

Combining like terms

Like Terms

Standard Form
Highest power of
Variable \rightarrow lowest
power of variable

Simplify: $2x^2 + 3x + 7 + 4x + 5 + x^2$

$$3x^2 + 7x + 12$$

Simplify: $4y^2 + 2 + 5y + 4y + 8y^2 + 5$

$$12y^2 + 9y + 7$$

Translating an English Phrase to an Algebraic Expression

Operation	Phrase	Expression
Addition	<u>a plus b</u> the <u>sum</u> of a and b a <u>increased</u> by b b <u>more than</u> a the <u>total</u> of a and b b <u>added to</u> a	$a + b$
Subtraction	<u>a minus b</u> the <u>difference</u> of a and b a <u>decreased</u> by b b <u>less than</u> a b <u>subtracted from</u> a	$a - b$
Multiplication	<u>a times b</u> the <u>product</u> of a and b <u>twice a</u>	$a \cdot b, ab, a(b), (a)(b)$ $2a$
Division	<u>a divided by b</u> the <u>quotient</u> of a and b the <u>ratio</u> of a and b b <u>divided into</u> a	$a \div b, a/b, \frac{a}{b}, b \overline{)a}$

Translate each English phrase into an algebraic expression

a) the difference of $17x$ and 5

$$17x - 5$$

b) the quotient of $10x^2$ and 7

$$10x^2 \div 7 \quad \frac{10x^2}{7}$$

c) the sum of $17y^2$ and 19

$$17y^2 + 19$$

d) the product of 7 and z

$$7z$$

e) Seventeen more than y

$$y + 17$$

f) Nine less than the product of nine and x squared

$$9x^2 - 9$$

g) five times the sum of m and n

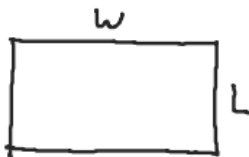
$$5(m + n)$$

h) the sum of five times m and n

$$5m + n$$

g) the difference of two times x and eight

$$2x - 8$$



h) The length of a rectangle is six less than the width. Let w represent the width of the rectangle. Write an expression for the length of the rectangle.

$$\text{width} = w$$

$$\text{length} = w - 6$$

i) Lauren has dimes and nickels in her purse. The number of dimes is three more than seven times the number of nickels. Let n represent the number of nickels. Write the expression for the number of dimes.

$$\text{nickels} = n$$

$$\text{dimes} = 7n + 3$$

Summary

Justin's car insurance has \$750 deductible per incident. This means that he pays \$750 and his insurance company will pay all costs beyond \$750. If Justin files a claim for \$2,100.

a) How much will he pay? $\$750$

b) How much will the insurance company pay? $2100 - 750$
 $\$1350$

Simplify:

$$3(1 + 9 \cdot 6) - 4^2$$

$$3(1 + 54) - 16$$

$$3(55) - 16$$

$$165 - 16$$

$$149$$

$$33 \div 3 + 8 \cdot 2$$

$$11 + 16$$

$$27$$

$$4 \cdot \frac{12}{8}$$

$$4 \cdot \frac{3}{2}$$

$$\frac{4}{1} \cdot \frac{3}{2} = \frac{12}{2} = 6$$

$$4 + 6(3 + 6)$$

$$4 + 6(9)$$

$$4 + 54$$

$$58$$

$$3^2 - 18 \div (11 - 5)$$

$$9 - 18 \div (11 - 5)$$

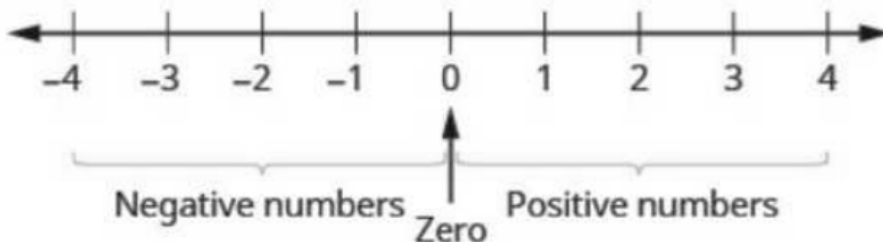
$$9 - 18 \div 6$$

$$9 - 3$$

$$6$$

What you will learn about:
Add and Subtract Integers

Use Negatives and Opposites



Numbers to the left of zero are negative and numbers to the right of zero are positive. Zero is neutral and is the only number that is not positive or negative.

Moving to the right numbers get bigger and moving to the left numbers get smaller.

Order each of the following pairs of numbers using $<$ or $>$

$$14 > 6 \quad -1 < 9 \quad -1 > -4 \quad 2 > -20$$

Opposite of a Number

Same number on
the opposite side
of zero

Opposite Notation

-a opposite a

Sometimes in algebra the same symbol has different meanings. Just like some words in English, the specific meaning becomes clear by looking at how it is used. You have seen the symbol "-" used in three different ways.

