Pre-Algebra

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Table of Contents

Unit 4 Equations

Unit 5 Proportions and Percents

Unit 6 Coordinate Plane and Geometry

Course Review

Answers to “first column” At end of book

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Unit 1 – Integers Objective Overview

The following is a small subset of possible problems that could represent each objective. Refer to notes, homework and reviews for a more complete picture.

Section 1 - Introduction to Integers

By the end of section 1 you should be able to:

- **Use integers to describe real life situations**
  A submarine is 50 feet below sea level.

  Sam has $125 in his account.

- **Plot numbers on a number line**
  Plot -2, 0, 3 on a number line.

- **Order numbers by placing < or > in between them**
  -5 7

  -7 -4

- **Order numbers from least to greatest**
  5, -7, 4, -4, 0

- **Find the absolute value of a number**
  $|-7| =$

  $|4| =$

  $-|-2| =$

Section 2 – Adding and Subtracting Integers

By the end of section 2 you should be able to:

- **Add Integers with the same sign**
  $5 + 7 =$

  $-6 + (-4) =$

- **Add integers with different signs**
  $-7 + 3 =$

- **Subtract integers**
  $-15 - 7 =$

  $2 - (-3) =$

- **Evaluate an expression involving addition or subtraction**
  $Evaluate\ a + b - c, for\ a = 2\ , b = -12, and\ c = -5$

Section 3 – Multiplying and Dividing Integers

By the end of section 3 you should be able to:

- **Multiply integers**
  $-7 \cdot -2 =$

  $-3 \cdot 8 =$

- **Divide integers**
  $\frac{-55}{5} =$

  $-36 \div -4 =$

- **Find the area of a rectangle**
  If the base of a rectangle is $6ft$ and the height is $8ft$ find the area of the rectangle.

- **Evaluate an expression involving multiplication or division**
  $Evaluate\ xy, for\ x = 17\ and\ y = -2$

Section 4 – Exponents and Order of Operations

By the end of section 4 you should be able to:

- **Write repeated multiplication as an exponent**
  Write the following using exponents
  $2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x \cdot x$

- **Evaluate exponents**
  3^4 =

  -2^4 =

  $(-4)^2$ =

- **Use the order of operations to evaluate expressions**
  $16 \div 2 \cdot 3$

  $2 + 7 \cdot 4$

  $\frac{2^2-1}{3}$

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Activity 1.1 - Integers

PART A

You are going to the movies with a friend. You have $20 with you and the movie cost $9. After paying, How much money do you have left? Is there anything strange about your answer?

How would you describe your answer to a friend?

PART B

You are going to a show and currently have $12. The show cost $23. After paying for the show, how much money do you have left? Is there anything strange about your answer?

How would you describe your answer to a friend?

PART C

What is similar between the answers to part A and part B?

What is different?

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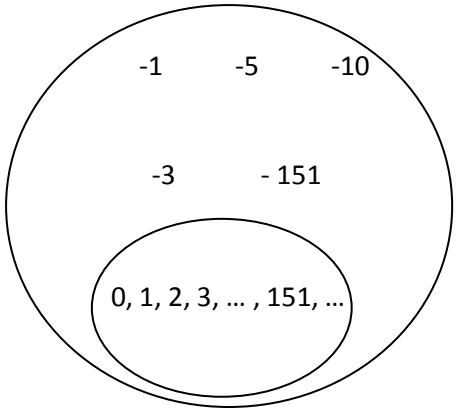
Unit 1 - Integers

Section 1 – Introduction to Integers (Signed numbers)

Integers

Integers include the Whole numbers we are use to counting with (0 , 1, 2, 3, 4, …) as well as the "opposites" of the natural number (-1, -2, -3, -4, ….)



Why do we need signed numbers?

Is there a difference between being $ 300 in debt and having $300 to spend?

Is there a difference between being 500ft below sea level and being 500ft. above sea level?

Integers give us a way to describe thing above and below a "zero" (sea level, $0, etc)

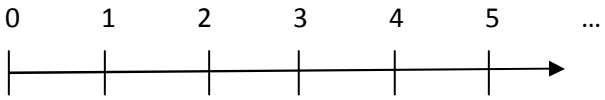
Example 1)

Write an integer to represent 50 feet below sea level.

