Packet 9: Solving Equations

Dear Parents/Guardians,

Packet 9 builds from a conceptual foundation for solving equations. In Lesson 1, students use mental math strategies such as the 'cover up method' to solve equations. In Lesson 2, students reinforce the properties of equality through the balance models. Students use these properties of equality (as well as other properties) to justify their symbolic notation work when solving equations in Lesson 3.

Solving Equations: Mental Math

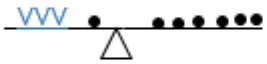
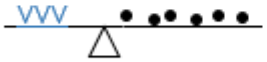
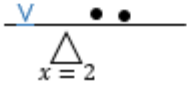
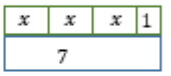
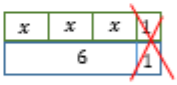
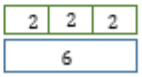
Students use a 'cover up' method, covering with their finger the variable expression, determining what the value of the unknown should be.

$2(x - 1) = -6$

Cover up the x – 1, since x is unknown. Think, "*2 times what number gives me -6? -3*"	$2(\square) = -6$
Cover up the x. Think, "*What minus 1 is -3? (-2)*"	$\square - 1 = -3$ $x = -2$

Solving Equations: Balance Strategies

Students will use balance scales and generic tape diagrams to represent and solve equations.

Strategy 2: **Balance Scales** Students will use cups to represent the unknown (the variable) and marbles for each quantity. They figure out how to balance the scale.	Strategy 3: **Generic Tape Diagram** Students represent variables and constants as 'tapes'. (Not drawn to scale.)
Represent and solve $3x + 1 = 7$	
Each V is an empty cup that represents an unknown value, such as x. Each ● represents a value of 1.  I can remove 1 marble from each side and still keep it balanced.  Each cup needs to weigh the same amount. Divide the 6 marbles into the 3 cups. Each cup would weigh 2 marbles.  $x = 2$	Use $\square$ to represent x.  $3x + 1 = 7$  Since $6 + 1 = 7$, rewrite 7 as the sum and remove 1 from both diagrams.  $3x = 6$ Divide 6 into three equal parts (for the $3x$). $x = 2$

By the end of the packet, your student should know…

How to solve equations using mental math Lesson 9.1

How to represent and solve equations using the balance scale model Lesson 9.2

How to solve equations using properties of equality Lessons 9.2 and 9.3

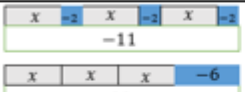
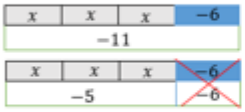
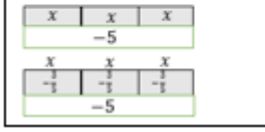
How to solve equations with rational coefficients Lesson 9.3

Additional Resources

Resource Guide (RG1)
Part 1, page 12

Solving Equations with Rational Numbers

Students will solve equations using traditional algebraic notation, building from the models in the first two lessons. They will justify each step.

Picture	Symbolic Notation	Justification
	$3(x - 2) = -11$	Given
	$3x - 6 = -11$	distributive property
	$3x - 6 = -11$ $-(-6) = -(-6)$ $3x = -5$	Remove (-6) (which is the same as adding 6) addition property of equality
	$\frac{3x}{3} = \frac{-5}{3}$ $x = -\frac{5}{3}$	Divide the -5 into 3 equal groups, or take $\frac{1}{3}$ of -5. multiplication property of equality