

Important Concepts . . .

Preview Review



Mathematics Grade 7 TEACHER KEY
W3 - Lesson 5: Transformations

Important Concepts of Grade 7 Mathematics

W1 - Lesson 1	Divisibility Rules
W1 - Lesson 2	Decimal Numbers
W1 - Lesson 3	Fractions
W1 - Lesson 4	Improper Fractions, Mixed Numbers, Percents, and Decimals
W1 - Lesson 5	Integers, Number Lines, and Sequencing
W1 - Quiz	
W2 - Lesson 1	Table of Values and Graphing Linear Equations
W2 - Lesson 2	Modeling Expressions, Equations, and the Preservation of Equality
W2 - Lesson 3	Algebra and Linear Equations
W2 - Lesson 4	Statistics
W2 - Lesson 5	Circle Graphs and Calculating Probability
W2 - Quiz	
W3 - Lesson 1	Circles
W3 - Lesson 2	Area of Triangles and Parallelograms
W3 - Lesson 3	Line Segments
W3 - Lesson 4	Parts and Plotting on a Cartesian Plane
W3 - Lesson 5	Transformations
W3 - Quiz	

Materials Required

Math Set
Calculator

No Textbook Required

This is a stand-alone course.

Mathematics Grade 7

Version 6

Preview/Review W3 - Lesson 5

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Preview/Review Concepts for Grade Seven Mathematics

Teacher Key



W3 - Lesson 5:

Transformations

Introductory Information for Teachers

Preview/Review courses are aimed mainly at students who have completed the regular course but who need to review some of the material before beginning the next grade. Other students may find Preview/Review courses useful in preparing for the new concepts they will study in their next grade.

No Preview/Review course is intended to replace the regular course because each covers only what the writers have decided are the top 15 concepts from the Program of Studies for that course.

Preview/Review materials are intended for use by teachers and students in one-subject and one-grade classrooms. This Preview/Review course contains fifteen lessons in three sections. Each section has five lessons. A short quiz is provided at the end of each section to test student knowledge of the material studied. In a classroom the course will likely be completed in three weeks.

This Preview/Review course is written to be stand-alone. There is no textbook required.

W3 – Lesson 5: Transformations

Objective:

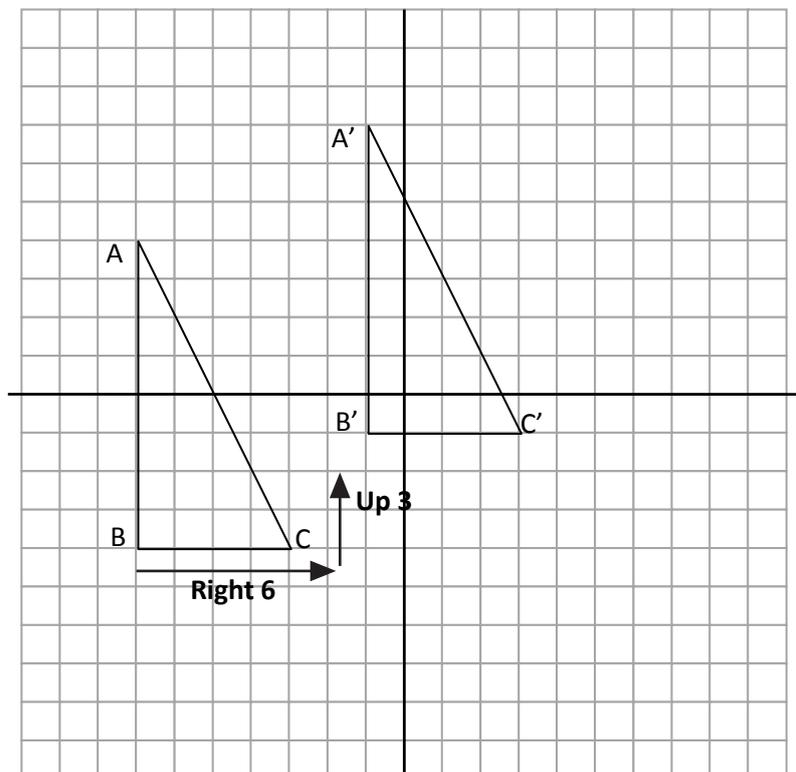
- *I can move points on a cartesian plane.*

Translations

Also called a **slide**, occurs when a figure is moved in one direction in a straight line from its original position. The final figure is identical to the original figure.