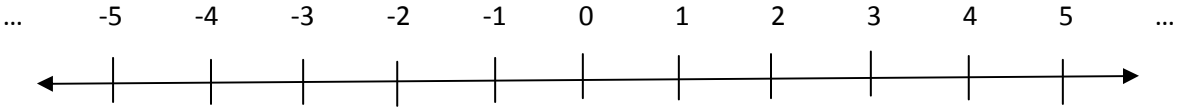
-50 feet — We use a negative sign since it is "below " sea level. We would have used a positive number if it was above sea level.

Number line

The number line we see from Arithmetic



Gets extended to represent negative numbers as well



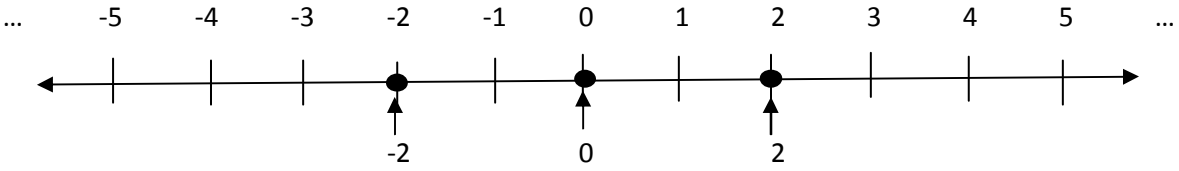
Negative numbers can be used to represent debt, numbers below zero, sea level, Temperatures below freezing (0 degrees Celsius) .

Positive numbers fall to the right of zero on a number line.

Negative numbers fall to the left of zero on the number line.

Example 2)

Plot 2, -2, 0 on a number line.



Negative numbers can be used to represent debt, sea level, temperatures below zero, as well as many other things.

Comparing Integers

We will speak of numbers being “less than“ another number or “greater than” another a number

We use < to mean less than

We use > to mean greater than

We use $\leq$ to mean less than or equal to

We use $\geq$ to mean greater than or equal to

The number that falls to the right on the number line is the greater number - The arrow points at the "lesser number"

A fun way to think of the arrows - They are like really hungry alligators and will always eat the bigger number.

Example 3)

Order 5 and 4 by placing a > or < sign between them.

Since on the number line 5 falls to the right of 4, 5 is the greater number.

5 > 4

Example 4)

Order -3 and -2 by placing a > or < sign between them.

Since on the number line -2 falls to the right of -3, -2 is the greater number.

-3 < -2

Note: 3 > 2 but on the negative side of the number line the "negative" number that are larger in **absolute value** are actually the "lesser number"

Example 5)

Order -5 and 1 by placing a > or < sign between them.

Since on the number line 1 falls to the right of -5, 1 is the greater number.

-5 < 1

Note: Negative numbers are always less than positive numbers.

Example 6)

Put the numbers in order from least to greatest: -7, 2, -5, 11, 0, -6

-7, -6, -5, 0, 2, 11

We put them in the order they would appear on the number line.

Absolute Value

Absolute value is the distance a number is from zero. It is **always** a positive number.

If Fred is $500 in debt, in other words he has -500 dollars, the absolute value of his debt is $500.

We use | | to symbolically ask for the absolute value of a number.

Example 7)

$\boldsymbol{Evaluate}\ |\mathbf{3}|$

$|3| = 3$ Positive numbers stay positive.

Example 8)

$\boldsymbol{Evaluate}\ |\mathbf{-2}|$

$|-2| = 2$ Negative number turn positive.

Example 9)

$\boldsymbol{Evaluate}\ |\mathbf{0}|$

$|0| = 0$

Example 10)

$\boldsymbol{Evaluate}\ -|\mathbf{-5}|$

$-|-5|$

$= -5$

The absolute value only applies to what is inside of the absolute value bars.

Exercise 1.1 NAME:_____

For problems 1 – 9 Write the positive or negative number that best represents the given information.

