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Introduction

Math Mammoth Early Geometry covers geometry topics for grades 1-3. These lessons are taken from the Math Mammoth Complete Curriculum (Light Blue Series).

The first lessons in this book have to do with shapes—that is where geometry starts. Children learn to recognize and draw basic shapes, and identify triangles, rectangles, squares, quadrilaterals, pentagons, hexagons, and cubes. They also put several shapes together to form new ones, or divide an existing shape into new ones.

We also study some geometric patterns, right angles, have surprises with pentagons and hexagons, and make shapes in a tangram-like game. These topics are to provide some fun while also letting children explore geometry and helping them to memorize the terminology for basic shapes.

The students also learn a little about symmetry—hopefully an easy and fun topic.

In the latter part of the book, the emphasis is on two third grade concepts: area and perimeter. Students find the perimeters of polygons, including finding the perimeter when the side lengths are given, and finding an unknown side length when the perimeter is given.

They learn about area, and how to measure it in either square inches, square feet, square centimeters, square meters, or just square units if no unit of length is specified.

Students also relate area to the operations of multiplication and addition. They learn to find the area of a rectangle by multiplying the side lengths, and to find the area of rectilinear figures by dividing them into rectangles and adding the areas.

We also study the distributive property “in disguise.” This means using an area model to represent $a \times (b + c)$ as being equal to $a \times b$ plus $a \times c$. The expression $a \times (b + c)$ is the area of a rectangle with side lengths a and $(b + c)$, which is equal to the areas of two rectangles, one with sides a and b , and the other with sides a and c .

Multiplying by Whole Tens is a lesson about multiplication such as 3×40 or 90×7 . It is put here so that students can use their multiplication skills to calculate areas of bigger rectangles.

Then we solve many area and perimeter problems. That is necessary so that students learn to distinguish between these two concepts. They also get to see rectangles with the same perimeter and different areas or with the same area and different perimeters.

Lastly we touch on solids, such as a cube, a rectangular prism, pyramids, a cone, and a cylinder, and study their faces, edges, and vertices. You can make paper models for them from the printouts provided after the answer key. Just print them out, cut out the shapes, fold the sides, and glue or tape the figures together. Alternatively you can buy them, usually made from plastic. Search on the internet for “geometric solids.”

I wish you success in teaching math!

Maria Miller

Geometry Games on the Internet

I encourage you to use some of these free resources that can make geometry so much fun!

SHAPES

Buzzing with Shapes

Tic tac toe with shapes; drag the counter to the shape that has the right number of sides.

<http://www.harcourtschool.com/activity/buzz/buzz.html>

Shape Cutter

Draw a polygon of any shape, cut it up, and manipulate the cut pieces. You can even have the computer mix up the pieces, so you can then try to recreate the original shape.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=72>

Shifting Shapes

Figure out what the shape is by viewing parts of it through a small opening! Click on the “eye” button to see it in its entirety.

<http://www.ictgames.com/YRshape.html>

Patch Tool

An online activity where the student designs a pattern using geometric shapes.

<http://illuminations.nctm.org/Activity.aspx?id=3577>

Polygon Matching Game

http://www.mathplayground.com/matching_shapes.html

Polygon Playground

Drag various colorful polygons to the work area to make your own creations!

<http://www.mathcats.com/explore/polygons.html>

Interactive Quadrilaterals

Drag the corners to play with squares, rectangles, rhombi, and more.

<http://www.mathsisfun.com/geometry/quadrilaterals-interactive.html>

Shapes Identification Quiz from ThatQuiz.org

Identify common two-dimensional shapes in this multiple-choice online quiz. You can modify the quiz parameters to your liking.

<http://www.thatquiz.org/tq-f/?-jlofv-11-p0>

Tangram puzzles for kids

Solve the puzzle by moving and rotating the seven pieces of the Tangram to form the given shape.

Complete the puzzle by moving and rotating the seven shapes.

<http://www.abcya.com/tangrams.htm>

Logic Tangram game

Note: This game uses only a four-piece “Tangram.” Use logic and spatial reasoning skills to assemble the four pieces into the given shape.

<http://www.mathplayground.com/tangrams.html>

Interactive Tangram Puzzle

Place the tangram pieces so they form the given shape.

http://nlvm.usu.edu/en/nav/frames_asid_112_g_2_t_1.html

Online Kaleidoscope

Design your own virtual kaleidoscope with this interactive tool.

http://www.zefrank.com/dtoy_vs_byokal/

SYMMETRY

Symmetry Game

Tell how many lines of symmetry a shape has.

http://www.innovationslearning.co.uk/subjects/maths/activities/year3/symmetry/shape_game.asp

Primary Resources: Mirror Images

See images mirrored in a line.

<http://www.primaryresources.co.uk/online/symmetry.swf>

Primary Resources: Reflection

Color the squares and reflect the given pattern in a line.