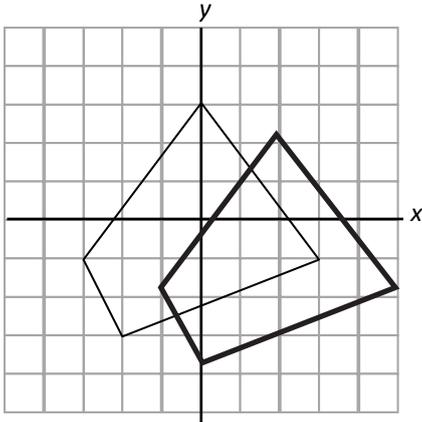
Example: A triangle $\triangle ABC$ shown below has been moved 6 units to the right and 3 units up. If the coordinate of angle B is $(-7, -4)$, what are the coordinates of angle B'.

Answer: Since the slide was $(+6, +3)$, the coordinate for angle B' is $((-7+6), (-4+3))$ or $(-1, -1)$.



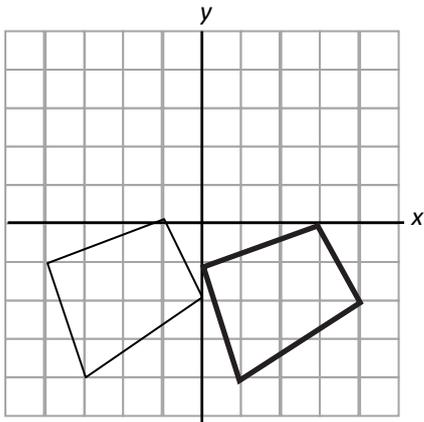
Practice:

1. Translate the figure 2 units to the right and 1 unit down (2, -1).

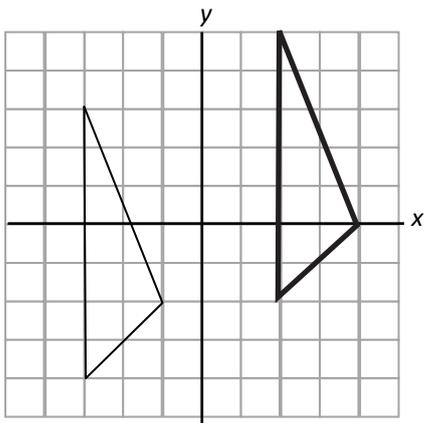


Note: When translating a figure x refers to the horizontal movement.
 + = right, - = left
 y refers to the vertical movement
 + = up, - = down

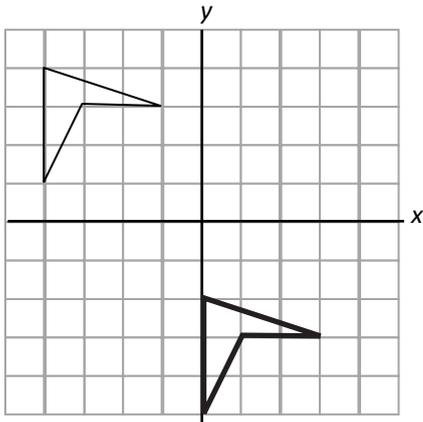
2. Translate the figure (4, 0).



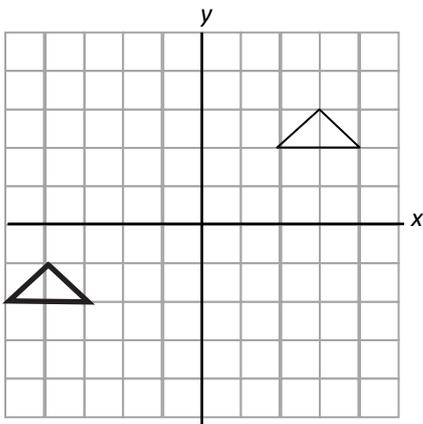
3. Translate the figure (5, 2).



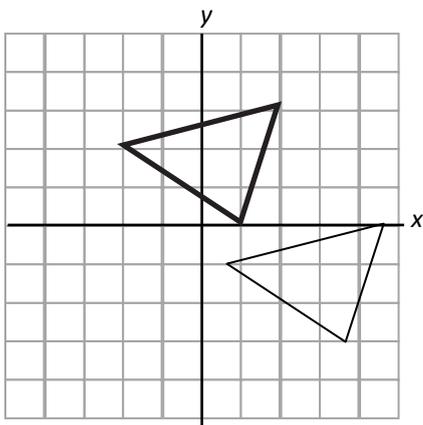
4. Translate the figure $(4, -6)$.



