Important Concepts . . .

Preview Review

Mathematics Grade 7

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

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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
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Preview/Review W3 - Lesson 5
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Preview/Review Concepts for Grade Seven Mathematics

W3 – Lesson 5:

Transformations

W3 – Lesson 5: Transformations

Objective:

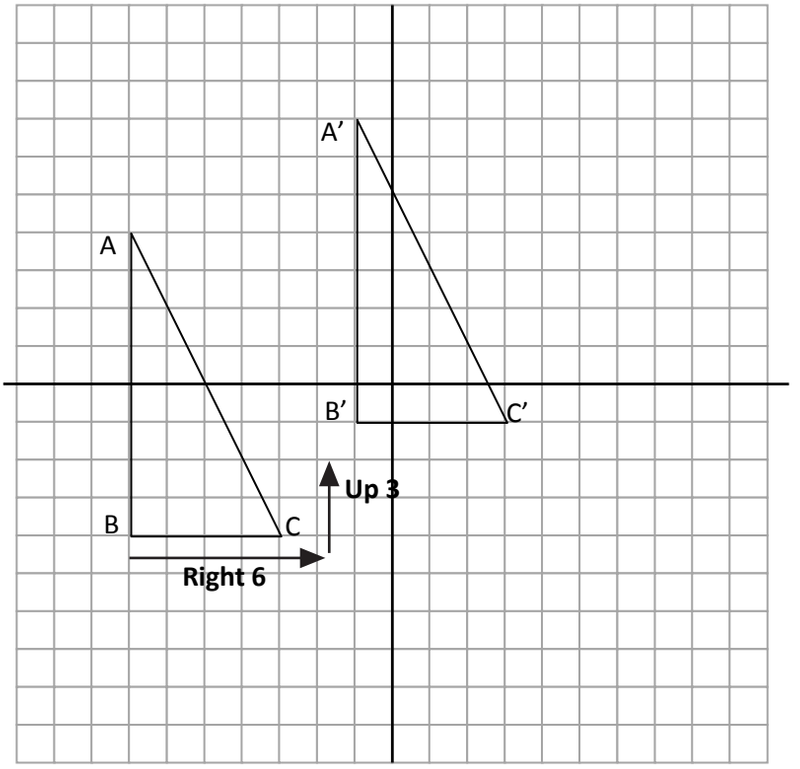
- *I can move points on a cartesian plane.*

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.

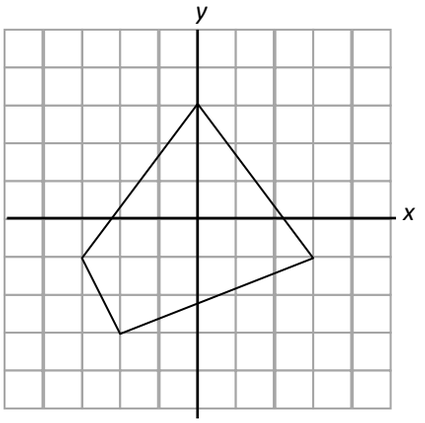
Example: A triangle △ ABC shown below has been moved 6 units to the right and 3 units up. If the coordinate of angle B is (-7, -4), what are the coordinates of angle B'.

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



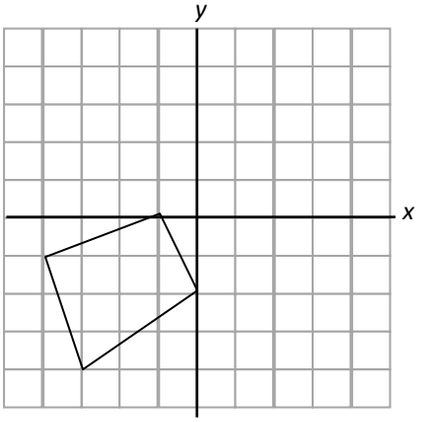
Practice:

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

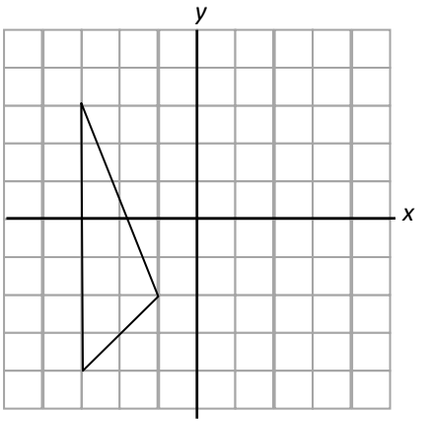


Note: When translating a figure x refers to the horizontal movement.
+ = right, – = left
y refers to the vertical movement
+ = up, – = down

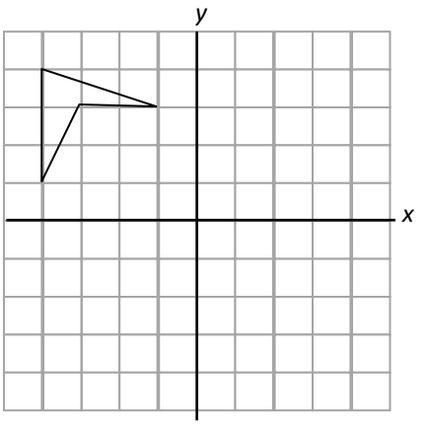
2. Translate the figure (4, 0).



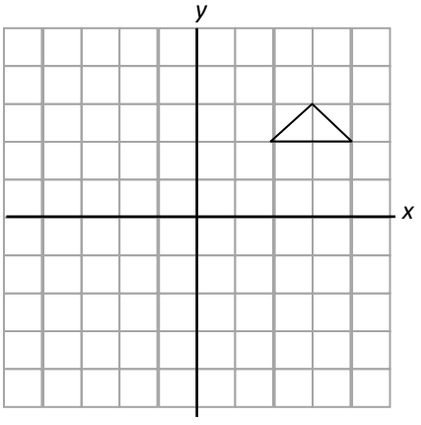
3. Translate the figure (5, 2).



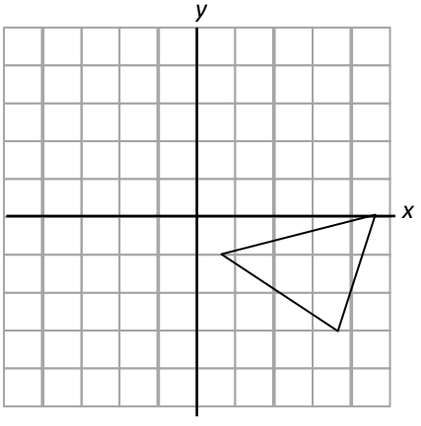
4. Translate the figure (4, -6).



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



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



Objective:

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

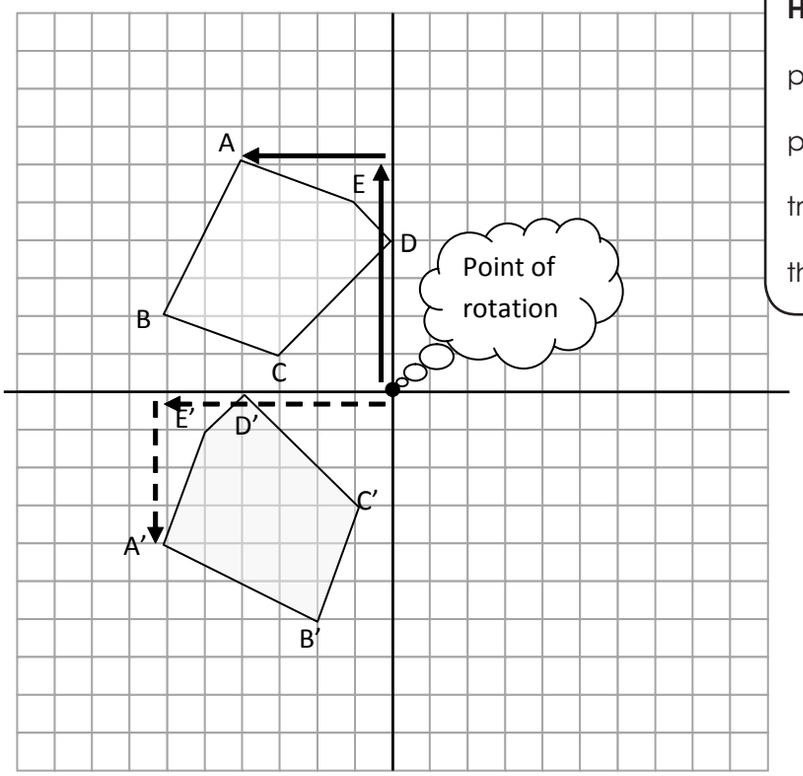
Rotations

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'?

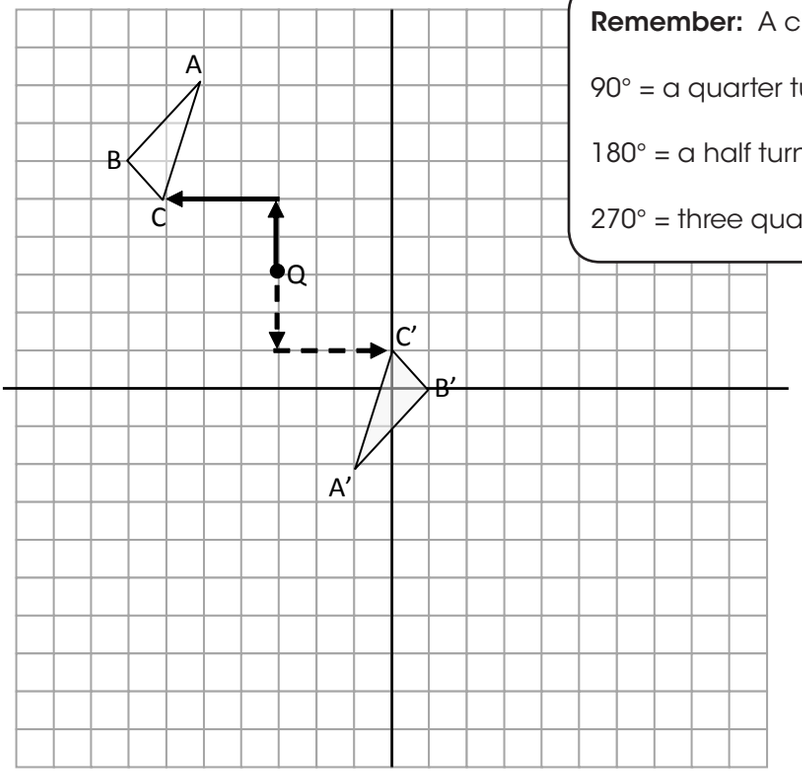
Answer: From the point of rotation, the distance to point A is 6 up and 4 across. Rotating the arrows counterclockwise 90° (or +90°,) but still starting from the point of rotation, has the arrows pointing at (-6, -4).

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°.

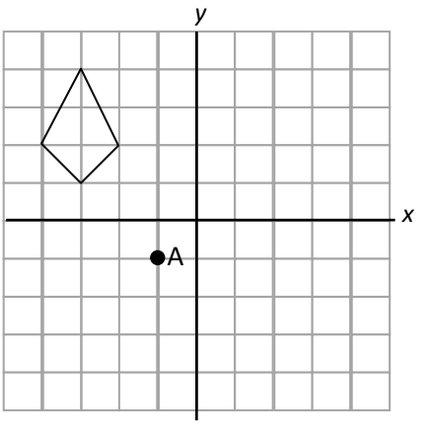
90° = a quarter turn

180° = a half turn

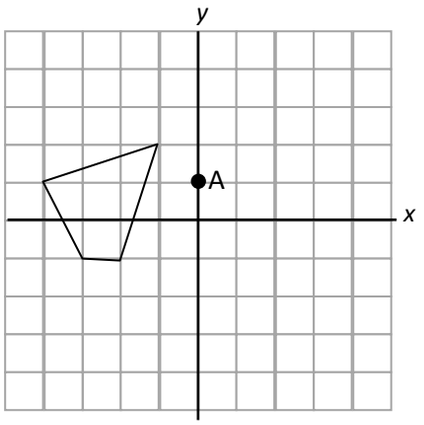
270° = three quarters turn

Practice:

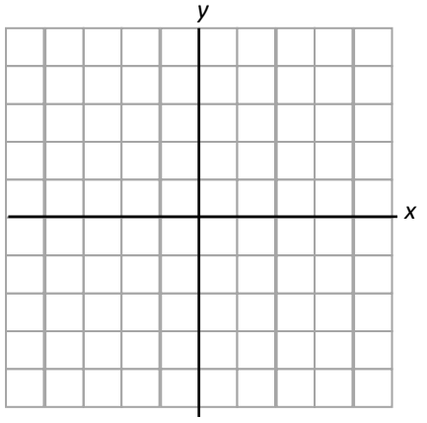
1. Rotate the figure 90° clockwise about point A.



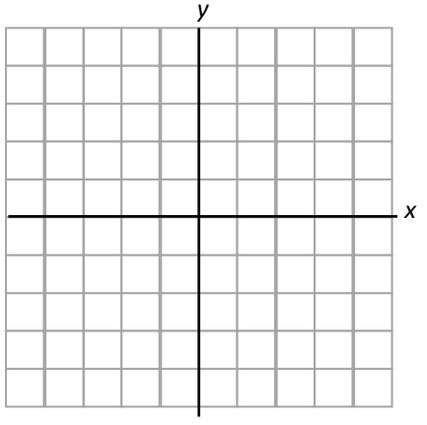
2. Rotate the figure 180° about point A.



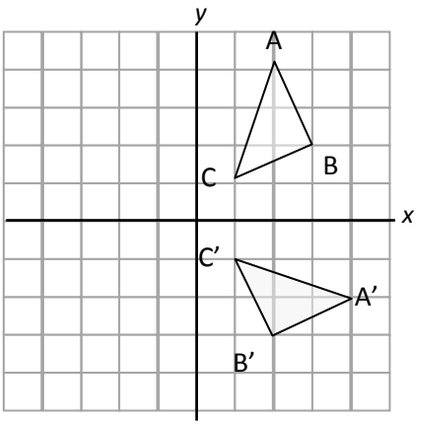
3. Plot the points W(2, 0), X (5, 0), Y (1, 3). Rotate the figure 180° about the origin.



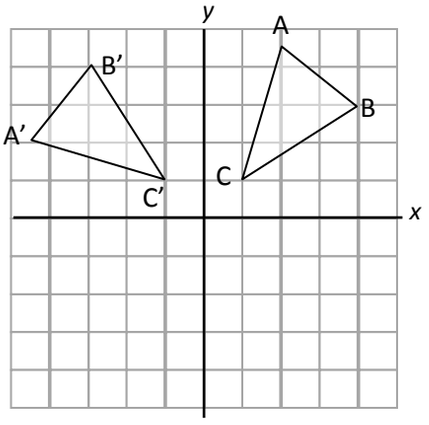
4. Plot A(1, -2), B(0, 2), C(3, 2), D(3, -3). Rotate the figure 90° about the origin.



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



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



Objective:

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

Reflections

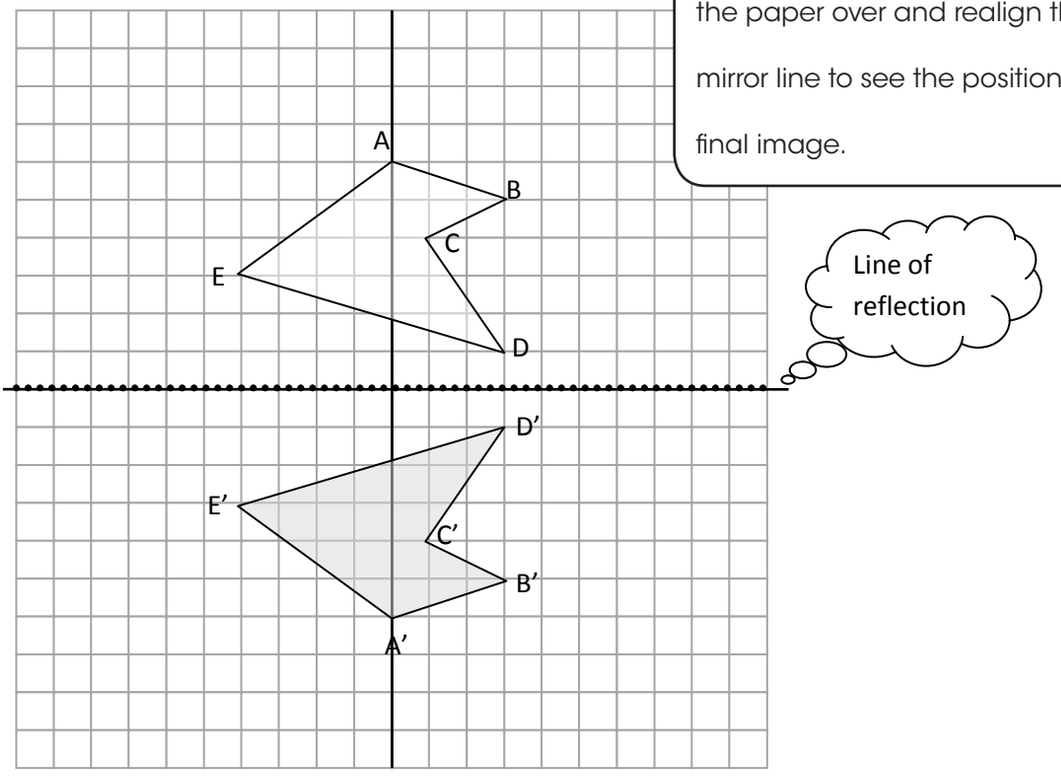
A **reflection** or flip, creates a mirror image of the shape. The mirror line would be a line of symmetry for the shape and its image.

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

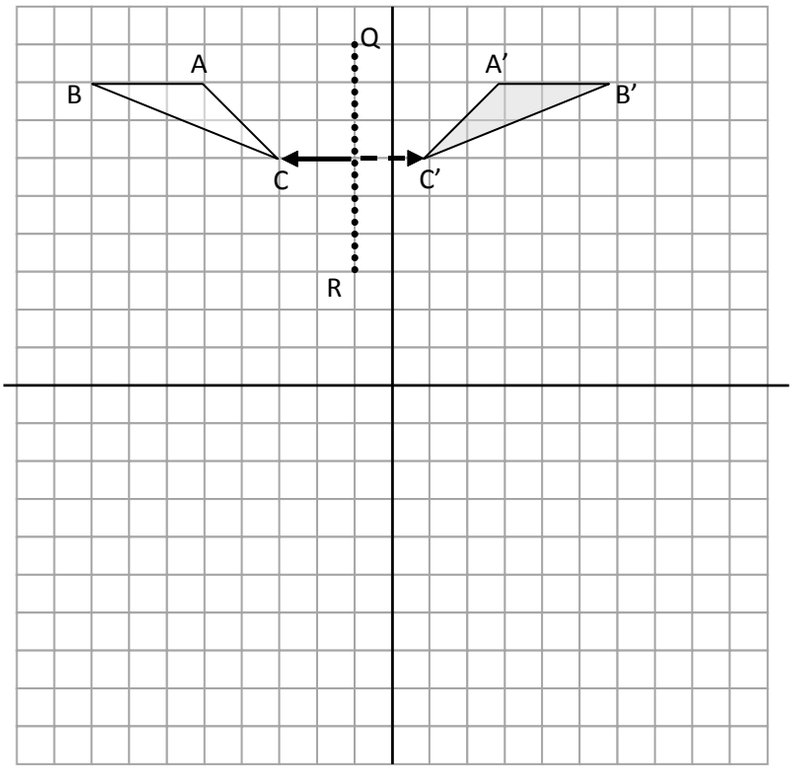
Answer: From the line of reflection, the perpendicular distance to point A is 6. Which means point A' would be 6 units in the opposite direction from the line of reflection.

