Unit 8

Operations with Rational Numbers

Operations with Rational Numbers

Converting Fractions, Decimals & Percents

Name: _____

Math Teacher: _____

Advanced Math 6
Unit 8 Calendar

3/25	3/26	3/27	3/28	3/29
Computer Lab	Mercedes Benz Field Trip	Classifying Rational Numbers & Converting Fractions, Decimals and Percents	Adding Fractions Review & Adding Rational Numbers	Adding Rational Numbers
IXL Skills Week of 3/25: J.1, J.3, J.4, J.6				
4/1	4/2	4/3	4/4	4/5
Spring Break – No School				
4/8	4/9	4/10	4/11	4/12
Adding Rational Numbers	Adding Rational Numbers	Quiz #1	Subtracting Rational Numbers	Subtracting Rational Numbers
IXL Skills Week of 4/8: N.1, N.2, N.3, N.4				
4/15	4/16	4/17	4/18	4/19
Subtracting Rational Numbers	Quiz #2	Milestone Review	Milestone Review	Milestone Review
IXL Skills Week of 4/15: N.5, N.6, N.7				
4/22	4/23	4/24	4/25	4/26
Milestone Review	Milestone Review	Milestone Review	Milestone Review	Milestone Review
IXL Skills Week of 4/22: Review Skills that You Need to Work On				
4/29	4/30	5/1	5/2	5/3
Multiplying/ Dividing Rational Numbers	Multiplying/ Dividing Rational Numbers	Review	Review	Unit 8 Test
IXL Skills Week of 4/29: N.8, N.9, N.10, N.11				

Unit 8: Operations with Rational Numbers
Standards, Checklist and Concept Map

Georgia Standards of Excellence (GSE):

MGSE7.NS.1a: Describe situations in which opposite quantities combine to make 0.

MGSE7.NS.1b: Understand *p + q* as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

MGSE7.NS.1c: Understand subtraction of rational numbers as adding the additive inverse, *p – q = p + (-q)*. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

MGSE7.NS.1d: Apply properties of operations as strategies to add and subtract rational numbers.

MGSE7.NS.2a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

MGSE7.NS.2b: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then *–(p/q) = (-p)/q = p/(-q)*. Interpret quotients of rational numbers by describing real-world contexts

MGSE7.NS.2c: Apply properties of operations as strategies to multiply and divide rational numbers.

MGSE7.NS.2d: Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

MGSE7.NS.3: Solve real-world mathematical problems involving the four operations with rational numbers.

What Will I Need to Learn??
Mark a check next to each concept as you master them.

_____ To show integer addition and subtraction on a number line

_____ To understand that the sum of opposites is zero

_____ To add and subtract integers, including in real-life situations (wd. problems)

_____ Understand that subtracting is the same as adding the inverse

_____ How to multiply integers

_____ How to divide integers

_____ Convert fractions (rational numbers) to decimals

_____ How to solve problems with rational numbers

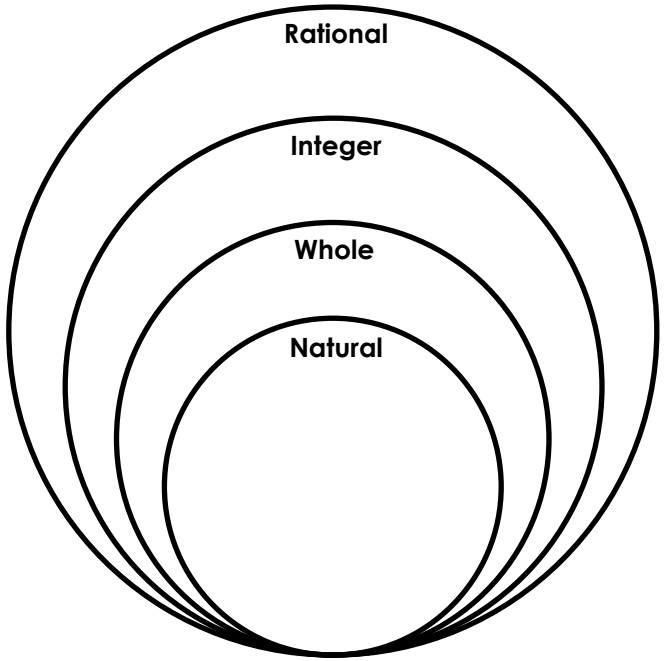
Unit 8 IXL Tracking Log

	Required Skills	
	Skill	**Your Score**
Week of 3/25	**J.1** (Add & Subtract Fractions w/ Like Denominators)	
	J.3 (Add & Subtract Fractions w/ Unlke Denominators)	
	J.4 (Add & Sub Fractions w/ Like Denominators, Word Problems)	
	J.6 (Add and Subtract Mixed Numbers)	
Week of 4/8	**N.1** (Add Integers Using Counters)	
	N.2 (Add Integers)	
	N.3 (Subtract Integers Using Counters)	
	N.4 (Subtract Integers)	
Week of 4/15	**N.5** (Add and Subtract Integers: Find the Sign)	
	N.6 (Add and Subtract Integers; Input/Output Tables)	
	N.7 (Add Three or More Integers)	
Week of 4/29	**N.8** (Multiply Integers: Find the Sign)	
	N.9 (Multiply Integers)	
	N.10 (Divide Integers: Find the Sign)	
	N.11 (Divide Integers)	

Unit 8 Concept Map: On a separate page, make a concept map of the standards listed above. Underline the verbs and circle the nouns they modify. Then, place those verbs on the connector lines of your concept map, and the nouns in the bubbles of the concept map.

Unit 8 Vocabulary

Vocabulary Term	Definition
Distributive Property	To multiply a sum by a number, multiply each addend of the sum by the number outside the parentheses.
Positive number	A number greater than zero
Negative number	A number less than zero
Opposite numbers	Two numbers with the same numeral but opposite signs (they are the same distance from zero on the number line, in opposite directions)
Natural numbers	"Counting numbers" from one to infinity
Whole numbers	"Counting numbers" from zero to infinity (all natural numbers and zero)
Integers	Whole numbers and their opposites
Rational numbers	A real number that can be written as an integer, a fraction, or a repeating or terminating decimal



Unit 8 Vocabulary

Vocabulary Term	Definition
Distributive Property	
Positive number	
Negative number	
Opposite numbers	
Natural numbers	
Whole numbers	
Integers	
Rational numbers	

Classifying Rational Numbers

Unit: Number System
Classifying Mystery Patterns

Name _____
Date _____ Pd_____

CLASSIFYING NUMBERS MYSTERY PATTERNS

Determine which three colors you are using, color the key, then color each block according to the classification of the number: whole, integer, or rational.

