.* Call on various students to practice saying the word.	**Responds in chorus** Responds in chorus using an AAC device
A transformation is a change. Show a toy Transformer. Say, **This toy shows a transformation. How many of you have seen a Transformer like this? If you have seen the toy change, you have seen a transformation.** Encourage students to share what they know about Transformers. Ask, **What is a transformation?** Wait for students to respond.	**Responds *a change*** Responds in chorus using an AAC device
Very good. In geometry, a *transformation* is a change of a shape. The change can be as simple as moving the figure without changing its size or shape, like this. Demonstrate moving an object in your room. Describe how the figure's size and shape did not change. Say, **I just transformed this [chair]. The transformation was the movement.** Say, **We call this a rigid transformation, meaning that we didn't change its size and shape, just its position. Other transformations can change the size of the figure or the shape of the figure.** **In this unit, we will only study transformations that move a shape — a rigid transformation. We are going to learn about three rigid transformations: 1. translations, 2. reflections, and 3. rotations.** **These transformations all have to do with movement of a shape. One of our big ideas in this lesson is that: *A transformation is a movement of a shape on a plane.*** **Today you will learn more about transformations.** Hold up the Vocabulary card for *transformation*. **We'll be talking about two of the movements you see on this Vocabulary card for *transformation*. And I'll show you how to follow the steps of a Task Analysis to solve a math story problem related to transformations.**	

2 Review the vocabulary terms.

Teacher Instructions

Say, **Before we get to our lesson, let's review this unit's vocabulary words.**

Use the Vocabulary cards to review each term and definition using the constant time-delay procedure described on page 51.

Student Response

Responds by selecting the correct Vocabulary card given 4 cards to choose from

Responds by selecting or eye-gazing to the correct Vocabulary card given 2 or 3 cards to choose from

Definitions

reflection: moving a figure by flipping it across a line without changing its size or shape

rotation: moving an object around a fixed point in a circle

transformation: changing a shape using a turn, flip, or slide

translation: moving a figure by sliding it without changing its size or shape

NOTE: *You may also need to review the following foundational vocabulary as they come up in the lesson.*

clockwise: moving in the direction of the hands on a clock

coordinate plane: a plane containing an x-axis and a y-axis

coordinates (x, y): pairs of numbers that tell an exact position

counterclockwise: moving in the opposite direction of the hands on a clock

diagonal: a line segment that goes from one corner to another, but is not an edge

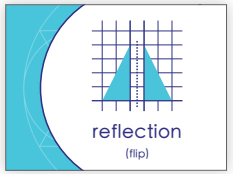
flip: to turn something over

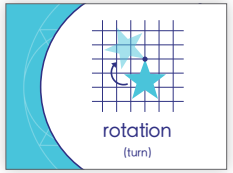
horizontal: going side to side, like the horizon

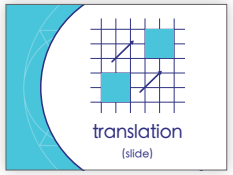
negative number: a number less than zero

origin point: the point where the x-axis and the y-axis meet (0, 0)

positive number: a number greater than zero







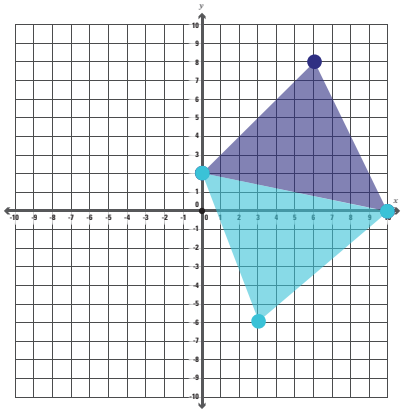
Teacher Instructions	Student Response
slide: to move a shape without turning it or flipping it ***symmetry:*** another name for reflection; when one half is a reflection of the other half ***turn:*** to rotate around a point ***vertical:*** going up and down ***x-axis:*** a line on a graph that runs horizontally (left to right) ***y-axis:*** a line on a graph that runs vertically (up and down)	