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.

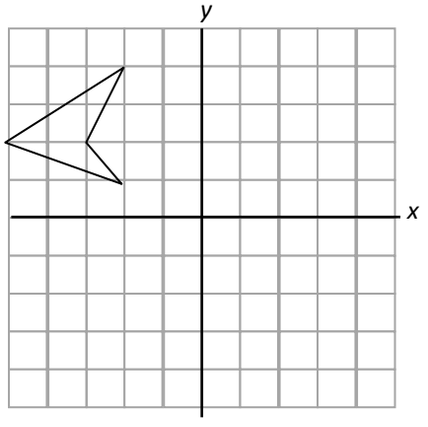


Example 2: Draw triangle A'B'C' when triangle ABC is reflected across line QR.

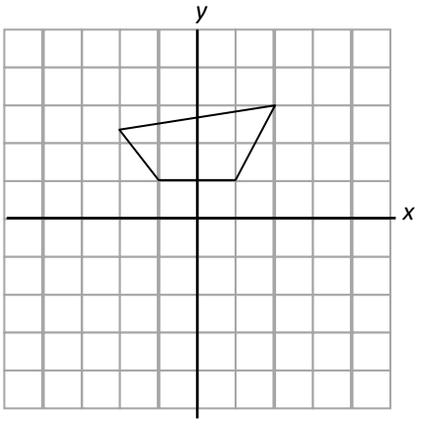


Practice:

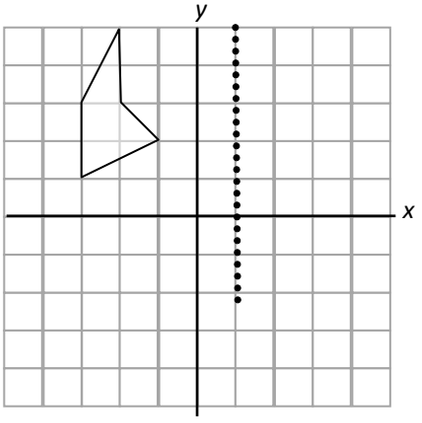
1. Reflect the figure across the y-axis.



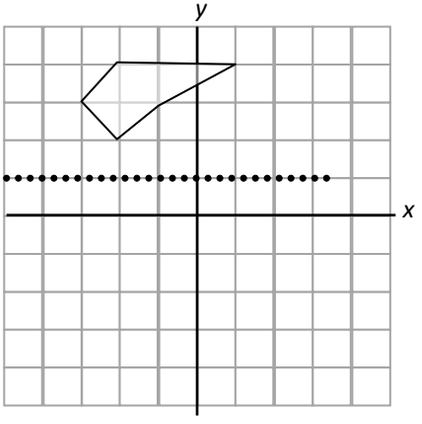
2. Reflect the figure across the x-axis.



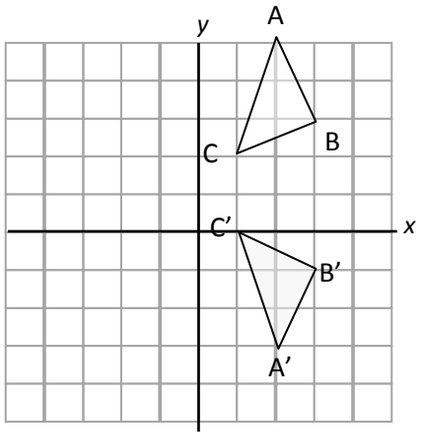
3. Reflect the figure across the given line.



