

AMP's Foundation and NCTM Focal Points

Program Description

The AMP Math system is an intervention program that helps middle- and high-school students bring their math skills up to grade level.

It is the first math intervention program to provide comprehensive alignment with and specifically address the six curriculum focal points provided by the National Council of Teachers of Mathematics (NCTM).

This guide describes the foundation of AMP Math and its alignment to the NCTM focal points, which can be found on pages T12–T15 of the Teacher's Edition.

NCTM Focal Points

According to the NCTM, "The curriculum focal points are the most important mathematical topics for each grade level. They comprise related ideas, concepts, skills, and procedures that form the foundation for understanding and lasting learning" (National Council of Teachers of Mathematics).

There are three Levels of AMP Math: each is geared toward the grade levels of student performance, and each level covers six NCTM focal points.

AMP Math Level	Grade Level Focus
Level 1	3 rd and 4 th grade
Level 2	5 th and 6 th grade
Level 3	7 th and 8 th grade

The six NCTM focal points that are covered in each level of AMP Math are found on pages T14 and T15 in the Teacher's Edition. Please see www.nctm.org/focalpoints to find out more about NCTM focal points.

Level 1

Level 1 covers the NCTM focal points for 3rd and 4th grade:

1. **Number and Operations and Algebra:** Developing understandings of multiplication and division and strategies for basic multiplication facts and related division facts
2. **Number and Operations:** Developing an understanding of fractions and fraction equivalence
3. **Geometry:** Describing and analyzing properties of two-dimensional shapes
4. **Number and Operations and Algebra:** Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication
5. **Number and Operations:** Developing an understanding of decimals, including the connections between fractions and decimals
6. **Measurement:** Developing an understanding of area and determining the areas of two-dimensional shapes

Level 2

Level 2 covers the NCTM focal points for 5th and 6th grade:

1. **Number and operations and Algebra:** Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication.
2. **Number and Operations:** Developing an understanding of decimals, including the connections between fractions and decimals.
3. **Measurement:** Developing an understanding of area and determining the areas of two-dimensional shapes.
4. **Number and Operations:** Developing an understanding of and fluency with multiplication and division of fractions and decimals.
5. **Number and Operations:** Connecting ratio and rate to multiplication and division.
6. **Algebra:** Writing, interpreting, and using mathematical expressions and equations.

Level 3

Level 3 covers the NCTM focal points for 7th and 8th grade:

1. **Number and operations and Algebra and Geometry:** Developing an understanding of and applying proportionality, including similarity.
2. **Measurement and Geometry and Algebra:** Developing an understanding of and using formulas to determine surface areas and volumes of three-dimensional shapes.
3. **Number and Operations and Algebra:** Developing an understanding of operations on all rational numbers and solving linear equations.
4. **Algebra:** Analyzing and representing linear functions and solving linear equations and systems of linear equations.
5. **Geometry and Measurement:** Analyzing two- and three-dimensional space and figures by using distance and angle.
6. **Data Analysis and Number and Operations and Algebra:** Analyzing and summarizing data sets.

AMP's Foundation

AMP Math aligns with four key areas of scientific research. The four key areas are

- problem solving
- skill acquisition and practice
- reading
- teaching and learning strategies

Turn to pages T12 and T13 of the Teacher's Edition to see the academic research base for AMP Math and how the principles of the research are used throughout the program.

	The Research Says	In AMP Math System
Problem Solving	Research indicates that a variety of strategies promote problem-solving performance, and that the most effective strategies are those that are used most frequently (Lesh & Hiebert, 2000). Problem-solving is a complex, multi-step process that involves identifying the problem, planning a solution, and monitoring and evaluating the solution (Lesh & Hiebert, 2000). Research shows that students who are given opportunities to solve problems in a variety of contexts are more likely to develop problem-solving skills (Lesh & Hiebert, 2000).	The AMP Math System is designed to provide students with a variety of problem-solving opportunities. The system includes a variety of problem-solving activities, including word problems, real-world problems, and open-ended problems. The system also includes a variety of problem-solving strategies, including drawing a diagram, making a table, and using a number line.
Skill Acquisition and Practice	Research indicates that students who are given opportunities to practice skills in a variety of contexts are more likely to acquire and retain those skills (Lesh & Hiebert, 2000). The AMP Math System is designed to provide students with a variety of opportunities to practice skills in a variety of contexts. The system includes a variety of skill-building activities, including drills, worksheets, and games.	The AMP Math System is designed to provide students with a variety of opportunities to practice skills in a variety of contexts. The system includes a variety of skill-building activities, including drills, worksheets, and games.
Reading	Research indicates that students who are given opportunities to read in a variety of contexts are more likely to develop reading skills (Lesh & Hiebert, 2000). The AMP Math System is designed to provide students with a variety of opportunities to read in a variety of contexts. The system includes a variety of reading activities, including word problems, real-world problems, and open-ended problems.	Reading is an important part of the AMP Math System. The system includes a variety of reading activities, including word problems, real-world problems, and open-ended problems. The system also includes a variety of reading strategies, including drawing a diagram, making a table, and using a number line.
Teaching and Learning Strategies	Research indicates that students who are given opportunities to learn in a variety of contexts are more likely to acquire and retain those skills (Lesh & Hiebert, 2000). The AMP Math System is designed to provide students with a variety of opportunities to learn in a variety of contexts. The system includes a variety of learning activities, including group work, individual work, and self-paced learning.	The AMP Math System is designed to provide students with a variety of opportunities to learn in a variety of contexts. The system includes a variety of learning activities, including group work, individual work, and self-paced learning.