3 Outline the lesson and link it to the students' prior knowledge.

Teacher Instructions	Student Response
Begin the lesson: **Remember, I told you a rigid transformation is a change made to a figure by moving it. The size or shape of the figure doesn't change. Rigid transformations happen all around us.**	
Have you ever seen a plane take off and fly into the sky? The plane changes positions from the ground to the sky, but it is still the same size. It is still the same shape. The movement is like a slide into the sky. A transformation where the movement is a slide is a called a *translation*.	**Responds *yes* or *no***
Hold up the Vocabulary card for *translation* and say, **The square in this picture shows it was slid. See the arrows? Have you ever slid anything or seen sliding?** Demonstrate the sign for slide. Have students name some examples of sliding, like sliding on ice, sliding on a slide, or sliding into a base in baseball.	**Responds *yes* or *no* and then names things slid or seen sliding** Responds *yes* or *no*; signs the word *slide*
Explain the next transformation — *reflection*. **Have you ever seen your reflection in a mirror? When you look at your reflection in the mirror, you still see you, not a changed you. Your face is simply flipped and reflected in the mirror. This type of transformation is called a *reflection*.** Hold up the Vocabulary card for *reflection* and point out how the triangle is just flipped to make a reflection. Demonstrate the sign for reflection or flip.	**Responds *yes* or *no***

Teacher Instructions	Student Response
Place the Coordinate Plane poster on a table. **These are the two types of transformations we will talk about in this lesson: translations and reflections.** **Does translation mean to "flip," "slide," or "turn"?** Use the sign for these actions.	**Responds *slide*** Given 2 Vocabulary cards, chooses the card for *slide*
Very good. A translation is a slide, like this. Demonstrate sliding a shape on the Coordinate Plane poster. Give each student a triangle shape. Say, **Open your Student Workbook to Lesson 2. You will see a coordinate plane on page 9 in Lesson 2. Use the triangle to show a translation on the coordinate plane in your Student Workbook.** **NOTE:** *The Coordinate Plane poster can also be used by students to demonstrate the translations and the reflections.*	**Translates the shape in any direction on the coordinate plane in the Student Workbook** Slides the shape in any direction on the coordinate plane in the Student Workbook
Say, **Translations are slides that can be done vertically, horizontally, or diagonally. Show me with your finger which way is vertical.**	**Uses finger to show an up and down motion** Given 2 Vocabulary cards, chooses *vertical* and then moves hand up and down
Great. Now show me with your finger which way is horizontal.	**Uses finger to show a horizontal direction** Given 2 Vocabulary cards, chooses *horizontal* and then moves hand left to right
Perfect. Now show me with your finger which way is diagonal.	**Uses finger to show a corner-to-corner direction** Given 2 Vocabulary cards, chooses *diagonal* and then moves hand in a corner-to-corner manner

Teacher Instructions	Student Response
Let's use your triangle to demonstrate sliding horizontally. Put your triangle on the coordinates (0, 2), (6, 8), and (10, 0). This is in Quadrant I. Now we are going to translate it to Quadrant II horizontally.	**Starts the shape at the coordinates and then translates it horizontally** With guidance, slides the triangle horizontally from Quadrant I to Quadrant II
Next, let's translate it to Quadrant III vertically.	**Translates the triangle vertically** With guidance, slides the triangle vertically from Quadrant II to Quadrant III
Last, let's translate it to Quadrant I diagonally. **NOTE:** *When repeating the lesson, choose different origin points to start, move across different quadrants, and practice with squares or other shapes.*	**Translates the triangle diagonally** With guidance, slides the triangle diagonally from Quadrant III to Quadrant I
The second type of transformation in this lesson is a reflection. Does *reflection* mean to flip, slide, or turn? Use the sign for these actions.	**Responds *flip*** Responds using the sign for *flip*
Very good. A reflection is a flip. Demonstrate flipping a triangle on the Coordinate Plane poster. **Now, let's use your triangle to demonstrate a reflection — a flip — on the coordinate plane in your Student Workbook.**	**Reflects the shape in any direction on the coordinate plane in the Student Workbook** Flips the shape in any direction on the coordinate plane in the Student Workbook to show a reflection