5. Translate the figure $(-7, -4)$.



6. Translate the figure $(-3, 3)$.



Objective:

- *I can rotate a figure on a cartesian plane.*

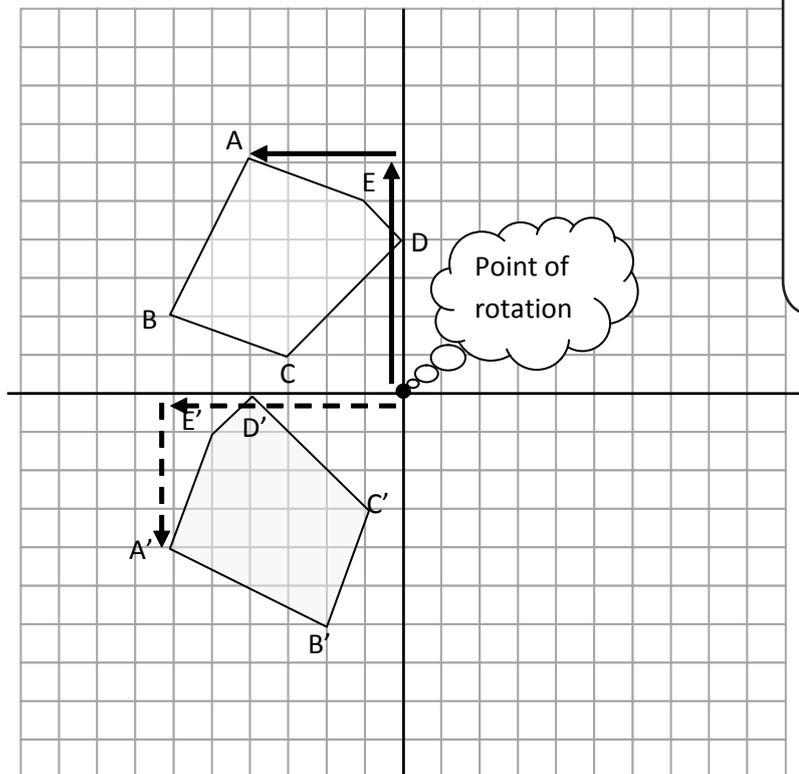
Rotations

A **rotation** turns a shape around a point, called point of rotation. The rotation can be any angle, and can be clockwise (negative), or counterclockwise (positive).

Example 1: A polygon ABCDE, shown below, is rotated 90° counterclockwise around the origin. If point A was originally (4, 6), what is point A'?

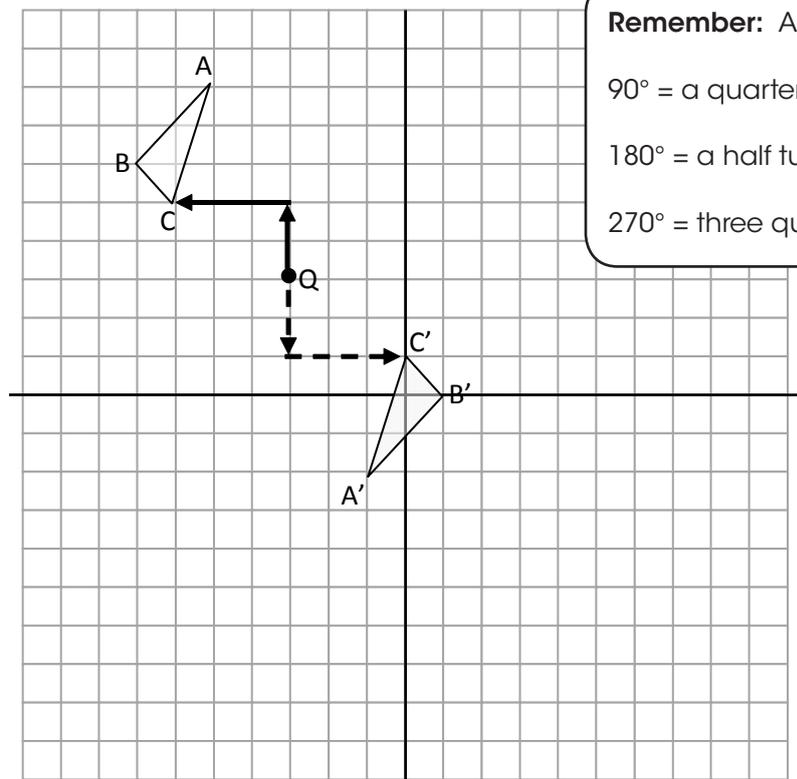
Answer: From the point of rotation, the distance to point A is 6 up and 4 across. Rotating the arrows counterclockwise 90° (or $+90^\circ$), but still starting from the point of rotation, has the arrows pointing at (-6, -4).

Therefore, point A' is (-6, -4)



Hint: Trace the image onto tracing paper, put your pencil onto the point of rotation, and turn the tracing paper to see the position of the final image.