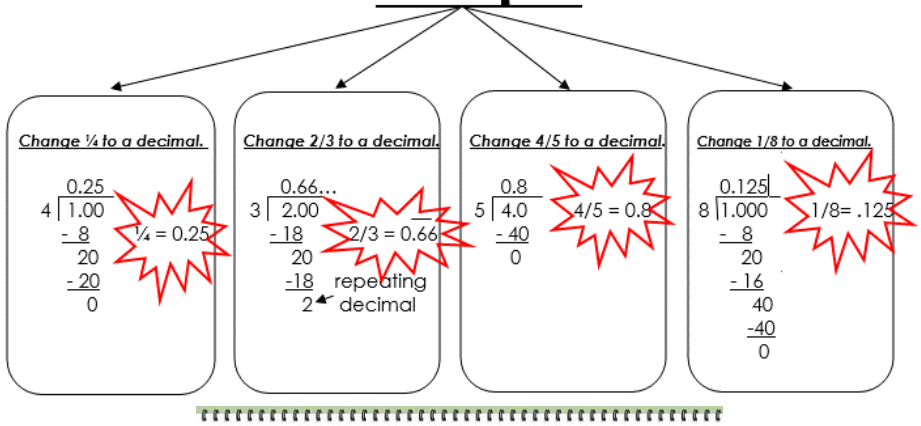
whole	integer	rational

15	9.0	100	$\frac{4}{2}$	7.0	0.0	$\frac{14}{2}$	67	13	18	$\frac{32}{8}$	91	452	11.0	$\frac{18}{9}$
-11	-1.0	1.7	-81	-14	-9.0	-17	-1.2	$-\frac{28}{4}$	$-\frac{8}{2}$	-64	$-\frac{72}{9}$	-7.1	-6	$-\frac{10}{1}$
$-\frac{77}{7}$	5.9	14.1	$-\frac{1}{8}$	-13	$-\frac{36}{4}$	-9.1	4.9	$-\frac{15}{4}$	-10	$-\frac{65}{5}$	$-\frac{21}{8}$	5.3	$\frac{34}{7}$	-33
-91	-77	$\frac{14}{3}$	-18	$-\frac{100}{2}$	-111	-99	$\frac{25}{3}$	$-\frac{33}{3}$	-55	-53	$-\frac{63}{7}$	$\frac{30}{7}$	-37	$-\frac{54}{9}$
$\frac{60}{5}$	90	1.0	$\frac{24}{4}$	8.0	99	567	$\frac{20}{2}$	89	727	999	$\frac{88}{11}$	$\frac{50}{5}$	365	$\frac{75}{5}$
0	$-\frac{33}{3}$	$-\frac{66}{2}$	890	-88	-50	178	-42	$-\frac{56}{7}$	548	$-\frac{120}{6}$	-70	$\frac{60}{10}$	-47	-93
14	231	-45	$\frac{28}{4}$	71	$-\frac{45}{9}$	30	$\frac{40}{5}$	-61	99	17	$-\frac{36}{6}$	6.0	1.0	-12
41.1	9.8	-8.1	$-\frac{7}{3}$	$\frac{7}{4}$	-2.1	$-\frac{19}{2}$	13.1	$\frac{17}{3}$	9.9	61.1	$\frac{27}{5}$	$-\frac{26}{5}$	-7.8	$\frac{11}{4}$
$-\frac{7}{8}$	$-\frac{55}{5}$	23.1	$-\frac{70}{7}$	-3.1	$-\frac{60}{4}$	$-\frac{13}{2}$	$-\frac{45}{15}$	-5.5	$-\frac{85}{5}$	$\frac{57}{6}$	$-\frac{90}{6}$	-12.1	$-\frac{125}{25}$	$\frac{41}{2}$
$-\frac{82}{2}$	-5.6	$-\frac{66}{2}$	67.2	$-\frac{100}{10}$	$-\frac{100}{9}$	$-\frac{80}{4}$	90.5	$-\frac{39}{13}$	-3.3	$-\frac{42}{6}$	$-\frac{15}{4}$	$-\frac{35}{7}$	78.3	$-\frac{52}{2}$
$-\frac{1}{5}$	7.3	$\frac{3}{10}$	2.2	-9.2	4.5	$-\frac{17}{4}$	61.2	$\frac{7}{9}$	4.67	0.98	3.5	0.32	$-\frac{4}{5}$	1.5
59	34	101	5.0	$\frac{4}{2}$	$\frac{42}{6}$	$\frac{35}{7}$	$\frac{81}{9}$	156	249	100	900	0	$\frac{120}{6}$	$\frac{48}{12}$
$\frac{108}{6}$	$-\frac{88}{4}$	825	$-\frac{48}{3}$	$\frac{36}{9}$	$-\frac{28}{7}$	$\frac{4}{1}$	$-\frac{12}{4}$	4.0	$-\frac{15}{3}$	301	$-\frac{18}{3}$	9.0	$-\frac{99}{9}$	$\frac{100}{25}$
38	$\frac{60}{12}$	$\frac{9}{3}$	504	3.0	$\frac{121}{11}$	15	209	$\frac{56}{7}$	88	64	$\frac{19}{1}$	79	709	$\frac{33}{11}$
$-\frac{4}{5}$	-6.7	3.25	$\frac{9}{12}$	$-\frac{6}{4}$	-7.8	-2.9	8.88	4.56	-0.7	$-\frac{23}{4}$	0.45	8.7	$\frac{65}{3}$	-0.2

Converting Fractions to Decimals

To convert from a fraction to a decimal, you _____ the _____ by the _____.

Examples



$\frac{3}{4} \rightarrow 3 \div 4$

$$\frac{3}{4} = 0.75$$

$$\begin{array}{r} .75 \\ 4\overline{)3.00} \\ -28\downarrow \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

You Try:

1) $\frac{2}{5}$ = _____ 2) $\frac{2}{8}$ = _____ 3) $\frac{13}{20}$ = _____

4) $1\frac{1}{2}$ = _____ 5) $\frac{5}{7}$ = _____ 6) $\frac{1}{9}$ = _____

Converting Decimals to Fractions

If you can _____ it as a decimal, you can _____ it as a fraction. Say the decimal using the correct place value, write it as a fraction and **simplify**.

Examples:

Change 0.25 to a fraction.	Change 0.4 to a fraction.	Change 1.04 to a fraction.	Change 2.001 to a fraction.
Say "twenty-five hundredths."	Say "four tenths."	Say "one and four hundredths."	Say "two and one thousandth."
$\frac{25}{100} \ \frac{\div 25}{\div 25} = \frac{1}{4}$	$\frac{4}{10} \ \frac{\div 2}{\div 2} = \frac{2}{5}$	$1\frac{4}{100} \ \frac{\div 4}{\div 4} = 1\frac{1}{25}$	$2\frac{1}{1000}$

You Try:

1) 0.3 = _____ 2) 0.45 = _____ 3) 7.1 = _____

4) 3.5 = _____ 5) 0.625 = _____ 6) 2.002 = _____

7) 1.125 = _____ 8) 10.01 = _____ 9) 1.20 = _____

Fractions, Decimals & Percents

EXAMPLE **Changing a Percent to a Fraction**

Express 35% as a fraction.

- Change the percent directly to a fraction with a denominator of 100. The number of the percent becomes the numerator of the fraction.

$$35\% = \frac{35}{100}$$

- Simplify, if possible.

$$\frac{35}{100} = \frac{7}{20}$$

35% expressed as a fraction is $\frac{7}{20}$.

EXAMPLE **Changing Decimals to Percents**

Express 0.7 as a percent.

$0.7 \times 100 = 70$ • Multiply the decimal by 100.

$0.7 \rightarrow 70\%$ • Add the percent sign.

So, 0.7 expressed as a percent is 70%.

EXAMPLE **Changing Percents to Decimals**

Change 4% to a decimal.

- Express the percent as a fraction with 100 as the denominator.

$$4\% = \frac{4}{100}$$

- Change the fraction to a decimal by dividing the numerator by the denominator.

$$4 \div 100 = 0.04$$

So, $4\% = 0.04$.

Converting Practice

Percent	Decimal	Fraction
32%	0.32	$\frac{32}{100} \div \frac{4}{4} = \frac{8}{25}$
	0.81	
40%		
		$\frac{4}{5}$
52%		
	1.25	
		$1\frac{9}{11}$
		$\frac{12}{16}$
144%		
	0.06	

More Converting Practice

Percent	Decimal	Fraction
24%	0.24	$\frac{24}{100} \div \frac{4}{4} = \frac{6}{25}$
	0.75	
38%		
		$\frac{10}{14}$
160%		
	2.15	
		$\frac{6}{13}$
		$1\frac{20}{32}$
8%		
	0.4	

Adding/Subtracting Fraction Review

Adding Fractions with Like Denominators

$$\frac{1}{7}+\frac{3}{7}$$

Add the numerators. Denominator is unchanged.

$$\frac{1+3}{7}$$

$$\frac{4}{7}$$

Adding Fractions with Unlike Denominators

$$\frac{1}{8}+\frac{2}{3}$$

Rewrite with common denominator

$$\frac{3\times 1}{3\times 8}+\frac{2\times 8}{3\times 8}$$

Add the numerators

$$\frac{3}{24}+\frac{16}{24}$$

$$\frac{19}{24}$$

Math — Fractions

Adding Fractions with the same denominator

Write the sum of each fraction below. Remember: when adding fractions with the same denominator, simply add the numerators and keep the denominator the same.