Teacher Instructions	Student Response
Reflections are flips that can be done across a mirror line — we call that the *line of symmetry*. In other words, the shape on both sides of the line will match exactly. Let's practice using the x-axis as the line of symmetry. **Show me again with your hand which way the x-axis goes.**	**Uses hand motion to show horizontal direction** Points to the x-axis
Great. Now, show me with your hand which way the y-axis goes.	**Shows vertical direction with hand** Points to the y-axis
A reflection is a flip, so first I will practice flipping across the x-axis. Put your triangle on the coordinates (0, 2), (6, 8), and (10, 0). 	**Starts the shape at the coordinates given** Places the triangle on the Coordinate Plane poster that has been pre-marked with dots for coordinate points, then reflects the shape
Now let's flip the triangle across the x-axis like this. Model flipping the shape, keeping the base side on (0, 2) and (10, 0). **Your turn.**	**Flips the shape across the x-axis**
Great job! You reflected the triangle across the x-axis. The x-axis is the line of symmetry — the mirror line. The triangle looks the same on both sides of the x-axis. When repeating this lesson, perform the same task across the y-axis using new coordinates. For additional lessons, use different shapes with four points, such as rectangles or squares.	
Say, **Very good. We have demonstrated both reflections and translations. Another of our big ideas in this lesson is that: *A translation slides and a reflection flips.*** **Nice work.**	

TEACH THE TASK ANALYSIS

STEP 1 Listen to or read the math story.

Teacher Instructions

Say, **OK, let's begin.** Point to the Task Analysis in the Student Workbook. Say, **This is a list of steps that will help us solve today's math story. We call it a *Task Analysis*. We will follow the steps on this Task Analysis and check them off (✓) one at a time as we complete them.**

Let's turn the page. Read the math story with me. Read the math story and encourage the students to follow along.

Student Response

Listens to the story being read; follows along in the Student Workbook

Watches as the words are read and pointed to

STEP 1 Read the math story.

Painting with Transformations

Maria is an artist. She is painting a landscape picture. She has already painted some mountains, but she wants to reflect the mountain in the lake below it. The reflection must match the mountain exactly. She also painted a bird on the ground. She wants to paint another bird just like it to look like the bird has taken flight.

Figure 1: Maria plotted the points of the first figure using these coordinates: **(1, 2)**, **(3, 2)**, and **(5, 2)**. She connected the points with curved lines. To transform the figure, she plotted these coordinates **(5, 6)**, **(7, 6)**, and **(9, 6)**. She connected these points with curved lines.

Figure 2: Maria plotted these coordinates for the second figure: **(-10, 0)**, **(-7, 6)**, **(-5, 2)**, **(-3, 6)**, and **(0, 0)**. She connected these points with straight lines. To transform this figure, she plotted these coordinates **(-10, 0)**, **(-7, -6)**, **(-5, -2)**, **(-3, -6)**, and **(0, 0)**. She connected these points with straight lines.

What types of transformations did Maria use?

Teacher Instructions	Student Response
Point to the Task Analysis in the Student Workbook. **We just read the math story, so let's go back a page to the Task Analysis and check off (✓) Step 1.**	**Checks off Step 1** Finds Step 1 on the Task Analysis and checks it off with your help

STEP 2 Identify the problem.

Teacher Instructions	Student Response
Review the math story, **In this math story, Maria (the artist) will make two types of transformations. She will make two types of changes to her painting. She will use what she knows about geometry to make these changes.** Say, **Let's talk about the transformations. In this math story, one transformation has to do with the mountains and one transformation has to do with the bird. One of our big ideas in this lesson is that: *A transformation is a movement of a shape on a plane.*** Point to the math story in the Student Workbook. (As an alternative, project the Student Workbook pages onto a whiteboard.) Have students identify the problem to be solved. **Let's find the problem we will be solving.** Point to the problem statement in the story. **I see this question: What types of transformations did Maria use? I will underline this question because this is the problem I have to solve. Your turn. Underline this question in your Student Workbook.**	**Finds and underlines the question** Given 2 choices, chooses the correct problem statement

what types of transformations did Maria use

Teacher Instructions

Now, I will write this problem statement in the Student Workbook. Your turn. Write the problem to be identified in the space for Step 2.

Student Response

Writes the problem statement in the Student Workbook

Glues the problem statement in the space provided in the Student Workbook

We have identified the problem, so we can check off (✓) Step 2 on the Task Analysis in your Student Workbook. You will have to flip back one page to the Task Analysis.

