Lesson 1-1A: Properties of Numbers; Addition

Objectives: Review addition of whole numbers and perimeter.

Addition: working towards a _____.

Definition: _____

Parts of an addition problem:

$$8 + 3 = 11$$

_____: the numbers that are added together.	_____: the result of adding

Addition Words

	more than	increased by
combined	the sum of	together

Examples:

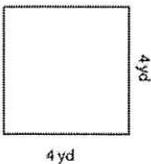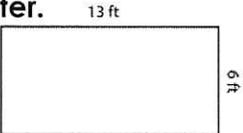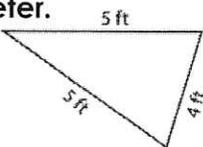1. A number (x) increased by 15 _____

2. x + 5 _____

Perimeter

1. _____: the distance around the polygon.

   *To find the perimeter, _____ all sides together.

Formulas:

Perimeter of a Square:	Perimeter of a Rectangle:	Perimeter of a Triangle:
Perimeter = 4 * side	Perimeter = 2 * length + 2 * width	Perimeter = side + side + side
P = 4s	P = 2L + 2W	P = a + b + c

Examples:

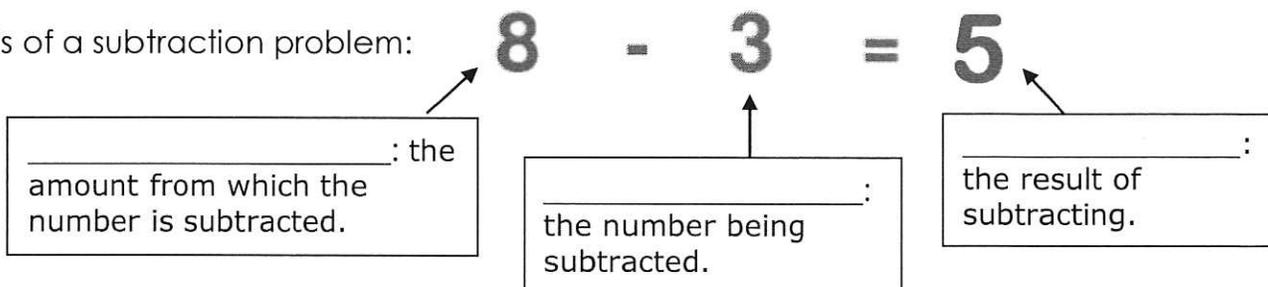| A. Find perimeter.	B. Find perimeter.	C. Find perimeter.
4 yd (square), 4 yd	13 ft, 6 ft (rectangle)	5 ft, 5 ft, 4 ft (triangle)
Formula: _____	Formula: _____	Formula: _____
Substitute: _____	Substitute: _____	Substitute: _____
Solve: _____	Solve: _____	Solve: _____

Chapter 1
Properties of Numbers; Subtraction

Objectives: Review subtraction of whole numbers.

Subtraction: Working _____ a total.

Definition: _____

Parts of a subtraction problem: **8** - **3** = **5**

_____: the amount from which the number is subtracted.

_____: the number being subtracted.

_____: the result of subtracting.

Subtraction Words

subtract	fewer	minus
decreased by	gave away	profit

Switch Order Words: The number after the word goes first in the problem:

less than	fewer than	subtracted from

Examples:

a) The difference of a number (y) and 6 _____

b) 4 less than a number n_____

c) y - 8 _____

Word Problems:

1. Charlie borrowed $45 from David. If David had $89, how much does he have now?

2. A specific task requires 58 hours to complete. If John worked for 16 hours, how many more hours does he need to work to complete the task?

2

Math 9

IC 1-1A

Evaluate each expression.

1) $427 + 195$

2) $293 + 338$

3) $385 - 218$

4) $470 - 211$

Write each as an expression.

5) the sum of 12 and 8

6) the sum of 2 and 8

7) 15 less than 23

8) 24 decreased by 8
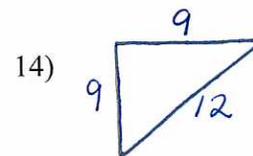
Write the expression in words.

9) $8 + 11$

10) $24 - 13$

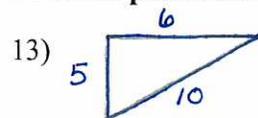**Solve the word problem. Show work.**

11) A recipe for cupcakes calls for 6 cups of sugar. Mary has already put in 3 cups. How many more cups does she need to put in?

12) Sarawong paid $7 for a salad. He now has $14. How much money did he have before buying the salad?

Find the perimeter.

13)

Formula: _____

Substitute: _____

Solve:

14)

Formula: _____

Substitute: _____

Solve:

2a

Ch 1 Matching questions

Radical	A. Any number greater than 0.
Equivalent Fractions	B. A fraction where the greatest common factor of the numerator and denominator is 1.
Positive Number	C. The distance around the polygon.
Power	D. A symbol used to refer to the root of a number.
Simplest Form	E. The set of whole positive and negative numbers including zero.
Perimeter	F. Two fractions that represent the same amount or quantity.
Integer	G. The result of multiplication.
Product	H. An expression made up of a base and exponent.

Division	A. Bottom of fraction. Total parts of the whole.
Subtraction	B. Squares of whole numbers that have no decimal in the answer.
Exponent	C. The product of a number multiplied by itself.
Denominator	D. The number or variable that represents the number of times the base is used as a factor.
Square a number	E. Separating a number into equal groups.
Perfect Squares	F. Repeated addition of the same number.
Multiplication	G. An operation that tells how many are left when some are taken away.

2b

Lesson 1-1B: Properties of Numbers; Multiplication (Area & Volume)

Objectives: Review multiplication of whole numbers and area

Multiplication: Working _____ a total.

Definition: _____

Parts of a multiplication problem:

$$5 \times 3 = 15$$

Terms:

1. _____: the numbers being multiplied.

2. _____: the result of multiplication.

Ways to represent multiplication:

a. Addition Problem:	b. Multiplication problem:
$$5 + 5 + 5 = 15$$	
c. Array:	d. Area model:

c. Array:

5

3 { 🍎🍎🍎🍎🍎 🍎🍎🍎🍎🍎 🍎🍎🍎🍎🍎

15 apples

Multiplication Words

of	twice	**each**
Doubled (*2)	Tripled (*3)	

Examples:

a) The product of a number (*t*) and 4 _____
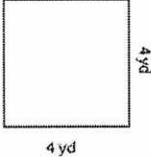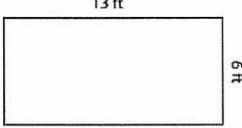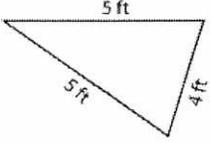
b) Bagels cost $.50 each._____

c) 7*k* _____

Area

1. _____ of a polygon is the number of square units needed to cover the surface. Measured in units squared.

Formulas:

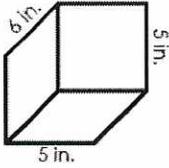| Area of Rectangle: Area= length * width A=L * W	Area of Square: Area=side * side A=s * s or A = s²	Area of Triangle: Area= $\frac{1}{2}$ * base * height $A = \frac{1}{2} bh$

Examples:

A. Find area.	B. Find area.	C. Find area.
4 yd × 4 yd	13 ft × 6 ft	5 ft, 5 ft, 4 ft triangle
Formula: _____	Formula: _____	Formula: _____
Substitute: _____	Substitute: _____	Substitute: _____
Solve: _____	Solve: _____	Solve: _____

Volume

1. _____ The amount of 3-dimensional space an object occupies. Measured in units cubed.