$\frac{3}{5}$ (3 = numerator, 5 = denominator) $\quad \frac{3}{5}+\frac{1}{5}=\frac{4}{5}$

$\frac{5}{5}+\frac{8}{5}=$ ☐ $\qquad \frac{3}{7}+\frac{1}{7}=$ ☐

$\frac{6}{3}+\frac{4}{3}=$ ☐ $\qquad \frac{7}{4}+\frac{8}{4}=$ ☐

$\frac{11}{9}+\frac{5}{9}=$ ☐ $\qquad \frac{9}{8}+\frac{9}{8}=$ ☐

$\frac{10}{12}+\frac{12}{12}=$ ☐ $\qquad \frac{17}{22}+\frac{3}{22}=$ ☐

$\frac{22}{50}+\frac{15}{50}+\frac{17}{50}=$ ☐

$\frac{35}{100}+\frac{6}{100}+\frac{79}{100}+\frac{14}{100}=$ ☐

Subtraction Fractions with UNLIKE denominators

$$\frac{5}{6}-\frac{3}{9}=$$

1. Find the LCM of the denominators. This is your new denominator.

Multiples of 6 = 6, 12, 18
Multiples of 9 = 9, 18, 27

LCM = 18

2. Rewrite the problem using the LCM.

$$\frac{5\times 3}{6\times 3}-\frac{3\times 2}{9\times 2}=\frac{15}{18}-\frac{6}{18}$$

Whatever you do to the numerator you must do to the denominator.

3. Subtract the numerators. The denominator stays the same.

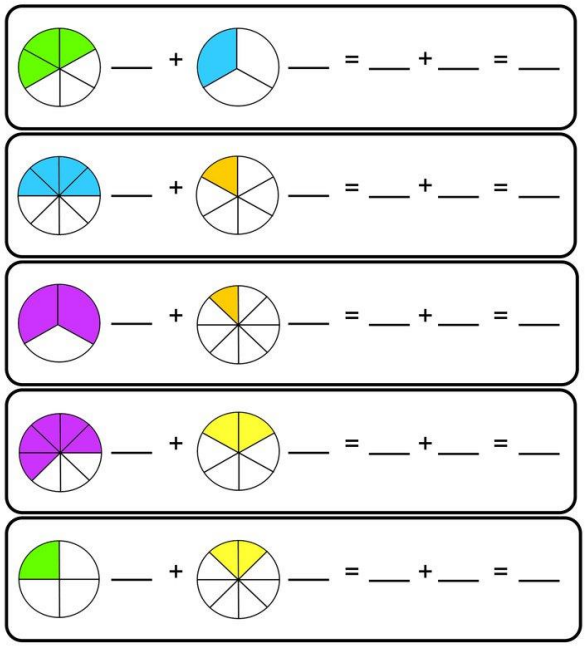
$$\frac{15}{18}-\frac{6}{18}=\frac{9}{18}$$

4. Simplify

$$\frac{9\div 9}{18\div 9}=\frac{1}{2}$$

Divide by the Greatest Common Factor.

Directions: Write the fraction for each diagram. Then, add the fractions. Make sure the denominators are the same.



Adding Fractions Practice

Why Did Airhead Eat the Dollar He Brought to School?

Do each exercise and find your answer at the bottom of the page. Write the letter of the exercise in the box above the answer.

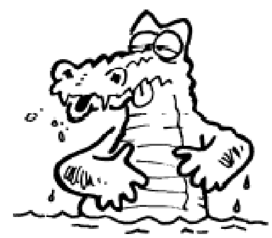
(S) $\frac{1}{2} + \frac{1}{3}$	(O) $\frac{2}{5} + \frac{1}{2}$	(T) $\frac{1}{2} + \frac{1}{4}$	(I) $\frac{1}{3} + \frac{4}{9}$	(Y) $\frac{1}{5} + \frac{2}{3}$	(U) $\frac{5}{8} + \frac{1}{4}$
(A) $\frac{1}{3} + \frac{5}{6}$	(H) $\frac{1}{2} + \frac{7}{8}$	(I) $\frac{3}{4} + \frac{2}{3}$	(S) $\frac{7}{16} + \frac{9}{16}$	(N) $\frac{1}{6} + \frac{4}{9}$	(W) $\frac{1}{4} + \frac{4}{5}$
(C) $\frac{1}{8} + \frac{2}{3}$	(H) $\frac{1}{2} + \frac{1}{6}$	(E) $\frac{3}{10} + \frac{1}{2}$	(L) $\frac{4}{15} + \frac{1}{3}$	(M) $\frac{3}{4} + \frac{7}{12}$	(N) $\frac{5}{6} + \frac{3}{10}$

$1\frac{5}{12}$	$\frac{3}{4}$	$\frac{13}{18}$	$1\frac{1}{20}$	$1\frac{1}{6}$	$\frac{5}{6}$	$1\frac{7}{20}$	$\frac{2}{3}$	$\frac{7}{9}$	1	$1\frac{1}{8}$	$\frac{3}{5}$	$\frac{7}{8}$	$\frac{2}{15}$	$\frac{19}{24}$	$\frac{3}{8}$	$1\frac{1}{12}$	$1\frac{1}{3}$	$\frac{9}{10}$	$\frac{11}{18}$	$\frac{4}{5}$	$\frac{13}{15}$

Subtracting Fractions Practice

LAST LINE

A careless zookeeper named Blake
Fell into a tropical lake
Said a fat alligator
A few moments later ...



"__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

$\frac{17}{40}$ $\frac{11}{18}$ $\frac{1}{6}$ $\frac{17}{28}$ $\frac{7}{18}$ $\frac{3}{5}$ $\frac{3}{16}$ $\frac{3}{16}$ $\frac{3}{8}$ $\frac{11}{28}$ $\frac{1}{2}$ $\frac{37}{100}$ $\frac{11}{12}$ $\frac{13}{36}$ $\frac{1}{15}$ $\frac{5}{12}$

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ !"

$\frac{19}{36}$ $\frac{11}{12}$ $\frac{1}{15}$ $\frac{11}{24}$ $\frac{11}{24}$ $\frac{23}{40}$ $\frac{7}{12}$ $\frac{1}{6}$ $\frac{11}{18}$ $\frac{1}{4}$ $\frac{11}{18}$ $\frac{1}{6}$ $\frac{5}{8}$ $\frac{19}{36}$ $\frac{11}{12}$ $\frac{11}{18}$ $\frac{2}{5}$ $1\frac{1}{24}$

To decode the last line of this limerick: Do each exercise below and find your answer in the code. Each time the answer appears, write the letter of the exercise above it.

(D) $\frac{7}{8} - \frac{1}{2}$ (I) $\frac{2}{3} - \frac{3}{5}$ (P) $\frac{3}{4} - \frac{1}{6}$ (B) $\frac{9}{10} - \frac{2}{5}$ (L) $\frac{5}{6} - \frac{3}{8}$ (A) $\frac{19}{20} - \frac{11}{20}$

(Y) $\frac{6}{7} - \frac{1}{4}$ (E) $\frac{5}{6} - \frac{2}{9}$ (U) $\frac{67}{100} - \frac{3}{10}$ (F) $\frac{7}{12} - \frac{1}{3}$ (V) $\frac{4}{5} - \frac{3}{8}$ (S) $\frac{7}{9} - \frac{1}{4}$

(G) $\left(\frac{2}{5} + \frac{1}{2}\right) - \frac{3}{10}$ (K) $\frac{5}{8} + \left(\frac{2}{3} - \frac{1}{4}\right)$ (O) $\frac{16}{16} - \left(\frac{3}{4} + \frac{1}{16}\right)$

(R) Razzle Shoes bought a $\frac{1}{2}$-page ad in the Times. Dazzle Shoes bought two ads that were $\frac{1}{6}$ page each. How much more advertising did Razzle Shoes buy?

