Welcome to Math Connects

Concepts • Skills • Problem Solving

The only true vertically aligned PreK–12 Mathematics Curriculum

Math Connects offers three dimensions of vertical alignment.

1 Content Design
Vertical content alignment is a process that ensures you and your students experience an articulated, coherent sequence of content from grade level to grade level. This provides you with the assurance that content is introduced, reinforced, and assessed at appropriate times in the series, eliminating gaps and unnecessary duplication. You are able to target your instruction to student needs because you are not teaching content intended to be covered later or that students have previously mastered.

2 Instructional Design
Our strong vertical alignment in instructional approach from PreKindergarten through Algebra 2 provides a smooth transition for students from elementary to middle school to high school. Our common vocabulary, technology, manipulatives, lesson planning, and Data-Driven Decision Making reduces the confusion students often encounter when transitioning between grade levels without this built-in articulation.

3 Visual Design
The student pages of Math Connects have a consistent visual design from grade to grade. This aids students’ transition from elementary school to middle school and from middle school to Algebra 1. Students are more likely to succeed when they are already familiar with how to navigate student pages.
5 Keys to Success

1 Backmapping

According to College Board research, about 80% of students who successfully complete Algebra 1 and Geometry by 10th grade attend and succeed in college. (Changing the Odds: Factors Increasing Access to College, 1990) *Math Connects* was conceived and developed by backmapping with the final result in mind—student success in Algebra 1 and beyond.

2 Balanced, In-Depth Content

*Math Connects* was developed to specifically target the skills and topics that give students the most difficulty, such as Problem Solving, in each grade span.

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3 Ongoing Assessment

*Math Connects* includes diagnostic, formative, and summative assessment; data-driven instruction; intervention options; and performance tracking, as well as remediation, acceleration, and enrichment tools throughout the program.

4 Intervention and Differentiated Instruction

A three-tiered Response To Intervention (RTI) is provided.

1 Daily Intervention

Reteach masters and Alternative Strategy suggestions address concepts from a different modality or learning style.

2 Strategic Intervention

Teachers can use the myriad of intervention tips and ancillary materials, such as the Strategic Intervention Guide (1–5) and Study Guide and Intervention (6–8).

3 Intensive Intervention

For students who are two or more years below grade level, *Math Triumphs* provides step-by-step instruction, vocabulary support, and data-driven decision making to help students succeed.

5 Professional Development

*Math Connects* includes many opportunities for teacher professional development. Additional learning opportunities in various formats—video, online, and on-site instruction—are fully aligned and articulated from Kindergarten through Algebra 2.
The Research Base

Continuous research with teachers, students, academician, and leading experts helps to build a solid foundation for Math Connects.

Program Development Research

- Evaluating state and local standards
- Qualitative market research
- Academic content research

For more detailed information about our classroom research results, please consult the Math Connects Program Efficacy Research Report.
for Math Connects

2 Formative Research
- Pedagogical research base
- Classroom field tests
- Teacher advisory boards
- Academic consultants and reviewers

Students using a field test of the Math Connects program (experimental group) had higher pre-test to post-test gains than students using other textbook programs (control group).

3 Summative Research
- Evidence of increased test scores
- Quasi-experimental program efficacy research
- Longitudinal studies
- Qualitative program evaluations

Access all Math Connects research at macmillanmh.com.
The NCTM Focal Points

In 2006, the National Council of Teachers of Mathematics (NCTM) released the Curriculum Focal Points for Pre-Kindergarten through Grade 8 Mathematics. These Curriculum Focal Points focus on the most important mathematical topics for each grade level. The concepts are vertically-aligned and expect a level of depth, complexity, and rigor at each level. They comprise related ideas, concepts, skills, and procedures that form the foundation for understanding and lasting learning. The Focal Points emphasize depth versus breadth. The Focal Points will be addressed and highlighted throughout our PreK-8 and Pre-Algebra series.

What is the benefit to you in your classroom?

These Focal Points identify content for each grade level that should be mastered in order for your students to have true mathematical understanding—being able to not only calculate the answer, but to explain the answer and how to apply the calculation. The NCTM Focal Points were used as the basis in the development of *Math Connects*. The authors have incorporated the Focal Points into the content to assist you in building depth of understanding.

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**Connections to the Focal Points**

- **Algebra**: Chapter 5
- **Geometry**: Chapters 9, 10
- **Measurement**: Chapter 9
- **Data Analysis**: Chapter 3
- **Number and Operations**: Chapters 1, 2, 8, 13
The Curriculum Focal Points identify key mathematical ideas for this grade. They are not discrete topics or a checklist to be mastered; rather, they provide a framework for the majority of instruction at a particular grade level and the foundation for future mathematics study. The complete document may be viewed at www.nctm.org/focalpoints.