Checks off Step 2

Finds Step 2 on the Task Analysis and checks it off with your help

STEP 3 (x,y) Plot the original figure(s) on the coordinate plane.

Teacher Instructions

Let's plot the first figure on the coordinate plane.

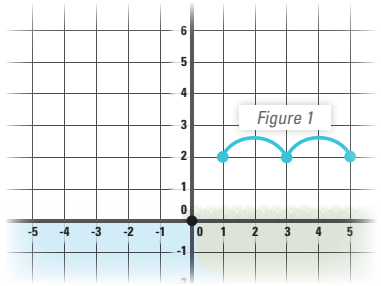
Using the Coordinate Plane poster, plot the points using the coordinates of Figure 1. Explain while you plot the points, **The first figure is placed at (1, 2), (3, 2), and (5, 2). I know the first number in a coordinate pair goes on the x-axis and the second number goes on the y-axis. I will mark these points with my marker, x-axis first and then up for the y-axis.**

Student Response

Plots the points using coordinates for Figure 1

Plots the points with support (using removable circle stickers if needed)

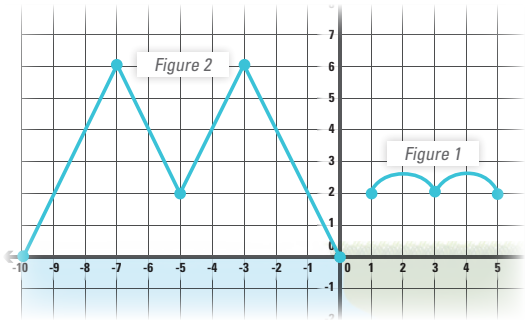
Maria connected the points with curved lines so I will do that. Your turn. Use your pencil. Plot the points using the coordinates — x-axis first, then up for the y-axis. Connect them using curved lines.



Connects the points with curved lines

Connects the points (using Wikki Stix if needed)

Teacher Instructions	Student Response
To help me remember this is Figure 1, I will mark this shape *Figure 1*. You do the same.	**Labels the shape as *Figure 1*** Stamps *1* near the shape
Let's plot the points of the second figure on the coordinate plane. Using the Coordinate Plane poster, plot the points using the coordinates of Figure 2. Explain while you plot the points, **The second figure is placed at (-10, 0), (-7, 6), (-5, 2), (-3, 6), and (0, 0). I know the first number in a coordinate pair goes on the x-axis and the coordinate is negative so I will mark on the left side of 0. The second number goes on the y-axis. It's positive so I will go up. You try it. Plot the points using the coordinates in your Student Workbook.**	**Plots the points using coordinates for Figure 2** Plots the points with support (using removable circle stickers if needed)
I'll connect the points in this order with straight lines. Your turn.	**Connects the points with straight lines** Connects the points (using Wikki Stix if needed)
To help me remember this is Figure 2, I will mark this shape *Figure 2*.	**Labels the shape as *Figure 2*** Stamps *2* near the shape
We plotted the figures on the coordinate plane, so we can check off (✓) Step 3 on the Task Analysis in your Student Workbook.	**Checks off Step 3** Finds Step 3 on the Task Analysis and checks it off with your help



STEP 4

Plot the transformed figure(s) on the coordinate plane.

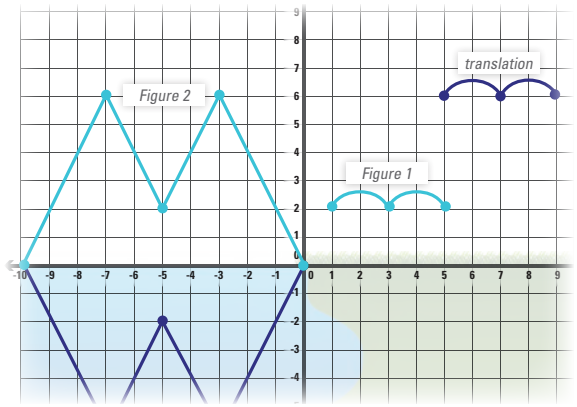
Teacher Instructions

Let's plot the transformed Figure 1 on the coordinate plane.