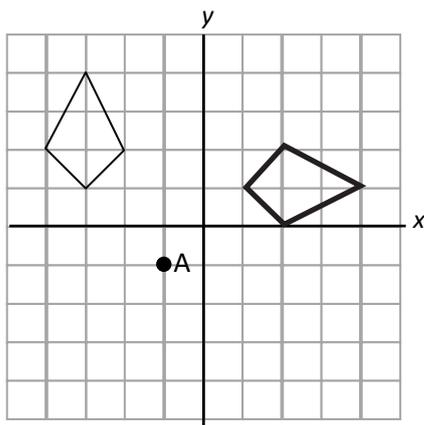
Example 2: A triangle ABC is rotated 180° clockwise around point Q. Draw and label triangle A'B'C'?



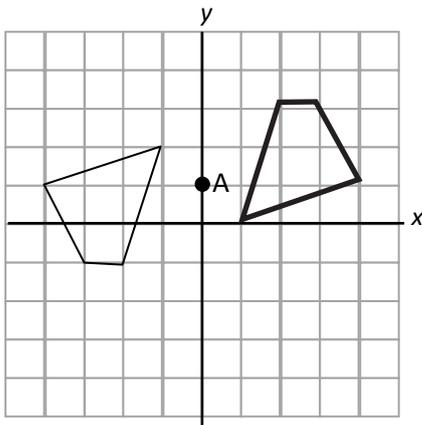
Remember: A circle has 360°.
 90° = a quarter turn
 180° = a half turn
 270° = three quarters turn

Practice:

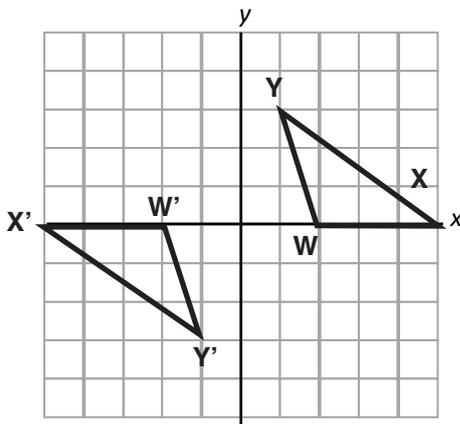
1. Rotate the figure 90° clockwise about point A.



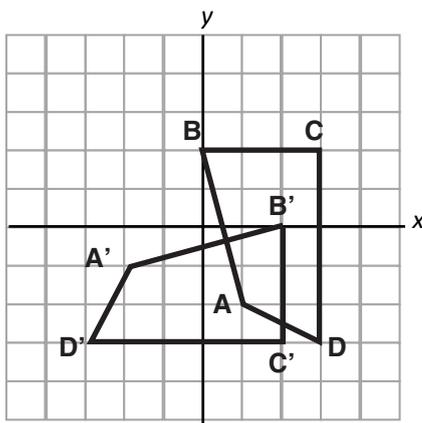
2. Rotate the figure 180° about point A.



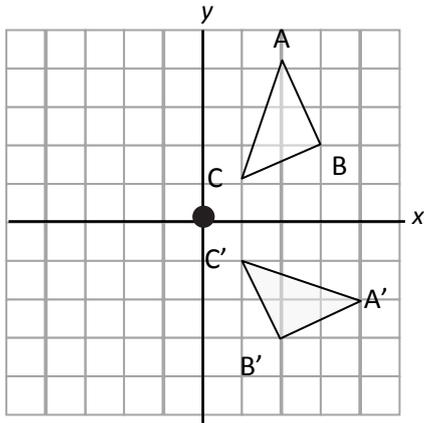
3. Plot the points $W(2, 0)$, $X(5, 0)$, $Y(1, 3)$. Rotate the figure 180° about the origin.



4. Plot $A(1, -2)$, $B(0, 2)$, $C(3, 2)$, $D(3, -3)$. Rotate the figure 90° about the origin.

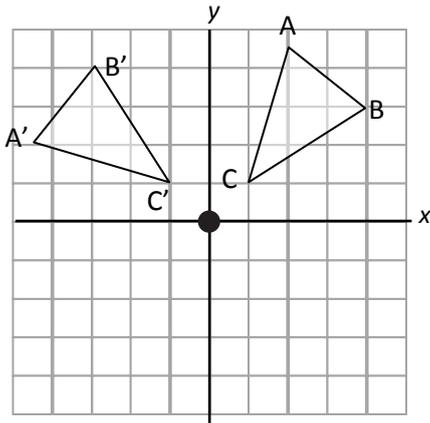


5. What is the degree of rotation and point of rotation of triangle ABC?



90° about the origin

6. What is the degree of rotation and point of rotation of triangle ABC?



-90° about the origin

Objective:

- *I can reflect a figure on a cartesian plane.*

Reflections

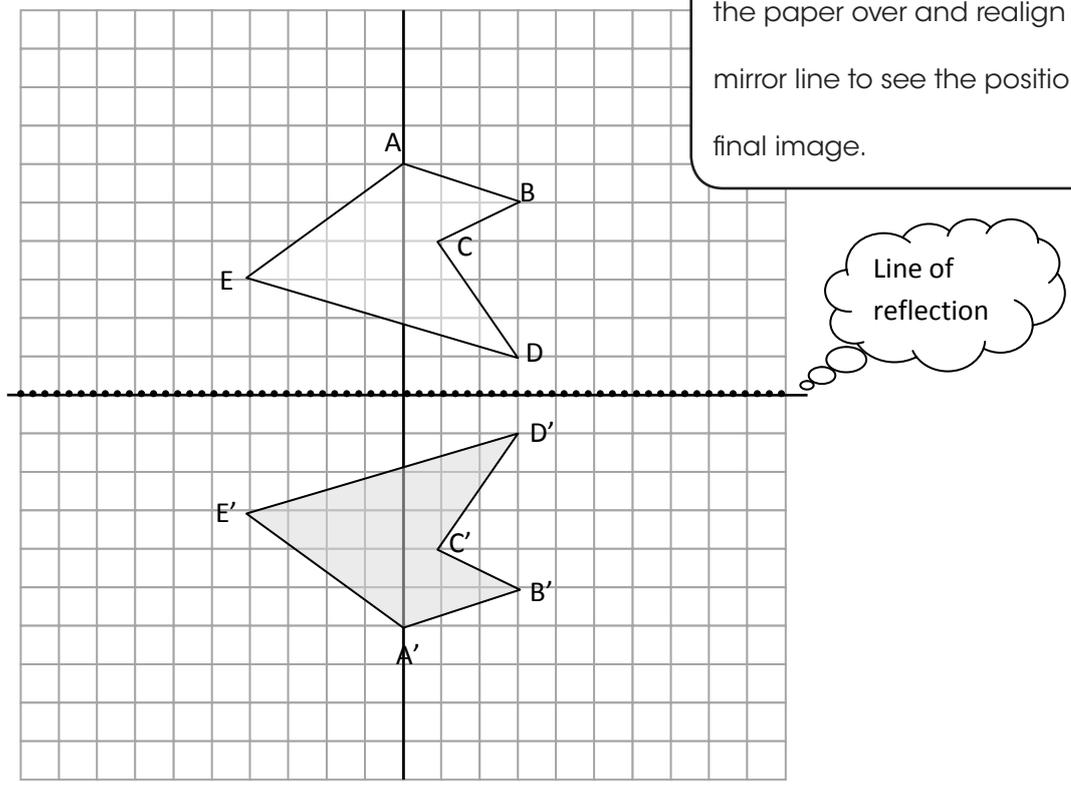
A **reflection** or flip, creates a mirror image of the shape. The mirror line would be a line of symmetry for the shape and its image.

Example 1: A polygon ABCDE, shown below, is reflected across the x-axis. If point A was originally (0, 6), what is point A'?

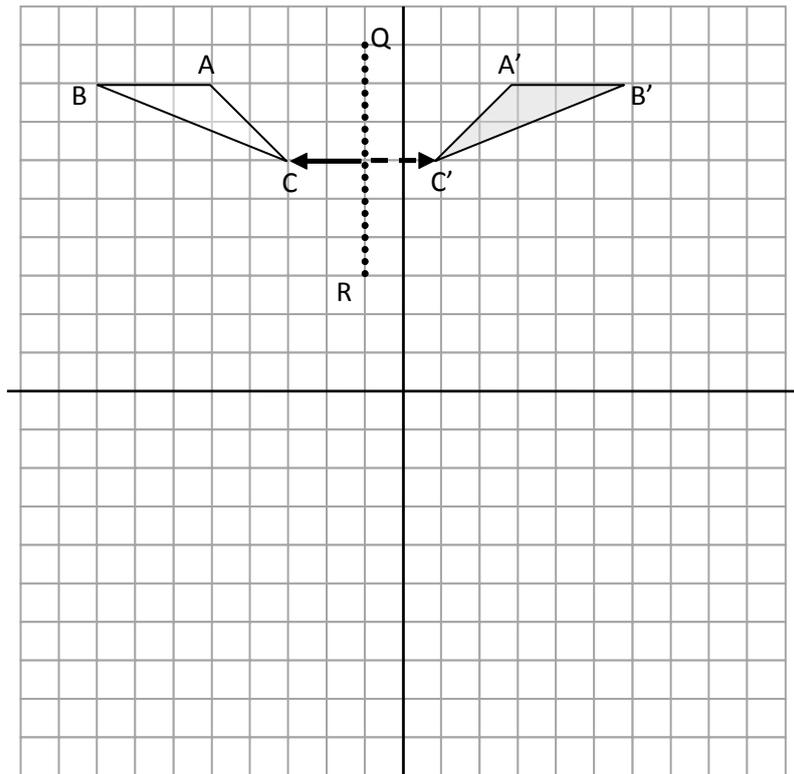
Answer: From the line of reflection, the perpendicular distance to point A is 6. Which means point A' would be 6 units in the opposite direction from the line of reflection.

