

The Curriculum

One Program's Alignment with the NCTM Standards



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Program Author of

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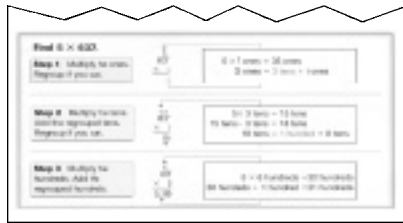
To align with the standards in the National Council of Teachers of Mathematics (NCTM) *Principles and Standards for School Mathematics*, an instructional program must fully engage all students in learning, understanding, and applying the content and process standards that describe the mathematics that students should know and be able to do. The first five standards describe the mathematical content goals; they are Numbers and Operations, Algebra, Geometry, Measurement, Data Analysis, and Probability. The next five standards address the processes of mathematics; they are Problem Solving, Reasoning and Proof, Communication, Connections, and Representation. The content and process standards are inextricably linked (NCTM, 2000). Effective, aligned programs reflect this vital link in their teaching and learning of mathematics.

Houghton Mifflin Mathematics, a new, coherent and comprehensive K–6 mathematics instructional program, fully aligns with the NCTM standards. While many programs tout that they are in alignment, not all programs give the rigorous nature of mathematics the careful attention that this program does. Moreover, *Houghton Mifflin Mathematics* helps students understand the underlying meaning of mathematics and provides opportunities for them to develop the skills and master the procedures needed to be successful in school mathematics. Its sequence of lessons and organization encourage students to make the connections necessary for mathematics understanding and success.

Connections with Prior Understanding

Houghton Mifflin Mathematics provides systematic instruction on the concepts and ideas of mathematics, being careful to draw upon what has been taught and learned previously. The balance between conceptual understanding and computational proficiency is

achieved when the curriculum enables and encourages students to build on the mathematics they already know. Quality instructional materials demonstrate computational algorithms and explain clearly the mathematics involved in each step of the procedure. This helps students make the integral connections that enable them to understand the underlying



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concepts exemplified in procedures as well as improve their computational proficiency.

Consider, for example, the program's Grade 4 measurement lessons wherein students first participate in hands-on activities and games that expose relationships about perimeter and area. Later, when the formulas for perimeter and area are introduced and developed, students are able

to connect their previous concrete experiences with the new, symbolic representation. This offers an ideal way for students to utilize what they know

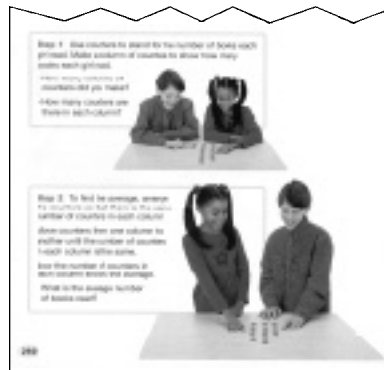


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and understand, and then recognize and understand the elements (variables) of a formula and why they are what they are. Students have had many opportunities to investigate and learn about perimeter before they learn the formula for the perimeter of a rectangle in this lesson.

Linking the Content Standards with the Process Standards

Principles and Standards for School Mathematics emphasizes the value and use of modeling in several of its standards, including algebra, geometry, and representation. *Houghton Mifflin Mathematics* uses many powerful models to represent mathematical ideas and procedures, which is a strong feature of the program. In this Grade 4 example, the



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average of whole numbers is represented with counters. The importance of this model is that it enables students to experience the effect of the algorithm for finding the average of a group of numbers. That is,

the effect of the addition and division used in the algorithm is demonstrated simply and naturally by using counters.

Throughout all grade levels, other process standards are emphasized in the context of content standards. Reasoning and problem-solving skills are routinely developed. Students are asked to communicate about mathematics by writing and talking about



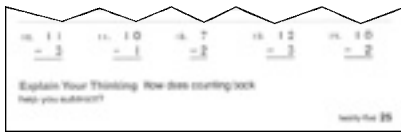
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what they have learned or what they think about the possibilities of a situation.

With *Houghton Mifflin Mathematics*, students participate in activities, games, and explorations that challenge their understanding of mathematical ideas

to recognize that questions must be framed in special ways so that the information obtained is useful and accurate. Hence, it is necessary that students practice both formulating questions and determining the best ways to evaluate the results.

To ensure and deepen mathematics understanding students need to ask themselves questions, explain their thinking, and discuss their reasoning with others. In *Houghton Mifflin Mathematics*

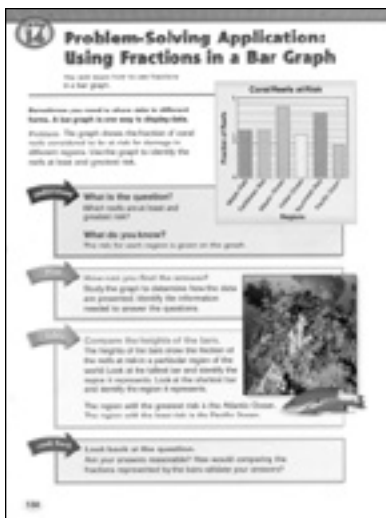


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students respond to Why? and How? questions in each lesson's Explain Your Thinking feature. When students think mathematically, they consider multiple approaches to problems and discuss them with others. They write about their solutions and reflect on what they did. When students

share their thinking with others, they gain a deeper understanding of the mathematics.

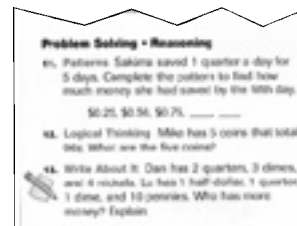
This program involves all of these scenarios in highlighted problem-solving and skills practice.



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An Emphasis on Problem Solving

One of the strongest features of *Houghton Mifflin Mathematics* is the way in which problem solving is woven into the fabric of the instruction. Students learn the value of planning to solve problems and the importance of looking back on what they have done. Effective problem solvers constantly monitor and adjust what they are doing. (NCTM, 2000). The problem-solving model of Understand, Plan, Solve, Look Back is revisited throughout the program and exemplified in each Problem-Solving Strategy, Application, and Skills lesson. Each regular lesson also includes problem solving and reasoning. Many activities and explorations engage students' problem-solving skills. As a result, one of this program's strengths is its contextualized development of problem solving.



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As the NCTM Curriculum Principle states, a curriculum is more than a collection of activities; it must be coherent, focused on important mathematics, and well articulated across the grades (NCTM, 2000). The organized sequence of mathematical topics in *Houghton Mifflin Mathematics* ensures that students form and build upon a strong foundation that is made stronger and expanded by connections with prior understanding and among mathematical topics. Its instruction focuses on the key skills and important mathematical concepts that comprise the content standards. More important, the instruction and applications involve the process standards. This deeper integration of the content and process standards, combined with the extensive connections among standards and with prior understanding, are what bring *Houghton Mifflin Mathematics* into full alignment with the NCTM standards.

Reference

National Council of Teachers of Mathematics (NCTM). *Principles and Standards for School Mathematics*. Reston, VA: NCTM, 2000.