Using the Coordinate Plane poster, plot the points using the coordinates of transformed Figure 1. Explain while you plot the points using the coordinates, **The transformed Figure 1 is placed at (5, 6), (7, 6), and (9, 6). I know the first number in a coordinate pair goes on the x-axis and the second number goes on the y-axis. I'll connect the points with curved lines, like this. Your turn. Plot these points and connect them using curved lines.**

Let's plot the second figure on the coordinate plane. Using the Coordinate Plane poster, plot the points of transformed Figure 2. Explain while you plot the points using the coordinates, **The second figure is placed at (-10, 0), (-7, -6), (-5, -2), (-3, -6), and (0, 0). I know the first number in a coordinate pair goes on the x-axis and the second number goes on the y-axis. I'll connect the points in this order with straight lines. Your turn.**

We plotted the points of the transformed figures on the coordinate plane, so we can check off (✓) Step 4 of the Task Analysis in your Student Workbook.



Student Response

Plots the points using coordinates for transformed Figure 2 and then connects the points with curved lines

Plots the points with support (using removable circle stickers if needed) and then connects the points (using Wikki Stix if needed)

Plots the points of transformed Figure 2 and then connects the points with straight lines

Plots the points with support (using removable circle stickers if needed) and then connects the points (using Wikki Stix if needed)

Checks off Step 4

Finds Step 4 on the Task Analysis and checks it off with your help

STEP 5

Identify the transformations on the coordinate plane.

Teacher Instructions	Student Response
One of the big ideas in this lesson is that: *A transformation is a movement of a shape on a plane.* Say, **The artist performed two transformations in her painting. We must decide which types of transformations she used for each figure.** Using the Coordinate Plane poster, say, **Let's look at this coordinate plane. You can look at the coordinate plane in your Student Workbook too.**	
Figure 1 was placed at (1, 2), (3, 2), and (5, 2). The points are connected with curved lines. The transformed figure's coordinates are (5, 6), (7, 6), and (9, 6). What does it look like Maria did?	**Responds *slid the shape*** Given 2 Vocabulary cards, chooses *slide* or signs *slide*
Help students determine the type of transformation by demonstrating the transformation. Say, **What type of transformation is this?**	**Responds *translation*** Given 2 Vocabulary cards, chooses *translation*
That's correct. This is a translation. The transformed shape and size are the same as the original shape. The figure just moved diagonally. The x-coordinate moved +4 units to the right and the y-coordinate moved +4 units up. Every point of the shape moved the same distance in the same direction. **Is this the bird or the mountains?**	**Responds *bird***
That's correct. Let's write *translation* next to the transformed bird.	**Writes *translation* next to the transformed bird** Given 2 Vocabulary cards, chooses the card for *translation* and places it next to the bird on the coordinate plane

Teacher Instructions	Student Response
Let's look at Figure 2. Figure 2 was placed at (-10, 0), (-7, 6), (-5, 2), (-3, 6), and (0, 0). The points are connected with straight lines. The transformed figure's coordinates are (-10, 0), (-7, -6), (-5, -2), (-3, -6), and (0, 0). What does it look like Maria did?	**Responds *she flipped the figure*** Given 2 Vocabulary cards, chooses the card for *flip*
Help students determine the type of transformation by demonstrating the transformation. Say, **What type of transformation is this?**	**Responds *reflection*** Given 2 Vocabulary cards, chooses the card for *reflection*
That's correct. This transformation is a reflection. The transformed shape and size are the same as the original shape. The figure just flipped to be a reflection. Notice how all the coordinates in the transformed figure had a negative, or inverse, y-axis coordinate. This is how we know it is a reflection. Looking at our coordinate plane, you can see that it is a reflection across the x-axis. **Is this the bird or the mountains?**	**Responds *mountains***
That's correct. Let's write *reflection* next to the mountains.	**Writes *reflection* next to the mountains** Given 2 Vocabulary cards, chooses *reflection* and places it next to the mountains on the coordinate plane
We have identified the types of transformations and labeled them on the coordinate plane. This is one of our big ideas: *A translation slides and a reflection flips.* Let's check off (✓) Step 5.	**Checks off Step 5** Finds Step 5 on the Task Analysis and checks it off with your help

