

MTH 1W: Adding and Subtracting Monomials

LESSON OVERVIEW:

Scope and Sequence – Main Lesson Topics	Prior Knowledge	Vocabulary
<ul style="list-style-type: none"> • Adding and Subtracting Monomials (Collecting Like Terms) <ul style="list-style-type: none"> • simplifying algebraic expressions • collecting like terms 	<ul style="list-style-type: none"> • Add/subtract integers • Add/subtract Fractions • Creating algebraic expressions 	<ul style="list-style-type: none"> • Term • Constant • Coefficient • Like-Term • Unlike-Term • expression

Learning Objectives
<p>I can:</p> <ul style="list-style-type: none"> • Identify like and unlike terms • Simplify expressions by collecting like terms • Solve expressions by collecting like terms and use substitution for given variable values • Create algebraic expressions to represent relationships in word problems

Curriculum Expectations
<ul style="list-style-type: none"> • C1.2 create algebraic expressions to generalize relationships expressed in words, numbers, and visual representations, in various contexts • C1.3 compare algebraic expressions using concrete, numerical, graphical, and algebraic methods to identify those that are equivalent, and justify their choices • C1.4 simplify algebraic expressions by applying properties of operations of numbers, using various representations and tools, in different contexts

1	Lesson Introduction & Problem String (<i>see below</i>)	40 minutes
<p>Introduction:</p> <p>In algebra, like terms are terms that have the same variables and powers, the coefficients of the variable do not need to match.</p> <p>Unlike terms are two or more terms that do not have the same variable or power.</p> <p>We “collect” like terms by counting how many of each different variable there are in the expression.</p> <p>Collecting like terms allows us to simplify algebraic expressions and make them shorter and easier to work with</p>		

2	Consolidation	10 minutes

3	Meaningful Notes	10 minutes
<ul style="list-style-type: none"> • Like terms: parts of an expression that have the same variable • Collecting like terms means to count how many of each different letter there are in an expression • We combine like terms to make an expression shorter and simpler. 		

4	Check Your Understanding	15 minutes
<ul style="list-style-type: none"> • 		

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LESSON BACKGROUND:

- As we have already seen, an algebraic expression is a collection of one or more terms involving variables, numbers and operations.
- For example, the algebraic expression $5m$, has one term,
- and $6x^2 + xy - 8$ has three terms.

- A monomial is an algebraic expression with one term: for example $2x$ or $5xy$.

- A binomial is an algebraic expression with two terms: for example $3x + 2$

- Only like terms can be combined when monomials and binomials are added together.

(Ontario Curriculum Mathematics Grade 8 Algebra)

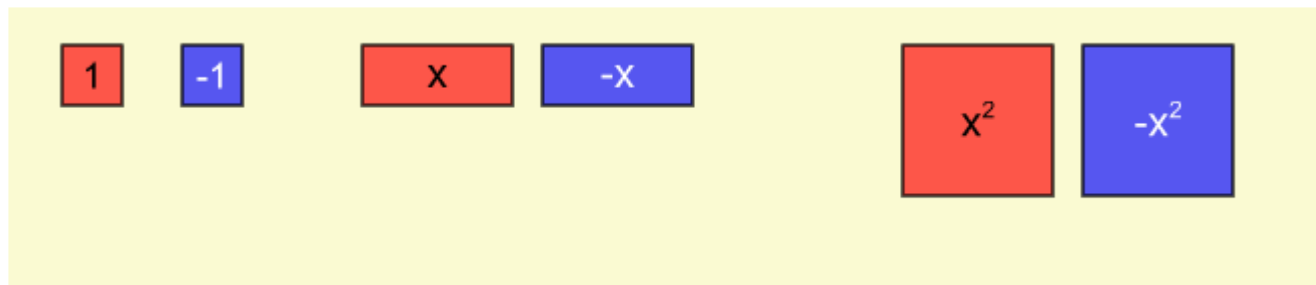
When using algebra tiles:

- recall that the small square = 1 unit,
- the rectangle = n units,
- the large square = n^2
- Also recall that one colour represents positive values and the other colour represents negative values. The colour doesn't matter, as long as it is consistent.

Some users of algebra tiles have the red tiles as positive and the blue as negative because red on a tap or thermometer red usually means warmer and blue represents cooler.

Some users of algebra tiles use red as negative and blue as positive, because in business if you are losing money, you are "in the red".