$10 - 4$	Between two numbers, it indicates the operation of <i>subtraction</i> . We read $10 - 4$ as "10 minus 4."
-8	In front of a number, it indicates a <i>negative</i> number. Figure 1.9 [the opposite of 3 is -3]. We read -8 as "negative eight."
$-x$	In front of a variable, it indicates the <i>opposite</i> . We read $-x$ as "the opposite of x ."
$-(-2)$	Here there are two "-" signs. The one in the parentheses tells us the number is negative 2. The one outside the parentheses tells us to take the <i>opposite</i> of -2 . We read $-(-2)$ as "the opposite of negative two."

Integers

Set of number including zero, whole numbers and opposites

(No fractions/No Decimals)

Absolute Value

Distance from zero on a number line

Evaluate x when $x = -8$

$$-8$$

Evaluate $-x$ when $x = -8$

$$-(-8) = 8$$

Evaluate $-x$ when $x = 8$

$$-(8) = -8$$



Evaluate:

$$|3|$$

$$3$$

$$|-44|$$

$$44$$

$$|0|$$

$$0$$

$$-|25|$$

$$-25$$

Fill in $<$, $>$ or $=$ for each pair of the following pairs of numbers.

$$7 \underline{\quad} -|-7|$$

$$7 \geq -7$$

$$-(-10) \underline{\quad} -|-10|$$

$$10 > -10$$

$$|-4| \underline{\quad} -|-4|$$

$$4 > -4$$

$$-1 \underline{\quad} |-1|$$

$$-1 < 1$$

Adding Integers

Simplify

$$24 - |19 - 3(6 - 2)|$$

$$24 - |19 - 3(4)|$$

$$24 - |19 - 12|$$

$$24 - |7|$$

$$24 - 7 = 17$$

$$1 + 4$$

$$5$$

$$8 + 2$$

$$10$$

$$19 - |11 - 4(3 - 1)|$$

$$19 - |11 - 4(2)|$$

$$19 - |11 - 8|$$

$$19 - |3|$$

$$19 - 3$$





$$16$$





$$-1 + (-4)$$

$$-5$$

$$-8 + (-2)$$

$$-10$$

	-5 + 3 means the sum of -5 and 3.
We start with 5 negatives.	
And then we add 3 positives.	
We remove any neutral pairs.	
We have 2 negatives left.	 2 negatives
The sum of -5 and 3 is -2.	-5 + 3 = -2

	$5 + (-3)$ means the sum of 5 and -3 .
We start with 5 positives.	
And then we add 3 negatives.	
We remove any neutral pairs.	
We have 2 positives left.	 2 positives
The sum of 5 and -3 is 2.	$5 + (-3) = 2$

53
-37

6

Add:

$-1 + 5$
 4

$1 + (-5)$
 -4

$-2 + 4$
 2

$2 + (-4)$
 -2

$37 + (-53)$
 -16

$-74 + (-27)$
 -101

$-31 + (-19)$
 -50

$15 + (-32)$
 -17

$-5 + 3(-2 + 7)$
 $-5 + 3(5)$
 $-5 + 15$
 10

$-42(-3 + 5)$
 $-42(2)$
 -84

Subtracting Integers

Add opposite

We start with 5 positives.



We 'take away' 3 positives.



We have 2 positives left.

The difference of 5 and 3 is 2.

2

Now we will subtract $-5 - (-3)$. Watch for similarities to the last example $5 - 3 = 2$.

To subtract $-5 - (-3)$, we restate this as "-5 take away -3"

We start with 5 negatives.



We 'take away' 3 negatives.



We have 2 negatives left.

The difference of -5 and -3 is -2.

-2

Subtract:





$$\begin{array}{r} 7 - 5 \\ 7 + (-5) \\ 2 \end{array}$$

$$\begin{array}{r} 12 - 8 \\ 4 \end{array}$$

$$\begin{array}{r} -7 - (-5) \\ -7 + 5 \\ -2 \end{array}$$

$$\begin{array}{r} -12 - (-4) \\ -12 + (-4) \\ -16 \end{array}$$

	-5 - 3 means -5 take away 3.
We start with 5 negatives.	
We now add the neutrals needed to get 3 positives.	
We remove the 3 positives.	
We are left with 8 negatives.	
The difference of -5 and 3 is -8.	-5 - 3 = -8

	$5 - (-3)$ means 5 take away -3 .
We start with 5 positives.	
We now add the needed neutrals pairs.	
We remove the 3 negatives.	
We are left with 8 positives.	 8 positives
The difference of 5 and -3 is 8;	$5 - (-3) = 8$

