

**Term**

Part of an expression  
separated by an addition  
or subtraction sign

**Like terms**

Terms that have the  
same variable

**Simplify**

Combine like terms

In algebra, you need to add, subtract, multiply, and divide using variables to stand for numbers.

In algebra

$3n$  means  $n + n + n$ .

$2n$  means  $n + n$ .

$n$  means  $1n$  (the 1 is not written).

$3n$  and  $2n$  and  $n$  are all called **terms**.  $3n + 2n$  is an example of an algebraic expression that includes **like terms**.

To **simplify** an algebraic expression, combine the like terms.

**EXAMPLE 1**

$$3n + 2n$$

Combine the like terms,  $3n$  and  $2n$ .

$3n + 2n$  means the same as

$$\begin{array}{rccccccc} n & + & n & + & n & + & n & + & n & = & 5n \\ \underbrace{\hspace{1.5cm}} & & \underbrace{\hspace{1.5cm}} & & & & & & & & \\ 3n & + & 2n & = & 5n \end{array}$$

**EXAMPLE 2**

$$3x - 15 - 10x$$

Combine the like terms by subtracting the  $x$ 's:

$$3x - 10x \text{ (Think } 3 - 10 = -7\text{)}$$

$$3x - 10x = -7x$$

Since you cannot combine  $-15$  with  $-7x$ , you are finished.

$$\text{The simplified answer: } 3x - 15 - 10x = -7x - 15$$

**Exercise A** Simplify each expression.

1.  $m + m$

3.  $v + v + v$

5.  $c + c + c + c$

2.  $s + s + s + s$

4.  $b + b + b$

**Unlike terms**

Terms that have  
different variables

You may have more than one variable in an expression.

**EXAMPLE 1**

$$3a + b$$

unlike terms

You cannot combine terms because  $a$  and  $b$  are **unlike terms**.

$$3a + a$$

like terms

$3a + a$  are like terms and can be combined to create  $4a$ .

To simplify expressions, combine all like terms.

**EXAMPLE 2**

$$3x + 15 + 6x - 7 + y$$

Combine  $x$  terms:  $3x + 6x = 9x$

Combine integers:  $15 - 7 = +8$

**Note:** You cannot combine unlike terms  $9x$ ,  $y$ , and  $8$ , so you are finished.

Rewrite  $3x + 15 + 6x - 7 + y$  as  $9x + y + 8$ .



Recall that you used the idea of opposites to solve equations of the form  $x - b = c$ . The same idea of opposites can be used to solve equations of the form  $x + b = c$ .

**EXAMPLE 1** Solve  $a + 24 = 51$  for  $a$ .

**Step 1** Write the equation.  $a + 24 = 51$

**Step 2** Subtract 24 from both sides of the equation.  $a + 24 = 51$   
This is the same as adding  $-24 = -24$  to both sides.

**Step 3** Simplify.  $a + 24 = 51$   
 $-24 = -24$   
 $a = 27$

**Step 4** Check.  $27 + 24 = 51$

**EXAMPLE 2** Solve  $r + 1.4 = 3.7$  for  $r$ .

**Step 1** Write the equation.  $r + 1.4 = 3.7$

**Step 2** Subtract 1.4 from both sides of the equation.  $r + 1.4 = 3.7$   
 $-1.4 = -1.4$

**Step 3** Simplify.  $r + 1.4 = 3.7$   
 $-1.4 = -1.4$   
 $r = 2.3$

**Step 4** Check.  $2.3 + 1.4 = 3.7$

Remember that subtraction is the same as adding the opposite.

**EXAMPLE 3** Solve  $k + (-2) = 7$  for  $k$ .

**Step 1** Rewrite the equation.  $k - 2 = 7$

**Step 2** Add 2 to both sides of the equation.  $k - 2 = 7$   
 $+2 = +2$

**Step 3** Simplify.  $k - 2 = 7$   
 $+2 = +2$   
 $k = 9$

**Step 4** Check.  $9 + (-2) = 7$

Again, each equation was solved by adding the opposite. Whenever you add an opposite, remember to add the opposite to both sides of the equation.



Whenever you find the root of an equation, you are solving the equation. Some equations can be solved mentally. For example, to solve  $n - 1 = 4$ , think “If you subtract 1 from a number, you get 4. What is the number?” Since  $5 - 1 = 4$ ,  $n = 5$ .

When equations cannot be solved mentally, you can add equal amounts to both sides of an equation to find the root, or value, of the variable:

**EXAMPLE 1** Solve  $n - 17 = 81$  for  $n$ .

<b>Step 1</b>	Write the equation.	$n - 17 = 81$
<b>Step 2</b>	Add 17 to both sides of the equation.	$\begin{array}{rcl} n - 17 & = & 81 \\ + 17 & = & + 17 \\ \hline n - 17 & = & 81 \\ + 17 & = & + 17 \\ n & = & 98 \end{array}$
<b>Step 3</b>	Simplify.	
<b>Step 4</b>	Check.	$98 - 17 = 81$

**EXAMPLE 2** Solve  $x - 29 = 43$  for  $x$ .

<b>Step 1</b>	Write the equation.	$x - 29 = 43$
<b>Step 2</b>	Add 29 to both sides of the equation.	$\begin{array}{rcl} x - 29 & = & 43 \\ + 29 & = & + 29 \\ \hline x - 29 & = & 43 \\ + 29 & = & + 29 \\ x & = & 72 \end{array}$
<b>Step 3</b>	Simplify.	
<b>Step 4</b>	Check.	$72 - 29 = 43$

**EXAMPLE 3** Solve  $g - (-2) = 7$  for  $g$ .

<b>Step 1</b>	Rewrite the equation.	$g + 2 = 7$
<b>Step 2</b>	Add $(-2)$ to both sides of the equation.	$\begin{array}{rcl} g + 2 & = & 7 \\ + (-2) & = & + (-2) \\ \hline g + 2 & = & 7 \\ + (-2) & = & + (-2) \\ g & = & 5 \end{array}$
<b>Step 3</b>	Simplify.	
<b>Step 4</b>	Check.	$5 - (-2) = 7$

Subtracting a negative is the same as adding the opposite.



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like terms

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To simplify expressions, combine all like terms.

**EXAMPLE 2**

$$3x + 15 + 6x - 7 + y$$

Combine  $x$  terms:  $3x + 6x = 9x$

Combine integers:  $15 - 7 = +8$

**Note:** You cannot combine unlike terms  $9x$ ,  $y$ , and  $8$ , so you are finished.

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**Exercise A** Combine like terms. Simplify each expression.