Therefore, point A' is (0, -6)

Hint: Trace the image onto tracing paper including the mirror line. Flip the paper over and realign the mirror line to see the position of the final image.

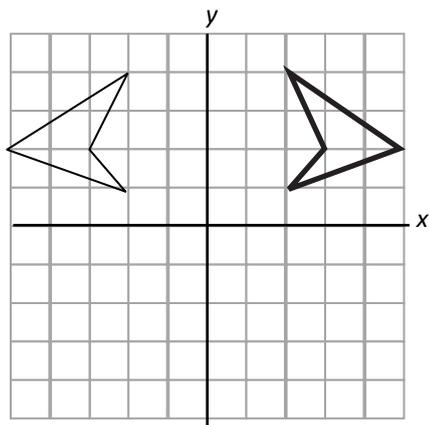


Example 2: Draw triangle $A'B'C'$ when triangle ABC is reflected across line QR .

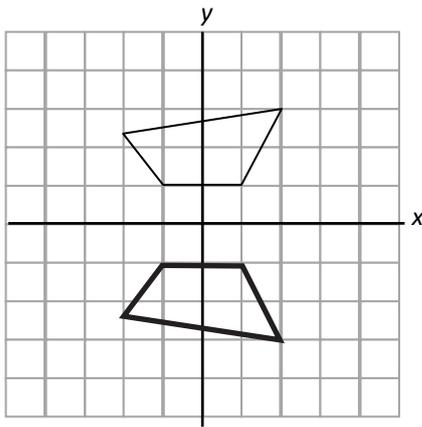


Practice:

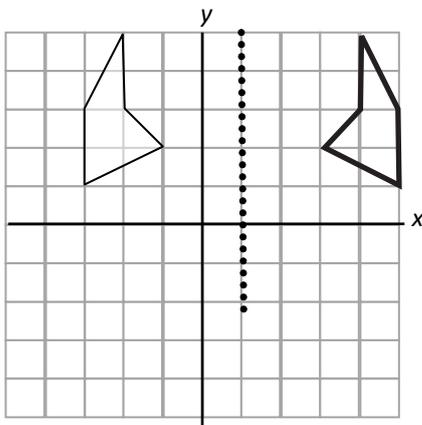
1. Reflect the figure across the y-axis.



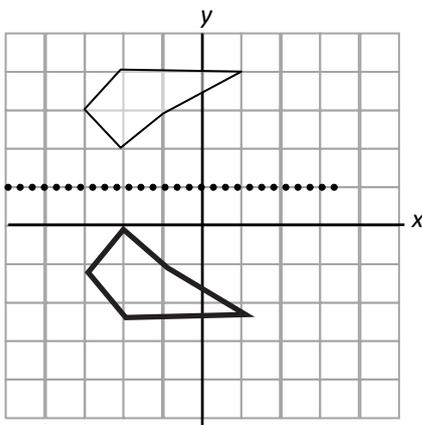
2. Reflect the figure across the **x-axis**.



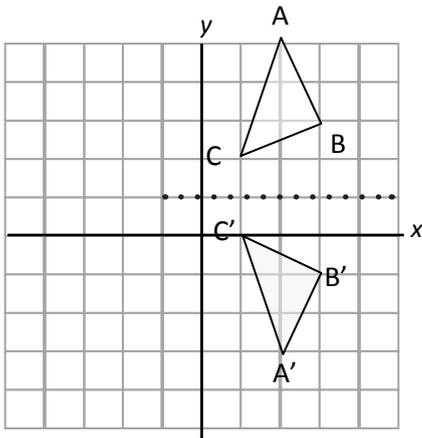
3. Reflect the figure across the given line.



