

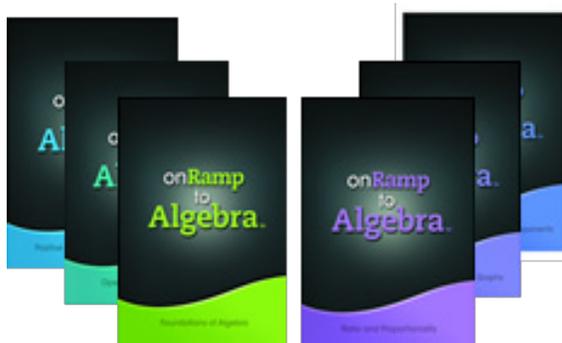
onRamp to Algebra™

Program Overview

Introduction

This guide introduces onRamp to Algebra, a program designed to ensure that at-risk students are successful in Algebra 1. It is an intensive intervention program that builds and solidifies foundational skills and conceptual understanding necessary to be successful in algebra.

This guide also introduces the program design and the Workshop model used to teach an onRamp to Algebra lesson.



Overview

Built on the proven success of the Ramp Up to Algebra model, onRamp to Algebra is a forty-five-minute mathematics course that is designed specifically for students who are at risk of failing Algebra 1.

Unlike traditional “catch-up” programs, onRamp to Algebra is designed to be taken prior to Algebra 1. The program’s goal is to accelerate students’ learning to the level needed to be successful in the gateway courses to advanced mathematics, such as Algebra 1. The lessons and units examine common student misconceptions and teachers work with students to revise these misconceptions and deepen their mathematical understanding.

3. The inverse of dividing by $\frac{1}{2}$ is multiplying by $\frac{1}{2}$.

4. The inverse of subtracting $\frac{1}{2}$ is adding $\frac{1}{2}$.

5. a. The additive inverse of 2 is -2 .

b. The multiplicative inverse of 2 is $\frac{1}{2}$.

c. The additive inverse of $\frac{1}{2}$ is $-\frac{1}{2}$.

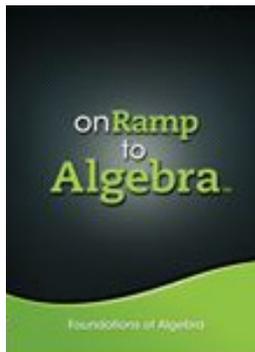
d. The multiplicative inverse of $\frac{1}{2}$ is 2.

Coach For part (d), some students may prefer to write $\frac{2}{1}$, which is fine; this makes the inversion more obvious. Watch for a student who writes the answer to part (d) as $\frac{1}{2}$. Verify that this is equivalent to 2 by performing the steps on a calculator. Dividing fractions will be covered in Unit 2. What is important at this point is that the student recognizes that the product of a number and its multiplicative inverse is 1.

Units

onRamp to Algebra consists of six content focused units:

- Unit 1: Foundations for Algebra
- Unit 2: Operations with Fractions
- Unit 3: Positive and Negative Numbers
- Unit 4: Ratio and Proportionality
- Unit 5: Showing Relationships with Graphs
- Unit 6: Expressions, Equations, and Exponents



Teach each of the six units using the flexible Workshop model. This model requires students to analyze concepts deeply, evaluate the appropriateness of their approach to solving a problem, and explain their work to a partner or small group.

Workshop Model



Within the lessons for each unit, students routinely work together to understand alternative approaches for solving a problem, discuss similarities and differences in approaches, and investigate possible errors in understanding.

d. Find a student who sketched a different type of diagram from yours. Say how each quantity is shown in the two different diagrams.

Content Design What will students need to know when they get to algebra? The program answers this question through a clear and efficient path from arithmetic to algebra.

$$\begin{array}{|c|} \hline 4 + 6 + 7 \\ \hline 4 + 6 + 7 \\ \hline 4 + 6 + 7 \\ \hline \end{array} = 3 \times \boxed{4 + 6 + 7} = 51$$

$$\begin{array}{|c|c|c|} \hline 4 & + & 6 & + & 7 \\ \hline 4 & + & 6 & + & 7 \\ \hline 4 & + & 6 & + & 7 \\ \hline \end{array}$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$\boxed{3 \times 4} + \boxed{3 \times 6} + \boxed{3 \times 7} = 51$$

onRamp to Algebra was designed to create an explicit and cohesive program based on mathematical concepts and to provide students with a variety of problems and skills to expose them to rich mathematical experiences.

4 Conventions for Using Numbers and Variables

GOAL To use the conventions for using numbers and variables in mathematical expressions.

Mathematics Learning Progressions

Looking Back
In the previous lesson, students used variables in mathematical expressions and substituted numbers for the variables to find the value of an expression.

Mathematics of the Lesson

- **Key Point** Students learn that a convention is a way to write expressions so they mean the same thing to everyone.
- **Key Point** Students learn the convention of multiplication, writing 4 times the variable n as $4n$, and the convention for division, writing 36 divided by the variable a as $\frac{36}{a}$.
- **Use Prior Knowledge** Students use variables in expressions, compute the value of the expression by substituting, and interpret the results. (Lesson 3)

Looking Ahead
Learning the conventions for using numbers and variables in algebraic expressions prepares students for learning the number properties and the Distributive Property, which is essential for justifying their reasoning.