Formula:

Volume of Rectangular Prism: Volume= length * width * height V=L * W * H	6 in. × 5 in. × 5 in.	Formula: _____ Substitute: _____ Solve: _____
Volume of Cylinder: Volume = π *radius squared * height $V = \pi r^2 h$	4 in, 5 in cylinder	Formula: _____ Substitute: _____ Solve: _____
Volume of Cube: Volume = side cubed $V = s^3$	6 cm cube	Formula: _____ Substitute: _____ Solve: _____
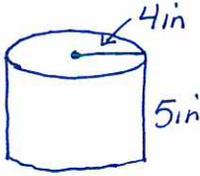
4
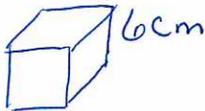
Properties of Numbers; Division

Objectives: Review division of whole numbers

Division: Working from a _____.

Definition:_____

Parts of a division problem:

$$10 \div 2 = 5$$

[ ]

[ ]   [ ]

10 ÷ 2 = 5

Group of 2
The quantity 10 contains 5 groups (of 2).
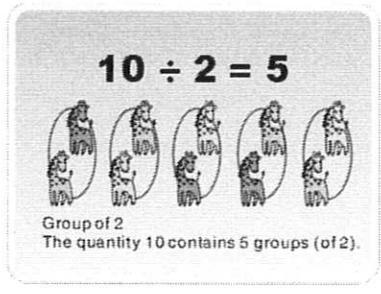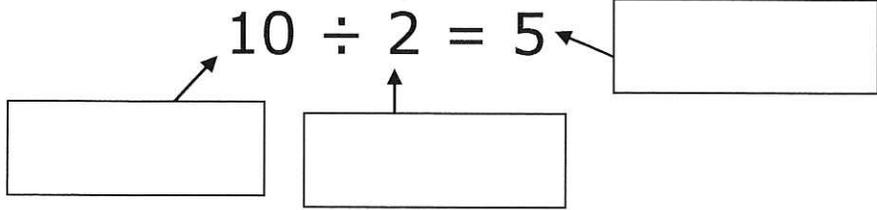
Terms:

1. _____: the numbers being divided (your total amount).

2. _____: the number being divided (how many equal groups).

3. _____: result of division (how many are in each group.)

Division 3 Ways: **Write 21 divided by 7 all 3 ways.**

Division Sign	Division Symbol	Division Bar (Fraction Bar)

Division Words

per	half (divide by 2)	
a third (divide by 3)	out of	ratio

a) The quotient of a number (z) and 3 _____

b) A number a divided by 12 _____

c) $\dfrac{f}{9}$ _____

Words into Math

ADDITION

Add
Sum
Increased By   Together
More   And
Plus
Combined

SUBTRACTION

Subtract   Difference
Decreased by   Minus

Turn Around Words
THAN   **FROM**
(*less than*)   **FEWER**

DIVISION

Quotient   Shared   Per
Ratio   Divided By

MULTIPLICATION

Product   Times
OF
Multiple   Twice

Parenthesis Words
Times the sum/difference of
Twice the sum/difference of
Times...of
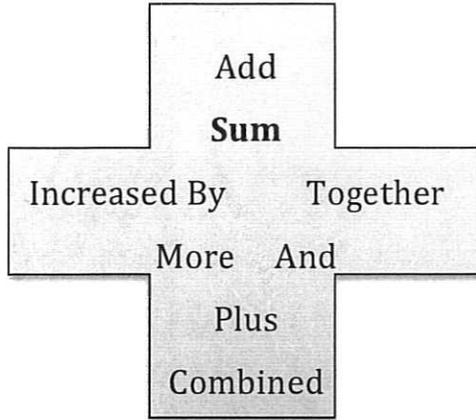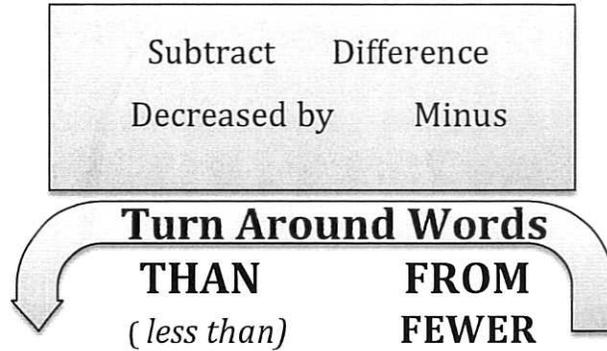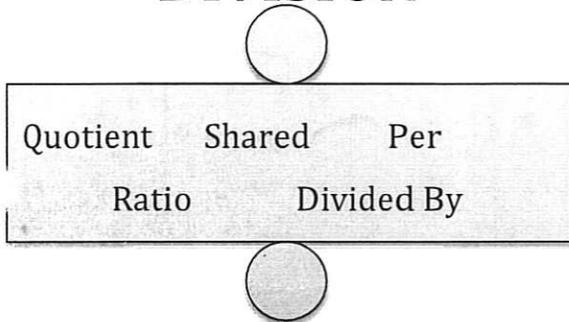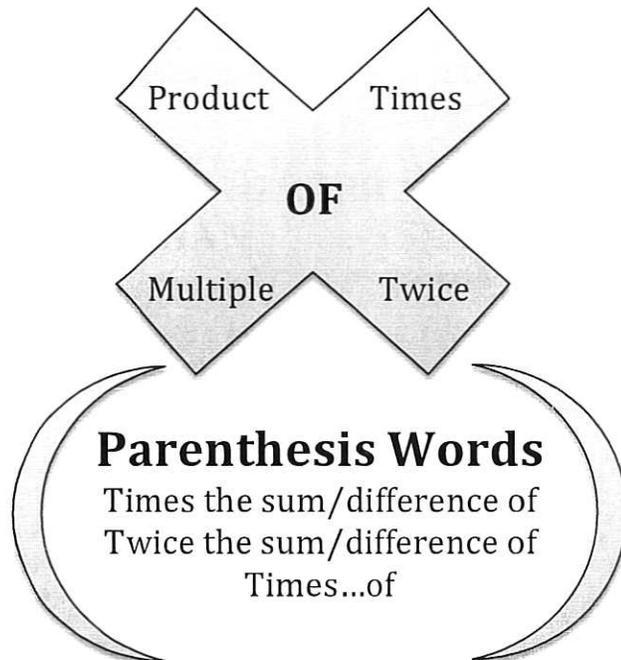
EQUALS
IS
are   were   will be

6

Math 9   ID: 1

IC 1-1B

Evaluate each expression.

1) $11 \cdot 20 \cdot 20$

2) $12 \cdot 14 \cdot 3$

3) $4200 \div 75$

4) $1344 \div 28$

Write each as an expression.

5) the product of 12 and 6

6) the quotient of 15 and 5

Write the expression in words.

7) $\dfrac{77}{7}$

8) $9 \cdot 7$

Solve the word problem. Show work.

9) How many packages of diapers can you buy with $60 if one package costs $6?

10) Find the price of one candy bar if nine candy bars cost $45.

Find the Area.

11)

14

6

Formula: _____

Substitute: _____

Solve:

12)

27

3
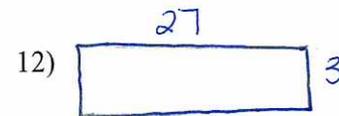
Formula: _____

Substitute: _____

Solve:

Find the volume.

13)

5

4

3

Formula: _____

Substitute: _____

Solve:

14)

2

12

4
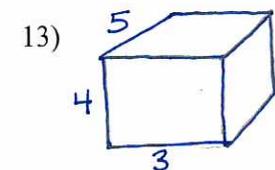
Formula: _____

Substitute: _____

Solve:

Rational Numbers	A. Numbers that are the same distance from zero in the opposite direction.
Quotient	B. The number or variable used as a factor in repeated multiplication.
Opposite Numbers	C. The ratio that compares a number to 100.
Sum	D. Part of a whole.
Base	E. The amount of 3-dimensional space an object occupies.
Percent	F. All fractions, integers and terminating and repeating decimals.
Factor	G. The result of division.
Fraction	H. The result of adding.
Volume	I. The numbers being multiplied.

