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Introduction

Math Mammoth Shapes is a worktext that covers geometry topics for grades 1-2. The emphasis is on exploring shapes in various ways. Students not only identify basic shapes, but they will interact, draw, and play with shapes in various ways.

In the first lessons of the book, students explore basic properties of shapes, such as the number of sides, whether the shape has right angles (“square” corners), or whether some of its sides are the same length.

Then they also compose and decompose geometric figures. This means, for example, putting two triangles together to make a quadrilateral, or dividing a square into two triangles. Composing and decomposing figures helps children understand part-whole relationships as well as observe and learn the properties of the original and composite shapes.

The lessons can seem quite easy, but they are laying a proper foundation for geometric understanding in later years. For example, composing and decomposing shapes helps develop a foundation for understanding area (studied in 3rd grade and onward). Analyzing the properties of shapes, such as the presence or absence of right angles or sides that are the same length, prepares students to study congruence.

Students also explore some geometric patterns, make shapes in a tangram-like game, and have surprises with pentagons and hexagons. These topics provide some fun while also helping students to memorize the terminology for basic shapes.

The lesson on rectangles and squares introduces the idea of a shape consisting of many little squares. Naturally, this is building towards the concept of area.

For the lessons on solids, you can download a file that allows you to make paper models of the solids:

https://www.mathmammoth.com/download/Printable_cutouts_common_solids.pdf

These are also included in the download version of this book (after the answer key).

Good Mathematical Practices

- Mathematics has a lot to do with structures and patterns. In the beginning lessons of the book, students begin classifying (sorting) shapes based on their properties. This task of analyzing and sorting shapes continues all through the elementary school, and it is typical of the work that mathematicians do: look for patterns or structures.

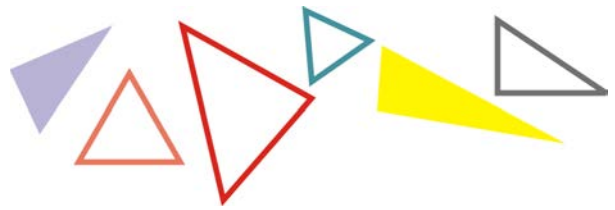
I wish you success in teaching math!

Maria Miller

Basic Shapes 1

These are **triangles**.

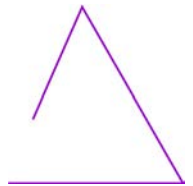
A triangle has three sides
(and three corners).



These are **circles**. A circle
doesn't have any corners.



1. Is this a triangle? What do you think?



2. Is this a triangle? Why or why not?



3. Is this a circle? Why or why not?

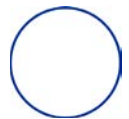


What makes a shape to be a **triangle**?



- A triangle has three sides.
- The sides are straight, not round or curved.
- A triangle is a closed shape.

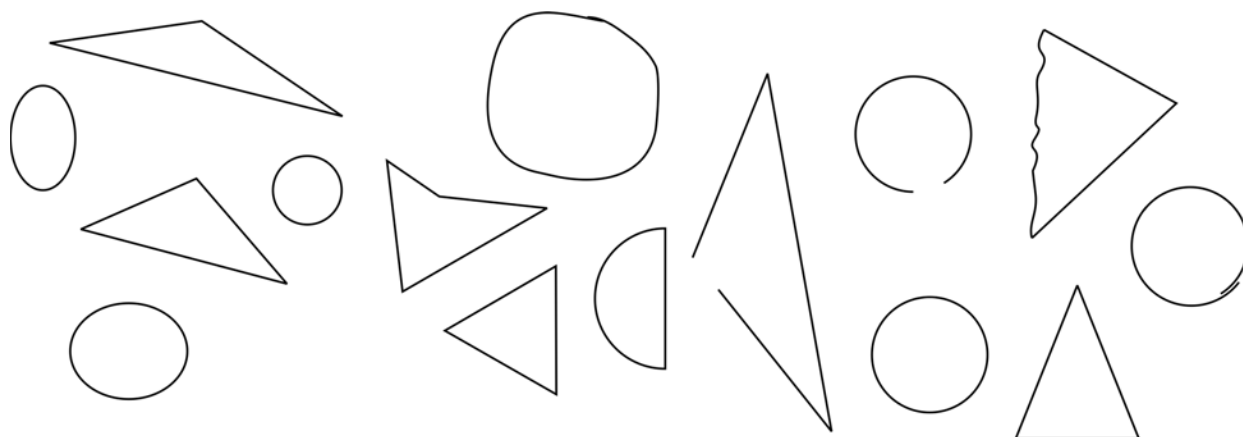
What makes a shape to be a **circle**?



