Mathematics
Unit 1: Algebra Concepts

Essential Understandings	▪ Simplifying algebraic expressions and solving equations are foundational tools for further algebraic study. ▪ Graphs and tables can be used to model data, make predictions, and solve problems.
Essential Questions	▪ How does one evaluate numerical expressions which contain integers and other rational numbers? ▪ How does one write numerical expressions to model word problems? ▪ How does one model simple algebraic expressions geometrically? ▪ What are the vocabulary terms which describe components of an algebraic expression? ▪ How does one evaluate algebraic expressions which contain exponents and more than one variable? ▪ How does one check possible solutions of an equation? ▪ How does one determine if relationships are linear or nonlinear when looking for patterns in tables, sequences, graphs, and other types of problems? ▪ How does one describe linear relationships using words or symbols? ▪ How does one solve equations of the forms $ax \pm b = c$ (where a, b, and c are positive rational numbers or positive or negative integers) and $ax \pm b = cx \pm d$ and $x/a \pm b = c$ (where a, b, c, and d are whole numbers)? ▪ How does one write multi-step equations to model real life situations? ▪ What are directly proportional relationships? ▪ How can directly proportional relationships found in tables and graphs be expressed symbolically? ▪ What is the meaning of the slope of a line and the y-intercept of a line? ▪ In lines modeled in terms of $y = kx$ and $y = mx + b$, how does one identify the slope and the y-intercept? ▪ How can one describe linear relationships found in tables and graphs using the symbolic forms $y = kx$ and $y = mx + b$?

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Essential Knowledge	▪ The order of operations is used to evaluate numerical expressions with integers. ▪ Numerical expressions using a variety of rational numbers are used to model word problems. ▪ Simple algebraic expressions can be modeled geometrically. ▪ The components of an algebraic expression are identified with specific vocabulary. ▪ The order of operations is used to evaluate algebraic expressions which contain exponents and more than one variable. ▪ Algebraic expressions in equations may be evaluated separately to determine whether or not values are solutions to equations. ▪ Linear and nonlinear patterns may be modeled in tables, sequences, graphs, and problems. ▪ Linear relationships may be described in words or symbols. ▪ Solving equations of the form ax $\pm$ b = c where a, b, and c are positive rational numbers or positive or negative integers follows a logical sequential process. ▪ Solving equations of the form ax $\pm$ b = cx $\pm$ d and x/a $\pm$ b = c with whole numbers also follows a logical sequential process. ▪ Real life situations may be modeled using a variety of equation forms. ▪ Data containing directly proportional relationships can be modeled in tables, graphs, and formulas. ▪ $y = kx$ is the formula which is used to model directly proportional relationships. ▪ The slope and the y-intercept are two important characteristics of a line graphed on the coordinate plane. ▪ In the symbolic forms of a line ($y = kx$ and $y = mx + b$) the 'k' and 'm' coefficients identify the value of the slope and the constant 'b' identifies the y-intercept. ▪ Linear relationships found in tables and graphs can be modeled using $y = kx$ and $y = mx + b$ forms.
Vocabulary	▪ Terms: ○ coefficient, combine like terms, constant, constant of proportionality, coordinates, intercepts, like terms, origin, quadrants, slope, slope-intercept form, terms, y = kx form

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Essential Skills	▪ Evaluate numerical expressions with integers following the order of operations. (I, R) ▪ Create and evaluate numerical expressions in solving word problems with rational numbers. (R) ▪ Model algebraic expressions geometrically. (I) ▪ Identify the components of an algebraic expression (variables, coefficients, and variables). (I, R) ▪ Evaluate algebraic expressions including those with whole number exponents and more that one variable. (I, R, A) ▪ Evaluate expressions within an equation by substituting values for the variables. (A) ▪ Identify a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or problem situations; and generalize a linear relationship using words or symbols. (I) ▪ Solve equations of the form $ax \pm b = c$ where a, b, and c are positive rational numbers or positive or negative integers. (I, R) ▪ Solve multi-step linear equations of the form $ax \pm b = cx \pm d$ and $x/a \pm b = c$ with whole numbers. (I) ▪ Write and solve a multi-step equation for a real-life situation. (I, R). ▪ Recognize directly proportional relationships from data in a table, graph, or formula. (I) ▪ Translate common directly proportional relationships into symbolic statements ($y = kx$) and graphs. (I) ▪ Interpret the slope and y-intercept of the graphs of $y = kx$ and $y = mx + b$ in terms of a given context. (I) ▪ Identify linear relationships of the forms $y = kx$ and $y = mx + b$ in tables, graphs, and concrete applications. (I, R)

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Related Maine Learning Results	D. Algebra Symbols and Equations D1.Students create and evaluate expressions. a. Create and evaluate expressions using integers. b. Create and evaluate expressions using rational numbers. Equations and Inequalities D2.Students understand and solve problems involving linear equations and know that a linear equation can be written in the form 0 = ax + b. a. Solve equations of the form ax +/- b = c where a, b, and c are positive rational numbers or positive or negative integers. b. Convert equations to 0 = ax + b form. D3.Students understand and use directly proportional relationships, y = kx. a. Recognize directly proportional relationships by information in a table, graph, or formula. b. Translate common directly proportional relationships into symbolic statements and graphs. c. Interpret the slope and y-intercept of the graph of y = kx in terms of a given context.
NECAP	NECAP Functions and Algebra M (F & A) 7-1 Identifies…a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or problem situations; and generalizes a linear relationship using words or symbols. M (F & A) 7-2 Demonstrates conceptual understanding of linear relationships (y = kx; y = mx + b)…in tables and graphs…and concrete situations. M (F & A) 7-3 …evaluating algebraic expressions (including those with whole number exponents or more than one variable)… M (F & A) 7-4 …solving multi-step linear equations of the form… ax $\pm$ b = cx $\pm$ d and x/a $\pm$ b = c with whole numbers.