Why form categories? What goals do we have in forming a system of categories, such as the categories we constructed for the Geometry Walk?

Categories are useful for discussing and thinking about objects, elements, and concepts in geometry. Categories organize things and give us a common language to speak with. They differentiate between the geometric shapes and put a label on things, but they also point out the similarities.

We form categories so that we can observe similarities and differences between objects in order to compare and contrast them, to clarify the meaning of terms, and to make connections and associations between those objects. By classifying objects, categories allow humans to distinguish their properties, organize them, and identify objects. More generally, categories are a way of trying to make sense of information gathered. This organized system can become the basis of a universal language. It also can give us a glimpse into the thought process of the observer.

Without labeling objects and categorizing them, it would be very difficult to distinguish between the geometric shapes and to talk and think about such things, especially large concepts, in relation to and in comparison with one another. They not only provide a common language, but they give ways of explaining things.

In order to construct categories, we must generalize the qualities of objects. This process of generalizing can help us examine objects more carefully, be more observant, and learn that what we might think fits in one category may fit in another one, too. There are often laws that a category follows. (E.g., the interior angles of a triangle add up to 180°. A square has four equal sides with only four 90° angles interior to it. Cubes have 6 faces that are equal squares.) They can help us to recognize math in the real world, not just in the classroom, and to see that geometry is everywhere. More generally, categories help us learn how to mathematically understand the world.

Are there concerns we might have about categorizing?

It seems that categories may overlap and an object won't necessarily fit into just one category. The fact that things can fall into multiple categories can be limiting and exclusive. On the other hand, it is possible

that there are things that don't fit into any category, so that things can be left out or not fit in. Can categories be all encompassing, or must they always exclude something?

Another problem is that categorization might lead to over-generalization. There can be discrimination against different shapes; small details can be lost in the formation of categories.

Every individual person could have a different view of which category the shape should be placed in, depending on what aspect of the object they are looking at, so it can be hard for one person to use another person's categories.

What properties should a category or system of categories in geometry have that will make it good or helpful?

A good category system should be consistent, moderately specific, and easy to use. It would have overarching broad categories with specific sub-categories.

A good system will help us to differentiate between the different objects/shapes, making it easier to find any formulas or descriptions that apply to the objects/shapes. A good system makes it easier to compare one shape to the other, to write a proof, and to determine such things as area, perimeter, ...

For a system of categories to be good, it must be easy to understand why each shape was placed in that category. Also, these categories should help identify properties of each shape. They ought to show how categories exist in the real world. For a system of categories to be good, you must be able to apply and find laws for the category so that these laws will apply to every shape or object in that category.

We classify a category system as good if it is one that allows for little or no crossover/overlap between categories. (There is, however, disagreement on this point.)