### **Key Vocabulary**

linear expression, p. 175

A linear expression is an algebraic expression in which the exponent of each variable is 1.

no exponent with variable

Linear Expressions	-4x	3x + 5y	$5 - \frac{1}{6}x$
Nonlinear Expressions	$\frac{1}{2}x^2$	$-7x^3+x$	$x^5 + 1$

You can use either a vertical or a horizontal method to add linear expressions.

#### Example 1 **Adding Linear Expressions**

Find each sum.

**a.** 
$$(x-2)+(3x+8)$$

Vertical method: Align like terms vertically and add.

$$x-2$$

$$+3x+8$$

$$4x+6$$

Linear expressions are usually written with the variable term first.

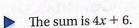
Rewrite the sum.

Group like terms.

Combine like terms.

of Addition

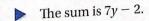
Commutative Property



**b.** 
$$(-4y+3)+(11y-5)$$

Horizontal method: Use properties of operations to group like terms and simplify.

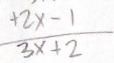
$$(-4y+3) + (11y-5) = -4y+3+11y-5$$
$$= -4y+11y+3-5$$
$$= (-4y+11y) + (3-5)$$
$$= 7y-2$$





# Try It Find the sum.

1. 
$$(x+3) + (2x-1)$$
 +  $2x$ 

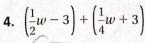


3. 
$$(4.5-n)+(-10n+6.5)$$

-In+4.5



2. 
$$(-8z+4)+(8z-7)$$





To subtract one linear expression from another, add the opposite of each term in the expression. You can use a vertical or a horizontal method.

### **Example 2** Subtracting Linear Expressions

Find each difference.

**a.** 
$$(5x+6)-(-x+6)$$

Vertical method: Align like terms vertically and subtract.

$$\begin{array}{c|c}
(5x+6) & 5x+6 \\
-(-x+6) & Add the opposite. & + x-6 \\
\hline
6x
\end{array}$$

### Common Error

When subtracting an expression, make sure you add the opposite of each term in the expression, not just the first term.

 $\triangleright$  The difference is 6x.

**b.** 
$$(7.5y + 5) - (8.5y - 6)$$

**Horizontal method:** Use properties of operations to group like terms and simplify.

$$(7.5y + 5) - (8.5y - 6) = (7.5y + 5) + (-8.5y + 6)$$
 Add the opposite.  

$$= 7.5y + (-8.5y) + 5 + 6$$
 Commutative Property of Addition  

$$= [7.5y + (-8.5y)] + (5 + 6)$$
 Group like terms.  

$$= -y + 11$$
 Combine like terms.

The difference is -y + 11.

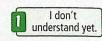
## Try It

Find the difference.

5. 
$$(m-3)-(-m+12)$$
  
 $1 + m - 3$   
 $-1 + 12$ 

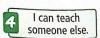
6. 
$$(-2c+5) - (6.3c+20)$$
  
-8.3C -15

# In-Class Practice









7. **WRITING** Describe how to distinguish a linear expression from a nonlinear expression. Give an example of each.