4 Performance Task (continued)

The Magic of Optics

Look at yourself in a shiny spoon. What happens to your reflection? Can you describe this mathematically? Now turn the spoon over and look at your reflection on the back of it. What happens?

Part 1: The Baseline

Examine your reflection in a regular, flat mirror. Have your partner measure the distance from your face to the mirror and record the distance. Now, center your reflection in the mirror and have your partner mark a center point on the mirror. Note the distances between key features (for example, from your nose to your eyebrow or your lip to the bottom of your glasses). Have your partner mark this distance and record a description of the measurement. Using this measurement to guide you, sketch the key features of your face to scale on the coordinate axes using the marked center point as your origin.





The Magic of Optics

Part 2: The Transformation

- 1. Now, look at your reflection on the back of a shiny spoon, making sure you are holding the spoon the same distance from your face as you held the mirror. Center your reflection in the spoon as you did for the mirror and mark your origin. Mark and measure the same key features that you did using the flat mirror. Are the two measurements the same? Are your two reflections congruent or similar? Explain your reasoning.
- 2. Find a scaling factor for your reflection by taking the ratio of the measurements of your key features. Describe in words the transformation of your image from the mirror to the spoon. Now describe that transformation mathematically. $(x, y) \rightarrow (?, ?)$



4 Performance Task (continued)

Using this transformation and your original sketch on the coordinate plane, sketch your reflection from the back of the spoon onto a coordinate plane.

3. Extend your investigation by looking at your reflection on the front of the spoon. Repeat the measurement process as in Step 1. Compare this measurement with that taken with the flat mirror and the back of the spoon. What is the same? What additional transformation is taking place? Describe this in words and then mathematically. $(x, y) \rightarrow (?, ?)$

Using this transformation and your original sketch on the coordinate plane, sketch your reflection from the spoon onto a coordinate plane.

