

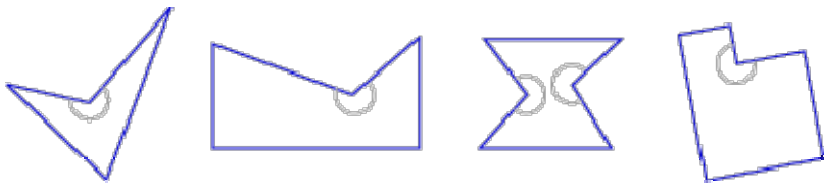
# Classifying Polygons

(adapted from <http://learner.org/courses/learningmath/geometry/session3/index.html>)

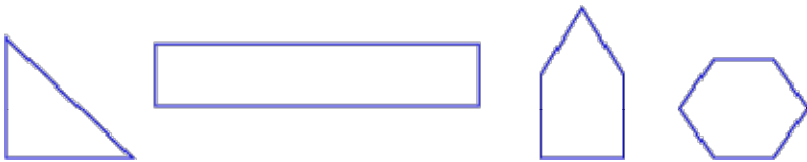
## Properties of Polygons

Polygons can be divided into groups according to certain properties.

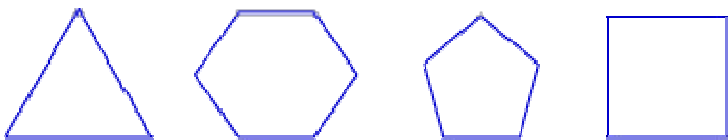
Concave polygons look like they are collapsed or have one or more angles dented in. Any polygon that has an angle measuring more than  $180^\circ$  is concave. These are concave polygons:



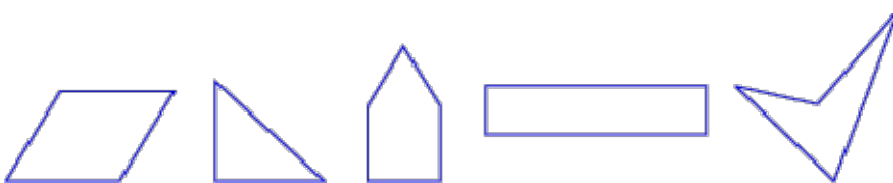
These polygons are not concave (i.e. they are convex):



Regular polygons have sides that are all the same length and angles that are all the same size. These polygons are regular:

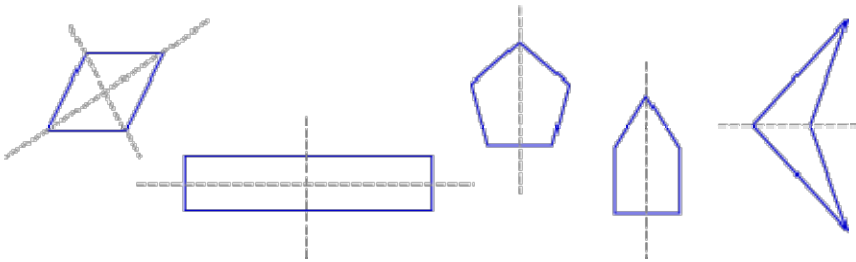


The polygons below are not regular. Such polygons can be referred to as irregular.

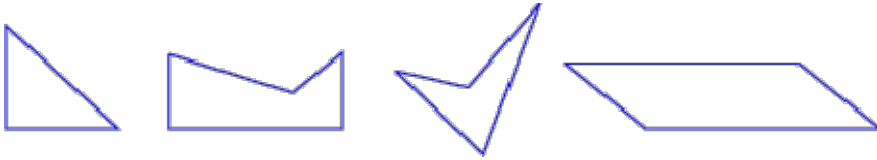


A polygon has line symmetry, or reflection symmetry, if you can fold it in half along a line so the two halves match exactly. The "folding line" is called the line of symmetry.

