

MA 6B	Mathematics Embedded Credit
Cape Career & Technology Center	Last Update: April 2017
Topic: Basic Algebra	Focus: Equations

Show-Me Standards: MA1, MA2, MA4	MO Grade Level Expectations: N2C10, A2A10, A2C9	NCTM Standards: 4A, 4B, 5B
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OBJECTIVE: Students will be able to solve problems simplifying algebraic expressions.

Introduction:

Before working with algebraic expressions, it is important to know some basic definitions.

Algebraic Expression: A phrase of mathematical origin that is made up of various numbers, letters and operations.


Equation: An algebraic statement that two algebraic expressions are equal.

Coefficient: The number with a variable. In the numerical operation $-(-3x)$ – the -3 is the coefficient of the expression. The meaning of this expression is -3 times the value of x . If there is no coefficient, then it is understood that the coefficient is 1.

Exponents: The designated number of times that a variable or number is multiplied by itself is equal to the exponent. Thus, x^4 means x times x times x times x . 3^4 means 3 times 3 times 3 times 3.

The use of Algebra requires one to know how to think about solving equations. Although the process of solving equations seems difficult it is important to know how to take steps to solve the equation. Almost every job, or career path, has to work with equations, or formulas. Solving equations and formulas for an 'unknown' (variable, see above) is a basic task that every vocational student needs to master.

Important concepts to remember when working with polynomials:

 Adding and subtracting.

- The terms have to be the same (e.g., $4x^2$ and $3x^2$ can be added together or subtracted).
- If there is no coefficient, then it is understood that the coefficient is 1.
- The rules for signed numbers must be followed at all times.

 Multiplying and dividing.

- Multiply/divide all coefficients and then the variables.
- Use the order of operations and rules for multiplying and dividing signed numbers.
- Parentheses mean to multiply everything in them by what is connected to the parentheses. (Example: $4(2x^3 + 6) = 8x^3 + 24$)
- If there is a negative sign in front of the parentheses, everything in the parentheses is multiplied by -1 , in other words, all of the signs of the terms are changed.

 Working with exponents.

- When adding or subtracting numbers or variables with exponents they can only be added if the exponents are the same. [e.g., $x^2 + 3x^2 = 4x^2$, but $(x^3 + 4x^5)$ impossible]

- When multiplying numbers or variables with exponents, the exponents are subtracted and the base stays the same. (e.g., $x^3 * x^5 = x^8$)
- When dividing numbers of variables with exponents, the exponents are subtracted and the base stays the same. (e.g., $\frac{x^4}{x^3} = x$)
- Anything to the exponent of 0 equals 1.
- Negative exponents mean the same as 1 over the number or variable to a positive exponent. (e.g., $y^{-3} = \frac{1}{y^3}$)

EXAMPLES:

$12x + 3 = 6x - 21$	The first step is to get the terms with x's on the left and those without on the right.
$12x - 6x + 3 = 6x - 6x - 21$	Part Two: move the numerical terms to the right side of the expression.
$6x + 3 - 3 = -21 - 3$	Now reduce the expression where possible.
$6x = -24$	Move the 6 to the right side of the equation.
$\frac{6x}{6} = \frac{-24}{6}$	Now reduce the expression where possible.
$X = -4$	The ANSWER .
$12(-4) + 3 = 6(-4) - 21$	CHECK the ANSWER.
$-48 + 3 = -24 - 21$	The ANSWER is CORRECT .

$x - 0.25x = 1.5$	First factor the x out of the expression.
$x(1 - 0.25) = 1.5$	Now reduce the expression wherever possible.
$x(0.75) = 1.5$	Move the 0.75 to the right side of the equation.
$\frac{x(0.75)}{0.75} = \frac{1.5}{0.75}$	Now reduce the expression wherever possible.
$x = 2$	The ANSWER .
$(2) - 0.25(2) = 1.5$	CHECK the ANSWER.
$2 - 0.5 = 1.5$	The ANSWER is CORRECT .

Solve These Algebraic Equations:

1. $y - 4 + 10 = -4$

2. $10 - c = 5$

3. $\frac{3x}{2} = -15$

4. $\frac{12}{2a} = 6$

5. $7(5x - 2) = 6(6x - 1)$

6. $8(2a + 1) = 4(7a + 8)$

7. $3 - (y+2) = 5 + 3(y+2)$

$$8. \frac{3}{4a} - \frac{1}{2a} + \frac{2}{8} = \frac{2}{a}$$

$$9. \frac{3}{8} = \frac{5}{8x} + \frac{3}{2x} - \frac{1}{x}$$

$$10. 0.25x - 1.5 + 0.05x = 0.15x$$

$$11. 3a^2 = 12$$

$$12. \sqrt{y^2} = 100$$