____ page

(T) Jill made a sauce in cooking class. She used $\frac{1}{2}$ cup of milk, $\frac{2}{3}$ cup of cream, and $\frac{1}{4}$ cup of water. How much less water was used than milk and cream combined?

_____ c

Adding Rational Numbers

To add rational numbers with the same sign, add their absolute values.
The sum is:

- positive if both integers are positive.
- negative if both integers are negative.

To add rational numbers with different signs, subtract their absolute values.
The sum is:

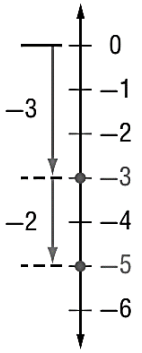
- positive if the positive integer's absolute value is greater.
- negative if the negative integer's absolute value is greater.
- **Remember:** What do you have more of, positives or negatives, and how many more do you have?

Examples:

1. **Find $-3 + (-2)$.**

Start at 0. Move 3 units down to show -3.

From there, move 2 units down to show -2.

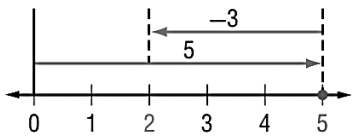


So, $-3 + (-2) = -5$.

2. **Find $-26 + (-17)$.**

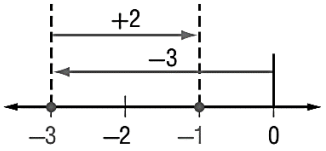
$-26 + (-17) = -43$

3. **Find $5 + (-3)$.**



So, $5 + (-3) = 2$.

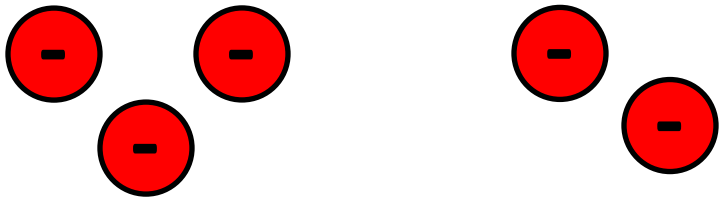
4. **Find $-3 + 2$.**



So, $-3 + 2 = -1$.

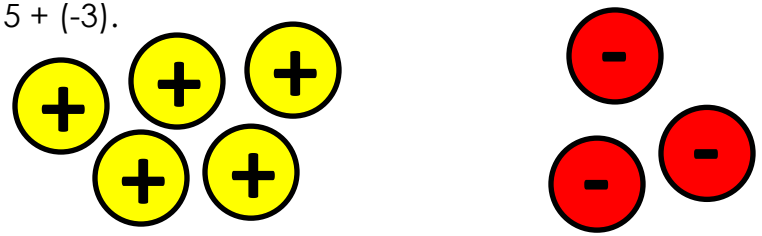
Find the sum using two-color counters.

Find -3 + (-2).

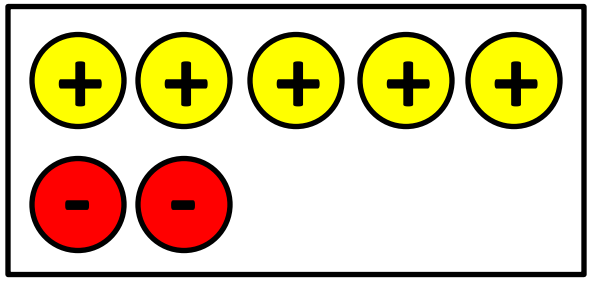


Three negatives (-3) plus another two negatives (-2) gives you five negatives (-5).

Find 5 + (-3).

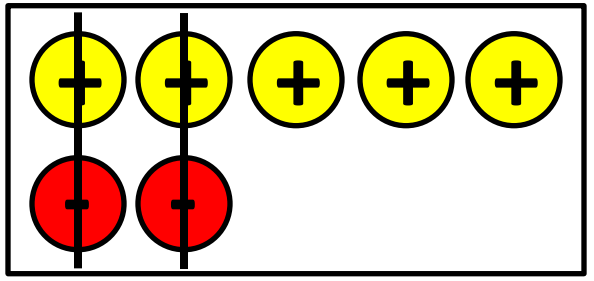


First, match up your zero pairs.



Remember that the sum of a number and its opposite is always 0. A number and its opposite are zero pairs.

Then cross out your zero pairs.



There are three positives left so, $5 + (-2) = 3$.

You Try:

Use (+) and (–) counters or a number line to find the sum.

1) –5 + (–2)

2) 8 + 1

3) –7 + 10

4) 16 + (–11)

5) –22 + (–7)

6) –50 + 50

7) –10 + (–10)

8) 100 + (–25)

9) –35 + (–20)

Use any method to find the sum.

10) –7 + (–3) + 10

11) –42 + 36 + (–36)

12) –17 + 17 + 9

13) 5 + (–8)

14) –3 + 3

15) –3 + (–8)

16) –7 + (–7)

17) –8 + 10

18) –7 + 13

19) $\frac{5}{8}+\frac{1}{8}$

20) $-\frac{1}{4}+\frac{3}{4}$

21) $-\frac{7}{15}+(-\frac{4}{15})$

22) –1.4 + (–1.3)

23) 1.4 + (–.27)

24) –28 + 1.6

25) 5 + 11 + (–5)

26) 7 + (–5) + 5

27) 9 + (–9) + 10

Write an addition expression to describe each situation. Then find each sum.

28) HAWK A hawk is in a tree 100 feet above the ground. It flies down to the ground.

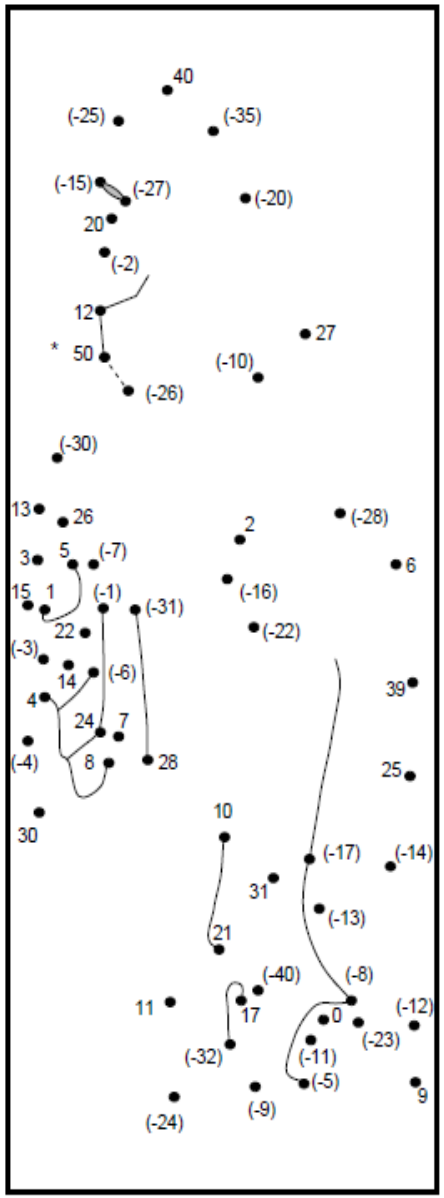
29) RUNNING Leah ran 6 blocks north then back 4 blocks south.

Answer the problems below and connect the dots in the order they are given. The pattern is started for you. Note: The two patterns are not connected together.