Numerator	A. The result of subtracting.
Additive Inverse	B. Combining numbers to make a total.
Negative Number	C. Top of the fraction. How many parts you have.
Decimal	D. The opposite of squaring a number.
Addition	E. A decimal that is nonterminating and nonrepeating. Cannot be represented by the ratio of 2 integers.
Difference	F. An integer and its opposite.
Square Root	G. Any number less than 0.
Area	H. A number that has a decimal point followed by digits that show value smaller than 1.
Irrational Numbers	I. The number of square units needed to cover the surface.

6b

Lesson 1-2: Operations with Decimals

Decimal: A number that has a decimal point followed by digits that show a value smaller than one.

4, 3 2 1 . 1 2 3

Thousands Hundreds Tens Ones Decimal Tenths Hundredths Thousandths

decimal point   tenths

hundredths

ones

3 . 4 5

+   . 2

* Adding and Subtracting

Jenny works in her family's small convenience store as a cashier. She finds the total cost and then determines the correct change. Last week, a customer bought three items: one item that cost $2.34, a second item that cost $0.98, and a third item that cost three dollars and nine cents.

A. Help Jenny by finding the total cost of all three items.

B. The customer gave Jenny a ten dollar bill. How much change did Jenny give the customer?

C. Tom, Jenny's younger brother, added the three items as shown below.
Does Tom's answer agree with your answer? **Sentence!**

$2.34
$.98
+ $3.90

$16.04

D. What was Tom's error?

Quick Check: Find each sum or difference.

a) $23.05 + 2.301 =$

b) $400.1 + 6.202 =$

c) $45.23 - 9.08 =$

d) $1.0003 - 0.9 =$

e) $203.901 - 2.0451 =$

f) $54.2 + 45.09 + 6.09 =$

Chapter 1

Mulitiplying

You are making a scale model of the planets using foam balls. If you make the Sun out of a ball that is 30 inches in diameter, you can make the planets to scale using the diameters in the table.

A. You changed your mind and wanted to use a ball with a 42-inchdiameter for the Sun, you would need to multiply each diameter in the table by 1.4.
You asked four of your friends to find the diameter of Saturn. They all got different answers.
a) 36.4   b) 3.64   c) 0.364   d) 3.6
Which answer is correct? **Show work/ Explain.**

Planet	Diameter
Mercury	0.103
Venus	0.26
Earth	0.276
Mars	0.147
Jupiter	3.09
Saturn	2.6
Uranus	1.1
Neptune	1.07

Quick Check: Find each product.

a) $2.34 * 2.5 =$

b) $400.1 * 1.01 =$

c) $2.001 * 3.4 =$

d) $6.45 \times 3.1 =$

e) $0.001 \times .03 =$

f) $4.004 \times 0.002 =$

Dividing Decimals

You want to buy a gift for your cousin, whose favorite hobby is knitting. You find a web site that sells handspun yarn. You can buy 2.4 ounces of llama yarn for $10.08 or 3.6 ounces of mohair yarn for $20.16. Which type of yarn is the better buy?

A. To determine the better buy, solve $10.08 \div 2.4$.

B. Use the method from Part (A) to find the cost per ounce of mohair yarn.

C. Based on your results from Parts (A) and (B), which type of yarn is the better buy?
Explain with a Sentence!

_____

_____

Quick Check

$$45\overline{)10.35} \qquad 60\overline{)24.6} \qquad 25\overline{)7.4}$$

$$13.78 \div 5.3 = \qquad 5.69\overline{)41.537}$$

8

Power Up! Performance Task

Calorie Counter

Juan is calculating how many Calories he consumes in a day. Through Internet research, he determines that a person his age should consume 68,820 Calories per month.

Write your answers on another piece of paper. Show all of your work to receive full credit.

Part A
Based on a 31-day month, how many Calories should Juan consume in a day?

Part B
Juan wants to eat fewer than 800 Calories at lunch. The table shows the menu at the school cafeteria with the Calorie totals listed for each item. Find two different meal options for Juan to choose for lunch. Then find the cost for each meal.

Food Item	Calories	Cost ($)
Carrots	41	0.80
Chocolate Cake (slice)	513	2.10
Cookie	253	1.45
Corn Dog	212	1.50
French Fries	103	1.10
Green Beans	39	0.80
Hamburger	449	2.50
Pepperoni Pizza (slice)	334	1.75
Salisbury Steak	342	2.30

Part C
Juan has a budget of $20.00 for lunch each week. Choose one of the meals from Part B for Juan's lunch on Monday. How much does he have left for the rest of the week? How much could he spend each remaining day, if he spends the same amount each day?

Part D
On game day, the entire basketball team eats together. There are 12 players on the team. Each player eats two slices of pizza, carrots, and a cookie. Find the total cost of the team's lunch.

8a

11. **(MP) Model with Mathematics** Refer to the graphic novel frame below for Exercises a–b.

CAR WASH Paycheck

Hourly wage	Hours worked
$5.50	$

I've already saved $68 for the $200 video game system.

a. How much more does Raj need until he has enough to buy the video game system? _____

b. Raj estimates that if he works for 20 hours, he will have enough to buy the video game system. Is he correct? Explain. _____

H.O.T. Problems Higher Order Thinking

12. **(MP) Reason Abstractly** Name three decimals with a product that is about 40.

_____

13. **(MP) Persevere with Problems** A scooter can travel between 22 and 28 miles on each gallon of gasoline. If one gallon of gasoline costs between $3.75 and $3.95 per gallon, about how much will it cost to travel 75 miles? _____

14. **(MP) Justify Conclusions** Suppose your friend multiplied 1.2 and 2.6 and got 31.2 as the product. Is your friend's answer reasonable? Justify your response.

_____

_____

15. **(MP) Reason Inductively** Green peppers are on sale for $2.89 per pound. Mrs. Moseley bought 1.75 pounds of peppers. Is it more reasonable to say that she spent between $5 and $6 or between $6 and $7 on the peppers? Explain your reasoning.

_____

_____

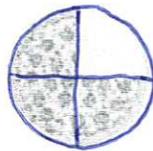# Lesson 1-3: Operations with Fractions and Mixed Numbers

Vocabulary:

1. _____: a part of a whole.

2. _____ fractions: Two fractions that represent the same amount or quantity.

3. _____: A fraction where the greatest common factor of the numerator and denominator is 1.
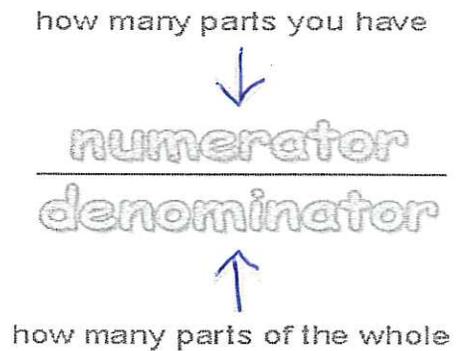
Calculations on the TI-30XIIS

Fractions:
- To get a fraction, use the $\boxed{A^b/c}$ button. It creates this separator ⌐ between parts
  - For ¾ type $\boxed{3}$ $\boxed{A^b/c}$ $\boxed{4}$ o For 4 ½ type $\boxed{4}$ $\boxed{A^b/c}$ $\boxed{1}$ $\boxed{A^b/c}$ $\boxed{2}$
  - It will show 3 / 4   o It will show 4 ∪ 1 / 2

- To convert between mixed fractions and improper fractions, use $\boxed{2^{nd}}$, $\boxed{A^b/c}$, $\boxed{=}$ (A^b/c ↔ d/c)

- To convert between fractions and decimals, use $\boxed{2^{nd}}$, $\boxed{PRB}$, $\boxed{=}$.   (F ↔ D)

Parts of a Fraction:

$\dfrac{3}{4}$ ← Numerator / ← Denominator

how many parts you have
↓
$\dfrac{\text{numerator}}{\text{denominator}}$
↑
how many parts of the whole

Types of Fractions:

Smaller → $\dfrac{3}{5}$ ← Larger

Proper Fraction

Larger (or equal) → $\dfrac{9}{5}$ ← Smaller (or equal)

Improper Fraction

Whole Number → $2\dfrac{1}{3}$ ← Numerator / ← Denominator

Mixed Number

Simplify Fractions: (use calculator)

- **To reduce a fraction to lowest terms where the greatest common factor is 1.**

$\dfrac{4}{6}$ =	☐	$\dfrac{2}{4}$ =	☐
$\dfrac{12}{15}$ =	☐	$\dfrac{6}{8}$ =	☐
$\dfrac{6}{10}$ =	☐	$\dfrac{9}{15}$ =	☐

Add Fractions and Mixed Numbers:

1. $\dfrac{8}{18} + \dfrac{4}{18} =$ 2. $4\dfrac{4}{5} + 2\dfrac{1}{3} =$

Subtract Fractions and Mixed Numbers:

1. $\dfrac{8}{18} - \dfrac{4}{18} =$ 2. $4\dfrac{4}{5} - 2\dfrac{1}{3} =$

Multiply Fractions and Mixed Numbers

1. $\dfrac{2}{5} \bullet \dfrac{3}{4} =$ 2. $\dfrac{1}{4} \bullet 1\dfrac{3}{4} =$

Divide Fractions:

1. $\dfrac{2}{7} \div \dfrac{2}{4} =$ 2. $2\dfrac{1}{4} \div 1\dfrac{3}{4} =$

Fractions:

You are a member of a local neighborhood sports organization. The organization sponsors 7 baseball teams **each** for boys and girls, 6 basketball teams **each** for boys and girls, 10 soccer teams for girls, and 6 football teams for boys.

A. Answer the following questions.

How many total teams does the organization sponsor?		
How many boys' teams?	How many girls' teams?	How many baseball teams?
How many basketball teams?	How many soccer teams?	How many football teams?

B. Make a fraction from the information above:

What fraction of the total number of teams are girls' teams?	What fraction are boys' teams?	What fraction are soccer teams?
What fraction are basketball teams?	What fraction are football teams?	What fraction are baseball teams?

C. What fraction of the total number of teams are not basketball teams?

What fraction are not soccer teams?

13. Mr. Davis rented four movies for the weekend. The movies and their lengths are shown in the table.

Movie	Length (hours)
Searching for Sara	$1\frac{3}{4}$
Waiting for Time	$2\frac{1}{6}$
The Ender	$2\frac{1}{4}$
The Array	$2\frac{1}{2}$

A The Davis family watched *Searching for Sarah* and $1\frac{1}{4}$ hours of *The Array* on Friday night. How much time did they spend watching movies on Friday night?

B On Saturday they watched *The Ender* and *Waiting for Time*. How much time did they spend watching movies on Saturday?

C Suppose you rented the movies shown in the table. Make up a plan for spending exactly $5\frac{1}{2}$ hours watching whole movies or parts of movies and taking at least one break. Be sure to include the time you take for breaks in the $5\frac{1}{2}$ hours.

1. Integers – The set of whole _____ and _____ numbers including zero.
   Ex. An integer can be any one of the following :... -4, -3, -2, -1, 0, +1, +2, +3, +4, ...

Zero is neither positive or negative
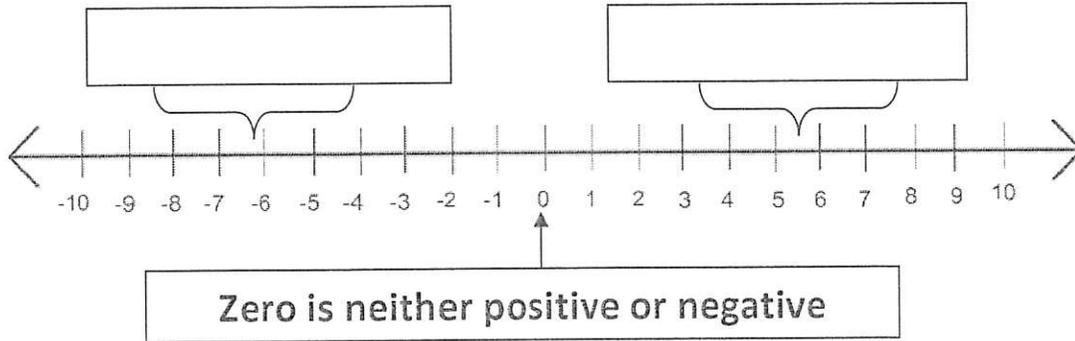
1. Positive Number: _____

2. Negative Number: _____

2. **Comparing Integers:** Numbers are arranged from least to greatest.

smaller
greater
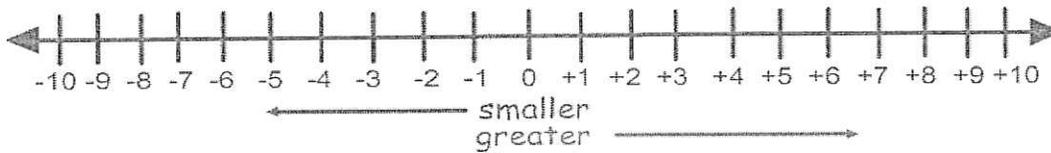
Words	−4 is less than 2.	2 is greater than −4.
	OR	
Symbols	−4 < 2	2 > −4

The symbol points to the lesser number.

Ex. Put the correct sign between the pairs of integers.
   *If you are having trouble, think of the numbers in terms of money. Positive numbers represent the money you have. Negative numbers represent money you owe.

Would you rather...
Have   Owe

5 ◯ -1   -2 ◯ 2

-3 ◯ -5   0 ◯ -2

-5 ◯ 2   -1 ◯ 3
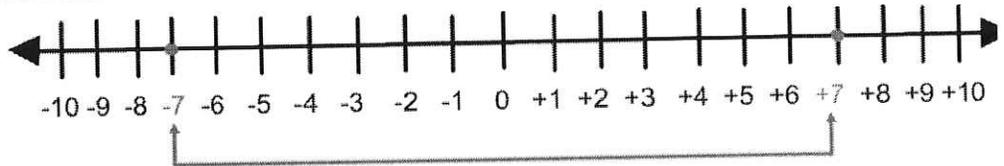
3. **Order Integers:** Put the integers in order from least to greatest.

    A. -4, +6, -2, +1, 0   _____   B. -2, -4, -1, -13 _____

    C. -6, +6, -3, +3, 0   _____   D. -22, -36, -1, 0 _____

4. **Opposite Numbers** – numbers that are the _____ distance from zero

                 in the_____ direction.

Ex: +7 and -7 are opposites

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

Examples:

Write the Opposite of each Integer

a) + 34 = _____   b) - 12 = _____   c) -2 = _____   d) +64 = _____

Words Real World: Integers can be used to represent real world data

Negative (-)	Positive (+)	Zero

Quick Check! Write an integer to describe the situation:

a) 7° below zero _____   b) Owing $50 _____

c) 150m above sea level _____   d) sea level _____

Write the integer represented by each point on the number line.