- A circle is perfectly round, with the same roundness everywhere!
- A circle is a closed shape.

(Mathematically, a circle is the set of points that are at the same distance from the center point of the circle, and this distance is called the radius of the circle.)

4. Color all the triangles and circles.



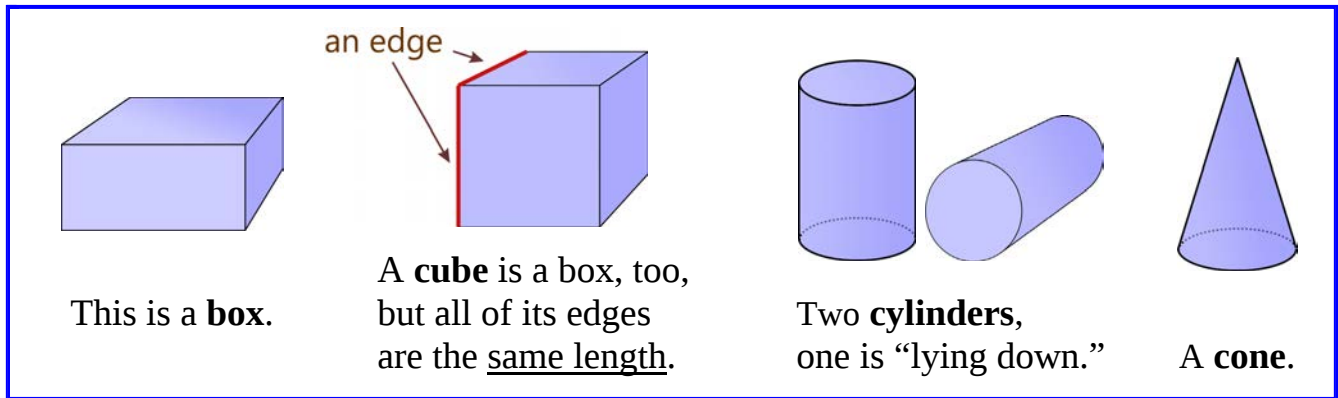
5. Sketch (draw) here two different triangles. One way to draw a triangle is to first draw three dots, and then join them with lines.

Triangle 1:	Triangle 2:
--------------------	--------------------

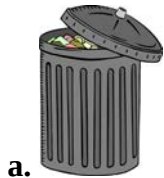
6. Draw here (freehand, sketching) a shape that is *not* a circle, yet it is round.

7. Draw here (freehand, sketching) three shapes that are *not* triangles.

Solids



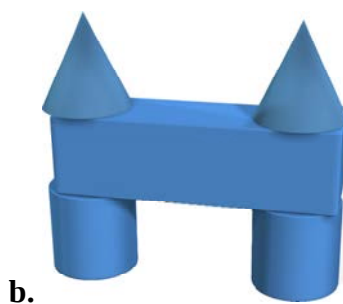
1. Name the basic solid(s) in these objects.



2. Which solid is it?

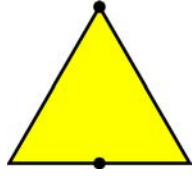
- a. It has six edges. It has six faces (flat sides) that are squares.
- b. It has a circle at the bottom and at the top.
- c. It has a circle at the bottom and a pointed top.
- d. It has six edges. All of its faces (flat sides) are rectangles or squares.

3. **Activity.** You will need a set of geometric solids, or solids you have made by folding from paper. Build these shapes (or similar) using the solids in your set.