1. $35 overdrawn

2. $36 in your account

3. 48 ft above sea level

4. 250ft. above sea level

5. 13° below zero

6. $21 overdrawn

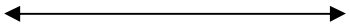
7. 72° above zero

8. 51 ft. below sea level

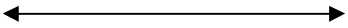
9. 7° below zero

Plot the following on a number line, label each point

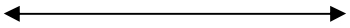
10. 3, -2, 0



11. 5, 2, -5



12. 6, -2 , -7



Evaluate the following absolute values

13. $|3|$

14 . $|-7|$

15. $|8|$

16. $|-9|$

17. $-|12|$

18. $|0|$

Order the following numbers by placing a > or < in between them.

19. 0 -8

20. 0 4

21. 3 -2

22. -4 7

23. -6 -8

24. -11 -2

Put the following in order from least to greatest

25. -3, 3, 0

26. -5, -3, -9

27. 6, 7, -11

28. $|-3|, -4, -|-5|$

29. $|0|, -2, |-2|$

30. $-|3|, 0, |3|$

31. What temperature is colder -21 degrees or – 15 degrees?

32. Is it better if sally is overdrawn by $10, or overdrawn by $30? (Which case is she in less debt?)

33. You are in a submarine and are at a depth of 75 feet below sea level. Your depth changes to 25 feet below sea level. Did you go up or down?

Activity 1.2 - Adding and Subtracting Integers

Part A

Billy Joe has $30 in his account, he writes a check for $50. How much money is in Billy Joe's account?

How could you write this problem as a math expression?

Part B

Sally sue has overdraft her account by $7. She deposits a check for $68 in to her account. How much does she have in her account?

How could you write this problem as a math expression?

Part C

A submarine is on a boat 25 feet above sea level. The sub is lowered to sea level and continues to a depth of 100 feet below sea level.

What number can represents the 25 feet above sea level?

What number can represent the 100 feet below sea level?

How far does the submarine travel total?

Write a math problem that represents this.

Part D

The temperature outside is 25 degrees and then it falls 35 degrees over night.

How far below 0 degrees is it?

Write a math problem that represents this.

Unit 1 - Integers

Section 2 – Adding and Subtracting Integers

If you have money, you can think of it as having a positive amount. If you pay or owe money youcan think of it as having a negative amount.

If you have $20 and someone gives you $30, you all together have $50. Both values are positive and when you combine them you end up with a larger positive number.

$$20 + 30 = 50$$

If you owe $ 45 (-45) and then borrow an additional $40 (-40), you all together owe $85 (-85). Both values are negative and when you combine them you end up with a negative number with an even larger absolute value.

$$-45 + -40 = -85$$

In both of these cases both values have the same sign, and in both cases we add the absolute values and keep the sign.

Example 1)

Add (-5) + (-3)

The signs are the same so we add the absolute values and keep the sign. (5 +3 = 8 and they were both negative so the answer is negative.)

-8

If you have $55 and pay someone $32 (-32) then you have $23 left. Since you started out with more money than you owed, you still have money left. In other words if you have opposite signs and the number with the larger absolute value is positive, then adding the numbers together will give a positive result.

$$55 + (-32) = 23$$

If you have $40 and need to pay someone $65 (-65), you would be in debt $25 (-25). Since the negative amount is larger than the positive amount , we end up owing in the end. In other words when the

numbers have opposite signs and the number with the largest absolute value is negative the end result is negative.

$$40 + (-65) = -25$$

In both cases both values have opposite signs, and in both cases we find the difference between the two numbers and keep the sign of the number with the larger absolute value.

Example 2)

Add (-7) + 3

The signs are opposite so we subtract (larger absolute value – smaller absolute value) and keep the sign of the number with the largest absolute value. (7 – 3 = 4, and -7 has the larger absolute value so the answer is negative)

(-7) + 3 = -4

Example 3)

Add -3 +15

The signs are opposite so we subtract (larger absolute value – smaller absolute value) and keep the sign of the number with the largest absolute value. (15 – 3 = 12, and 15 has the larger absolute value so the answer is positive)

-3 + 15 = 12

RULE:

If you add two numbers with the same sign, then you add the numbers and keep the sign.