D   A   C   B   E

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
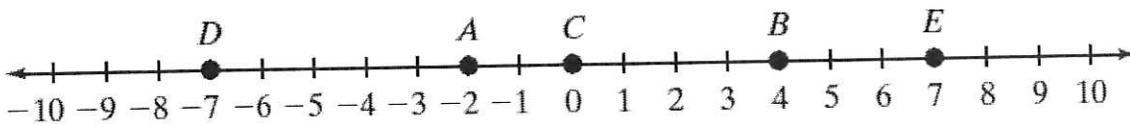
9. *A* _____   10 *B* _____   11. *C* _____

12. *D* _____   13. *E* _____

Inquiry Lab
Absolute Value

Inquiry HOW can a number line help you find two integers that are the same distance from zero?
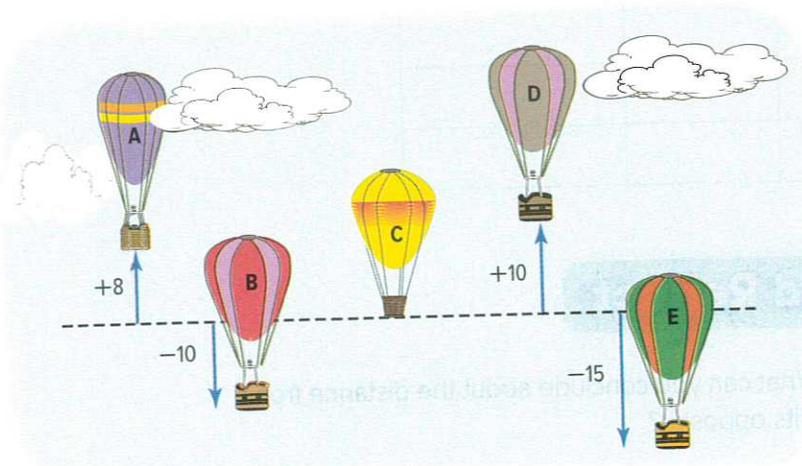
Several hot air balloons were flying at the same height. The dashed line below represents their starting point. Which two balloons moved the same distance but in opposite directions?

Hands-On Activity

In the diagram below, +8 means Balloon A climbed 8 feet and −10 means Balloon B moved down 10 feet.

Use the diagram to compare the distance each balloon moved.

Step 1 Complete the chart to compare the distance each balloon moved from the dashed line.

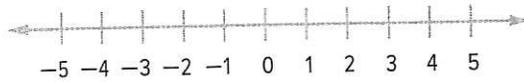| Balloon	Integer	Direction	Distance Moved (ft)
C	0	none	0
D	+10		
E	−15		

Step 2 Determine which two balloons moved the same distance away from the dashed line.

So, Balloon ☐ and Balloon ☐ moved ☐ feet from the dashed line.

12a

Inquiry Lab Absolute Value

MP Use Math Tools Use the number line to determine the distance between each integer and zero.

Show your work.

$$-5\ -4\ -3\ -2\ -1\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5$$

1. −2 _____

2. +3 _____

Work with a partner to complete the table. The first one is done for you.

	Integer	Distance Between Integer and Zero	Opposite Integer	Distance Between Opposite Integer and Zero
	3	3	−3	3
3.	7			
4.	−11			
5.	−13			
6.	−21			

Analyze and Reflect
Collaborate

7. **MP Reason Inductively** What can you conclude about the distance from zero for both an integer and its opposite?

_____

Create
On Your Own

8. **MP Model with Mathematics** The movement of Balloon B in the Activity was represented by the number −10. Write a number to represent the starting point of the balloons. How is this number shown on the diagram?

_____

9. **inquiry** HOW can a number line help you find two integers that are the same distance from zero?

_____

_____

Name: _____

Integer Quiz

Perform the given operation on each integer.

1.) 3 + (-5) =

2.) 3 + (-9) =

3.) 2 + (-4) =

4.) 10 – (-3) =

5.) 2 – (-5) =

6.) 3 + (-5) =

7.) -2 –3 =

8.) 12 – (-20) =

9.) -4 – 3 =

10.) 21 – (-3) =

11.) 2 – 3 =

12.) 3(-5) =

13.) 34(-2) =

14.) -9(-4) =

15.) 12(-3) =

16.) $\dfrac{-12}{4} =$

17.) $\dfrac{-20}{-2} =$

18.) $\dfrac{200}{-50} =$

For questions 19 and 20, use the following chart about various ocean dwelling mammals. Be sure to show your work!

Animal	Position
Dall's Porpoise	-330 ft
Pacific White-Sided Dolphin	-660 ft
Beluga Whale	-990 ft
Bottlenose Dolphin	-1640 ft
Pilot Whale	-1970 ft

This chart was taken from McDougal Littell Middle School Math, Course 3 Student Worksheet book, Chapter 2

19.) How much deeper can a Bottlenose Dolphin dive than a Dall's Porpoise?

20.) How much deeper can a Beluga Whale dive than a Pacific White-Sided Dolphin?

14a

Multiplying and dividing integers is very similar to multiplying and dividing whole numbers. Just remember the two basic rules for determining the sign of the product or quotient.

Rule 1: The product or quotient of two integers with the *same sign* is positive.

Rule 2: The product or quotient of two integers with *opposite signs* is negative.

Find each product or quotient.

a. $5 \cdot 7$
$$5 \cdot 7 = 35$$
Same sign (both +)

b. $-2(-3)$
$$-2(-3) = 6$$
Same sign (both −)

c. $15 \div 3$
$$15 \div 3 = 5$$
Same sign (both +)

d. $-40 \div (-10)$
$$-40 \div (-10) = 4$$
Same sign (both −)

e. $-5 \cdot 7$
$$-5 \cdot 7 = -35$$
Opposite signs (−, +)

f. $2(-3)$
$$2(-3) = -6$$
Opposite signs (+, −)

g. $-15 \div 3$
$$-15 \div 3 = -5$$
Opposite signs (−, +)

h. $40 \div (-10)$
$$40 \div (-10) = -4$$
Opposite signs (+, −)

Complete the table. The first row has been done for you.

		Same or Opposite Sign?	Sign of Product or Quotient	Product or Quotient
	$-5 \cdot 12$	Opposite	Negative	-60
1.	$-91 \div (-13)$			
2.	$6 \cdot 8$			
3.	$72 \div -9$			
4.	$-3(-6)$			
5.	$-18 \div 2$			
6.	$11 \cdot (-5)$			
7.	$52 \div 4$			
8.	$-12(6)$			

14b

Lesson 1-5: Exponents and Square Roots

After this lesson, you will be able to...
- represent repeated multiplication with exponents
- describe how powers represent repeated multiplication

Terms:

1. _____ a number: Multiply a number by itself.

2. _____ : the number or variable used as a factor in repeated multiplication.

3. _____ : the number or variable that represents the number of times the base is used as a factor.

4. _____ : an expression made up of a base and exponent. The result of repeated multiplication

5. _____ : The product of a number multiplied by itself. Numbers such as 1, 4, 9, 16, and 25 are called perfect squares because they are squares of _____ numbers. They have no decimals in the answer.

6. _____ : The opposite of _____ a number. One of the two equal factors. The symbol $\sqrt{x}$ is read "the square root of x". It is the number that multiplied by itself equals x. For example, $\sqrt{16}$ = 4, because 4^2 = 16. (4^2= 4 x 4=16)

7. _____ : A symbol used to refer to the root of a number. ($\sqrt{}$)

Numbers _____ { The power is read

$5^6 = 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

_____

Algebra _____ { The power is read

$a^n =$

_____

Squares of Numbers:

To square a number, just multiply it by itself ...

Example: What is 3 squared?

3 Squared = 3

1	2	3
4	5	6
7	8	9

$= 3 \times 3 = 9$

"Squared" is written as the exponent 2:

this means "squared"

$4^2 = 16$

16

Square Roots:

A **square root** of a number is a value that can be **multiplied by itself** to give the original number. It is the opposite of squaring a number.

A radical is the symbol that tells us to find the square root.

$$\sqrt{9} = 3$$

and we say *"square root of 9 equals 3"*

Example: What is $\sqrt{25}$?

Well, we just happen to know that $25 = 5 \times 5$, so when we multiply 5 by itself (5×5) we will get 25.

So the answer is:

$$\sqrt{25} = 5$$

Exponents:

The **exponent** of a number says **how many times** to use the number in a multiplication.

