

## Math 344 - Day 1

1. Introduction / Syllabus / Modes of instruction
2. Symmetry can be thought of in two different ways:
  - a. A symmetry is a property of a figure.
  - b. A symmetry is an *isometry* (rigid motion) that maps a figure to itself
3. An *isometry* is a transformation that preserves angles and distances.
  - a. Flips (reflections) and rotations are examples of isometries.
  - b. If a flip or rotation takes a figure onto itself, it is a *symmetry* of that figure.

4. Consider the following figure:



- a. How many symmetries does this figure have?
  - b. Come to a consensus and describe each symmetry.
5. How should we determine whether two symmetries are *equivalent*?

Two symmetries of a figure are equivalent if...

6. Definition: Two symmetries of a figure are equivalent if they have the same effect on the figure.
7. If you want something more formal:

We can think of a symmetry as a special kind of function that takes each point of a figure as an input and gives a point of the figure (maybe the same) as an output. Then two symmetries would be the same if they were the same as functions (i.e. for each input, the two functions give the same output.)

8. Determine how many symmetries an equilateral triangle has. For each symmetry:
  - a. Write a verbal description of the symmetry.
  - b. Draw a diagram to illustrate the symmetry.
  - c. Create a symbol to represent the symmetry. The symbol should be simple enough to save writing but should be descriptive as well.
9. How do we know there are only six symmetries? Justify that there can be no more.
10. What happens if you combine two of the six symmetries? Is the combination a new symmetry or equivalent to one of the original six? Justify!