

Name: \_\_\_\_\_

★ LET'S LEARN ABOUT NUMERICAL OPERATIONS ★

✔ **Objective:** You will be able to...  
 ~ add, subtract, multiply, and divide numbers  
 ~ solve problems by operating with numbers

☆ **Why is learning about numerical operations important?**

- we use operations in every day life  
 - cooking, tipping, shopping, figure at gas mileage, payments, bills, budgeting, etc.
- need to know them to pass math, college & career

<p>~ What do you know about operations with numbers already?</p> <ul style="list-style-type: none"> <li>• fractions are like division                      ex. <math>\frac{1}{2}</math> is <math>1 \div 2</math></li> <li>• GEMDAS                      grouping</li> </ul>	<p>~ What would you like to know/learn about when it comes to operating with numbers?</p> <ul style="list-style-type: none"> <li>• operating in equations</li> <li>• imaginary #s                      (Alg 2)</li> </ul>
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★ **Do Now:** You owe \$25 towards your phone bill, but you just received \$88 for your birthday! Write any numerical expression involving addition, subtraction, multiplication, and/or division that could be used to determine how much money you have to spend as you wish. Then simplify your expression.

$\$88 - 25 = \$63$

$x + 25 = 88$      $x$ : amount you have to spend  
 $x = \$63$   
 $88 - x = 25$   
 $x = \$63$

Quick Review: Absolute value is... ex. from 0

$1. |-2| = 2$      $2. |18| = 18$      $3. |-100| = 100$

~ **Adding Integers**

★ If the signs are the same, find the sum and keep the sign.

ex.  $-3 + -7 = -10$      $8 + 10 = 18$

★ If the signs are different, find the difference and take the sign of the number with the larger absolute value.

ex.  $4 - 1 = 3$      $10 - 8 = 2$

~ **Subtracting Integers**

★ Use the "KFC" Rule: keep flip change the sign

$4 - 6 = -2$

You can then apply the rules for addition.

ex.  $4 + (-6) = -2$

Another Hint:  $4 - 6 = -2$     you have \$4    you owe \$6    you owe \$2

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Do Now:  
Find each sum.

①  $-13 + -7 = -20$   
same sign:  
add & keep the sign

$8 + -8$   
②  $8 + (-8) = 0$   
you have 8, you owe 8

③  $15 + (-8) = 7$   
Signs are different,  
find the difference  
& take the sign of the  
larger #

④  $-12 + 20 = 8$

⑤  $-100 + 100 = 0$

⑥  $2 + (-9) = -7$

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★ Station 1: Simplify each expression. Use the number line to assist you as necessary, and to support your answer.

1.  $3 + -5$       2.  $4 - 9$       3.  $-2 + 1 + 4$

- left      + right

★ Station 2: Simplify each expression. Use pictures to help you!

⊕ positive 1      ⊖ negative 1

⊕ and ⊖ combined is...

1.  $4 + -2$       2.  $-4 - 5$       3.  $6 - 1$

✍ Practice Applying the Skills You Learned!

①  $-3 - 8 = -11$   
K F C  
 $-3 + (-8) = -11$

②  $-5 - (-7) = 2$   
K F C  
 $-5 + 7 = 2$

③  $6 - -5 = 11$   
K F C  
 $6 + 5 = 11$

④  $-2 - 1 = -3$   
K F C  
 $-2 + -1 = -3$

\* Variable Problem:

\* Word Problem:

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\*What is a variable??

\* letters to represent values

\*ex.  $x$

\*vary  $\rightarrow$  values can change

Let's solve...

$$a = -2 \quad b = -4 \quad c = 6$$

①  $b + c - a$

$$(-4) + (6) - (-2)$$

$$\underline{2} - (-2)$$

$$K | F | C$$

$$2 + 2$$

$$= 4$$

②  $-a + b - c$

$$-(-2) + (-4) - (6)$$

$$\underline{2 + (-4)} - (6)$$

$$-2 - 6$$

$$K | F | C$$

$$= -2 + -6$$

$$= -8$$

\* double negative = positive

Sep 19-11:38 AM

In The Real World...