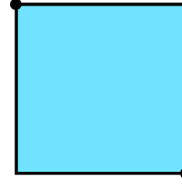


Composing and Decomposing Shapes 1

1. Draw a line from dot to dot so that you divide the shape into two new shapes.
What kind of shapes are the new shapes?



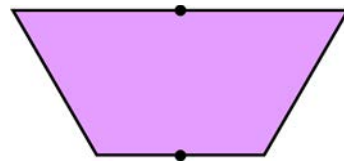
a. The new shapes are



b. The new shapes are



c. The new shapes are



d. The new shapes are

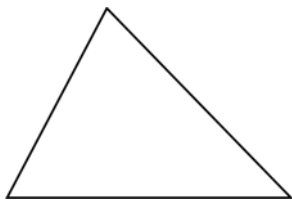
2. Draw *one* or *two* lines in each shape so that you get new shapes as indicated.
Instead of doing this with a pencil, you can draw the basic shapes on paper (they don't need to be the same size as here), cut them out, and use scissors to cut each shape into parts.



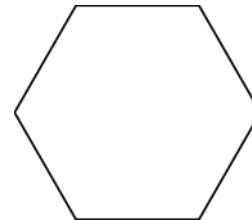
a. two triangles



b. two semi-circles and a rectangle



c. a triangle and a four-sided shape



d. a triangle and a five-sided shape

Surprises with Shapes

1. Connect the dots using a ruler.
Be neat! What shape do you get?
-

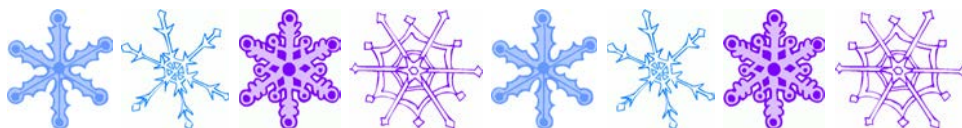
2. Draw a line from one corner to some other corner. This divides your shape into two new shapes. What shapes are they?
-

3. Draw more lines from a corner to some corner so that the whole shape gets divided into triangles.

4. Connect the dots using a ruler.
Be neat! What shape do you get?
-

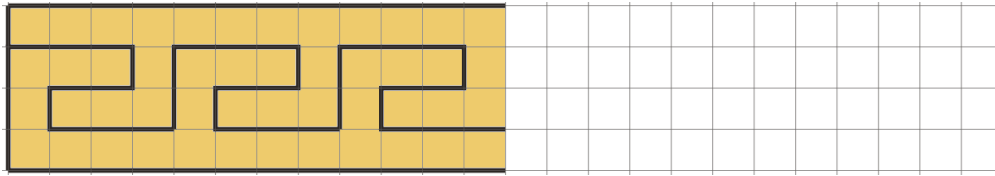
5. Draw a line from one corner to the opposite corner. Then repeat so that each corner gets connected to the opposite corner. You need to draw three lines to do that.