If you add two numbers with different signs the subtract the absolute values and then keep the sign of the number with the larger absolute value.

Example 4)

Add 5 + (-16)

The signs are opposite so we subtract (larger absolute value – smaller absolute value) and keep the sign of the number with the largest absolute value. (16 – 5 = 11, and -16 has the larger absolute value so the answer is negative)

5 + (-16) = -11

Example 5)

Add -2 + 11+(-7)

Start by adding the first two numbers

-2+11+(-7)

= 9+(-7)

Then combine that result with the last number

= 2

Recall:

If you add two numbers with the same sign, then you add the numbers and keep the sign.

If you add two numbers with different signs the subtract the absolute values and then keep the sign of the number with the larger absolute value.

Subtraction

In order to subtract add the opposite. Every subtraction problem can be handled like the above examples.

Example 6)

Subtract -13 – (-7)

To minus a negative we add

-13 – (-7)

= -13 +7

= -6

Since they are opposite signs we subtract the numbers and keep the larger numbers sign.

Example 7)

Subtract 3– (-4)

3 – (-4)

= 3+4 We " add the opposite of a - 4" , so we add +4.

= 7

Example 8)

Subtract -6 – 3

To minus a positive we add a negative

-6 – 3

= -6 +(-3) Since both numbers are negative combining them

= -9 makes the answer a larger negative number.

Example 9)

Subtract 7 – 10

7 – 10

= 7 + (-10) "if you have $7 and pay owe someone $10, you can pay

= -3 them the $7, but you owe the $3 (-$3)"

Example 10)

Subtract -7 – 4 – (-11)

-7 – 4 – (-11)

= -7 + -4 +11 Recall subtracting a negative is addition.

= -11 + 11 Combing -7 +-4, you get -11.

= 0

A few helpful properties of addition… "a" can be any number. It is a variable – we are using it in place of a number because the following are true for all numbers.

The Addition Property of Zero

$$a + 0 = a$$

Example 11)

Add 3 + 0

3+0 = 3

The Commutative Property of Addition

$$a + b = b + a$$

Example 12)

Rewrite 7 + 3 using the commutative property of Addition

7 + 3 = 3 + 7

The Associative Property of Addition

$$(a + b) + c = a + (b + c)$$

Example 13)

Rewrite (5+2) + 3 using the Associative Property of Addition

(5+2) + 3 = 5 + (2 + 3)

The Inverse Property of Addition

$$a + (-a) = 0$$

Example 14)

Add 3 + (-3)

3 + (-3) = 0

Expressions with Variables

Variables can be used as place holders in expressions. For example if we wanted to evaluate

$$a - b \text{ for } a = -2 \text{ and } b = 7$$

We would replace a with -2 and replace b with 7, so

$$a - b = -2 - 7$$

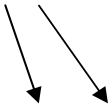
$$= -2 + -7$$

$$= -9$$

Example 15)

Evaluate a + b , for a = -5 and b = -17

a +b



= (-5) + (-17)

= -22

Exercise 1.2 NAME:_____

1. -3 + 4
2. 6 + (-3)
3. -4 + 9
4. 7 + (-11)
5. -15 +7
6. -13 +8
7. 6 +-6
8. 5 + 5
9. -12 + -12
10. -23 + 7
11. -16 + (-11)
12. 13 + -11
13. 3 – 5
14. 8 – 15
15. 9 – 12
16. -4 – 5
17. -7 – 12
18. -6 – 11
19. – 3 - (-2)
20. 7 – (-5)
21. -3 – (-4)
22. 3 – 4 + (-12)
23. 2 – 9 – (-4)
24. -5 + (-4) – 7

Evaluate the following for the given values

25. a + b , for a = -3 and b = -2
26. a – b , for a = 4 and b = -5

27. a +b for a = 7 and b = -10

28. If Joe had a checking account balance of $35 and need to pay a bill for $57. If he writes a check for the bill, what would his account balance be?