It is helpful to have students indicate positives and negatives on their drawings and models



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PROBLEM	HINTS	EXTENSIONS
$10x - 4x + 3 + 2$	<ul style="list-style-type: none"> • How many types of terms do we have? • Which term does the “minus” belong to? • Which terms can be combined? How do you know? • Can you make a model of this problem? 	<ul style="list-style-type: none"> • $12x - 5x + 6 - 1$ • Explain why we can only combine numbers that have like terms
$3x + 4 + 5x - 6$	<ul style="list-style-type: none"> • How many types of terms do we have? • How is this question different than the first? How is it the same? • Can you make a model of this problem? • Which terms can be combined? How do you know? 	<ul style="list-style-type: none"> • $5x - 7 + 2x + 5$ • Explain why when you combined like terms in the sample problem you had a -2. • What questions are helpful to ask yourself when combining like terms?
$6x - (-5y) - 2x - 3y$	<ul style="list-style-type: none"> • How many types of terms do we have? • How is this question different than the first? How is it the same? • Which terms can be combined? How do you know? • Can we simplify anything? • Be careful with the minus signs! The sign to the left of the term belongs to the term 	<ul style="list-style-type: none"> • $8x - (-8y) - 5x - y$ • Explain why brackets are used in this problem • Explain how to subtract a negative number
$-3x + 2 + 6x + (-8)$	<ul style="list-style-type: none"> • How many types of terms do we have? • How is this question different than the first? How is it the same? • Which terms can be combined? How do you know? • Can we simplify anything? • What’s the same as adding a negative? • Can we group the like terms? 	<ul style="list-style-type: none"> • Prove that adding a negative is the same as subtracting a positive. Use models or pictures to help you justify your $-5x + (-1) + 2x + 6$
$(-5x) - (-7) + x - 3$	<ul style="list-style-type: none"> • Can you make a model of this problem? • Can we simplify anything before we collect like terms? • What are the coefficients on both x terms? Why might this be important to know? • Can we group the like terms? 	<ul style="list-style-type: none"> • $(-4x) - 8 - (-x) - 2$
$\left(-\frac{1}{5}x\right) + \frac{1}{3}y + \frac{2}{5}x + \frac{2}{3}y$	<ul style="list-style-type: none"> • It’s the same big idea, but with fractions • What do you recall about adding fractions? • How many types of terms do we have? How do you know? • How is this question different than the previous questions? How is it the same? • Can you make a model of this problem? • Which terms can be combined? How do you know? • Can we simplify anything? 	<ul style="list-style-type: none"> • $\frac{x}{3} + \frac{2y}{5} - \frac{2x}{3} + \frac{y}{5}$

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PROBLEM	HINTS	EXTENSIONS
$4x - 2x^2 - 5x^2 - (-2x)$	<ul style="list-style-type: none"> • How many types of terms are here? Be careful! • How is this like previous questions we have done? How is it different? • Can you make a model of this problem? • What are the exponents of $4x$ and $-2x$? • Which terms can be combined? How do you know? • Can we simplify anything? 	<ul style="list-style-type: none"> • $10x^2 - 3x + 5x - 14x^2$ • If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include about negative numbers? Discuss in your group what you think the most important ideas are
$3x^2 + 9x + 2 - 7x^2 - 2x - 5$	<ul style="list-style-type: none"> • How many types of terms are here? How do you know? • How is this like previous questions we have done? How is it different? • Can you make a model of this problem? • Which terms can be combined? How do you know? • Can we simplify anything? 	<ul style="list-style-type: none"> • $x^2 + 3x + 1 - 4x^2 + 2x - 3$ • If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include? Discuss in your group what you think the most important ideas are
$\frac{1}{6}x + 3 - \frac{2}{3} + \frac{5}{6}x$	<ul style="list-style-type: none"> • How many types of terms are here? How do you know? • How is this like previous questions we have done? How is it different? • Can you make a model of this problem? • Which terms can be combined? How do you know? • Can we simplify anything? 	<ul style="list-style-type: none"> • $\frac{3}{8}x - \frac{4}{9} + \frac{1}{8}x + 1$ • If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include about fractions? Discuss in your group what you think the most important ideas are
$\frac{2m}{7} + \frac{3n}{8} - \frac{3m}{2} + 2n$	<ul style="list-style-type: none"> • How many types of terms are here? How do you know? • How is this like previous questions we have done? How is it different? • Can you make a model of this problem? • Which terms can be combined? How do you know? • Can we simplify anything? 	<ul style="list-style-type: none"> • $\frac{x}{4} + \frac{2y}{3} - \frac{5y}{6} + \frac{4x}{3}$

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Teacher Observations/To Go Back to During Gallery Walk:

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