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Introduction

Math Mammoth Early Geometry is a worktext that covers geometry topics for grades 1-3.

The first lessons in the book have to do with shapes. Children learn to identify and draw basic shapes. Using cutout shapes, they put several shapes together to form new ones. They also divide existing shapes into new ones by drawing a line in shapes.

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

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).

Starting from the lesson *Polygons*, the lessons are for third grade level. In the first three lessons of this section, students sort shapes into categories based on their attributes, and learning, in particular, about quadrilaterals as a category. Students observe attributes such as the number of sides, presence of right angles, and whether the shape has equal sides or not. They learn about rhombuses, rectangles, and squares, and how a square is *also* a rectangle and a rhombus.

Their work here prepares students to classify quadrilaterals in great detail in grade 5. Students classify figures in grade 4 also, based on angles, and focusing on triangles in particular.

Next, we focus on the area of rectangles and shapes composed of rectangular areas. (How to calculate the area of other common shapes, such as triangles, polygons, and circles, is studied in 6th and 7th grades.)

We start the topic with the lesson *Getting Started with Area*, where students tile shapes with unit squares cut out of paper, thus learning the foundation of how area is measured. From there, the lessons gradually lead to the thought that area of a rectangle can be found by multiplying its side lengths. Students learn about different units for area (both metric and customary) and get hands-on experience on finding the area of rectangles by measuring the sides in inches or centimeters.

Then the lessons deal with the area of compound (rectilinear) shapes, whose area can be found by decomposing the shape into (non-overlapping) rectangles.

In this context, we also study the distributive property "in disguise", in the lesson *Area of Decomposed Rectangles*. A rectangle is divided into two parts, and its area is found in two different ways: either as the area of the entire rectangle, or by adding the areas of the two parts.

From this area model, we can see that $a \times (b + c)$ is equal to $a \times b + a \times c$. The expression $a \times (b + c)$ is the area of the entire rectangle, with side lengths *a* and (b + c), and this is equal to the sum of the areas of two rectangles, one with sides *a* and *b*, and the other with sides *a* and *c*. (The images in the lesson make it more clear.)

The distributive property is studied in its algebraic form in 6th grade, but students will use it again in 4th grade in the context of finding common factors of two whole numbers. For example, they will express the sum 36 + 8 as 4 (9 + 2).

In the lesson *Multiplying by Whole Tens* students learn to multiply a single-digit number by a multiple of ten, for example 3×40 or 90×7 . After that, students use this skill to calculate areas of bigger rectangles in the rest of the lessons in the book.

The last major topic in the book is perimeter. Students learn perimeter as the "go-around measure": the total distance when you go or travel around the shape. Then, several lessons focus on both area and perimeter, to make sure students learn to distinguish between these two concepts. We investigate rectangles that have the same area but different perimeters, and also rectangles that have the same perimeter but different areas.

Sample worksheet from

https://www.mathmammoth.com