① The NY Giants

lost 25 yards on one play, but then gained 50 yards on the next play.

Then they lost another 5 yards.

What was their net yardage gain/loss?

$$\underline{-25 + 50} - 5$$

$$= 25 - 5$$

$$= +20 \text{ yards}$$

+20 yards gained

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- ② A fish is 20 ft below sea level. He descends 12 more feet. Write an integer to represent his position.



$$\begin{array}{r} -20 - 12 \\ -20 + -12 \\ \hline -32 \end{array}$$

32 ft below sea level

Sep 19-12:02 PM

Do Now:

①  $3 \overline{) -8} =$   
 $\begin{array}{r} K | F | C \\ 3 \overline{) -8} = -5 \end{array}$

②  $-1 \overline{) -(-8)} =$   
 $\begin{array}{r} K | F | C \\ -1 \overline{) +8} = 7 \end{array}$

③  $12 \overline{) -8} =$   
 $\begin{array}{r} K | F | C \\ 12 \overline{) -8} = 4 \end{array}$

④  $-5 \overline{) -7} =$   
 $\begin{array}{r} K | F | C \\ -5 \overline{) -7} = -12 \end{array}$

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Practice: Simplify each expression in #1-6, and complete each exercise in #7-9.

1.  $3 + n$  if  $n = -10$

$3 + -10$   
 $-7$

2.  $-2 - p$  if  $p = 5$

$-2 - 5$   
 $-7$   
 $3$

3.  $4 + -11 - 10$

$4 + -11 + -10$   
 $-7 + -10$   
 $-17$

4.  $w - 3 + (-2)$  if  $w = 8$

$8 - 3 + (-2)$   
 $5 + -2$   
 $3$

5.  $4 + -41 - 9$  if  $s = 9$

$4 + -41 - 9$   
 $-37 + -9$   
 $-46$

6.  $12 - 21$

$12 + -21$   
 $-9$

7. The temperature in the morning was  $-3$  degrees Fahrenheit. It rose  $40$  degrees by the end of the day. Write and simplify a numerical expression to determine the final temperature.

$-3 + 40$   
 $37^{\circ}\text{F}$

8. The Giants gain  $10$  yards. On their next play, they lose  $15$  yards. Then they gain another  $20$  yards. Write and simplify a numerical expression to determine their net yardage gain/loss.

$10 + -15 + 20$   
 $-5 + 20$   
 $15$

9. A submarine is  $400$  feet below sea level. It descends another  $355$  feet. Write and simplify a numerical expression to determine the location of the submarine as an integer.

$-400 - 355$   
below descending  
 $-755$

**\*Optional Challenges:**

Challenge A: Create any problem in which the answer is  $-9$ !

Challenge B: Will the sum of a negative integer and a positive integer always be a whole number? Support your answer.

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★ Let's Develop Some Division Rules!

There are eight dog treats and eight dogs. If the treats are to be shared equally among the dogs, how many treats will each dog receive? $8 \div 8$ $1$ treat	There are zero dog treats and eleven dogs. If the treats are to be shared equally among the dogs, how many treats will each dog receive? $0 \div 11$ $0$ treats	There are ten dog treats and zero dogs. What happens to the dog treats? $10 \div 0$ unknown/undefined
In a class action lawsuit, \$10,000 is to be divided evenly among 10,000 people. How much money will each person receive? $\$10,000 \div 10,000$ $\$1$	There are zero dollars to be divided evenly between 258 people. How much money will each person receive? $\$0 \div 258$ $= 0$	There are \$100 and zero people. What happens to the money? $\$100 \div 0$ undefined
In general, a number divided by itself is always $1$	In general, zero divided by any nonzero number is always $0$	In general, a number divided by zero is always undefined

★ Let's Develop Some More Rules!