6. Decorate your shape now so that it becomes a SNOWFLAKE!
ALL snowflakes have this basic shape.

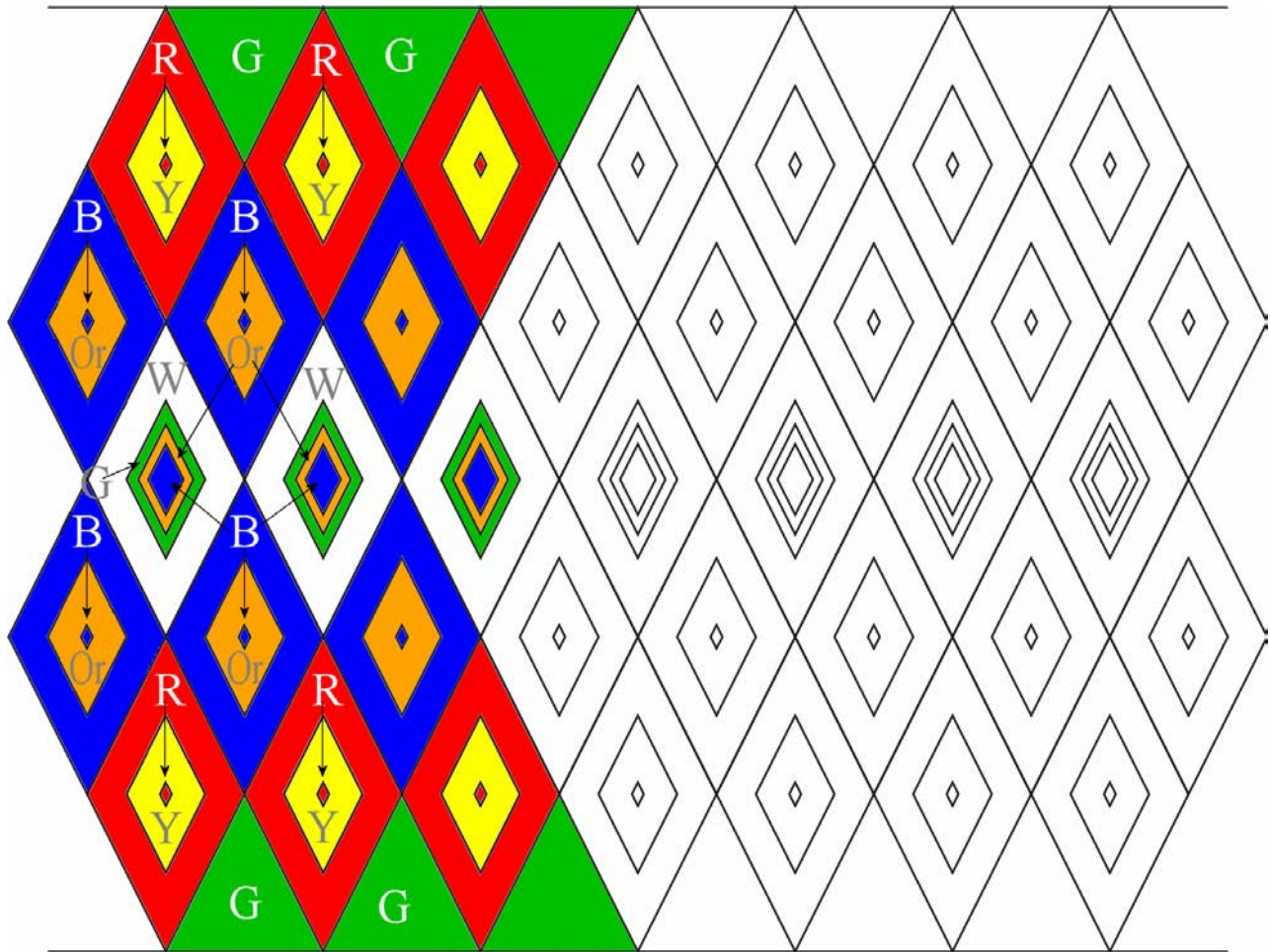


Geometric Patterns

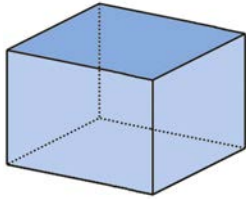
1. The design below is often seen in Greek vases. Continue it.



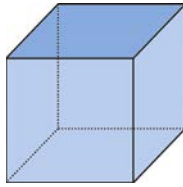
2. This is a pattern from an apron used by Kirdi people in Cameroon, Africa. Notice it uses PARALLELOGRAMS that are inside each other. Continue the coloring in the pattern.



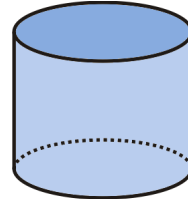
Three-Dimensional Shapes



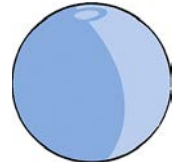
This is a **box**. It is also called a “rectangular prism.”



A **cube** is a box, too, but all of its sides are equally long.



A **cylinder** has a circle on the bottom and at the top.



A **ball** or a sphere.

1. Are these things in the shape of a *box* or a *cube*? Underline the right choice.



box *or* cube



box *or* cube



box *or* cube



box *or* cube



box *or* cube



box *or* cube



box *or* cube



box *or* cube

2. Find four things in your classroom or at home in the shape of a *box*. Put them in order from the smallest to the biggest.

I found _____, _____,
_____, and _____.

3. Find two things in your classroom or at home in the shape of a *cube*, one smaller and one bigger.

I found _____ and _____.