<http://www.primaryresources.co.uk/online/reflection.swf>

AREA AND PERIMETER

Free Worksheets for Area and Perimeter

Create worksheets for the area and the perimeter of rectangles/squares with images, word problems, or problems where the student writes an expression for the area using the distributive property. Options also include area and perimeter problems for irregular rectangular areas, and more.

http://www.homeschoolmath.net/worksheets/area_perimeter_rectangles.php

Everything you wanted to know about area and perimeter

Short explanations of how to find the perimeter of simple shapes and the area of rectangles, followed by quizzes on three levels. In perimeter, level two, some side lengths are not given. In level three, you calculate the perimeter of compound shapes. In area of rectangles, level 1 has just rectangles, and levels 2 and 3 have compound shapes made of rectangles.

http://www.bgfl.org/custom/resources_ftp/client_ftp/ks2/maths/perimeter_and_area/index.html

Shape Explorer

Find the perimeter and area of odd shapes on a rectangular grid.

<http://www.shodor.org/interactivate/activities/ShapeExplorer/>

Math Playground: Measuring the Area and Perimeter of Rectangles

Amy and her brother, Ben, explain how to find the area and perimeter of rectangles and show you how changing the perimeter of a rectangle affects its area. After the lesson, you will use an interactive ruler to measure the length and width of 10 rectangles, and to calculate the perimeter and area of each.

http://www.mathplayground.com/area_perimeter.html

Math Playground: Party Designer

You need to design areas for the party, such as a crafts table, food table, seesaw, and so on, so that they have the given perimeters and areas.

<http://www.mathplayground.com/PartyDesigner/PartyDesigner.html>

BBC Bitesize - Perimeter

A simple revision (review) “bite” for perimeter that includes short explanations and a few quiz questions.

<http://www.bbc.co.uk/schools/ks3bitesize/maths/measures/perimeter/revise1.shtml>

BBC Bitesize - Area

Brief revision (review) “bites”, including a few interactive questions, about area: counting squares, area of rectangles, area of triangles, parallelograms, and of compound shapes. Includes an activity and a test.

<http://www.bbc.co.uk/schools/ks3bitesize/maths/measures/area/revise1.shtml>

Geometry Area/Perimeter Quiz from ThatQuiz.org

An online quiz, asking either the area or perimeter of rectangles, triangles, and circles. You can modify the quiz parameters to your liking, for example to omit the circle, or instead of solving for area, you solve for an unknown side when the perimeter/area is given.

<http://www.thatquiz.org/tq-4/?-j201v-lc-m2kc0-na-p0>

Area vs. Perimeter Quiz

Do you sometimes mix up area and perimeter? Take this 10-question online quiz and practice NOT mixing up the two concepts. Includes some challenge questions.

<http://www.mrmaisonet.com/index.php?/Area-Quizzes/Area-vs-Perimeter.html>

Area and Perimeter of Rectangles

A 10-question quiz with varying questions concerning area and perimeter of rectangles.

<https://www.ck12.org/assessment/ui/views/test.view.new.html?practice/Area-and-Perimeter-of-Rectangles-Practice?type=practice>

FunBrain: Shape Surveyor Geometry Game

A simple and easy game that practices finding either the perimeter or area of rectangles.

<http://www.funbrain.com/poly/index.html>

Area of Rectangle

Drag the corners of the rectangle and see how the side lengths and areas change.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=46>

XP Math: Find Perimeters of Parallelograms

This online quiz shows you parallelograms and rectangles, and you need to calculate the perimeter, including typing in the right unit, and not using the altitude of the parallelogram.

<http://www.xpmath.com/forums/arcade.php?do=play&gameid=10>

Area and Perimeter Builder

Create your own rectangular shapes using colorful blocks and explore the relationship between perimeter and area. You can choose to show the side lengths to understand how a perimeter works. You can also use two work areas (grids) to compare the area and perimeter of two shapes side-by-side. Lastly, challenge yourself in the game screen to build shapes or find the area of various figures.

http://phet.colorado.edu/sims/html/area-builder/latest/area-builder_en.html

SOLIDS

Identify solids

Select the name and drop it on the correct solid.

<http://www.softschools.com/math/geometry/shapes/solids/games/>

Geometric Solids

Manipulate various geometric solids. Color the solid to investigate properties such as the number of faces, edges, and vertices.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=70>

2-D and 3-D Shapes

Learn about different solids and see them rotate.

http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/3d/index.htm

Identify solids

Click to identify the partially buried 3-dimensional shapes.

<http://www.primaryresources.co.uk/online/longshape3d.html>

Space Blocks

Build with blocks to illustrate three-dimensional shapes.

http://nlvm.usu.edu/en/nav/frames_asid_195_g_2_t_2.html