

LessonTitle: Paper folding 2D and 3D Shapes		Geo 1.8
Utah State Core Standard and Indicators Geometry Standards 3.1 Process Standards 1-4		
Summary		
This lesson focuses on using vocabulary to describe shapes and angles. Students are involved in folding paper and providing instructions to a partner to fold a similar shape. Their use of clear mathematical communication will make the job easier.		
Enduring Understanding	Essential Questions	
In order to communicate clearly and develop arguments about geometric relationships, we must analyze and then express specific characteristics and properties.	How do we describe, classify, and understand relationships among two and three dimensional objects?	
Skill Focus	Vocabulary Focus	
<ul style="list-style-type: none"> • Communication about mathematical thinking. • Use mathematical language to express ideas precisely. • Describing and classifying 2D and 3D shapes 		
Assessment		
Materials: Blank 8.5 x 11 inch paper for 2D and 3D paper folding, blank 5.5 in x 8.5 in paper for the heart folding.		
Launch		
Explore		
Summarize		
Apply		

Directions:

Part I.

- Student pairs stand back to back and decide who is sender and who is receiver.
- The sender gives 6 or 7 folding instructions while simultaneously folding their own paper. The suggestion may be made for them to fold the paper to make a 3D object such as an airplane, paper hat, origami, or anything else their imagination allows.
- Receiver will follow instructions. Receiver must remain silent and may not ask for clarification or turn around to peek.
- When folding is finished partners may compare foldings.
- Students trade roles and repeat the exercise.

Discourse Suggestions: How many were successful? What were the problems in achieving success? What is needed to communicate effectively?

Part II. After discussing the experience, have students do the first activity below. The idea is to define classes and properties of shapes, the 2nd level (analysis) of the van Hiele stages of geometric thought.

Part III. Have students do the paper heart folding activity in pairs. After defining some geometric terms, they should have more success. (Or the teacher can read instructions without demonstrating, thus forcing students to listen to and interpret the words the teacher is using—in order to successfully create a heart.)

- Show student pairs a copy of the heart.
- One student will fold the paper, the other will write down what shapes they used for the folds and the order in which they were done.
- Tell students to make the heart by folding the 2.5 in by 8.5 in paper keep track of what geometric shapes and/or rotations they used to achieve their heart.
- Have student pairs compare results and descriptions of folds.
- Have the entire class decide on the best and easiest way to make the heart and then write up the steps to successful paper heart folding.

Discourse Suggestions: What were the problems in achieving success? How many folds were needed? What geometric shapes were used for the folds? What is needed to communicate effectively? How does paper folding help students learn math?

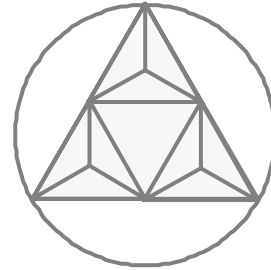
Possible Instructions for folding the heart:

- Fold the 2.5 in x 8.5 in paper in half (bring the 2.5 in sides together). Open out again.
- Hold the paper in landscape view. Fold the top right and top left edges of the paper down to meet the center crease. Fold. It should now look like a tent (pentagon).
- Turn it over.
- Rotate it 180 degrees. Fold the 4 corners at the top down to create four small triangles on each corner.
- Turn the paper over and admire your heart!

Finding Shapes

Name all the figures that you recognize in the drawing. Then define the terms below. You are defining specific classes and properties of shapes.

Shape



Circle

Triangle

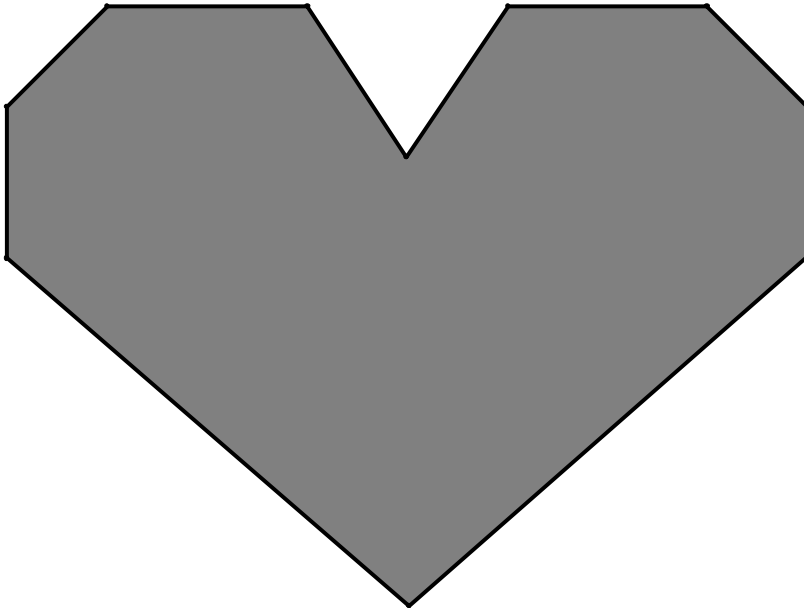
n-gon

parallelogram

rhombus

trapezoid

The Folded Heart



The Folded Heart