Example: $5^3 = 5 \times 5 \times 5 = 125$

- In words: 5^3 could be called "5 to the third power", "5 to the power 3" or simply "5 cubed"

Blank Square Root Chart 1 – 15

$\sqrt{1} = \boxed{}$ $\sqrt{4} = \boxed{}$ $\sqrt{9} = \boxed{}$

$\sqrt{16} = \boxed{}$ $\sqrt{25} = \boxed{}$ $\sqrt{36} = \boxed{}$

$\sqrt{49} = \boxed{}$ $\sqrt{64} = \boxed{}$ $\sqrt{81} = \boxed{}$

$\sqrt{100} = \boxed{}$ $\sqrt{121} = \boxed{}$ $\sqrt{144} = \boxed{}$

$\sqrt{169} = \boxed{}$ $\sqrt{196} = \boxed{}$ $\sqrt{225} = \boxed{}$

18

Quick Check:

Squares:

1. $4^2 =$ _____ * _____ = _____   2. $8^2 =$ _____ * _____ = _____

3. $2^2 =$ _____ * _____ = _____   4. $3^2 =$ _____ * _____ = _____

Square Roots:

1. $\sqrt{100} = \sqrt{\rule{2cm}{0pt}} =$ _____   2. $\sqrt{81} = \sqrt{\rule{2cm}{0pt}} =$ _____

3. $\sqrt{25} = \sqrt{\rule{2cm}{0pt}} =$ _____   4. $\sqrt{36} = \sqrt{\rule{2cm}{0pt}} =$ _____

Exponents:

Exponential Form	Repeated Multiplication	Value
a) 6^3	$6 \times 6 \times 6$	
b)	$3 \times 3 \times 3 \times 3$	
c)		49
d) 11^2		
e)		125

4. Does $4^3 = 3^4$? Show how you know.

Directions: Start with the box under the large arrow. Solve the exponent problem. Shade the answer box. Follow the arrow to the next box. Continue until you get to the end box.

Start Here

Boxes: 3^2, 1^2, 8^2, 14^2, 5^2, 10^2, END, 4^2, 13^2, 9^2, 6^2, 12^2, 7^2, 11^2, 2^2, 15^2

18b
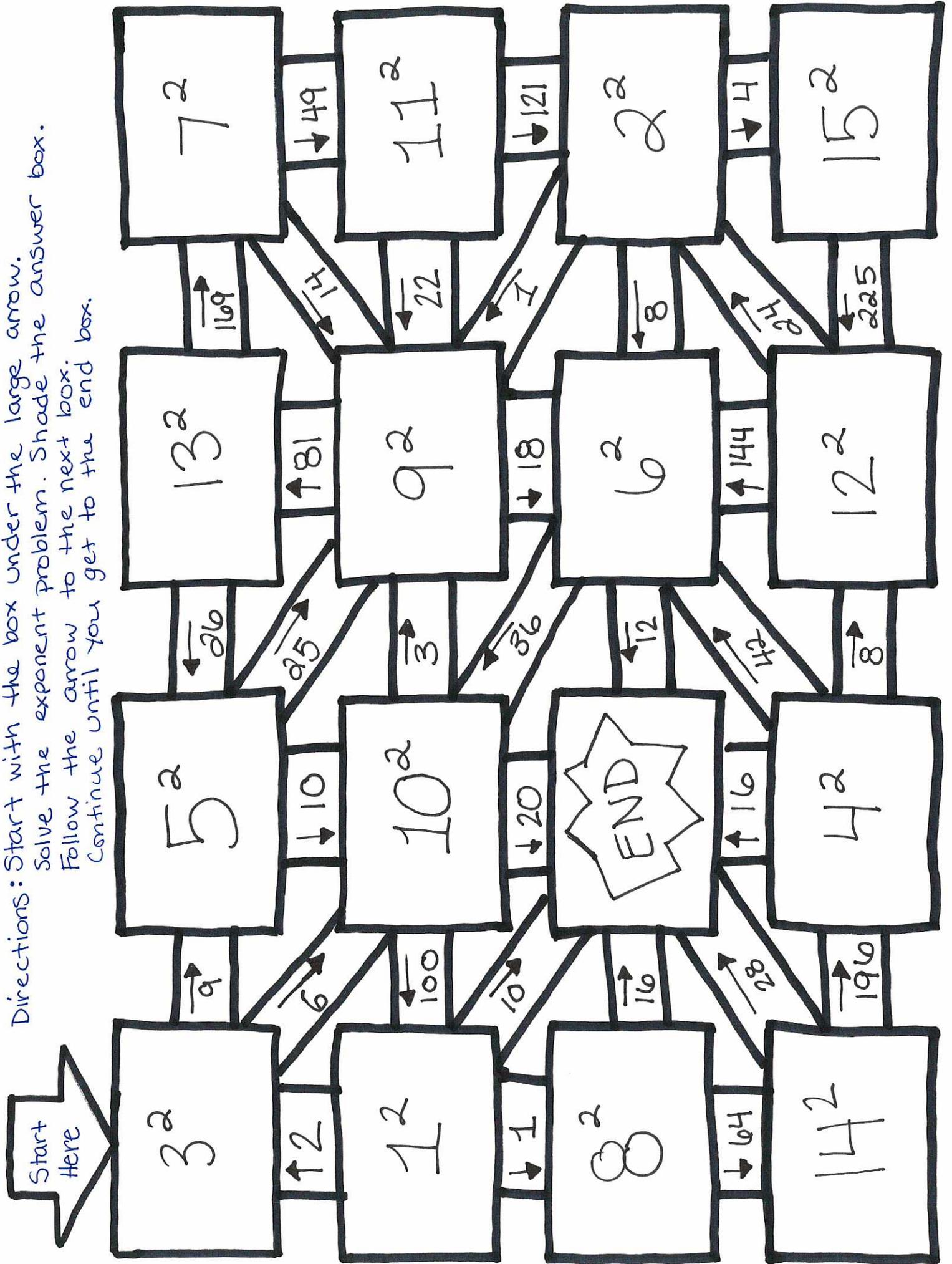
Lesson 1-6: Fractions, Decimals and Percents

Objectives: Represent and/or use numbers in equivalent forms
Convert decimals, fractions and percents to other forms. (A1.1.1.1)

Percent: a _____ that compares a number to _____.

Percent to decimal

2 Methods:
1. Divide percent by 100

Percent   **5%**

Decimal   _____

2. Move the decimal point- _____ places left & add 0's

$\underset{\frown}{5}.$ = _____

Decimal to Percent

2 Methods:
1. Multiply the decimal by 100

Decimal   **.15**

Percent   _____

2. Move the decimal point- _____ places right

$\underset{\frown}{.15}$ = ____

19

Percent to fraction

| Percent | **5%** |

Put the Percent over 100 and simplify in your calculator

| Fraction |

● CLICK

● CLICK

Fraction to decimal to percent

Divide the numerator (top) by the denominator (bottom)

| Fraction | $\dfrac{3}{8}$ | = _____ |

↓

| Decimal | | **Multiply by** _____ |

↓

| Percent | | _____ |

● CLICK

● CLICK

Fraction, decimal, percent
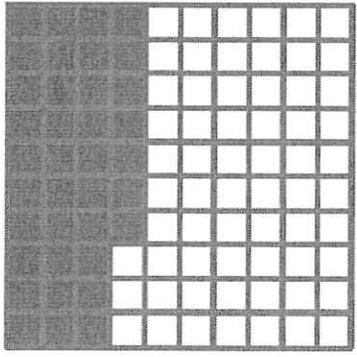
Fraction	Decimal	Percent
$\dfrac{}{100}$	.	%

ANSWER

Fractions, decimal, percents
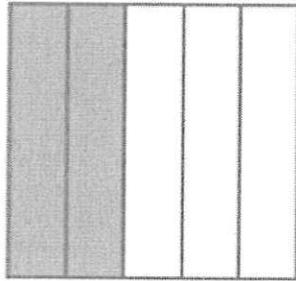
HINT

Fraction	Decimal	Percent
—		%

ANSWER

HINT

Fraction	Decimal	Percent
—		%

ANSWER

20a

Fractions, decimal, percents

HINT | **ANSWER**

Fraction	Decimal	Percent
___		%
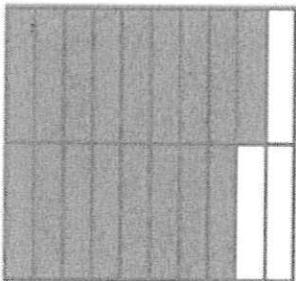
HINT | **ANSWER**

Fraction	Decimal	Percent
___		%

On Your Own!