PATTERN #1

41 + 9 = 50
(-9) + (-17) = (-26)
(-20) + (-11) = ____
(-5) + 4 = ____
(-14) + 7 = ____
(-3) + 8 = ____
13 + 13 = ____
(-14) + (-16) = ____
(-7) + 20 = ____
(-4) + 7 = ____
(-2) + 3 = ____
21 + (-6) = ____
5 + (-9) = ____
17 + 13 = ____
(-4) + 8 = ____
0 + (-3) = ____
5 + 9 = ____
11 + 11 = ____
(-14) + 8 = ____
12 + 12 = ____
11 + (-3) = ____
3 + 4 = ____
11 + 17 = ____
0 + 11 = ____
(-10) + (-14) = ____
5 + (-14) = ____
(-20) + (-20) = ____
(-3) + 20 = ____
(-10) + (-22) = ____
2 + 19 = ____

LINE ENDS



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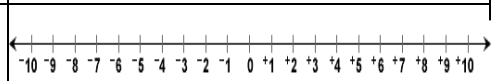
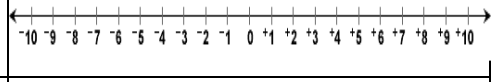
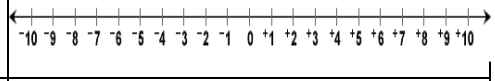
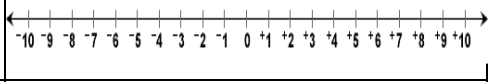
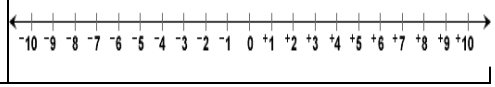
PATTERN #2

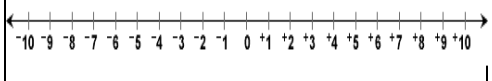
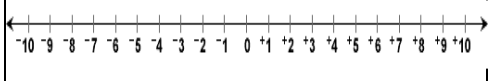
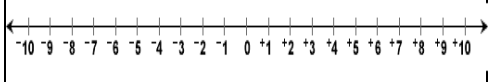
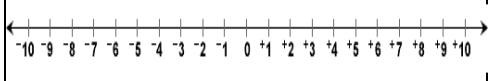
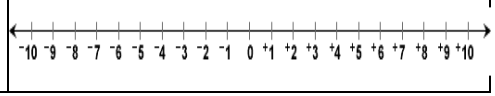
(-18) + 8 = ____
(-3) + 5 = ____
(-10) + (-6) = ____
(-11) + (-11) = ____
6 + 4 = ____
33 + (-2) = ____
1 + (-18) = ____
(-18) + 5 = ____
(-8) + 0 = ____
2 + (-25) = ____
2 + (-2) = ____
(-9) + (-2) = ____
(-3) + (-2) = ____
6 + 3 = ____
(-20) + 8 = ____
(-3) + (-11) = ____
35 + (-10) = ____
20 + 19 = ____
3 + 3 = ____
(-19) + (-9) = ____
6 + 21 = ____
(-4) + (-16) = ____
(-30) + (-5) = ____
20 + 20 = ____
25 + (-50) = ____
(-5) + (-10) = ____
(-5) + (-22) = ____
9 + 11 = ____
3 + (-5) = ____
8 + 4 = ____

LINE ENDS

Adding Integers with Models

Problem	Sum	With Counters	Number Line
1) 3 + (-5) =			
2) 2 + (-8) =			
3) 4 + (-4) =			
4) (-7) + 4 =			
5) (-6) + 5 =			

What is the algorithm (rule) for adding integers with <u>DIFFERENT</u> signs?

Problem	Sum	With Counters	Number Line
1) -5 + -2 =			
2) -2 + -3 =			
3) -2 + -4 =			
4) 7 + 4 =			
5) -2 + -3 =			

What is the algorithm (rule) for adding integers with the <u>SAME</u> signs?

More Adding Rational Numbers

If a = -3, b = -5 and c = 5, find the sum.

1) c + b **2)** a + |b| **3)** |a + b|

4) a + b + c **5)** a + |c + b| **6)** a + c

If x = -10, y = 2 and z = -1, find the sum.

7) x + z **8)** |z| + x **9)** |x + y + z|

10) z + y **11)** x + y **12)** |x + y| + z

Write an addition expression to describe each situation. Then find each sum.

13) FOOTBALL A team gains 20 yards. Then they lose 7 yards.

14) MONEY Roger owes his mom $5. He borrows another $6 from her.

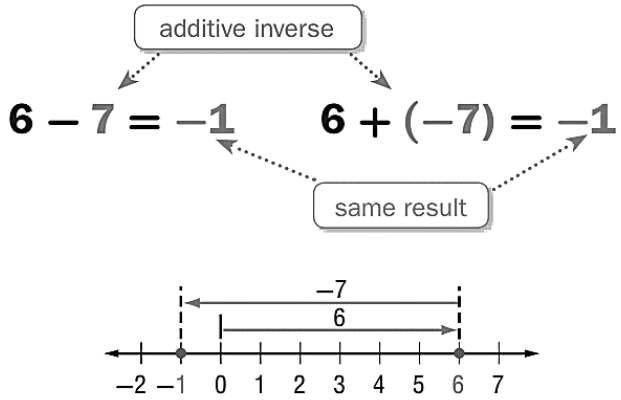
15) HOT AIR BALLOON A balloon rises 340 feet into the air. Then it descends 130 feet.

16) CYCLING A cyclist travels downhill for 125 feet. Then she travels up a hill 50 feet.

Subtracting Rational Numbers

Are you able to add rational numbers? Then you are able to subtract integers.

To subtract an integer, add its additive inverse. In other words, you subtract rational numbers by adding the opposite.



Examples:

1. Find 8 − 13.

$8 - 13 = 8 + (-13)$ To subtract 13, add -13.

$= -5$ Simplify.

Check by adding $-5 + 13 \stackrel{?}{=} 8$

$8 = 8$ ✓

2. Find −10 − 7.

$-10 - 7 = -10 + (-7)$ To subtract 7, add -7.

$= -17$ Simplify.

Check by adding $-17 + 7 \stackrel{?}{=} -10$

$-10 = -10$ ✓

You Try:

Subtract.

1) 5 – 2 **2)** 6 – (–7) **3)** –3 – 2

4) 8 – 13 **5)** –7 – (–7) **6)** 6 – 12

7) 15 – (–7) **8)** –15 – 6 **9)** –3 – 8

10) –10 – 12 **11)** 13 – (–12) **12)** 14 – (–22)

13) 10 – (–20) **14)** –16 – 14 **15)** –25 – 25

16) 6 – (–31) **17)** –18 – (–40) **18)** 15 – (–61)

Evaluate each expression if r = –4, s = 10, and t = –7.

19) $r - 7$ **20)** $t - s$

21) $s - (-8)$ **22)** $t - r$

23) $s - t$ **24)** $r - s$

25) FOOTBALL A team gained 5 yards on their first play of the game. Then they lost 6 yards. Find the total change in yardage.

26) CHECKING Your checking account is overdrawn by $50. You write a check for $20. What is the balance in your account?

27) TEMPERATURE The average temperature in Calgary, Canada, is 22°C in July and –11°C in January. Find the range of the highest and lowest temperatures in Calgary.

Evaluate each expression if x = –8, y = 7, and z = –11.

28) $x - 7$

29) $-13 - y$

30) $-11 - z$

31) $x - z$

32) $z - y$

33) $y - x$

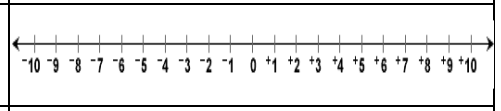
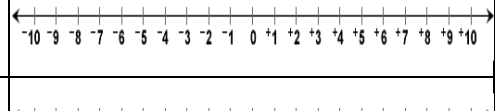
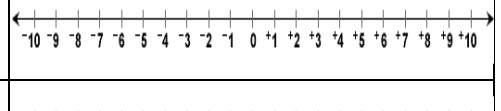
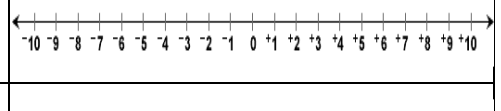
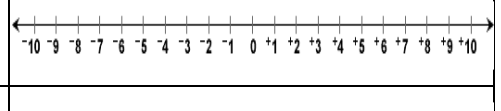
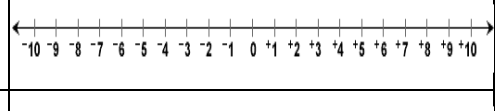
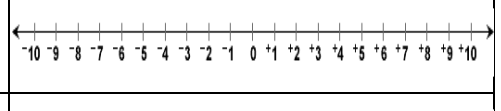
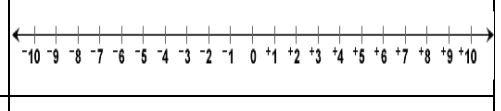
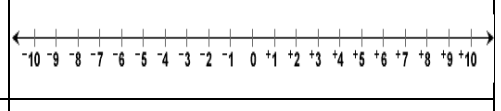
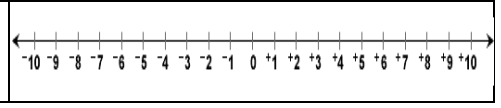
34) $x - (-z)$