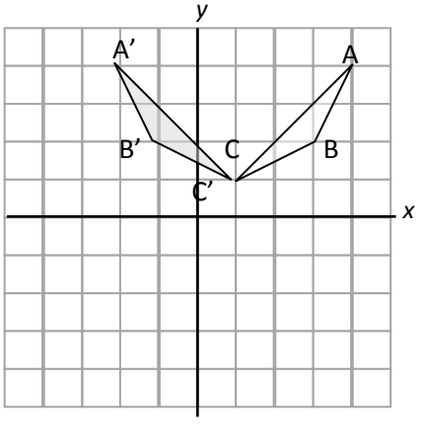
4. Reflect the figure across the given line.



5. Draw the line of reflection.



6. Draw the line of reflection.



Summary and Practice:

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

1. Fill in the blanks.

   a. A word describing a transformation where a figure stays the same except for its location is _____.

   b. If point A(5, 0) was translated (2, -1) the new coordinates for A' would be _____.

   c. The point that a rotation occurs around is called the _____. It does not always have to be the origin.

   d. A negative rotation means the image is turned in a _____ direction.

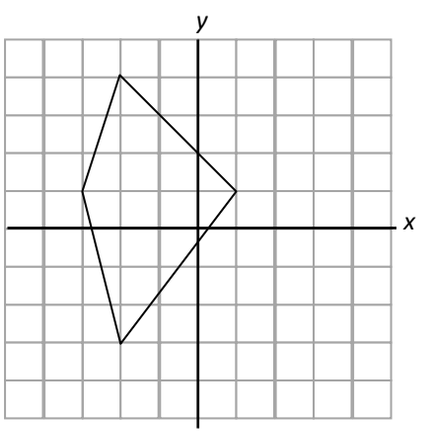
   e. Rotating an image -90° has the same result as rotating it _____°.

   f. The line used to create a mirror image is called a _____.

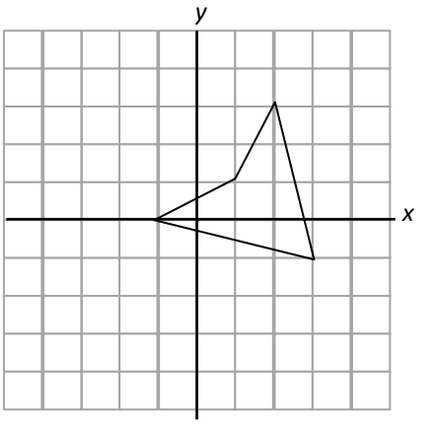
   g. If point G(-4, 2) was reflected across the y-axis, the coordinates of point G' would be _____.

   h. If point H(3, -5) was reflected across the x-axis, the coordinates of point H' would be _____.

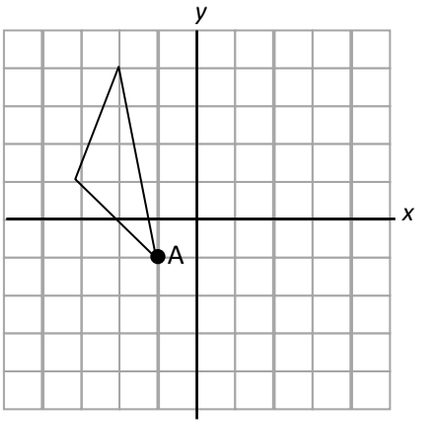
2. Translate the figure (4, 1).



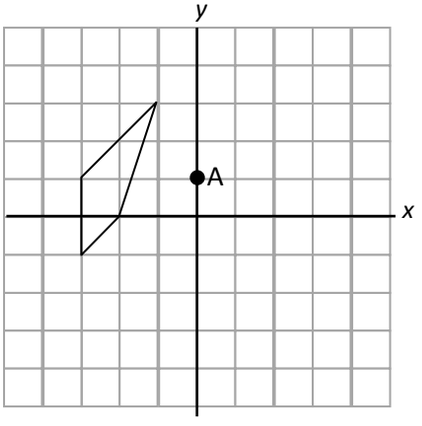
3. Translate the figure (-3, -2).