Write the fraction, decimal, and percent equivalent to each. Simplify all fractions

	Fraction	Decimal	Percent
1.	$\dfrac{3}{5}$		
2.	$\dfrac{3}{8}$		
3.	$\dfrac{3}{10}$		
4.		0.8	
5.			3 %

20b

Name _____ Date _____

Convert each decimal to a percent.

Convert % to decimal

0.85 =

50%

0.92 =

25%

0.68 =

7%

0.12 =

32%

0.52 =

100%

Convert each decimal to a fraction. (write answer in lowest terms)

0.16 =

0.76 =

0.56 =

0.36 =

0.6 =

TheMathWorksheetSite.com

20 C

Name _____ Date _____

Convert each fraction to a decimal.

$\dfrac{6}{25}$ = _____

$\dfrac{13}{25}$ = _____

$\dfrac{3}{20}$ = _____

$\dfrac{17}{25}$ = _____

$\dfrac{7}{20}$ = _____

Convert each % to fraction.

50%

5%

100%

75%

25%

Convert each fraction to a percent.

$\dfrac{11}{25}$ = _____

$\dfrac{2}{25}$ = _____

$\dfrac{16}{25}$ = _____

$\dfrac{19}{25}$ = _____

$\dfrac{9}{25}$ = _____

20d

1-7 Inequalities

Inequalities

Symbol	Words	Circle	Direction	Example of Graph
>	Greater Than	Open	Right	3
≥	Greater Than or Equal To	Closed	Right	4
<	Less Than	Open	Left	-2
≤	Less Than or Equal To	Closed	Left	5

Inequality Word List

>	≥	<	≤
Is more than	minimum	is smaller than	maximum
is greater than	at least	is less than	at most
is larger than	is not less than	below	not more than
above	not smaller than		Is not greater than

21

Inequalities

Vocab

1. _____ : a statement that 2 expressions are **not** equal.

2. _____ of Inequality : Value or values that make the statement true

| Symbol	Words	Circle	Direction
>		Open	Right
<			
≥			
≤			

Graphing Inequalities

$x < 3$

Since 3 is **not** a solution, it has an *open* circle on it. Also, since x is less than 3, I shaded the arrow to the *left*.

$x \geq -8$

Since −8 is a solution it has a *closed* circle. Also, since x is greater than or equal to −8, I shaded to the *right*.

22

INEQUALITY	VERBAL PHRASE	GRAPH

a. $b > -1$ _____

-3 -2 -1 0 1 2 3

b. $v < 3$ _____

-3 -2 -1 0 1 2 3

c. $f \geq -2$ _____

-3 -2 -1 0 1 2 3

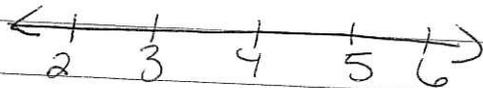|	
Equation A statement that shows that two expressions are equal.	

Inequalities
 	
 Do _____ show equality. However, an inequality does show the _____ between two or more expressions.
 	
 • Four Relationships
   > (greater than)
   $\geq$ (greater than or equal to)
   < (less than)
   $\leq$ (less than or equal to)
	Examples:
	
	 ←|-----|-----|-----|-----|-----|-----|→
	
	 ←|-----|-----|-----|-----|-----|-----|→
	
	 ←|-----|-----|-----|-----|-----|-----|→
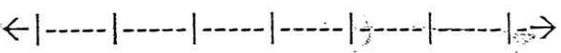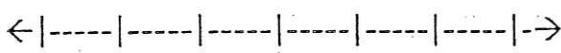
Graph of a linear inequality (in one variable) The set of points on a _____ _____ that represents all of the solutions of the inequality.	←|-----|-----|-----|-----|-----|-----|→
Equivalent inequalities Inequalities that have the same solution.	←|-----|-----|-----|-----|-----|-----|→
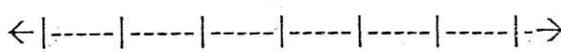
22a

Draw the graph:

1. $x < 0$

$\xleftarrow{\qquad \underset{-2}{|} \quad \underset{-1}{|} \quad \underset{0}{|} \quad \underset{1}{|} \quad \underset{2}{|} \qquad}$

2. $x \geq 3$

$\xleftarrow{\qquad \underset{2}{|} \quad \underset{3}{|} \quad \underset{4}{|} \quad \underset{5}{|} \quad \underset{6}{|} \qquad}$

3. $x \leq -2$

$\xleftarrow{\qquad \underset{-4}{|} \quad \underset{-3}{|} \quad \underset{-2}{|} \quad \underset{-1}{|} \quad \underset{0}{|} \qquad}$

Write the inequality

4. _____

$\xleftarrow{\qquad \underset{-12}{|} \quad \underset{-11}{|} \quad \underset{-10}{\phi} \quad \underset{-9}{} \quad \underset{-8}{|} \qquad}$

5. _____

$\xleftarrow{\qquad \underset{51}{|} \quad \underset{52}{} \quad \underset{53}{\bullet} \quad \underset{54}{|} \quad \underset{55}{|} \qquad}$

6. _____

$\xleftarrow{\qquad \underset{-4}{|} \quad \underset{-3}{} \quad \underset{-2}{\phi} \quad \underset{-1}{|} \quad \underset{0}{|} \qquad}$

7. _____

$\xleftarrow{\qquad \underset{-102}{|} \quad \underset{-101}{|} \quad \underset{-100}{\phi} \quad \underset{-99}{} \quad \underset{-98}{|} \qquad}$

8. _____

$\xleftarrow{\qquad \underset{37}{|} \quad \underset{38}{|} \quad \underset{39}{\bullet} \quad \underset{40}{} \quad \underset{41}{|} \qquad}$

9. _____

$\xleftarrow{\qquad \underset{1}{|} \quad \underset{2}{} \quad \underset{3}{\bullet} \quad \underset{4}{|} \quad \underset{5}{|} \qquad}$

22b
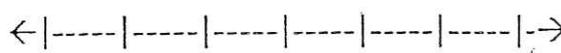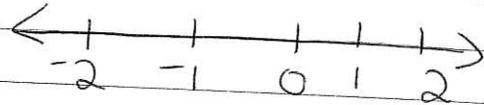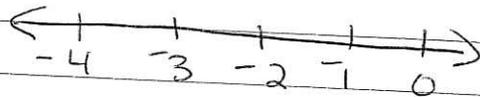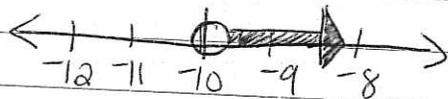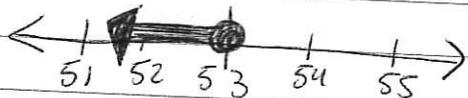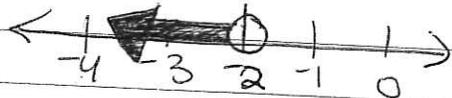
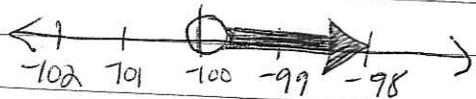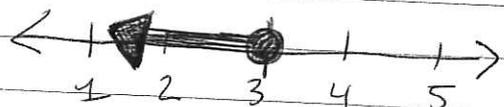## Example 1:

Graph the solutions of each inequality on a number line.