G4-FP1  **Number and Operations and Algebra:** Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication

Students use understandings of multiplication to develop quick recall of the basic multiplication facts and related division facts. They apply their understanding of models for multiplication (i.e., equal sized groups, arrays, area models, equal intervals on the number line), place value, and properties of operations (in particular, the distributive property) as they develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers. They select appropriate methods and apply them accurately to estimate products or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems.

G4-FP2  **Number and Operations:** Developing an understanding of decimals, including the connections between fractions and decimals

Students understand decimal notation as an extension of the base-ten system of writing whole numbers that is useful for representing more numbers, including numbers between 0 and 1, between 1 and 2, and so on. Students relate their understanding of fractions to reading and writing decimals that are greater than or less than 1, identifying equivalent decimals, comparing and ordering decimals, and estimating decimal or fractional amounts in problem solving. They connect equivalent fractions and decimals by comparing models to symbols and locating equivalent symbols on the number line.

G4-FP3  **Measurement:** Developing an understanding of area and determining the areas of two-dimensional shapes

Students recognize area as an attribute of two-dimensional regions. They learn that they can quantify area by finding the total number of same-sized units of area that cover the shape without gaps or overlaps. They understand that a square that is 1 unit on a side is the standard unit for measuring area. They select appropriate units, strategies (e.g., decomposing shapes), and tools for solving problems that involve estimating or measuring area. Students connect area measure to the area model that they have used to represent multiplication, and they use this connection to justify the formula for the area of a rectangle.

G4-FP4C  **Algebra:** Students continue identifying, describing, and extending numeric patterns involving all operations and nonnumeric growing or repeating patterns. Through these experiences, they develop an understanding of the use of a rule to describe a sequence of numbers or objects.

G4-FP5C  **Geometry:** Students extend their understanding of properties of two-dimensional shapes as they find the areas of polygons. They build on their earlier work in grade 3 with models of fractions and multiplication and division as the inverse of multiplication, as partitioning, or as successive subtraction. By working with decimals, students develop understandings of strategies for multidigit division by using models that represent division as the inverse of multiplication, as partitioning, or as successive subtraction. By working with decimals, students extend their ability to recognize equivalent fractions. Students’ earlier work in grade 3 with models of fractions and multiplication and division facts supports their understanding of techniques for generating equivalent fractions and simplifying fractions.

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Program Philosophy
Balanced Instruction, Vertically-Aligned from Grades PreK through Algebra 1

The vertical alignment of *Math Connects* PreK-8 and *Algebra 1* incorporates a balance of instruction throughout. These programs provide students a balanced approach to mathematics by:

- investigating concepts and building conceptual understanding,
- developing, reinforcing, and mastering computational and procedural skills,
- applying mathematics to problem-solving situations.

This sequence of Student Edition pages illustrates the vertically-aligned development of the conceptual understanding and corresponding computational and procedural skills for an important algebra topic.

**Primary**  Students use two-color counters to model addition sentences. This activity forms a basis for future understanding of and success in solving algebraic equations.

**Intermediate**  Students build on their experience with counters to using cups and counters to model and solve addition and subtraction equations. The exercises are designed to help students bridge the gap from using cups and counters to solving equations symbolically.

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*Primary Students use two-color counters to model addition sentences. This activity forms a basis for future understanding of and success in solving algebraic equations.*

**Explore**

Addition Activity for 5-2
Addition and Subtraction Equations

An equation is a sentence like $4 + 5 = 9$ that contains an equals sign (=). The equals sign shows that the expressions on each side of it are equal. Equations sometimes have a missing number.

$$6 + x = 9$$

When you find the value of the missing number that makes the equation true, you solve the equation.

**Step 1**

Model the expression $n + 3$ on the left side. To model $n + 3$, use a cup to show $n$ and 3 counters.

**Step 2**

Model the expression on the right side. Place 5 counters on the right to show 5. An equals sign shows that both sides are the same.

**Step 3**

Find the value of $n$. Put enough counters in the cup so that the number of counters on each side of the equals sign is the same.

The value of $n$ that makes $n + 3 = 5$ true is $n = 2$.

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*Math Connects, Grade 1, Student Edition, page 155*

*Math Connects, Grade 4, Student Edition, page 196*
symbolically.
next lesson, students solve simple equations
Lab, students make the transition from cups and
a cup, as a counter, or as a written
Math Connects,

Middle School Students represent the variable $x$ as
as a cup, as a counter, or as a written $x$. In this Algebra
Lab, students make the transition from cups and
counters to the more abstract algebra tiles. In the
next lesson, students solve simple equations
symbolically.
Continuity of Instruction The instructional sequence described demonstrates
the power of backward mapping from the desired result, success in Algebra 1.
This process of development avoids gaps and overlaps between grade levels and
ensures that at each grade level the concepts and skills are built on the strong
foundation developed in previous grades. The same approach was used across
all strands throughout the entire PreK-12 series.