35) $|y - z|$

36) $x - z - y$

37) $3 + -x$

Subtracting Integers with Models

Problem	Sum	With Counters	Number Line
1) 3 - 2 =			
2) -2 - (-1) =			
3) 4 - (-4) =			
4) (-7) – (-4) =			
5) 6 – 10 =			
6) -5 – (-2) =			
7) -2 – (-3) =			
8) 2 – 4 =			
9) 1 – (-9) =			
10) -2 – (-3) =			

What is the algorithm (rule) for subtracting integers?

Solving One-Step Equations +/-

Solving a one-step equation with integers requires you to create zero pairs to isolate the variable.

Examples:

#1 Solve: $r + 5 = -10$ Check: $r + 5 = -10$

$-5 \quad -5$ $-15 + 5 = -10$

$r = -15$ $-10 = -10$ ✓

#2 Solve: $p - (-3) = -6$ Check: $p - (-3) = -6$

$p + 3 = -6$ $-9 - (-3) = -6$

$-3 \quad -3$ $-9 + 3 = -6$

$p = -9$ $-6 = -6$ ✓

You Try!

Solve each equation. Don't forget to check your answer.

1. $x - 13 = -22$ **2.** $x - (-4) = 10$ **3.** $y + 16 = -2$

5. $z + (-5) = 12$ **6.** $t + (-7) = -5$ **7.** $r - (-12) = -17$

8. $j + 23 = 54$ **9.** $y - 14 = 9$ **10.** $e + (-13) = -2$

Mixed Practice

Find the sum or difference.

1. $-3 + 5$ **2.** $-7 + (-7)$ **3.** $3 - 7$

4. $-2 + 2 + (-2) + 2$ **5.** $4 + 9 + (-14)$ **6.** $-120 + 2$

7. $-5 - 4$ **8.** $6 + (-2) - (-3)$ **9.** $0 - (-14)$

10. $-69 + - (32)$ **11.** $-20 - 0$ **12.** $-30 - 2 - (-20)$

13. $|-13| - |13|$ **14.** $6 + (-4) + 9 + (-2)$ **15.** $-5 - 4$

Evaluate each expression if r = –5, s = 11, and t = –6.

19. $r - 7$ **20.** $t - s$

21. $s - (-8)$ **22.** $t - r$

23. $s - t$ **24.** $r - s$

Solve each equation. Don't forget to check your answer.

1. $x - (-4) = 7$ **2.** $y + 3 = -12$ **3.** $z - 5 = -15$

Multiplying Rational Numbers

The PRODUCT of two rational numbers with <u>the same sign</u> is always positive.

<u>Examples:</u>

1) $2(6) = 12$ 2) $-10\ (-6) = 60$ 3) $(-4)^2 = 16$

<u>You Try:</u>

1) $-12\ (-4) =$ 2) $(-5)^2 =$ 3) $6\ (7) =$

4) $-34\ (-2) =$ 5) $-20\ (-8) =$ 6) $(-2)^4$

The PRODUCT of two rational numbers with <u>different signs</u> is always negative.

<u>Examples:</u>

1) $6\ (-4) = -24$ 2) $-5\ (7) = -35$

<u>You Try:</u>

1) $-7\ (11) =$ 2) $(-3)^3 =$ 3) $-2\ (14) =$

4) $(-3)\ (-4)\ (-5) =$ 5) $(-9)\ (-1)\ (-5) =$ 6) $8\ (-12) =$

Evaluate each expression if a = -6, b = -4, c = 3, and d = 9. Show all work including substitution and computation.

7) $-5c =$ 8) $b^2 =$ 9) $2a =$

10) $bc =$ 11) $abc =$ 12) $abc^3 =$

30. $-3a^2 =$ 31. $-cd^2 =$ 32. $-2a + b =$

MULTIPLYING INTEGERS - A

EXAMPLE #1

$4 \cdot (-6) = 4 \times 6 = 24 = (-24)$

YOU HAVE A POSITIVE FOUR AND A NEGATIVE SIX.

MULTIPLY THE NUMBERS, 4 X 6 = 24.

WHEN MULTIPLYING, A "+" AND A "-" MAKES A NEGATIVE NUMBER.

MULTIPLY AND DIVIDE RULES

IF THE SIGNS ARE THE SAME, THE ANSWER IS POSITIVE.
IF THE SIGNS ARE DIFFERENT, THE ANSWER IS NEGATIVE.

EXAMPLE #2

$(-3) \cdot (-2) = (3)(2) = 6 = +6$

YOU HAVE A NEGATIVE THREE AND A NEGATIVE TWO.

MULTIPLY THE NUMBERS, 3 X 2 = 6.

WHEN MULTIPLYING, A "-" AND A "-" MAKES A POSITIVE NUMBER.

EXAMPLES

(+4)(+3) = +12
(-4)(-3) = +12

(+4)(-3) = -12
(-4)(+3) = -12

SOLVE.

1.	3	·	6	=		2.	(- 5)	·	+ 7	=	
	THE SIGNS ARE THE SAME.						THE SIGNS ARE DIFFERENT.				
3.	(- 8)	·	4	=		4.	(- 6)	·	+ 8	=	
5.	9	·	(+ 4)	=		6.	4	·	- 6	=	
7.	- 6	·	(- 6)	=		8.	9	·	(- 9)	=	
9.	0	·	(- 8)	=		10.	(- 9)	·	(- 9)	=	
11.	3	·	+ 7	=		12.	- 5	·	3	=	
13.	(- 2)	·	13	=		14.	(- 7)	·	(- 6)	=	
15.	- 8	·	(- 7)	=		16.	+ 9	·	13	=	
17.	5	·	- 1	=		18.	12	·	(- 5)	=	
19.	(+ 5)	·	(- 3)	=		20.	(- 4)	·	(- 4)	=	
21.	8	·	0	=		22.	- 7	·	(- 9)	=	
23.	(- 4)	·	(- 9)	=		24.	+ 5	·	- 6	=	
25.	11	·	- 5	=		26.	0	·	(- 4)	=	
27.	(- 3)	·	8	=		28.	6	·	(+ 7)	=	
29.	12	·	+ 12	=		30.	- 9	·	(- 9)	=	
29.	(- 7)	·	5	=		30.	(+ 2)	·	13	=	

Dividing Rational Numbers

The QUOTIENT of two rational numbers with <u>the same sign</u> is always positive.

<u>Examples:</u>

1) 80 ÷ (10) = 8 2) $\frac{-66}{-11} = 6$ 3) -42 ÷ (-6) = 7

<u>You Try:</u>

1) –14 ÷ (–7) = 2) $\frac{-80}{-20}$ = 3) -420 ÷ (-3) =

4) $\frac{540}{45}$ = 5) –24 ÷ (–8) = 6) 100 ÷ (–0) =

The QUOTIENT of two rational numbers with <u>different signs</u> is always negative.

<u>Examples:</u>

1) 80 ÷ (-10) = -8 2) $\frac{-66}{11} = -6$ 3) -42 ÷ 6 = -7

<u>You Try:</u>

1) -12 ÷ 4 = 2) $\frac{18}{-2}$ = 3) -10 ÷ 10 =

4) 350 ÷ (-25) = 5) $\frac{-256}{16}$ = 6) -12 ÷ (4) =

Evaluate each expression if d = –24, e = –4, & f = 8. Show all work including substitution and computation.