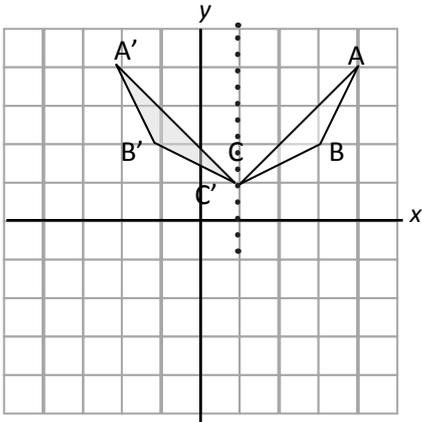
4. Reflect the figure across the given line.



5. Draw the line of reflection.



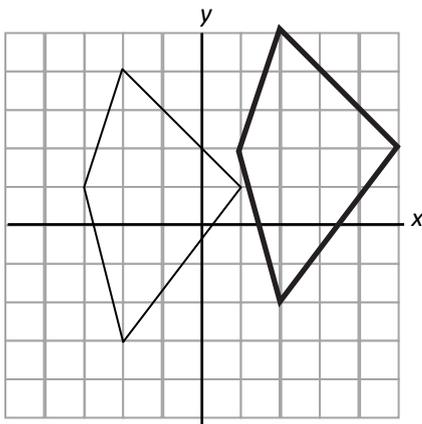
6. Draw the line of reflection.



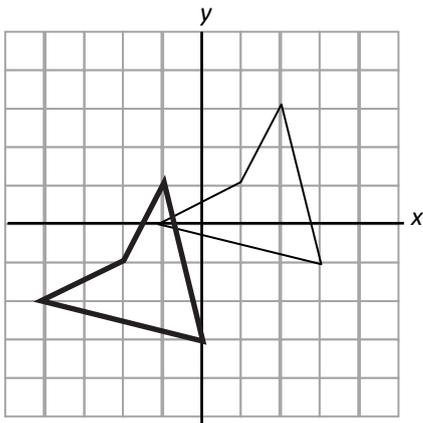
Summary and Practice:

- Using what you've learned, answer the following questions.

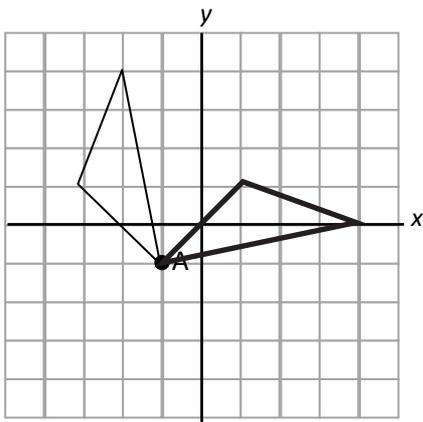
- Fill in the blanks.
 - A word describing a transformation where a figure stays the same except for its location is **translation**.
 - If point A(5, 0) was translated (2, -1) the new coordinates for A' would be **A'(7, -1)**.
 - The point that a rotation occurs around is called the **point of rotation**. It does not always have to be the origin.
 - A negative rotation means the image is turned in a **counterclockwise** direction.
 - Rotating an image -90° has the same result as rotating it **270°** .
 - The line used to create a mirror image is called a **line of reflection**.
 - If point G(-4, 2) was reflected across the y-axis, the coordinates of point G' would be **G'(4, 2)**.
 - If point H(3, -5) was reflected across the x-axis, the coordinates of point H' would be **H'(3, 5)**.
- Translate the figure (4, 1).



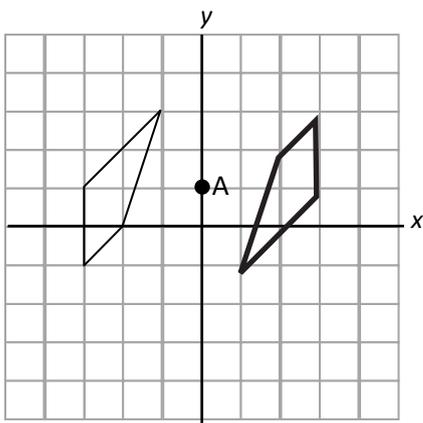
3. Translate the figure $(-3, -2)$.



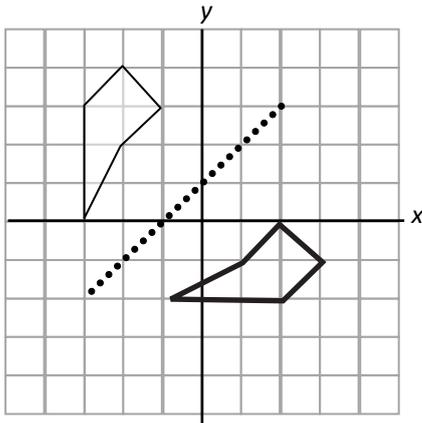
4. Rotate the figure -90° about point A.