Vocabulary
From This Lesson
Conventions are agreed-upon ways of writing mathematics.
From Previous Lessons
A **variable** is a symbol, usually a letter, that represents one or more numbers.
An **algebraic expression** is a mathematical phrase that consists of variables, numbers, and operation symbols.
Substitution is used to replace one thing with another.

Common Core State Standards
Content Standards

6.EE.2.a Write expressions that record operations with numbers and with letters standing for numbers.

6.EE.2.b Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. . . .

Mathematical Practices

MP1 Make sense of problems and persevere in solving them.

MP4 Model with mathematics.

MP7 Look for and make use of structure.

The program was also designed to do the following:

- Teach students to use concepts in a variety of real-life situations.
- Direct and emphasize student interactions.
- Use simple algebra to teach the fundamentals of arithmetic.
- Instruct students to comprehend and speak the language of mathematics.

Concepts are carefully sequenced so that foundations are firmly built and each topic is taught in sufficient depth. This careful progression pulls students beyond rehearsal into thinking strategically about the problem and its mathematics.

Unit 1 Foundations of Algebra		
<ol style="list-style-type: none"> 1. Reasoning with Diagrams 2. Reasoning with Numbers 3. Reasoning with Variables 4. Conventions for Using Numbers and Variables 5. Conventions for Using Parentheses 6. The Number Properties 7. PUTTING IT TOGETHER: Conventions and the Number Properties 8. Using Variables in Formulas 9. The Distributive Property 	<ol style="list-style-type: none"> 10. PUTTING MATHEMATICS TO WORK: Applying the Distributive Property 11. The Inverses of Addition and Multiplication 12. PUTTING IT TOGETHER: Progress Check 13. Relationships between Quantities 14. Using Graphs to Represent Relationships 15. Understanding the Problem Situations 	<ol style="list-style-type: none"> 16. Representing Problem Situations 17. Writing Formulas to Answer Questions 18. PUTTING IT TOGETHER: The Unit in Review <li style="text-align: center;">Comprehensive Review

Problems are designed to provide natural learning environments through authentic and meaningful real-world problems.

The length of a shoelace needed for a shoe or boot depends on the number of eyelets that the shoe has. For any shoe, you need a total of 7 in. on each end of the lace to tie a bow plus 1 extra inch for each eyelet. Sketch a diagram to help you understand this situation better.

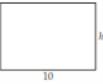


1. What are the two quantities that vary in this situation?
2. What is the length of the shoelace if the shoe has 2 eyelets?
3. What is the length of the shoelace if the shoe has 16 eyelets?
4. How many eyelets does the shoe have for a 20-in. shoelace?
5. How many eyelets does the shoe have for a 36-in. shoelace?
6. Write a formula for the length of shoelace needed in terms of the number of eyelets.

The onRamp to Algebra lessons carefully balance concepts and problem solving with essential skills practice. This practice is regular and efficient, and it focuses only on facts and procedures that should be automatic.

Skills

Calculate the area of each rectangle. The dimensions are given in centimeters. When using numbers and variables together, follow the appropriate conventions.

3. 
4. 
5. 
6. 

Underlying each lesson are three essential outcomes for a solid understanding of mathematics:

- Mathematical reasoning
- Concept application
- Mathematical discourse

Essentials

Both teacher and student materials are available for onRamp to Algebra.

Product Array

Teacher	Student
<ul style="list-style-type: none"> • 6 TE units • 1 Program Overview • 1 Content DVD • online teacher license <ul style="list-style-type: none"> • eText • Online Concept Book • Presentation Screens • PD Videos • Onsite/Webex PD 	<ul style="list-style-type: none"> • 6 SE units (per student) • 20 Extra Practice Workbooks • Online student license <ul style="list-style-type: none"> • eText • Online Concept Book • Online Math Tools • Animations/Videos • Glossary • Online Tests

Lesson Components

onRamp to Algebra follows the Workshop model of Opening, Work Time, and Closing.

Opening

The Opening is a period of interactive instruction that lasts approximately ten minutes. Engage students with the concept and allow them to interact directly with the mathematics. An animated lesson launch and write-on presentation screens tie directly to the start of the lesson in the Student Edition.

Work Time

The Work Time is approximately twenty-five minutes of independent work, followed by partner or small-group work. Students explore a concept and work through a specified problem set. Coach students to help them understand the concept at a deeper level and make connections between mathematical concepts.

Closing

The Closing is a ten-minute block where students summarize their understandings of the topic and share their solution strategies with the rest of the class. Guide conversations to ensure that key ideas are made explicit.

Homework

The Homework builds on the Work Time, where problems reinforce the lesson's concept. The Homework feature concludes with a short set of skill exercises. Students can complete the Homework in the Student Edition or online where they have access to animations, videos, and additional mathematical tools.

Review

This guide provided an introduction to the onRamp to Algebra mathematics program.

onRamp to Algebra lessons are taught through the Workshop model and are deliberately structured to lead students to become independent in the mathematical world by doing, talking, reading, and writing about math.