7) 12 ÷ *e* 8) 40 ÷ *f* 9) *d* ÷ 6

10) *d* ÷ *e* 11) *f* ÷ *e* 12) e^2 ÷ *f*

13) $\frac{-d}{e}$ 14) *ef* ÷ 2 15) $\frac{f+8}{-4}$

DIVIDING INTEGERS - A

EXAMPLE #1

24 ÷ (- 6) = 24 ÷ 6 = 4 = (- 4)

YOU HAVE A POSITIVE 24 AND A NEGATIVE 6.

DIVIDE THE NUMBERS, 24÷6 = 4.

WHEN DIVIDING, A "+" AND A "-" MAKES A NEGATIVE NUMBER.

MULTIPLY AND DIVIDE RULE

IF THE SIGNS ARE THE SAME THE ANSWER IS POSITIVE. IF THE SIGNS ARE DIFFERENT THE ANSWER IS NEGATIVE.

EXAMPLE #2

(- 32) ÷ (- 8) = 32 ÷ 8 = 4 = + 4

YOU HAVE A NEGATIVE THIRTY-TWO AND A NEGATIVE EIGHT.

DIVIDE THE NUMBERS, 32÷8 = 4.

WHEN DIVIDING, A "-" AND A "-" MAKES A POSITIVE NUMBER.

EXAMPLES

(+ 12) ÷ (+ 3) = +4
(- 12) ÷ (- 3) = +4

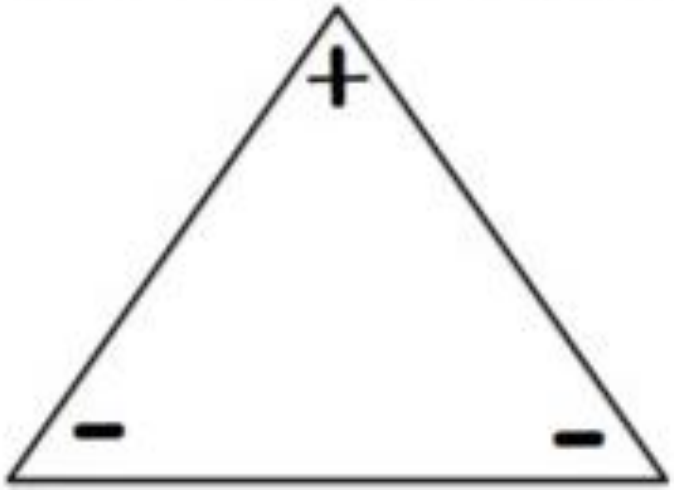
(+ 12) ÷ (- 3) = -4
(- 12) ÷ (+ 3) = -4

SOLVE.

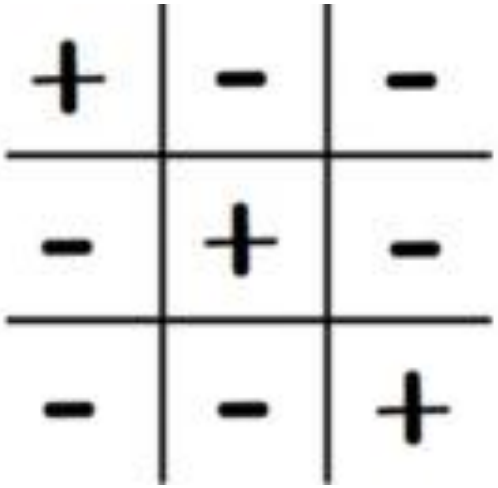
1. 21 ÷ 3 = _____ (THE SIGNS ARE THE SAME.)
2. + 40 ÷ (- 4) = _____ (THE SIGNS ARE DIFFERENT.)
3. (- 12) ÷ + 6 = _____
4. 33 ÷ (- 3) = _____
5. 12 ÷ (- 6) = _____
6. (- 81) ÷ (- 9) = _____
7. (- 35) ÷ (- 7) = _____
8. (+ 16) ÷ + 4 = _____
9. (+ 36) ÷ 9 = _____
10. (- 27) ÷ - 3 = _____
11. (- 49) ÷ (+ 7) = _____
12. 54 ÷ 9 = _____
13. 15 ÷ 5 = _____
14. + 42 ÷ (- 6) = _____
15. - 28 ÷ 4 = _____
16. (- 18) ÷ (- 6) = _____
17. 0 ÷ - 8 = _____
18. 39 ÷ (- 3) = _____
19. (- 32) ÷ + 4 = _____
20. (- 60) ÷ 5 = _____
21. (- 12) ÷ (- 2) = _____
22. (- 8) ÷ (- 1) = _____
23. 72 ÷ (- 9) = _____
24. 22 ÷ - 2 = _____
25. (- 30) ÷ + 3 = _____
26. (+ 25) ÷ 5 = _____
27. 48 ÷ (- 8) = _____
28. + 36 ÷ (- 4) = _____
29. - 14 ÷ (- 7) = _____
30. (- 45) ÷ (+ 9) = _____
31. 16 ÷ (+ 8) = _____
32. - 24 ÷ 12 = _____

MULTIPLYING AND DIVIDING INTEGERS RULES

(ONLY USED FOR MULTIPLICATION AND DIVISION)

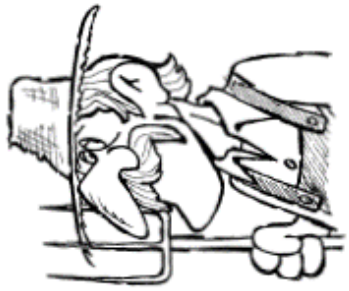


Put your fingers over the two signs of the numbers in your problem. The remaining sign is the sign of the answer.



Cover the two signs in any row column or diagonal the remaining sign is the sign of your answer.

Multiplying and Dividing Puzzle



FAMOUS FARMING EXPRESSION

The multiplication table below contains 42 mistakes. Shade in each box that contains a mistake. Please use pencil so you can erase if necessary.

YOU WILL END UP WITH A FAMOUS FARMING EXPRESSION!

X	2	−4	−9	6	3	8	−1	4	−8	−2	−6	7	−5	9	−7
−3	6	−12	−27	−18	9	−24	−3	12	−24	6	−18	−21	−15	27	−21
9	−18	−36	−81	54	−27	72	9	36	−72	−18	54	63	45	81	63
−6	12	−24	54	−36	18	−48	−6	24	48	12	−36	−42	−30	−54	−42
5	−10	−20	−45	30	−15	40	5	20	−40	−10	30	35	25	45	35
−7	14	−28	−63	−42	21	−56	−7	28	−56	14	−42	−49	−35	63	−49

Mulitiplying and Dividing Practice

Multiply and/or Divide.

1) $-15 \div 3 =$

2) $-30(5) =$

3) $22 \div (-2) =$

4) $-14(-6) =$

5) $-8 \div (-8) =$

6) $-7\ (15) =$

7) $225 \div (-15) =$

8) $7(-3) =$

9) $-38 \div 2 =$

10) $-2(-10) =$

11) $-500 \div (-50) =$

12) $-3(-3)(4) =$

13) $(-5)^2 =$

14) $-24 \div (-8) =$

15) $20(-6) =$

16) $-49 \div (-7) =$

17) $(-13)^2 =$

18) $\frac{-36}{-4} =$

19) $-3(4) =$

20) $\frac{0}{-9} =$

21) $3(-3) =$

22) $\frac{64}{4} =$

23) $(-5)(-3)(4) =$

24) $-189 \div (-21) =$

Evaluate each expression if m = –32, n = 2, and p = –8. Show all your work!