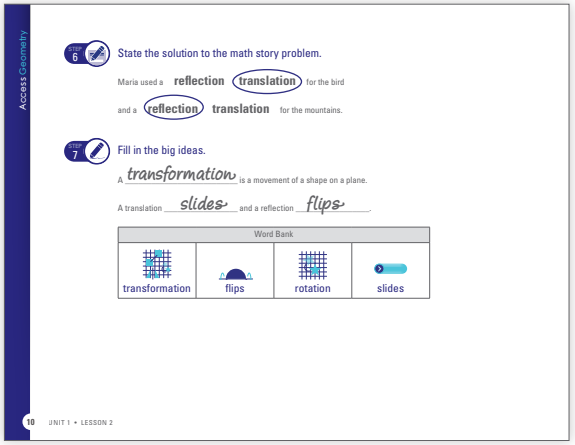
STEP 6 State the solution to the math story problem.

Teacher Instructions	Student Response
Let's look back at the problem to be solved. The question to solve was "What types of transformations did Maria use?" A big idea in this lesson is that: *a transformation is a movement of a shape on a plane.*	
Model stating the solution using the Student Workbook pages projected onto a whiteboard. Say, **We just decided that Maria used a translation for the bird and a reflection for the mountains. I will circle *translation* for the bird and *reflection* for the mountains in the Student Workbook. Your turn.**	**Circles *translation* for the bird and *reflection* for the mountains in the Student Workbook** Circles or marks *translation* for the bird and *reflection* for the mountains in the Student Workbook
This is one of our big ideas: *A translation slides and a reflection flips.* **I will now be able to check off (✓) Step 6. You can do the same.**	**Checks off Step 6** Finds Step 6 on the Task Analysis and checks it off with your help

STEP 7 Fill in the big ideas.

Teacher Instructions	Student Response
Say, **Now, let's review the big ideas we learned. Let's think about this together.** **We learned that: *A transformation is a movement of a shape on a plane.* We also learned about two types of transformations that involve movement of the shape: translation and reflection. *A translation slides and a reflection flips.***	
Let's fill in both big ideas in your Student Workbook.	**Fills in the big ideas** Circles the correct responses to complete the big ideas

Teacher Instructions	Student Response
Let's read them together.	**Reads the big ideas with you** Points to the words as you read
Now I am done with this problem. I can check off (✓) Step 7. Your turn.	**Checks off Step 7** Finds Step 7 on the Task Analysis and checks it off with your help



REPEAT THE LESSON

Repeat this lesson as needed (many times, repeating for a week is helpful to students) until students are fairly consistent in following your model to complete the steps of the Task Analysis. Remember that you can print additional pages of the Student Workbook from the digital file. Change elements of the story problem as appropriate to give students additional practice.

CHALLENGE PROBLEM

To add challenge to the lesson, print this Challenge Problem and a blank Coordinate Plane Graphic Organizer (Appendix B) from the digital file. Distribute to students who are ready for a challenge.

Remind students that there are two rules for performing translations and reflections.

- **For *translations*, each point of the shape is moved the same distance (or number of units) in the same direction.**
- **For triangles that are *reflections* and that cross a vertical line of symmetry, two points on the vertical line of symmetry will stay the same, but the third point changes. The same applies for reflections across a horizontal line of symmetry. The lengths of the sides of the triangle do not change, so the point will be the same distance on the reflected side of the figure after the reflection.**

Read the story aloud to students before they begin to solve the problem.

Nick is an artist who is drawing a new lake picture with two sailboats in the lake. He wants them to be a distance apart and of equal size. He uses what he knows about geometry to make the drawing work. He uses triangles on a coordinate plane as the sailboats. He places the first sailboat — triangle ABC — at the coordinates (-6, 2), (-2, 2), and (-4, 6). Nick performs a translation of +8 units right, -6 units down to paint the second sailboat — triangle DEF. Nick also wants each sailboat to have a reflection in the water across a line of symmetry. The line of symmetry is the base of the triangle.