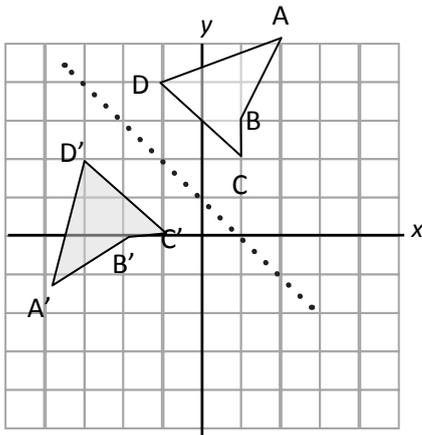
5. Rotate the figure 180° about point A.



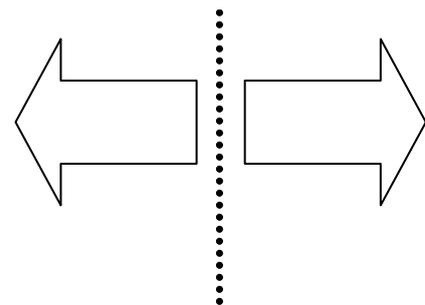
6. Reflect the figure across the given line.



7. Draw the line of reflection.



8. Danny created this image of arrows by reflecting it over the y-axis.



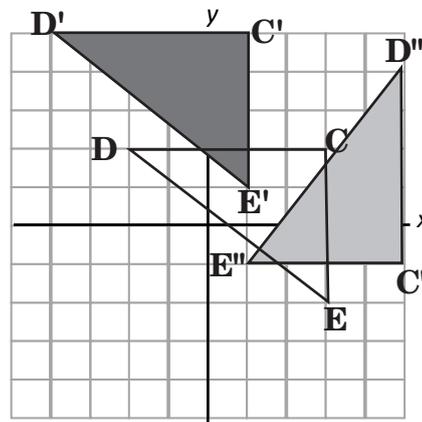
- a. Would it be possible to make the same transformation using only a translation? Why or why not?

No, a translation keeps the image identical and will not point the arrow in the opposite direction.

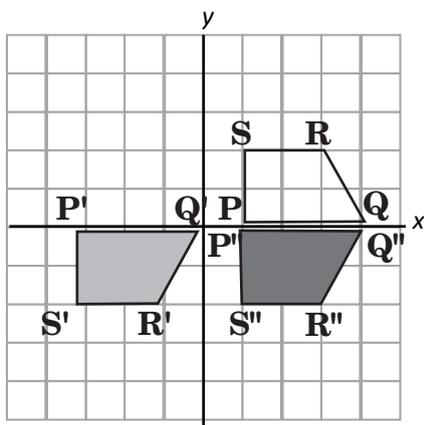
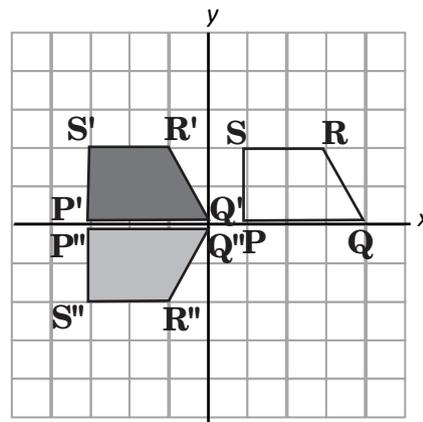
- b. If Danny wanted to create this image without using a reflection, what transformation(s) could he use instead?

Because the image is symmetrical, Danny can rotate the image 180° then translate it into the appropriate position.

5. Plot and join the coordinates of $\triangle CDE$. $C(3, 2), D(-2, 2), E(3, -2)$.
 - a. Translate $\triangle CDE$ 2 units left and 3 units up to form $\triangle C'D'E'$.
 - b. Rotate $\triangle C'D'E'$ -90° about the origin forming $\triangle C''D''E''$



6. Plot and join the points to the shape. $P(1, 0), Q(4, 0), R(3, 2), S(1, 2)$.
 - a. Translate the image 4 units left forming $P'Q'R'S'$
 - b. Reflect the image across the x-axis forming $P''Q''R''S''$. Shade in this figure.



- c. Plot figure PQRS again on the second Cartesian plane.
- d. Repeat steps a. and b. but start with the reflection, then the translation. (Do step b then step a)

e. Compare the final images. Are they the same? Explain.

Yes the final image is the same since the transformations were the same. The difference would be the in between image.



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