## Lesson 22: Combining Like Terms (Part 3)

Let’s see how we can combine terms in an expression to write it with less terms.

### 22.1: Are They Equal?

Select **all**expressions that are equal to $8−12−\left(6+4\right)$.

1. $8−6−12+4$
2. $8−12−6−4$
3. $8−12+\left(6+4\right)$
4. $8−12−6+4$
5. $8−4−12−6$

### 22.2: X’s and Y’s

Match each expression in column A with an equivalent expression from column B. Be prepared to explain your reasoning.

**A**

1. $\left(9x+5y\right)+\left(3x+7y\right)$
2. $\left(9x+5y\right)−\left(3x+7y\right)$
3. $\left(9x+5y\right)−\left(3x−7y\right)$
4. $9x−7y+3x+5y$
5. $9x−7y+3x−5y$
6. $9x−7y−3x−5y$

**B**

1. $12\left(x+y\right)$
2. $12\left(x−y\right)$
3. $6\left(x−2y\right)$
4. $9x+5y+3x−7y$
5. $9x+5y−3x+7y$
6. $9x−3x+5y−7y$

### 22.3: Seeing Structure and Factoring

Write each expression with fewer terms. Show or explain your reasoning.

1. $3⋅15+4⋅15−5⋅15$
2. $3x+4x−5x$
3. $3\left(x−2\right)+4\left(x−2\right)−5\left(x−2\right)$
4. $3\left(\frac{5}{2}x+6\frac{1}{2}\right)+4\left(\frac{5}{2}x+6\frac{1}{2}\right)−5\left(\frac{5}{2}x+6\frac{1}{2}\right)$

### Lesson 22 Summary

Combining like terms is a useful strategy that we will see again and again in our future work with mathematical expressions. It is helpful to review the things we have learned about this important concept.

* Combining like terms is an application of the distributive property. For example:

$\begin{matrix}2x+9x\\\left(2+9\right)⋅x\\11x\end{matrix}$

* It often also involves the commutative and associative properties to change the order or grouping of addition. For example:

$\begin{matrix}2a+3b+4a+5b\\2a+4a+3b+5b\\\left(2a+4a\right)+\left(3b+5b\right)\\6a+8b\end{matrix}$

* We can't change order or grouping when subtracting; so in order to apply the commutative or associative properties to expressions with subtraction, we need to rewrite subtraction as addition. For example:

$\begin{matrix}2a−3b−4a−5b\\2a+-3b+-4a+-5b\\2a+-4a+-3b+-5b\\-2a+-8b\\-2a−8b\end{matrix}$

* Since combining like terms uses properties of operations, it results in expressions that are equivalent.
* The like terms that are combined do not have to be a single number or variable; they may be longer expressions as well. Terms can be combined in any sum where there is a common factor in all the terms. For example, each term in the expression $5\left(x+3\right)−0.5\left(x+3\right)+2\left(x+3\right)$ has a factor of $\left(x+3\right)$. We can rewrite the expression with fewer terms by using the distributive property:

$\begin{matrix}5\left(x+3\right)−0.5\left(x+3\right)+2\left(x+3\right)\\\left(5−0.5+2\right)\left(x+3\right)\\6.5\left(x+3\right)\end{matrix}$



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