The polygons below have line symmetry. The lines of symmetry are shown as dashed lines. Notice that two of the polygons have more than one line of symmetry.

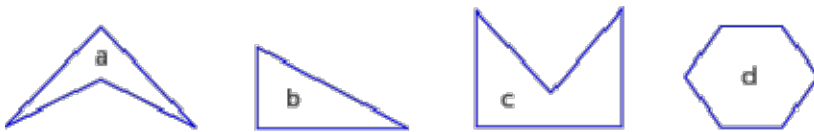


These polygons do not have line symmetry:

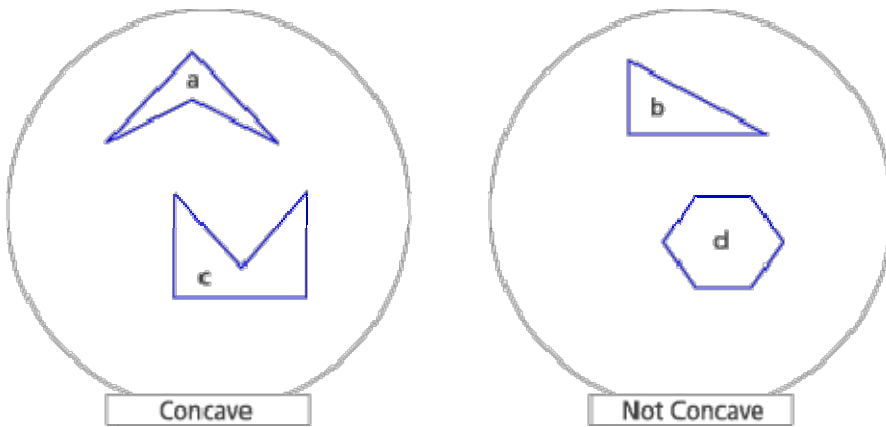


## Classifying Polygons

Consider the polygons below:



This diagram shows how these four polygons can be grouped into the categories Concave and Not Concave.



### Problem 1

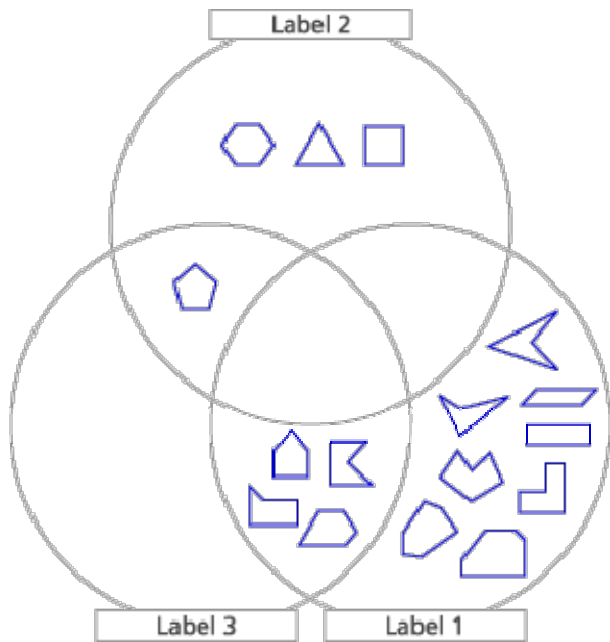
Make a diagram to show how these same four polygons can be grouped into the categories Line Symmetry and Not Concave. Use a circle to represent each category.

## Problem 2

Using the Large Venn diagram and page of shapes: Put each of the labels Regular, Concave, and Triangle next to one of the circles on the diagram. Place all the polygons in the correct regions of the diagram.