You owe \$3.00 to each of five people. Represent this situation as a numerical expression using multiplication or division, and simplify to represent the total amount you owe as a number. $-3 \cdot 5$ $-15$ owe \$15	The temperature drops a total of 60 degrees (steadily) over the course of three hours. Represent this situation as a numerical expression using multiplication or division, and simplify to represent the amount of temperature change per hour. $-60 \div 3$ $-20^{\circ}\text{ per hour}$	You lost \$5.00 somewhere. A magic genie (an imaginary one of course) says to you: I will undo your misfortune 10 times! Represent this situation as a numerical expression using multiplication or division, and simplify to represent the amount of money you will have as an integer. $-5 \cdot 10$ $-50$
In general, a negative number times a positive number is always negative	In general, a negative number divided by a positive number is always negative	In general, a negative number times a negative number is always positive

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(HW)

Blank Sheet of Paper

①  $-3 \cdot 4 = -12$

⑤  $-12(20) = -240$

②  $\frac{-9}{3} = -3$

⑥  $-8 \cdot -7 = 56$

③  $-27 \div (-9) = 3$

⑦  $24 \div -8 = -3$

④  $-10 \div -3 = 30$

⑧  $\frac{-48}{-4} = 12$

Sep 21-12:04 PM

## Multiplying &amp; Dividing Signed Numbers Rules

\* positive \* positive = pos.

ex.  $3 \cdot 3 = 9$

\* positive \* negative = neg.

ex.  $3(-1) = -3$

\* negative \* positive = neg.

ex.  $-3 \cdot 4 = -12$

\* negative \* negative = pos.

ex.  $-2(-3) = 6$

\* positive  $\div$  positive = pos.

ex.  $\frac{8}{4} = 2$

\* positive  $\div$  negative = neg.

ex.  $20 \div -2 = -10$

\* negative  $\div$  positive = neg.

ex.  $\frac{-12}{3} = -4$

\* negative  $\div$  negative = pos.

ex.  $\frac{-20}{-2} = 10$

Practice Applying the Skills You Learned!

Hint:



Practice: Simplify each expression in #1-6, and complete each exercise in #7-9.

1.  $4n$  if  $n = -10$

2.  $-2 \cdot 7 \cdot -1$

3.  $40/c$  if  $c = -8$

4.  $7b \cdot ad$  if  $b = -6$  &  $d = -1$

5.  $-10 \cdot 10 \cdot 2$

6.  $-25 \cdot -3t \cdot d$

• Substitute in variables  
• then evaluate  
• \* means times

$$\begin{aligned} & \frac{-100}{-2} = 50 \\ & -2 \cdot -10 \cdot 3 \cdot -1 \cdot -2 = 120 \\ & 2 \cdot -9 \cdot -2 = 36 \\ & -18 \cdot -2 = 36 \end{aligned}$$

The temperature dropped steadily over the course of five hours. The total drop was 35 degrees. Write and simplify a numerical expression to determine the final temperature at the end of the five-hour period.

$$-35 \div 5 = -7^\circ\text{F}$$

8. The Broncos lost five yards on three consecutive plays! Write and simplify a numerical expression to determine their net yardage gain/loss.

$$-5(3) = -15$$

loss of 15 yds

9. A certain fish is swimming 20 feet below sea level. A shark is swimming six times as deep as the fish. Write and simplify a numerical expression to determine the location of the shark compared to sea level as an integer.

$$(-20)(6) = -120$$

Some important notes/reminders/tips/hints from this lesson were...  
(Try to think of what you would tell a classmate if he/she were absent from class today.)

### Addition

- signs same: sum; keep sign
- signs are different: subtract; keep sign of greater #

\* descending: going down

• neg + neg = neg

• Subtraction  
KFC or LCC

ex.  $-8 - 3$   
K F change sign  
 $-8 + -3 = -11$

8

### 3-2-1 Exit!

Three problems I can solve are...

$$\star -2 + 5 =$$

$$\star -3 - 1 =$$

$$\star 4 + -5 - 2 =$$

Two things I learned today are...

★

★

One question about signed integer operations I still have is...

★

(If you do not have any questions, create a problem that could be solved using any of the concepts you worked with today.)

### 3-2-1 Exit!

Three problems I can solve are...

$$\star 13 \cdot -2 =$$

$$\star 44/0 =$$

$$\star -2 \cdot -3 \cdot -4 =$$

Two things I learned today are...

★

★

One question about signed integer operations I still have is...

★

(If you do not have any questions, create a problem that could be solved using any of the concepts you worked with today.)

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