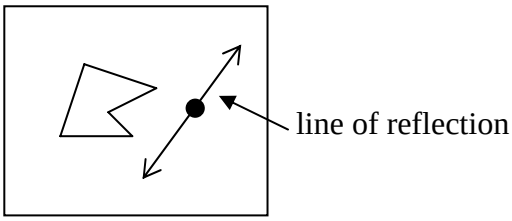
Reflections

1. a. Draw a simple polygon on a sheet of patty paper. Then draw a line on the patty paper outside the figure and place a point on the line.

Example



b. On a second sheet of patty paper, trace the polygon, the line of reflection and the point.

c. Flip the second piece of patty paper over and place it under the first so that the lines and the point coincide. Now trace the image onto the first patty paper.

d. Connect a point in the pre-image with its corresponding image point. Repeat this for two other points on the original polygon.

e. Compare the lengths of each segment connecting a point with its image. Are the segments all the same length?

f. Measure the angle formed by the line of reflection and each of the segments connecting a point and its image. What are the measures of these angles? How do the measures compare?

g. Fold the patty paper along the line of reflection. What can you say about the size of the image compared to the pre-image? Is a reflection an isometry?

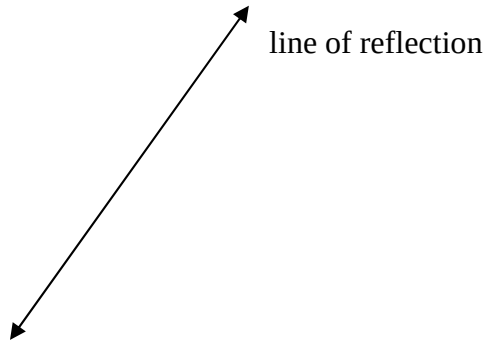
h. The line of reflection divides each segment connecting a point and its image into two parts. Compare the lengths of the two parts of each segment.

i. Complete the following statement:

The line of reflection is the _____ _____ of every segment connecting a point of the pre-image and its image.

Reflections (Continued)

2. a. Draw a simple polygon on one side of the line below. Label the vertices, A, B, C, etc.

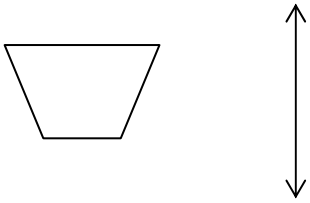


b. Place a Mira™ on the line of reflection and mark the vertices of the image. Then complete the image and label the corresponding vertices, A', B', C', etc.

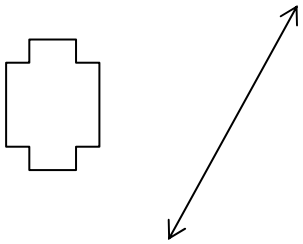
c. Write a statement comparing the size, position relative to the line of reflection, and orientation of the figure and its image.

3. Use your Mira™ to construct the image of each figure over the given line of reflection.

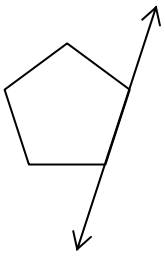
a.



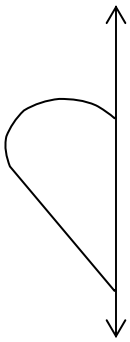
b.



c.



d.



Reflections (Continued)

4. A reflection can be used to find the shortest path. Suppose that Bob is camping along the river. He sets up his tent and builds a fire at point F. He walks through the woods picking berries for his dinner. When he looks back at the camp, he notices that a spark has set his gear on fire. He needs to get water from the river and put out the fire as soon as possible. He needs the shortest path from point B (the berries) to the river and then to point F (where his gear is on fire).

To find the shortest path:

a. Reflect point F over the line that is the river's edge.

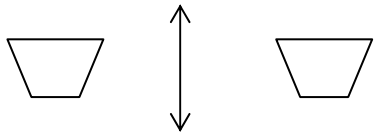
b. Draw $\overline{F'B}$.

c. Label the intersection of the river edge and $\overline{F'B}$ as point S.

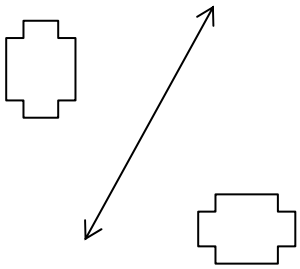
d. Bob should run from B to S, pick up the water in his berry bucket, and then run from S to F, to put out the fire. Draw his path.

Answers:

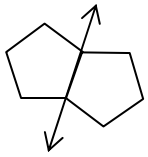
1. e. No, the segments are not all the same length.
   f. The angle measures are congruent (180º).
   g. The image is congruent to the pre-image, therefore, the reflection is an isometry.
   h. The lengths of the two parts of each segment are equal.
   i. The line of reflection is the <u>perpendicular bisector</u> of every segment connecting a point of the pre-image and its image.
2. a.-b. Answers will vary.
   c. The size of the pre-image and image are the same, the distance from the line of reflection is the same, and the orientation of the image is opposite the orientation of the pre-image.
3. a.



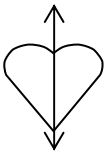
b.

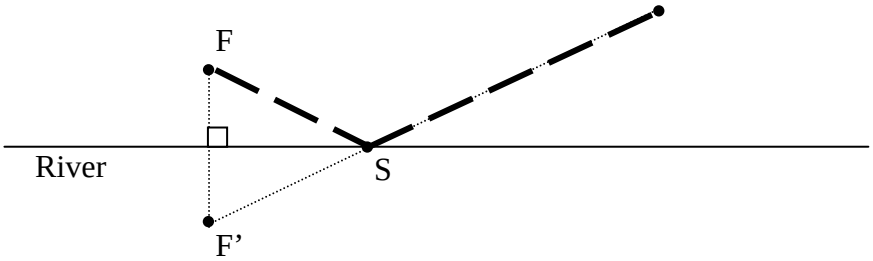


c.



d.



B

4.