A.) x > -2 $\longleftrightarrow$

B.) w ≤ -5 $\longleftrightarrow$
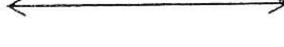
C.) k ≥ 4 $\longleftrightarrow$

D.) y < 6 $\longleftrightarrow$

Example 2:

Write the inequality shown in each graph:

A.) $\longleftrightarrow$ 0 8

B.) $\longleftrightarrow$ -12 0

C.) $\longleftrightarrow$ -9 0
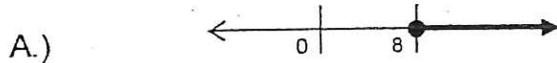
Example 3:

Graph the solutions of each inequality on a number line:

A.) 15 < x $\longleftrightarrow$

B.) –8 ≥ b $\longleftrightarrow$

22 C

Words	Symbols	Graph
(		
(		
(		

22d
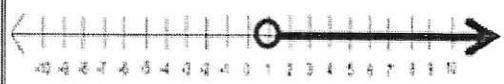
Lesson 1-8: Compare and Order Real Numbers

Vocabulary

The set of numbers consists of the set of rational numbers and the set of irrational numbers.

1. _____: include all fractions, integers and terminating and repeating decimals. Can be written in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

   Examples: _____

2. _____: a decimal that is nonterminating and nonrepeating. Cannot be represented as a ratio of two integers.

   Examples: _____

Lesson:

Example 1: Order the numbers from Least to Greatest

STRATEGY: Make all numbers a decimal. Then put them in order.

$$3\frac{1}{8}, \ \pi, \ -\sqrt{6}, -3.1, \ 3.92$$

Step 1: Express each number as a decimal: (up to 5 decimal places)

$3\frac{1}{8} =$ _____

$\pi \ =$ _____

$-\sqrt{6} =$ _____

$-3.1 = -3.1$

$3.92 = 3.92$

Step 2: Put the numbers in order from least to greatest.
        Use a number line if needed.
(number line)

23

Example 2: Which is greater $\frac{9}{4}$ or $\sqrt{5}$?

STRATEGY: Make all numbers a decimal. Then put them in order.

Step 1: Express each number as a decimal: (up to 5 decimal places)

$$\frac{9}{4} = \underline{\hspace{3cm}}$$

$$\sqrt{5} = \underline{\hspace{3cm}}$$

Step 2: Compare

$$\underline{\hspace{8cm}}$$

Coached Example

How can you write $-\sqrt{5}$, $-2\frac{1}{5}$, -2.31, and -1.3^3 in order from greatest to least?

How do you express $-\sqrt{5}$ as an approximate decimal to three decimal places? _____

Write an inequality to compare that decimal and -2.31. _____

How do you express $-2\frac{1}{5}$ as a decimal? _____

Write an inequality to compare that decimal to $-\sqrt{5}$ and -2.31. _____

How do you express -1.3^3 as a decimal? _____

Write an inequality to compare that decimal to $-\sqrt{5}$, $-2\frac{1}{5}$, and -2.31. _____

How can you write these 4 decimals in order from greatest to least? _____

How can you write the original numbers in order from greatest to least?

$$\underline{\hspace{10cm}}$$

24

Ordering Real Numbers in a Real-World Context

Calculations and estimations in the real world may differ. It can be important to know not only which are the most accurate but which give the greatest or least values, depending upon the context.

EXAMPLE 3 | Real World | CA CC 8.NS.2

Four people have found the distance in kilometers across a canyon using different methods. Their results are given in the table. Order the distances from greatest to least.

My Notes

Distance Across Quarry Canyon (km)			
Juana	**Lee Ann**	**Ryne**	**Jackson**
$\sqrt{28}$	$\frac{23}{4}$	$5.\overline{5}$	$5\frac{1}{2}$

STEP 1 Write each value as a decimal.

$\sqrt{28}$

$\frac{23}{4}$

$5.\overline{5}$

$5\frac{1}{2}$

STEP 2 Plot $\sqrt{28}$, $\frac{23}{4}$, $5.\overline{5}$, and $5\frac{1}{2}$ on a number line.

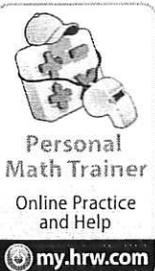From greatest to least, the distances are:

YOUR TURN

7. Four people have found the distance in miles across a crater using different methods. Their results are given below.

   Jonathan: $\frac{10}{3}$, Elaine: $3.\overline{45}$, José: $3\frac{1}{2}$, Lashonda: $\sqrt{10}$

   Order the distances from greatest to least.

   _____

24a

Ordering Real Numbers

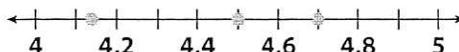You can compare and order real numbers and list them from least to greatest.

EXAMPLE 2

CA CC 8.NS.2

Order $\sqrt{22}$, $\pi + 1$, and $4\frac{1}{2}$ from least to greatest.

STEP 1

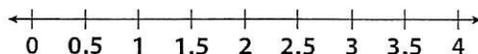**STEP 2** Plot $\sqrt{22}$, $\pi + 1$, and $4\frac{1}{2}$ on a number line.

Read the numbers from left to right to place them in order from least to greatest.
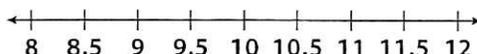
From least to greatest, the numbers are

YOUR TURN

Order the numbers from least to greatest. Then graph them on the number line.
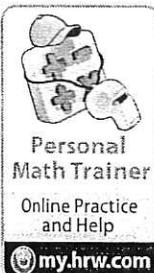
5. $\sqrt{5}$, 2.5, $\sqrt{3}$ _____

6. π^2, 10, $\sqrt{75}$ _____

Math Talk
Mathematical Practices

If real numbers a, b, and c are in order from least to greatest, what is the order of their opposites from least to greatest? Explain.

24b

Compare and Order Rational Numbers

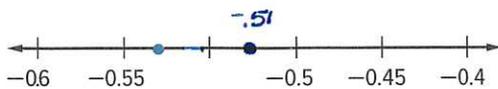To compare and order rational numbers, first write them in the same form.

Examples

Tutor

Fill in each ◯ with <, >, or = to make a true statement.

4. -0.51 ◯ $-\frac{8}{15}$

Rename $-\frac{8}{15}$ as a decimal. Then graph both decimals on a number line.

5. Order the set $\left\{-2.46, -2\frac{22}{25}, -2\frac{1}{10}\right\}$ from least to greatest.

Write $-2\frac{22}{25}$ and $-2\frac{1}{10}$ as decimals to the hundredths place.

$-2\frac{22}{25} =$ $-2\frac{1}{10} =$

Graph the decimals on the number line.

From least to greatest, the order is _____

Got it? Do these problems to find out.

Show your work.

Fill in each ◯ with <, >, or = to make a true statement.

e. $-3\frac{5}{8}$ ◯ -3.625 **f.** $\frac{3}{7}$ ◯ 0.413

g. Order the set $\left\{-7\frac{13}{20}, -7.78, -7\frac{17}{100}\right\}$ from greatest to least.

24c

Comparing and Ordering Rational Numbers   Name_____

Fill in each blank with < , > , or = to make each sentence true.

Decimal: Decimal: Decimal:

1. $\dfrac{2}{3}$ ___ $\dfrac{5}{8}$ 2.   0.03 ___ 0.003   3. 1.1 ___ $\sqrt{2}$

4. $\dfrac{2}{5}$ ___ 0.44   5. -2.75 ___ -2.5   6. -3/4 ___ -.75

Write the numbers in order from least to greatest.

8. $.44, \dfrac{3}{8}, 0.5, \dfrac{2}{5}$ 9. $0.2, \dfrac{4}{15}, 0.21, \dfrac{1}{4}$

10. $\sqrt{5}, -2.1, 0.5, -0.5, \dfrac{5}{100}$

Decimal: Decimal: order:

_____

12. $4^2, \sqrt{15}, -\dfrac{5}{2}, -2\dfrac{1}{3}, \dfrac{1}{16}$ 13. $4.12, \sqrt{16}, -4, \dfrac{9}{2}, -\dfrac{17}{4}$

24d