


CHAPTER 2: SIMPLIFYING WITH VARIABLES


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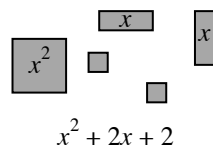


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Notes:

COMBINING LIKE TERMS

Combining tiles that have the same area to write a simpler expression is called **combining like terms**. See the example shown at right.



When you are not working with actual tiles, it can help to picture the tiles in your mind. You can use these images to combine the terms that are the same. Here are two examples:

Example 1:

$$2x^2 + xy + y^2 + x + 3 + x^2 + 3xy + 2 \Rightarrow 3x^2 + 4xy + y^2 + x + 5$$

Example 2:

$$3x^2 - 2x + 7 - 5x^2 + 3x - 2 \Rightarrow -2x^2 + x + 5$$

A **term** is an algebraic expression that is a single number, a single variable, or the product of numbers and variables. The simplified algebraic expression in Example 2 above contains three terms. The first term is $-2x^2$, the second term is x , and the third term is 5 .

Notes:

COMMUTATIVE PROPERTIES



The **Commutative Property of Addition** states that when *adding* two or more number or terms together, order is not important. That is:

$$a + b = b + a. \quad \text{For example, } 2 + 7 = 7 + 2$$

The **Commutative Property of Multiplication** states that when *multiplying* two or more numbers or terms together, order is not important. That is:

$$a \cdot b = b \cdot a. \quad \text{For example, } 3 \cdot 5 = 5 \cdot 3$$

However, *subtraction* and *division* are not commutative, as shown below.

$$7 - 2 \neq 2 - 7 \text{ since } 5 \neq -5$$

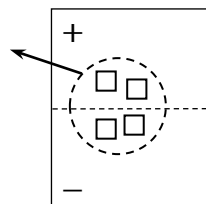
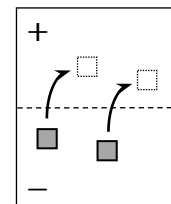
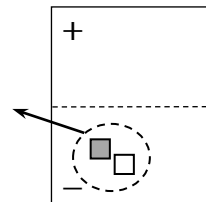
$$50 \div 10 \neq 10 \div 50 \text{ since } 5 \neq 0.2$$

SIMPLIFYING AN EXPRESSION ("LEGAL MOVES")



Three common ways to simplify or alter expressions on an Expression Mat are illustrated below.

- Removing an equal number of opposite tiles that are in the same region. For example, the positive and negative tiles in the same region at right combine to make zero.
- Flipping a tile to move it out of one region into the opposite region (i.e., finding its opposite). For example, the tiles in the “-” region at right can be flipped into the “+” region.
- Removing an equal number of identical tiles from both the “-” and the “+” regions. This strategy can be seen as a combination of the two methods above, since you could first flip the tiles from one region to another and then remove the opposite pairs.



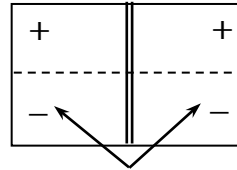
Notes:

USING AN EQUATION MAT



An **Equation Mat** can help you visually represent an equation with algebra tiles.

The double line represents the “equal” sign (=).



For each side of the equation, there is a positive and a negative region.

For example, the equation $2x - 1 - (-x + 3) = 6 - 2x$ can be represented by the Equation Mat at right. (Note that there are other possible ways to represent this equation correctly on the Equation Mat.)