### Problem 3

Use the picture of a Venn diagram below:



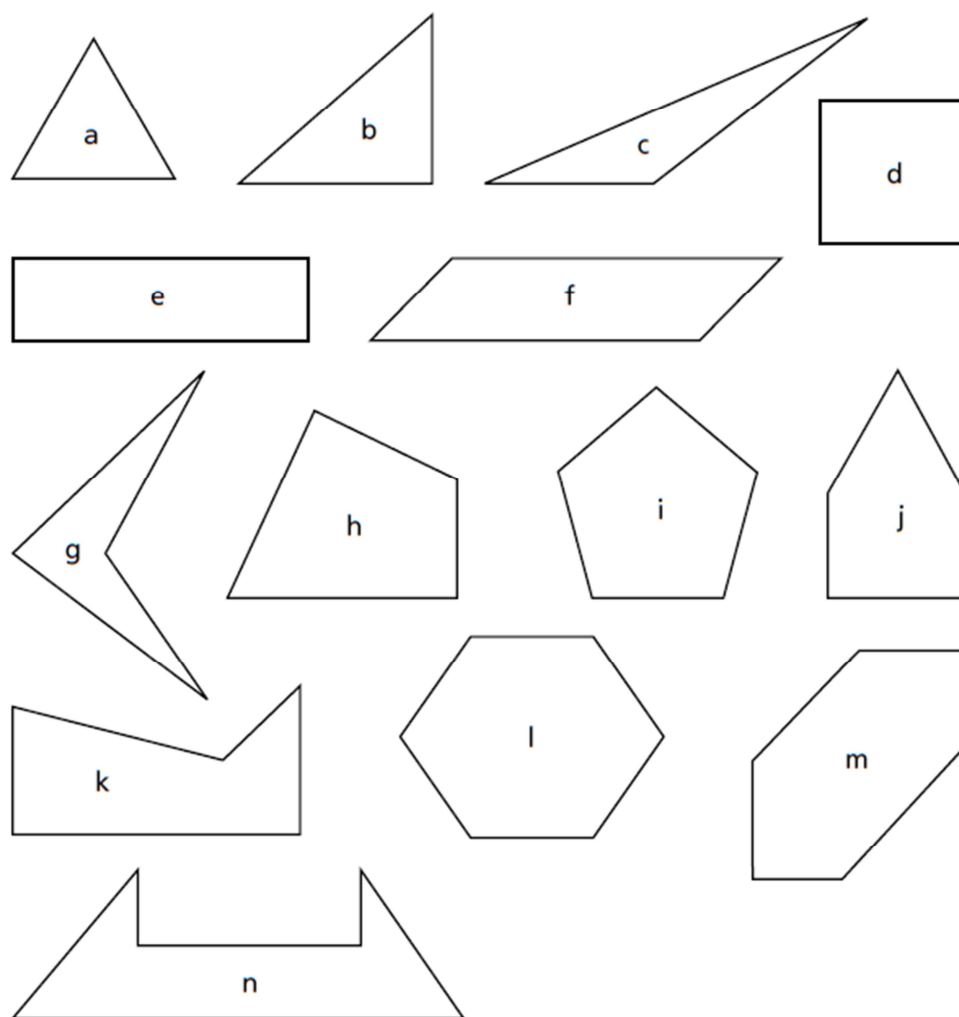
- Determine what the labels on this diagram must be.
- Explain why there are no polygons in the overlap of the Label 1 circle and the Label 2 circle.
- Explain why there are no polygons in the Label 3 circle that are not also in one of the other circles.

## Problem 4

Using the options for labels on the page of shapes, create a 3-circle Venn diagram in which none of the given polygons are placed in an overlapping region (that is, no polygon belongs to more than one category). (Polygons can be either in just one category or in none of the categories, i.e. outside the circles altogether.)

### Optional: Problem 5

Create a 3-circle Venn diagram in which all of the polygons are placed either in the overlapping regions or outside the circles (that is, no polygon belongs to just one category).



Regular	Concave	Triangle
Irregular	Not Concave	Not Triangle
Quadrilateral	Pentagon	Hexagon
Not Quadrilateral	Not Pentagon	Not Hexagon
Line Symmetry	No Line Symmetry	

