

## Unit A - Building Blocks

### Overview

This first unit gives students the essential tools they will use throughout their work in math including:

- extending the number system to include integers
- the concept of a variable and how it can be manipulated
- solving algebraic equations and giving a clear argument to justify a solution.

During this unit, students will review working with decimal operations so they are ready to work with rational numbers that include negatives in Unit C.

**21<sup>st</sup> Century Capacities:** Presentation, Analyzing

### Stage 1 - Desired Results

#### ESTABLISHED GOALS/ STANDARDS

**MP4** Model with Mathematics

**MP6** Attend to precision

**MP7** Look for and make use of structure

**CC.7.NS.1a** Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

**CC.7.NS.1b** Understand  $p + q$  as the number located a distance  $|q|$  from  $p$ , in the positive or negative direction depending on whether  $q$  is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

**CC.7.NS.1c** Understand subtraction of rational numbers as adding the additive inverse,  $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts

**CC.7.NS.1d** Apply properties of operations as strategies to add and subtract rational numbers.

**CC.7.NS.2a** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to

#### *Transfer:*

*Students will be able to independently use their learning in new situations to...*

1. Present a solution that is supported by an argument that is clear to the audience (Presentation)
2. Manipulate equations/expressions or objects to create order and establish relationships. (Analyzing)

#### *Meaning:*

**UNDERSTANDINGS:** *Students will understand that:*

1. Mathematicians represent and analyze mathematical situations and structures using algebraic symbols.
2. Mathematicians examine mathematical relationships to discern a pattern or structure.
3. Mathematicians compare the effectiveness of two arguments, and—if there is a flaw in an argument—explain what it is.

**ESSENTIAL QUESTIONS:** *Students will explore & address these recurring questions:*

- A. How do I decide if my answer makes sense, and if not, what do I do?
- B. How is thinking algebraically different from thinking arithmetically?
- C. What symbols are used to represent the world we live in?
- D. What strategies do mathematicians use when solving problems to ensure consistent answers?

<p>satisfy the properties of operations, particularly the distributive property, leading to products such as <math>(-1)(-1) = 1</math> and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.</p> <p><b>CC.7.NS.2b</b> Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If <math>p</math> and <math>q</math> are integers then <math>-(p/q) = (-p)/q = p/(-q)</math>. Interpret quotients of rational numbers by describing real-world contexts.</p> <p><b>Use properties of operations to generate equivalent expressions.</b></p> <p><b>CC.7.EE.1</b> Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p><b>CC.7.EE.2</b> Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.</p> <p><b>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b></p> <p><b>CC.7.EE.3</b> Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p> <p><b>CC.7.EE.4</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p><b>CC.7.EE.4a</b> Solve word problems leading to equations of the form <math>px + q = r</math> and <math>p(x + q) = r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.</p>	<p><b>Acquisition:</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"><i>Students will know...</i></th> <th style="width: 50%;"><i>Students will be skilled at...</i></th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <ol style="list-style-type: none"> <li>1. That every number (other than zero) has an opposite number</li> <li>2. That absolute value represents a distance</li> <li>3. Explain how <math>-2^2</math> and <math>(-2)^2</math> are different</li> <li>4. Vocabulary: power, base, exponent, square, cube, square root, distribute, opposite, absolute value, term, like term, variable, constant, integer, expression, equation</li> </ol> </td> <td style="vertical-align: top;"> <ol style="list-style-type: none"> <li>1. Expressing repeated multiplication with an exponent</li> <li>2. 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