

Vertical Progression:

<p>6th Grade</p>	<p>ELG 6.1 Understand ratio concepts and use ratio reasoning to solve problems.</p> <ul style="list-style-type: none"> ○ 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”
<p>7th Grade</p>	<p>ELG 7.1 Analyze proportional relationships and use them to solve real-world and mathematical problems.</p> <ul style="list-style-type: none"> ○ 7.RP.A.2 Recognize and represent proportional relationships between quantities. ○ 7.RP.A.2.a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. ○ 7.RP.A.2.b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. <p>ELG 7.5 Draw, construct, and describe geometrical figures and describe the relationships between them.</p> <ul style="list-style-type: none"> ○ 7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
<p>8th Grade</p>	<p>ELG 8.7 Understand congruence and similarity using physical models, transparencies, or geometry software.</p> <ul style="list-style-type: none"> ○ 8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations: ○ 8.G.A.1.a Lines are taken to lines, and line segments to line segments of the same length. ○ 8.G.A.1.b Angles are taken to angles of the same measure. ○ 8.G.A.1.c Parallel lines are taken to parallel lines. ○ 8.G.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. ○ 8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. ○ 8.G.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. ○ 8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. <i>For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</i>
<p>Geometry</p>	<p>ELG.MA.HS.G.1 Experiment with transformations in the plane.</p> <ul style="list-style-type: none"> ○ G-CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). ○ G-CO.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

ELG 8.7: Understand congruence and similarity using physical models, transparencies, or geometry software

ELG.MA.HS.G.2 Understand congruence in terms of rigid motions.

- **G-CO.6.** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

ELG.MA.HS.G.5 Understand similarity in terms of similarity transformations.

- **G-SRT.3** Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Students will demonstrate command of the ELG by:

- Verifying experimentally the properties of rotations, reflections, and translations.
- Describing the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- Using informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
- Describe a sequence that exhibits the congruence or similarity between two given figures.

Vocabulary:

- | | | |
|----------------------|-----------------------|---------------------------|
| • angles | • congruent figures | • reflections |
| • adjacent | • coordinates | • rigid transformations |
| • alternate exterior | • counter-clockwise | • rotations |
| • alternate interior | • deductive reasoning | • scale factor |
| • complementary | • dilation | • sequence |
| • congruent interior | • experiment | • similar |
| • corresponding | • image | • similar triangles |
| • exterior | • line of reflection | • transformations |
| • interior | • line segments | • translation |
| • supplementary | • lines | • transversal |
| • vertical | • parallel lines | • two-dimensional figures |
| • center of rotation | • pre-image | • verify |
| • clockwise | • properties | |
| • congruent | • proportional | |

Sample Instructional/Assessment Tasks:

1) Standard(s): 8.G.3, 8.G.4

Source: <http://www.insidemathematics.org/assets/common-core-math-tasks/aaron's%20designs.pdf>

Item Prompt:

Aaron's Designs

This problem gives you the chance to:

- draw reflections and rotations of a given figure on a grid
- describe transformations needed to make a given pattern

A) Aaron is drawing some designs for greetings cards.

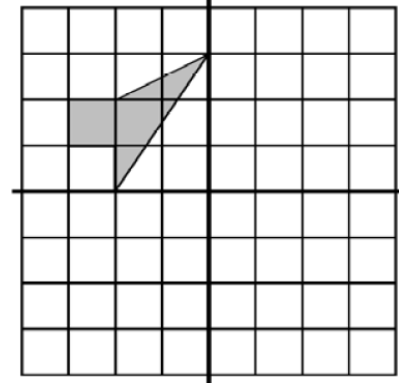
He divides a grid into 4 quadrants and starts by drawing a shape in one quadrant.

He then reflects, rotates or translates the shape into the other three quadrants.

Finish Aaron's first design by reflecting the gray shape over the vertical line.

Then reflect both of the shapes over the horizontal line.

This will make a design in all four quadrants.