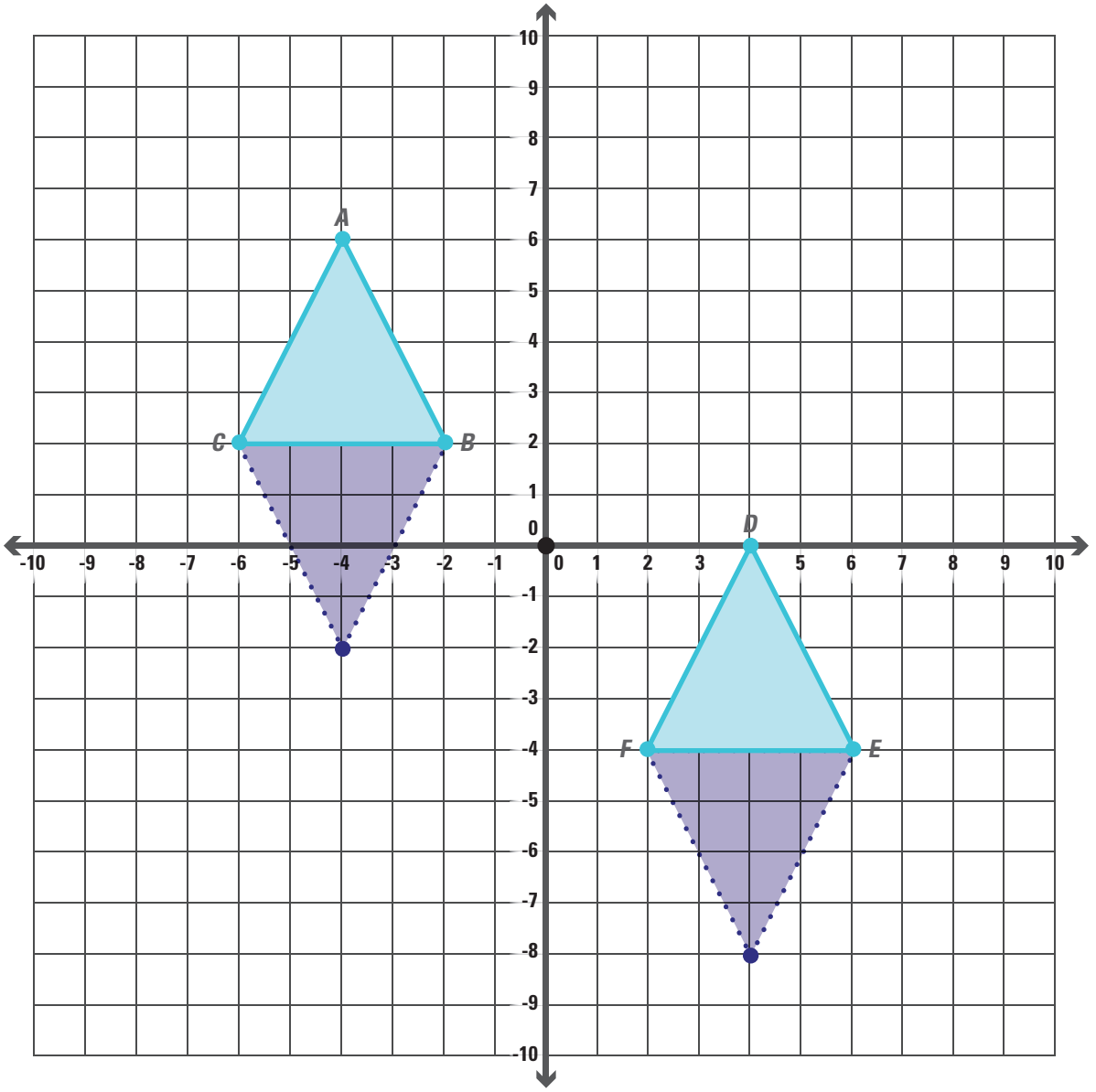
What are the coordinates for the second sailboat's position in the water? Also find the coordinates for the reflections of both boats.

Answer:

Sailboat DEF translated coordinates are (2, -4), (6, -4), and (4, 0).
Sailboat ABC's reflection is (-6, 2), (-2, 2), and (-4, -2).
Sailboat DEF's reflection is (2, -4), (6, -4), and (4, -8).