25) $m \div n =$

26) $p \div 4 =$

27) $p^2 \div m =$

28) $m \div p =$

29) $\frac{-p}{n} =$

30) $p \div (-n^2) =$

31) $\frac{p}{4n} =$

32) $\frac{18-n}{-4} =$

33) $\frac{m+8}{-4} =$

34) $\frac{m+n}{6} =$

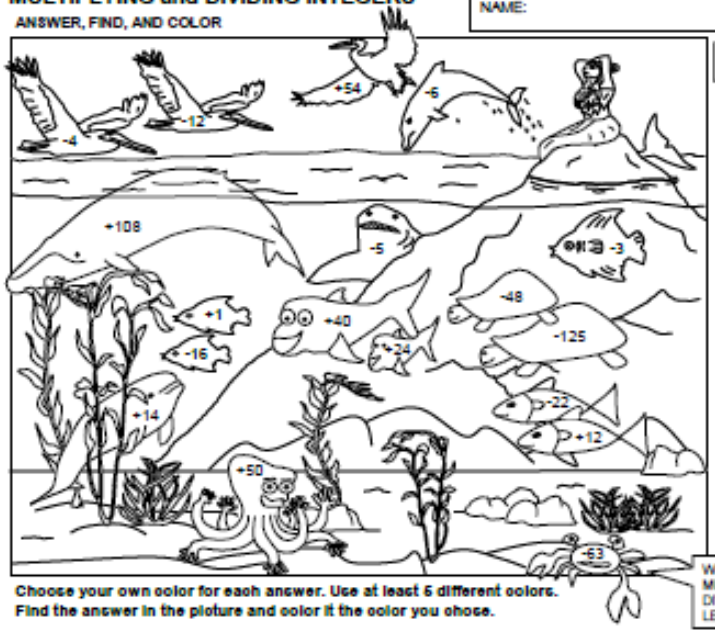
35) $mnp =$

36) $m \div n =$

MULTIPLYING and DIVIDING INTEGERS

ANSWER, FIND, AND COLOR

NAME:



HELPFUL EXAMPLES

1. +2 • +3 = +6
2. +2 • -3 = -6
3. -6 ÷ -3 = +2
4. -6 ÷ +2 = -3
5. -4 • -3 ÷ +2
   = +12 ÷ +2
   = +6
6. -8 ÷ -2 ÷ -2
   = +4 ÷ -2
   = -2

(+) x (+) = +
(-) x (-) = +
(-) x (+) = -
(+) x (-) = -

WHEN YOU'RE MULTIPLYING AND DIVIDING, WORK LEFT TO RIGHT.

Choose your own color for each answer. Use at least 6 different colors.
Find the answer in the picture and color it the color you chose.

	ANSWER	COLOR		ANSWER	COLOR
a.	-5 • 4 • -2 =		j.	9 • -1 • -6 =	
b.	48 ÷ -4 =		k.	-42 ÷ 14 =	
c.	-2 • -4 • -6 =		l.	+32 ÷ -2 =	
d.	4 • -9 ÷ -3 =		m.	+5 • +2 • +5 =	
e.	6 • -2 • -2 =		n.	+3 • -12 ÷ 6 =	
f.	-50 ÷ -5 ÷ -2 =		o.	-1 • +1 • -1 =	
g.	-1 • +9 • +7 =		p.	12 ÷ -6 • +2 =	
h.	-8 • -7 ÷ 4 =		q.	+88 ÷ 2 ÷ -2 =	
i.	5 • -5 • +5 =		r.	-9 • 4 • -3 =	

Solving One-Step Equations x/÷

Solving a one-step equation with integers requires you to create zero pairs to isolate the variable.

Examples:

#1 Solve: $-2x = 12$

$\div -2 \quad \div -2$

$x = -6$

Check: $-2x = 12$

$-2(-6) = -12$

$-12 = -12$ ✓

#2 Solve: $\frac{x}{-5} = -7$

$(-5)\ \frac{x}{-5} = -7\ (-5)$

$x = 35$

Check: $\frac{x}{-5} = -7$

$\frac{-35}{-5} = -7$

$--7 = -7$ ✓

You Try!

Solve each equation. Don't forget to check your answer.

Solve	Check
1) $\frac{x}{5} = -2$	
2) -40 = -5p	
3) $-2 = \frac{m}{16}$	
4) -11k = 22	
5) $\frac{a}{29} = 5$	
6) -22a = -418	

Mixed Operation Practice

Add, Subtract, Multiply or Divide.

1) 4 - 19 =

2) -1820 ÷ (-20) =

3) -44 + (-95) =

4) 38 - 54 =

5) 82 • 86 =

6) -3675 ÷ (-75) =

7) -14 - 2 =

8) 46 - 60 =

9) 82 • 65 =

10) 56 • (-41) =

11) 13 • 62 =

12) 57 • (-7) =

13) -1860 ÷ (-31) =

14) 74 - (-78) =

15) 80 + 63 =

16) 43 • (-79) =

17) 31 + (-60) =

18) -6 + 64 =

19) 17 + 89 =

20) 5 - 8 =

21) 7161 ÷ (-77) =

22) 38 + 53 =

23) -56 • (-55) =

24) -1260 ÷ (-30) =

25) -18 - 98 =

26) 71 • 77 =

27) 1610 ÷ 46 =

28) 56 + (-20) =

29) 47 + (-88) =

30) -168 ÷ 2 =

Unit 8 End of Unit Study Guide

Knowledge and Understanding

1) What is the algorithm for adding with negative numbers?

2) a) What is the sum of two numbers that are the same distance from zero on the number line?

b) What are they called?

3) Model the problem -6 – 2 using + and – counters:

Proficiency of Skills

4) $10-(-7)=$_____

5) $(2)(12)(-5)=$_____

6) $(-150)\div(-15)=$_____

7) $(8.1)+(-1)+(-7.1)=$_____

8) $(-1.3)-(-4.3)=$_____

9) $(-5)(2-8)=$_____

10) Convert $\frac{2}{9}$ to a decimal: _____

11) Convert 1.08 to a fraction: _____

Application

12) Order from least to greatest: $-\frac{1}{4}$, $-\frac{6}{8}$, $1\frac{4}{5}$, -0.5, 1.4

13) If *b* represents a negative number, is $b \cdot b$ a positive or negative number?

14) A submarine 530 feet below sea level descends an additional 100 feet before ascending 120 feet. What is the location of the submarine?

a) 750 ft below sea level b) 550 ft below sea level
c) 510 ft below sea level d) 510 ft above sea level

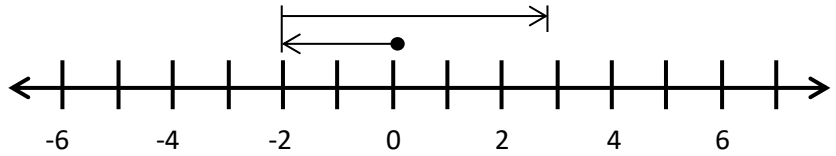
15) Which two integers have a product of -30 and a sum of -7?

a) -3 and -10 b) -3 and -4 c) 3 and -10 d) 2 and -15

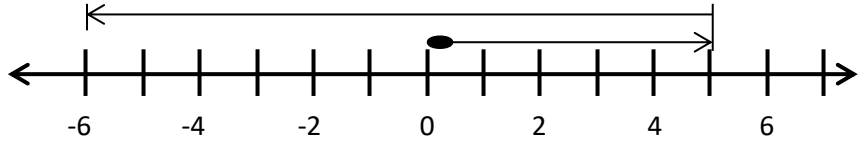
16) The temperature at 9 AM was 11°F. The temperature dropped 4 degrees per hour for the next three hours. What is the temperature at noon?

a). -3°F b) -7°F c) -1°F d) -2°F

17) What addition expression is represented by the model below?



18) What subtraction expression is represented by the model below?



19) When the following fractions are converted to decimals, which one will result in a repeating decimal?

A. $\frac{7}{10}$ B. $\frac{5}{12}$ C. $\frac{5}{8}$ D. $\frac{3}{5}$

20) For your birthday, you decide to go parasailing over the ocean. You're peacefully sailing at 120 feet above sea level, and then you ascend 25 feet. Finally, you decide to dive into the ocean, and you fall 165 feet. Describe your new location. Justify your answer with an illustration, an equation, and/or complete sentences.