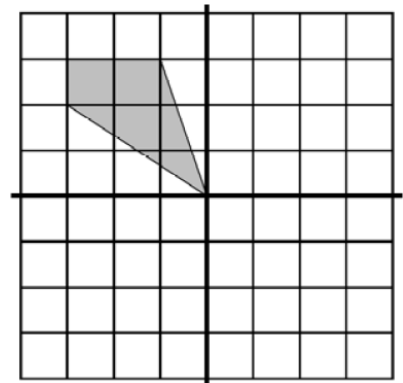


B) To finish drawing Aaron's second design, rotate the gray shape $\frac{1}{4}$ of a turn in a clockwise direction about the origin. Then draw the second shape.

Rotate the second shape $\frac{1}{4}$ of a turn in a clockwise direction about the origin. Then draw the third shape.

Rotate the third shape $\frac{1}{4}$ of a turn in a clockwise direction about the origin. Then draw the fourth shape.

This will make a design in all four quadrants.

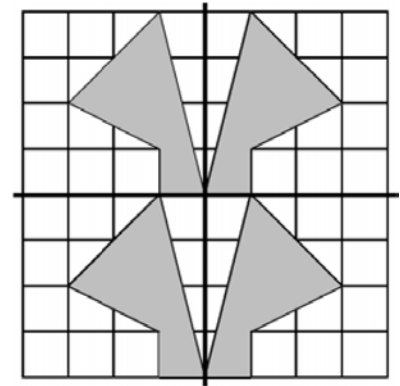


ELG 8.7: Understand congruence and similarity using physical models, transparencies, or geometry software

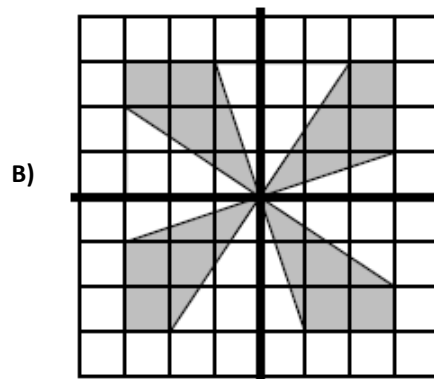
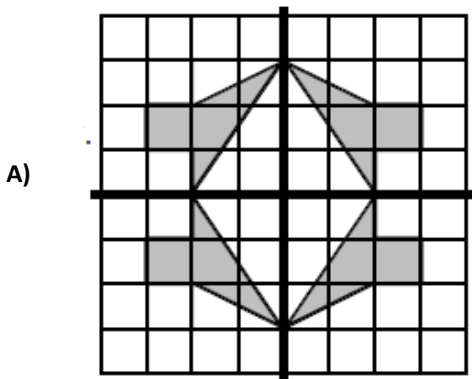
C) This is Aaron' third design.

He started with one gray shape in the top left hand quadrant of the grid and transformed it to make the design.

Describe the transformations that Aaron may have used to draw this design.



Correct Answer:



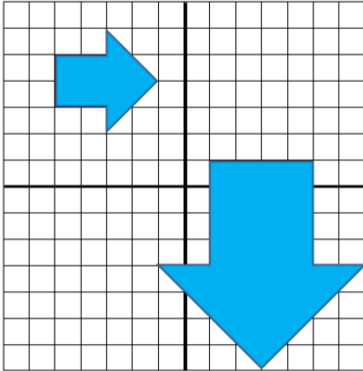
C) There are multiple correct responses. One example might be: "Reflects the shape over the vertical line, then translates/slides the 2 shapes down 4 squares."

2) Standard(s): 8.G.4

Source: <https://www.illustrativemathematics.org/content-standards/8/G/A/4/tasks/1946>

Item Prompt:

Determine, using rotations, translations, reflections, and/or dilations, whether the two polygons below are similar. The intersection of the dark lines on the coordinate plane represents the origin (0,0) in the coordinate plane.



Correct Answer:

Yes, the figures are similar. Justifications may vary. All should include a dilation of either $\times 2$ or $\times \frac{1}{2}$ and either a reflection over a line with slope = 1 or -1 or a rotation equivalent to 90° clockwise.