

RightStart™ Mathematics: A Hands-On Geometric Approach

RightStart™ Mathematics: A Hands-On Geometric Approach is an innovative approach for teaching many middle school mathematics topics, including perimeter, area, volume, metric system, decimals, rounding numbers, ratio, and proportion. The student is also introduced to traditional geometric concepts: parallel lines, angles, midpoints, triangle congruence, Pythagorean theorem, as well as some modern topics: golden ratio, Fibonacci numbers, tessellations, Pick's theorem, and fractals. In this program the student does not write out proofs, although an organized and logical approach is expected.

Understanding mathematics is of prime importance. Since the vast majority of middle school students are visual learners, approaching mathematics through geometry gives the student an excellent way to understand and remember concepts. The hands-on activities often create deeper learning. For example, to find the area of a triangle, the student must first construct the altitude and then measure it. If possible, students work with a partner and discuss their observations and results.

Much of the work is done with a drawing board, T-square, 30-60 triangle, 45 triangle, a template for circles, and goniometer (device for measuring angles). Constructions with these tools are simpler than the standard Euclid constructions. It is interesting to note that CAD (computer aided design) software is based on the drawing board and tools.

This program incorporates other branches of mathematics, including arithmetic, algebra, and trigonometry. Some lessons have an art flavor, for example, constructing Gothic arches. Other lessons have a scientific background, sine waves, and angles of incidence and reflection; or a technological background, creating a design for car wheels. Still other lessons are purely mathematical, Napoleon's theorem and Archimedes' stomaion. The history of mathematics is woven throughout the lessons. Several recent discoveries are discussed to give the student the perspective that mathematics is a growing discipline.

Good study habits are encouraged through asking the student to read the lesson before, during, and following the worksheets. Learning to read a math textbook is a necessary skill for success in advanced math classes. Learning to follow directions is a necessary skill for studying and everyday life. Occasionally, an activity or lesson refers to previous work making it necessary for the student to keep all work organized. The student is asked to maintain a list of new terms.

This text was written with several goals for the student: a) to use mathematics previously learned, b) to learn to read math texts, c) to lay a good foundation for more advanced mathematics, d) to discover mathematics everywhere, and e) to enjoy mathematics.

About the author

Joan A. Cotter, Ph.D., author of *RightStart™ Mathematics: A Hands-On Geometric Approach* and *RightStart™ Mathematics* elementary program has a degree in electrical engineering, a Montessori diploma, a masters degree in curriculum and instruction, and a doctorate in mathematics education. She taught preschool, children with special needs, and mathematics to grades 6-8.

Hints on Tutoring

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Before starting a lesson, the student should look over the Materials list and gather all the supplies, including a mechanical pencil or a sharp #2 pencil and a good eraser. Then the student reads over the goals, keeping in mind that italicized words will be explained in the lesson. (These new words are to be recorded in the student's math dictionary.) Next the student begins reading the Activities, carefully studying any accompanying figures. It is a good habit to summarize the activity after reading it. If a paragraph is unclear, the student should reread the paragraph, keeping in mind that sometimes more is explained in the following paragraph. No one learns mathematics by reading the text only once.

Each activity needs to be understood before going to the next activity. Make sure the student understands the importance of completing the problems on the worksheet when called for in the lesson. Sometimes it will be necessary to refer to the lesson while completing the worksheet. All work needs to be kept neatly in a three-ring binder for future reference.

Be careful how you react to the "I don't get it" plea. Tell the student you need a question to answer. You do not want to get in the habit of reading the text for your student and then regurgitating to her like a mother robin feeding her young. The text is written for students to read for themselves. Learning how to ask questions is an important skill to acquire toward becoming an independent learner. If questions remain after diligent study, the student can contact the author at JoanCotter@RightStartMath.com.

If a child has a serious reading problem, read the text aloud while he follows along and then ask him to read it aloud. Be sure each word is understood. For less severe reading problems, you might model aloud the process of reading an activity, commenting on the figure, and summarizing the paragraph. Some of the time, students need encouragement to overcome frustration, which is inherent in the learning process. Occasionally, a student may have a knowledge gap needed for a particular lesson, requiring other resources to resolve. Incidentally, research shows one of the major causes of difficulties in learning new concepts for this age group is insufficient sleep.

After the student has completed the worksheet, ask her to compare her work with the solution. If the student has a partner, they can compare and discuss their work before referring to the solutions. Ask her to explain what she learned and any discrepancies. Keep in mind that some activities have more than one solution. You might also ask her to grade her work on some agreed upon scale. It also is a good idea for the student to reread the goals of the lesson to see if they have been met. Encourage discussion on practical applications of the topic.