The coordinate points on the line of symmetry (the base of the triangle) remain constant, but the coordinate point that is reflected across the line of symmetry changes to +8 units, which allows the length of the sides to remain the same.

CHALLENGE PROBLEM ANSWER KEY



LESSON ANSWER KEY

STEP 3
Plot the original figure(s).

STEP 4
Plot the transformed figure(s).

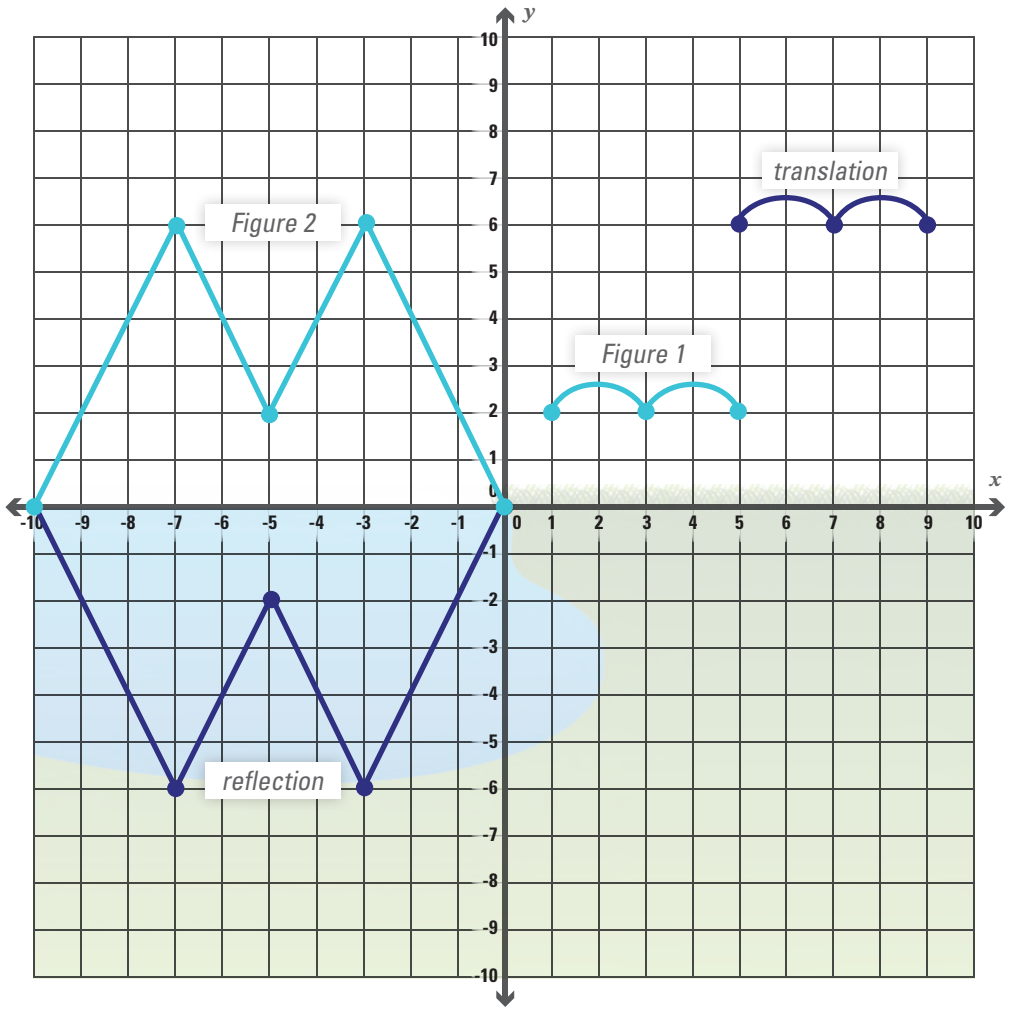
STEP 5
Identify the transformations.

Figure 1

Original	Transformed
(1, 2) (3, 2) (5, 2)	(5, 6) (7, 6) (9, 6)

Figure 2

Original	Transformed
(-10, 0) (-7, 6) (-5, 2) (-3, 6) (0, 0)	(-10, 0) (-7, -6) (-5, -2) (-3, -6) (0, 0)



Access Geometry