

## M153: Reasoning and Proof Through Similarity Post-Badge Task

### Reflecting on Badge Learning

Now that you have learned more about congruence, respond to the questions that follow. These are the same questions you responded to before the start of this badge.

### The Task

In this task, you will use the “golden ratio” to create a design.

**QUESTION 1** The “golden ratio” is sometimes referred to as “the perfect proportion.” Use an internet search to

- (a) Determine what the golden ratio is.
- (b) Identify 3-5 real world instances of the golden ratio. List or draw some examples of what you discover.

*(Optional)*



*Answers will vary. Possible student response:*

- (a) The golden ratio is a ratio that has an approximate value of 1.618.
- (b) Some real world examples of things that use the golden ratio are the ratio of face height to width, our DNA, and the spirals in a sunflower.

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**QUESTION 2** The value of the golden ratio is approximately 1.618. Recreate the XQ Institute logo shown at a scale that is 1.618 times larger than the one shown here.



*Answers will vary. Possible student response:*

I created this image at 162% of its original dimensions since the golden ratio requires an increase by a factor of 1.618.



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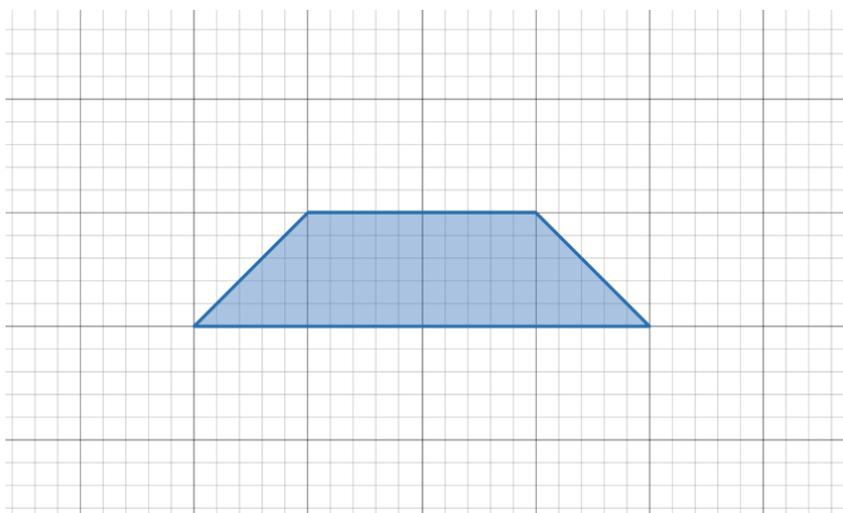
### QUESTION 3

Apply the golden ratio (scale of 1.618:1) to create a design starting with the given trapezoid. You can do this by hand using the grid on the next page OR you can do it digitally using the [Logo Design Golden Ratio](#) file in Desmos.

- Use the golden ratio to create a design that has at least three different-sized trapezoids (including the original trapezoid).
- Include at least two other transformations (translation, rotation, reflection) in the creation of your design.
- Create a summary of the transformations that you used in the notebook below. For each of the transformations, be sure to include:
  - The location of the center of the dilation and the scale used.
  - The distance and direction of any translations.
  - The center, number of degrees and direction (clockwise, counterclockwise) for any rotations you used.
  - The line of reflection for any reflections you used.



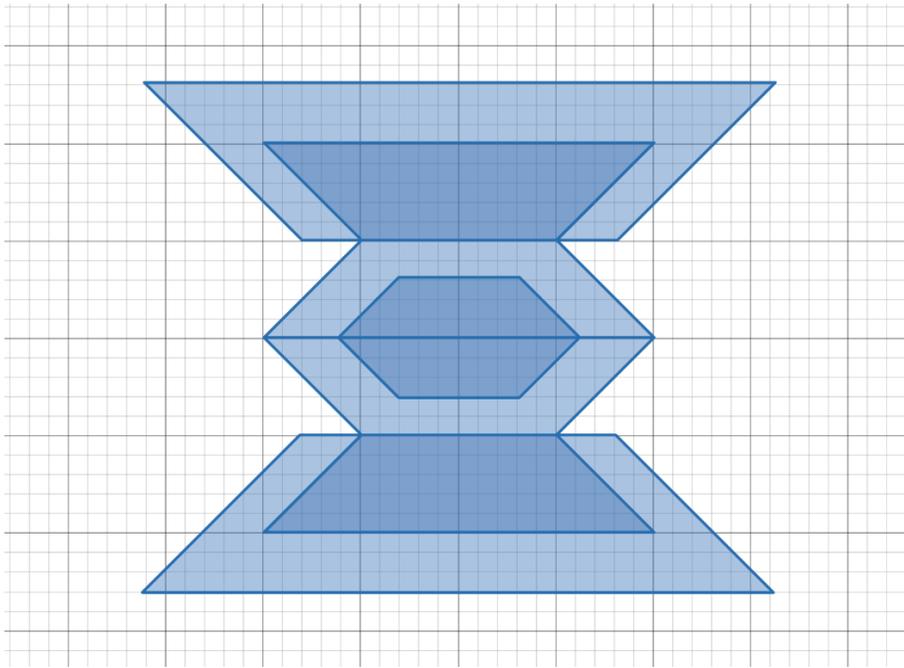
*My "Reflections"*



*Answers will vary. Possible student response [See following page for the design matching this description]:*

I created my design in Desmos. I started by creating a dilation of the original trapezoid using a scale of  $1/1.618$  to make a smaller version with a center of dilation at the midpoint of the base of the original trapezoid. I then reflected that smaller trapezoid over the line containing the base of the original trapezoid. To create a symmetric design, I reflected the original trapezoid also over that line. Finally, I reflected the top and bottom trapezoid over the line containing the upper and lower most sides. And I did a dilation of those to increase the size by a factor of 1.618.

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**QUESTION 4** What else did you learn that was not reflected in Questions 1-3?



*Answers will vary. Possible student response:*

- I didn't use any rotations in my design here, but I learned that you can rotate objects about a point in two directions -- either clockwise or counterclockwise.

**QUESTION 5** Compare your answers to these questions now to your answers from the earlier attempt. What do you notice about your progress?



*Answers will vary. Look for students to explain what they know now compared to what they knew when responding to the pre-test.*