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ARTICLES: SCHOOL 2.0

SINGAPORE MATH

by Sarah Bayne

December 7th, 2011 – Avenues will be using the Singapore math program for students in kindergarten through grade six when the school opens in September 2012.

Singapore math is based on the primary textbooks and national curriculum of Singapore and was introduced into the United States in 2000. The program has a strong emphasis on problem solving and model drawing, with a focus on in-depth understanding of the essential math skills recommended by the National Council of Teachers of Mathematics (NCTM) and the Common Core State Standards. Singapore math has recently been adopted by the states of Oregon and California for their state curricula.

Explanations of math concepts are clear and simple, often given in just a few words in a cartoon balloon. Key features of the Singapore math program include:

1. Each level's textbook builds upon preceding levels, assuming students do not need to be taught what has already been covered, and thus each textbook matches what students are ready to learn next.
2. Teachers focus on essential math skills, not on re-teaching what has already been taught. Students master essential math skills more rapidly, even though teachers teach more slowly and in more depth.
3. Mathematical concepts are taught through a progression from concrete examples through pictorial to abstract. For example, addition and subtraction of decimals are taught in second and third grades in the concrete form of dollars and cents. Abstract decimal fractions, introduced in fourth grade, are preceded by a pictorial model of centimeters and millimeters on a metric ruler.
4. Word problems are used to teach the meaning of mathematical operations. Students learn when to add and when to subtract by relying on the meaning of the situation, rather than on "clue words."
5. In Singapore math books, line segments are often used to teach the thought process behind solving an arithmetical problem. The segments are shown as colorful bars of fixed width ("bar models"). Students begin solving simple multi-step word problems in third grade using the bar model method. Older students use the same method on increasingly more difficult problems. By the end of sixth grade, students have not only mastered multiplication and division of fractions but are comfortable doing multi-step word problems as well and are well prepared for Algebra 1.

For example, sixth grade students are solving problems like this:

"Lauren spent 20 percent of her money on a dress. She spent $\frac{2}{5}$ of the remainder on a book. She had \$72 left. How much money did she have at first?"

6. The texts are written in a child-friendly pictorial language and guide students not only to technical mastery of mathematics, but to full understanding of the underlying concepts and processes.

By teaching concepts and emphasizing problem solving, Singapore math ensures students make rapid progress in the essential skills. For example, they learn multiplication in first grade, and by fourth grade, they are ready to apply it to fractions, as shown in the following problem:

"A grocer has 42 apples. $\frac{2}{7}$ of them are red, and the rest are green. How many of them are green?"

To figure the answer, Singapore math teaches children the following:

- 42 apples = 7 units
- 1 unit = $42/7 = 6$
- 5 units = $6 \times 5 = 30$
- There are 30 green apples.

Students are encouraged to see fractional "pieces" as units, an important concept when students later encounter fractional division.

By sixth grade, students are solving complex, multi-step problems using bar models, which explain and reinforce concepts such as addition and subtraction, multiplication and division, fractions, decimals, percentages and ratios. The bar model and the basic skills embedded in the mathematical problems reinforce each other.

The Singapore texts are rich with problem-based development, providing simple explanations for hard concepts. Schools using this method have seen higher math test scores. More importantly, students have fuller comprehension of what they are learning. Its use in the lower grades at Avenues will prepare students for the problem-based learning we will use in Upper School math.

Examples in this article are taken from the "Singapore Math" article by John Hoven and Barry Garelick (citation below). Some material is also adapted from the Wikipedia article on [Singapore Math](#).

For more information on Singapore Math:

[Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics](#). National Council of Teachers of Mathematics, 2006.

John Hoven and Barry Garelick, "Singapore Math: Simple or Complex?" *Educational Leadership* 65:3 (November 2007): 38-21.

[Singapore Math Method](#). NPR Science Friday, December 17, 2004.

[What the United States Can Learn from Singapore's World Class Mathematics System](#). Report from the American Institutes for Research for U.S. Department of Education, Policy and Program Studies Service, January 28, 2005, 192 pages.

Winnie Hu, "[Making Math Lessons as Easy as 1, Pause, 2, Pause ...](#)" *New York Times*, October 1, 2010.

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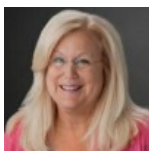
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