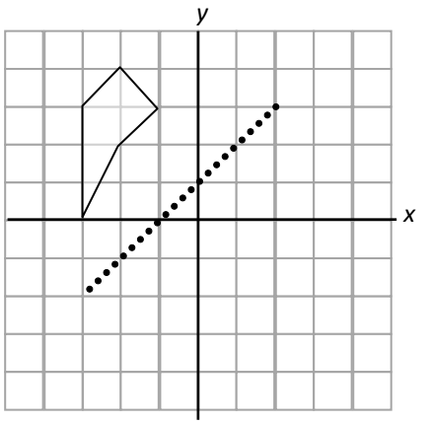
4. Rotate the figure -90° about point A.



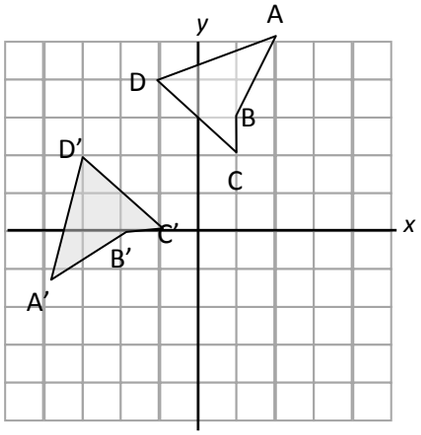
5. Rotate the figure 180° about point A.



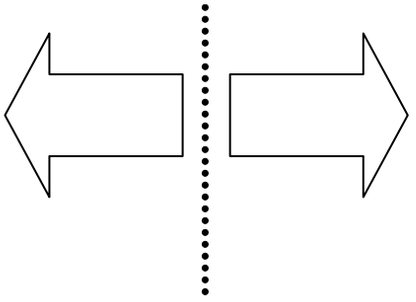
6. Reflect the figure across the given line.



7. Draw the line of reflection.



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



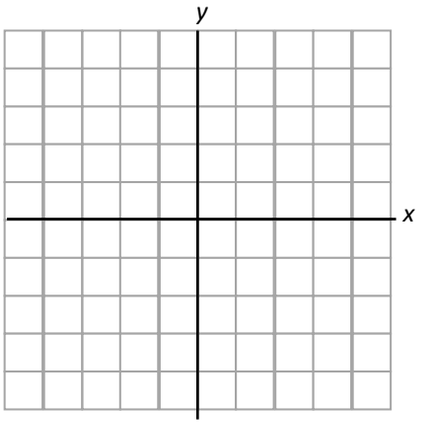
a. Would it be possible to make the same transformation using only a translation? Why or why not?

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

5. Plot and join the coordinates of △CDE. C(3, 2), D(-2, 2), E(3, -2).

   a. Translate △CDE 2 units left and 3 units up to form △C'D'E'.

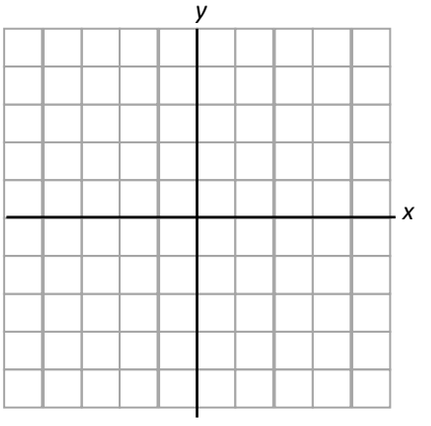
   b. Rotate △C'D'E' -90° about the origin forming △C"D"E"

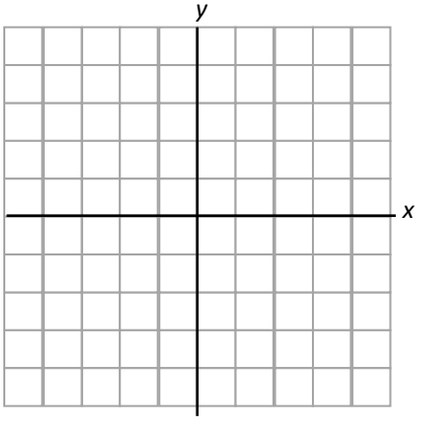


6. Plot and join the points to the shape. P(1, 0), Q(4, 0), R(3, 2), S(1, 2).

   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.

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