29. If you are in a submarine and are at a depth of 55 feet below sea level and rise 15 feet, what depth are you at?

30. It is $32°F$ and the temperature is expected to drop $50°$ in the next month, what is the temperature expected to be?

Activity 1.3 - Multiplying and Dividing Integers

What does it mean to have $3 \cdot 5$?

Can you write $3 \cdot 5$ using only addition?

What does it mean to have $3 \cdot -5$?

Can you write $3 \cdot -5$ using only addition?

Find the following

- $2 \cdot -6$
- $-3 \cdot 2$

Using the above examples can determine a rule for the sign of a product when the two numbers being multiplied have opposite signs?

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Unit 1 - Integers

Section 3 – Multiplying and Dividing Integers

MULTIPLICATION

Consider the product $3 \cdot -5$

Remember that means that you have three (-5) added together, in other words

$$(-5) + (-5) + (-5)$$

$$= -10 + -5$$

$$= -15$$

We know that $3 \cdot 5 = 15$. From the above we can see that if one number is a negative the answer will become negative. Since multiplication in commutative (we can change the order and get the same result) $-5 \cdot 3$ = -15 as well.

When you multiply two numbers that have opposite signs, the result is negative.

Remember that a negative sign means opposite. Therefore if you have two negatives you can think of it as taking the opposite of a number and then take the opposite of that which leaves you with the original number. For example

$$-2 \cdot -5 = 10$$

When you multiply two numbers that have the same sign, the result is positive.

One fun way to remember that multiplying two negatives makes a positive is to think of one of the negative signs turning vertical to combine with the second negative to make the plus sign.

RULE:

When you multiply two numbers that have opposite signs, the results is negative.

When you multiply two numbers with the same sign, the result is positive.

Example 1)

Multiply $\mathbf{8 \cdot 7}$

$8 \cdot 7$

$= 56$ Same sign so the answer is positive

Example 2)

Multiply $\mathbf{-4 \cdot 8}$

$-4 \cdot 8$

$= -32$ Opposite signs so the answer is negative

Example 3)

Multiply $\mathbf{9 \cdot -4}$

$9 \cdot -4$

$= -36$ Opposite signs so the answer is negative

Example 4)

Multiply $\mathbf{-6 \cdot -7}$

$-6 \cdot -7$

$= 42$ Same sign so the answer is positive

Properties of Multiplication

Let a be any real number, then the following properties are true.

The Multiplication Property of Zero
$a \cdot 0 = 0$

The Multiplication Property of One
$a \cdot 1 = a$

The Associative Property of Multiplication
$(a \cdot b) \cdot c = a \cdot (b \cdot c)$

The Commutative Property of Multiplication
$a \cdot b = b \cdot a$

So what do you do if there are more than 2 numbers? The following is an example of that.

Example 5)

$\mathbf{3}(-\mathbf{2})(\mathbf{6})(-\mathbf{4})$

We will start with the first two numbers 3(-2) which means $3 \cdot -2$, which is -6, so the problems changes from

$3(-2)(6)(-4)$

$= -6\ (6)(-4)$ Now combine the next two

$= -36\ (-4)$ and the last two

$= 144$ is the final answer

Evaluating expressions with Multiplication

We can also evaluate expressions that contain multiplication.

Example 6)

Evaluate $4x$, for $x = -9$

$4x$ means $4 \cdot x$

Therefore replacing x with the -9 gives

$4 \cdot x$

$= 4 \cdot -9$

$= -36$ which is the final answer.

DIVISION

Every Division problem can be rewritten as a multiplication problem. Therefore the rules of multiplication can be extended to division as well.

Notice the similarities between the following

$$-2 \cdot 3 = -6 \quad \text{and} \quad -6 \div 3 = -2$$

We can even goes as far as saying $-6 \div 3 = -2$ because $-2 \cdot 3 = -6$. Therefore it makes sense the rules will be the same as well.

RULE:

When you Divide two numbers that have opposite signs, the results is negative.

When you Divide two numbers with the same sign, the result is positive.