Subtract:

$$\begin{array}{r} -3 - 1 \\ -4 \end{array}$$

$$\begin{array}{r} 3 - (-1) \\ 4 \end{array}$$

$$\begin{array}{r} -6 - 4 \\ -10 \end{array}$$

$$\begin{array}{r} 6 - (-4) \\ 10 \end{array}$$

Simplify:

$$\begin{array}{r} 13 - 8 \\ 5 \end{array}$$

$$\begin{array}{r} 13 + (-8) \\ 5 \end{array}$$

$$\begin{array}{r} -17 - 9 \\ -26 \end{array}$$

$$\begin{array}{r} -17 + (-9) \\ -26 \end{array}$$

Simplify:

$$9 - (-15)$$

$$24$$

$$-7 - (-4)$$

$$-3$$

$$7 - (-4 - 3) - 9$$

$$7 - (-7) - 9$$

$$14 - 9$$

$$5$$

$$18 - |2 - 7|$$

$$18 - |-5|$$

$$18 - 5$$

$$13$$

$$-12 + 2|3 - 4|$$

$$-12 + 2|-1|$$

$$-12 + 2(1)$$

$$-12 + 2 = -10$$

$$-14 + (-18) + 10$$

$$-32 + 10$$

$$-22$$

$$6 - 38 + 27 + (-8) + 126$$

$$-32 + 27 + (-8) + 126$$

$$-5 + (-8) + 126$$

$$-13 + 126$$

$$113$$

$$32 - [5 - (15 - 20)]$$

$$32 - [5 - (-5)]$$

$$32 - [10]$$

$$22$$

$$3^2 - 4^2$$

$$9 - 16 = -7$$

In June 2011, the state of Pennsylvania estimated it would have a budget surplus of \$540 million. The same month, Texas estimated it would have a budget deficit of \$27 billion. Use the integers to the budget of Pennsylvania and Texas.

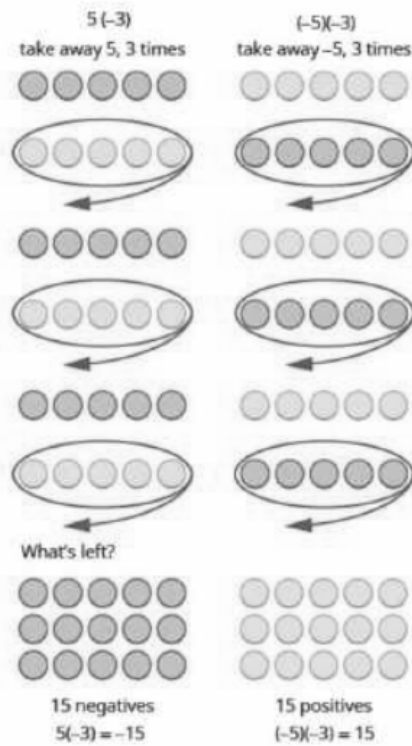
Penn
\$540,000,000

Texas
-\$27,000,000,000

What you will learn about:
Multiply and Divide Integers

Multiplying Integers

How does it work



MULTIPLICATION OF SIGNED NUMBERS

For multiplication of two signed numbers:

Same signs	Product	Example
Two positives	Positive	$7 \cdot 4 = 28$
Two negatives	Positive	$-8 \cdot (-6) = 48$
Different signs	Product	Example
Positive · negative	Negative	$7 \cdot (-9) = -63$
Negative · positive	Negative	$-5 \cdot 10 = -50$

Multiply by -1

Divide Integers

Multiply

$$\begin{array}{l} -9 \cdot 3 \\ -27 \end{array}$$

$$\begin{array}{l} -2(-5) \\ 10 \end{array}$$

$$\begin{array}{l} 4(-8) \\ -32 \end{array}$$

$$\begin{array}{l} 7 \cdot 6 \\ 42 \end{array}$$

MULTIPLICATION AND DIVISION OF SIGNED NUMBERS

For multiplication and division of two signed numbers:

- If the signs are the same, the result is positive.
- If the signs are different, the result is negative.

Same signs

Result

Two positives

Positive

Two negatives

Positive

If the signs are the same, the result is positive.

Different signs

Result

Positive and negative

Negative

Negative and positive

Negative

If the signs are different, the result is negative.

Simplify

$$\begin{array}{l} 7(-2) + 4(-7) - 6 \\ -14 + -28 - 6 \\ -42 - 6 \\ -48 \end{array}$$

$$\begin{array}{l} (-2^4) \\ -1 \cdot 2^4 = -16 \end{array}$$

$$\begin{array}{l} 9(-3) + 7(-8) - 1 \\ -27 + (-56) - 1 \\ -83 - 1 = -84 \end{array}$$

$$\begin{array}{l} (-2)^4 \\ (-2)(-2)(-2)(-2) = 16 \end{array}$$

1.1 & 1.2
 Puc Wed
 10/21
 @ 10pm

Simplify

$$12 - 3(9 - 12)$$

$$16 - 6(7 - 13)$$

$$12(-9) \div (-3)^3$$

$$-30 \div 2 + (-3)(-7)$$

Evaluate the following when $n = -5$

$$2x^2 + 3x + 8$$

$$-3x^2 - 2x + 6$$

Translate Phrases to Expression
 with integers

Trasnlate and simplify the sum of eight and negative twelve,
 increased by three

Translate and simplify the differnce of negative eight and negative
 twleve, increased by nine.