Problem Solving

The first key area of scientific research is problem solving.

AMP Math uses six problem-solving strategies that are introduced in the first unit and then applied throughout the entire program. The following are the six different problem-solving strategies:

- Draw a picture or use a model
- Find a pattern
- Make a list
- Try a simpler form of the problem
- Make a table or chart
- Guess, check, and revise

The lessons in the Student Guide are broken into different sections. These sections are found at the top of each page:

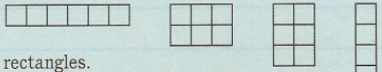
- Learn the Skill
- Choose a Strategy
- Reading Comprehension
- Problem Solving

The Choose a Strategy area is where students will choose from the six problem-solving strategies they learned in the first unit to solve a problem.

On page 27 in the Level 1, Volume 1 Student Guide, students are learning about multiplication when they encounter this problem: Sandra has 6 radish plants. How many different ways can she put them in rows and columns? What strategy should students use for this problem?

- Draw a picture or use a model
- Find a pattern
- Make a list
- Guess, check, or revise

The strategy used in this lesson is draw a picture or use a model.

<p>Draw a Picture or Use a Model (area model)</p> <p>An area model can also represent multiplication. Each square represents 1. Putting the squares into rectangles is another way to show multiplication.</p>	<p>Step 2: Plan Imagine that each radish is planted in a square. Use six squares to make different rectangles.</p> <p>Step 3: Solve </p> <p>There are four possible rectangles.</p> <p>Step 4: Check Count the squares in each area model. Each model should have a total of six squares.</p>
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AMP Math provides students with opportunities to make the math their own. By doing so, it builds their confidence, which is important in an intervention program.

Skill Acquisition and Practice

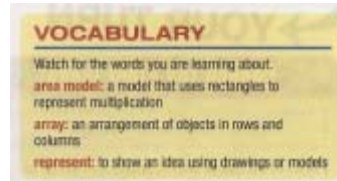
Skill acquisition and practice is the second key area of scientific research on which AMP Math is based.

The instructional model used in AMP Math follows an approach in which students are given opportunities to solve problems as an entire class, in small groups, in pairs, or individually.

Each lesson begins with an open-ended question to the class (for example, *Why do we need to eat different kinds of foods?*). Because there is no right or wrong answer, this approach helps students relate to the concept that will be taught.

Students are then given an example or a passage to read that introduces a mathematical concept in a way they can understand. For an example, see page 27 in the Student Guide.

Notice that the vocabulary words are listed at the top and then highlighted on the page.



Even when reading an AMP Link article, students are pointed to the vocabulary words in their Student Guide, and the words are highlighted in the magazine.

Turn to page 29 in the Student Guide, and notice the vocabulary to the right. Open the AMP Link Magazine to page 3, to find the vocabulary words highlighted in the article.



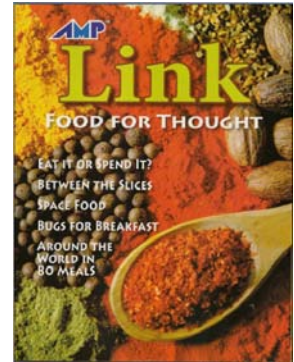
Finally, students synthesize their understanding and practice application of the skill in the independent practice. Working on the independent practice alone is meant to give students confidence in their problem-solving ability.

Reading

The third key area of scientific research is reading.

Support for reading comprehension is provided throughout every lesson in the program and is meant to deepen students' understanding of math concepts and vocabulary.

Reading comprehension and math comprehension go hand-in-hand in the AMP Math system. If students have difficulty understanding a math scenario or comprehending the math vocabulary, then they are not able to understand or solve the math problem. Many students lack the reading comprehension skills they need to solve math problems, which is why AMP Math focuses heavily on reading.



Take out the AMP Link Magazine, and look at the articles that are included.

In the article “Food for Thought,” students pull out the math by outlining what they eat each day and calculating portions.

Teaching and Learning Strategies

The fourth key area is teaching and learning strategies.

In AMP Math, students are given the opportunity to engage with each other throughout each lesson. According to the theories behind AMP Math, learning is best achieved when learners are engaged with the social process.

As mentioned earlier, AMP Math is structured so that students are divided into groups and share their answers with each other. This interaction within groups, small teams, or focused pairs engages students and gives them a chance to work in a social situation to solve math problems.

It also helps students build confidence because it shows them that there are multiple ways of arriving at the solution. If their solution differs from their peers or even from their teacher's, it doesn't mean that it's wrong. If the thinking behind their solution is sound, then they are headed in the right direction.

Review

This guide presented the six NCTM focal points for each level of AMP Math and its scientific research base.

The AMP Math system applies this research throughout every lesson in the four key areas: problem solving, skill acquisition and practice, reading, and teaching and learning strategies.

Finally, information is included about how this research impacts daily instruction.

References

National Council of Teachers of Mathematics (NCTM). "Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics." NCTM Web site.
<http://www.nctm.org/focalpoints>.