Example7)

$-55 \div 5$

$-55 \div 5 = -11$

Example 8)

$\mathbf{-72 \div -8}$

$-72 \div -8 = 9$

Example 9)

$\frac{\mathbf{142}}{\mathbf{-2}}$ $\frac{142}{-2}$ is the same as $142 \div -2$

$142 \div -2 = -71$

Example 10)

$\frac{\mathbf{-81}}{\mathbf{-9}}$

$\frac{-81}{-9} = 9$

Properties of Division

When dividing it is important to remember you cannot divide by zero!

- $\frac{a}{0}$ *is undefined*
- $\frac{a}{1} = a$
- *if* $a \neq 0$, *then* $\frac{a}{a} = 1$ *and* $\frac{0}{a} = 0$

Evaluating expressions with division

We can evaluate expressions that contain division in the same way we have evaluated other expressions.

Example 11)

Evaluate $\frac{\boldsymbol{x}}{\boldsymbol{y}}$, ***for*** $\boldsymbol{x = -125}$ ***and*** $\boldsymbol{y = 5}$.

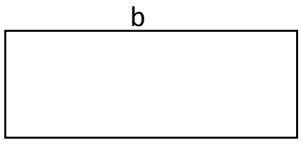
$\frac{x}{y}$ Replacing x with -125 and y with 5 gives

$= \frac{-125}{5}$

$= -25$

Area of a rectangle

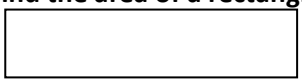
The area of a rectangle can be found by multiplying the base times the height.



$A = b \cdot h$ or $A = l \cdot w$

Example 12)

Find the area of a rectangle whose bas is 10 cm and Height is 3 cm.



$A = b \cdot h$

$A = 5cm \cdot 4\ cm$

$A = 20cm^2$

The area in 20 square cm.

Exercise 1.3 NAME:_____

Multiply

1. $3(-4)$
2. $-4 \cdot 6$
3. $-4 \cdot 7$
4. $-3(-5)$
5. $-8(-8)$
6. $-11(-7)$
7. $-8 \cdot 3(-2)$
8. $6 \cdot (-2) \cdot 5$
9. $(-5)(-6)(-2)$
10. Find the product of 8 and -13.
11. Find the product of -7 and – 4
12. Find the product of -6 and 9
13. $Evaluate\ xy, for\ x = -6\ and\ y = 9$
14. $Evaluate\ 6ab,\ for\ a = -3\ and\ b = -7$
15. Evaluate $-7xy, for\ x = -1\ and\ y = 6$

Dividing

16. $-33 \div 3$

17. $-95 \div -5$

18. $240 \div -12$

19. $\frac{-36}{-12}$

20. $\frac{-28}{7}$

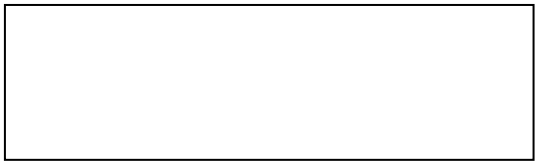
21. $\frac{64}{-8}$

22. Evaluate $\frac{-a}{b}$, $for\ a = 72, and\ b = -4.$

23. Evaluate $\frac{a}{b}, for\ a = 22\ and\ b = -2.$

24. Evaluate $a \div b, for\ a = 56, and\ b = 8.$

For problem 25-27, consider the following rectangle.



Find the area of the rectangle with dimensions below.

25. $b = 3m,\ h = 4m$

26. $b = 7ft, h = 5ft$

27. $b = 11cm,\ h = 4cm$

Activity 1.4 – Exponents and Order of Operations

Solve the following and when prompted compare answers with your neighbors.

- $3 + 5 \cdot 4$

Did you get the same answers as your neighbor? Why or Why not? What was done differently? Can they both be right? How do we know what the right answer is?

- $18 \div 2 \cdot 3$

Did you get the same answers as your neighbor? Why or Why not? What was done differently? Can they both be right? How do we know what the right answer is?

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Unit 1 - Integers

Section 4 – Exponents and Order of Operations

Exponents

Multiplication is a simplified was to write repeated Addition. For example:

$$4 \cdot 5 = 5 + 5 + 5 + 5$$

So is there a similar way to write repeated multiplication? Something like

$$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$$

We can use something called an EXPONENT in this case. We have a base – the number being multiplied, and the exponent – how many times we multiply it. So

$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^6$ ← Exponent

↑ Base

$3 = 3^1$	Three to the first power		
$3 \cdot 3 = 3^2$	Three to the second power	or	Three squared
$3 \cdot 3 \cdot 3 = 3^3$	Three to the third power	or	Three cubed
$3 \cdot 3 \cdot 3 \cdot 3 = 3^4$	Three to the fourth power		
$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^5$	Three to the fifth power		

Example 1)

2^4

2^4

$= 2 \cdot 2 \cdot 2 \cdot 2$	2^4 means there are four twos multiplied together
$= 4 \cdot 2 \cdot 2$	Multiply the first two numbers $2 \cdot 2 = 4$
$= 8 \cdot 2$	Multiply that answer with the next number $4 \cdot 2 = 8$
$= 16$	Multiply that product with the remaining 2

Example 2)

$\mathbf{3^3 \cdot 4^2}$ recall $3^3 = 3 \cdot 3 \cdot 3$ and $4^2 = 4 \cdot 4$

$3^3 \cdot 4^2$

$= 3 \cdot 3 \cdot 3 \cdot 4 \cdot 4$

$= 27 \cdot 16$

$= 432$

Since $3^3 = 27$ and $4^2 = 16$, we could use the associative property of addition and turn
$3^3 \cdot 4^2 = 27 \cdot 16 = 432$

Example 3)
$\mathbf{(-2)^4}$

$(-2)^4$
$= (-2)(-2)(-2)(-2)$
$= 4(-2)(-2)$
$= -8(-2)$
$= 16$

Example 4)
$\mathbf{-2^4}$ Is this the same problem as example 3?
-2^4
$= -2 \cdot 2 \cdot 2 \cdot 2$ What repeats? Why?
$= -4 \cdot 2 \cdot 2$
$= -8 \cdot 2$
$= -16$ Why is this answer negative but the problem above is positive?

In example 3 the exponent belong on the parentheses, In example 4 the exponent applied only to the number it touched not to the negative.

-2^4 would be the same as – $(2)^4$

Order of Operations

Consider the following problem:

$$2 + 3 \cdot 4$$

If we multiply first	If we add first
$2 + 3 \cdot 4$ $2 + 12$ 14	$2 + 3 \cdot 4$ $5 \cdot 4$ 20

ONLY ONE ANSWER CAN BE CORRECT! SO WHICH ONE IS IT??

It is possible to complete the problem and get different answers – However only one answer is correct. We need to be able to agree on what the right answer is and how to go about getting it.

The order that we are expected to follow in called **The order of operations**

1. Start with grouping symbols (parenthesis, etc)
2. Simplify any exponents
3. Complete any multiplication and Division – going from left to right.
4. Complete and addition and subtraction – going from left to right.

You may have heard the phrase "**P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally", or the acronym "**PEMDAS"** as ways of helping you remember this order. You can write PEMDAS like

P
E
MD
AS

Keeping the M and D on the same level emphasizes that multiplication and division are on the same level and have the same priority.
The same is true for addition and subtraction.

Example 5)

$\mathbf{2 + 3 \cdot 4}$

$2 + 3 \cdot 4$
$= 2 + 12$
$= 14$

According to PEMDAS the multiplication out ranks the addition.

Example 6)

$\mathbf{4^2 + 3 \cdot 5}$

$4^2 + 3 \cdot 5$	There are no Parentheses or other grouping symbols.
$= 16 + 3 \cdot 5$	There is an exponent $4^2 = 16$
$= 16 + 15$	Multiplication comes before Addition.
$= 31$	

Example 7)

$\mathbf{4 + 6(2 - 7) \div 10}$

$4 + 6(2 - 7) \div 10$	
$= 4 + 6(-5) \div 10$	According to PEMDAS, the inside of the parentheses goes first.
$= 4 + (-30) \div 10$	Then the Multiplication and Division (left to right)
$= 4 + (-3)$	
$= 1$	

Example 8)

$\mathbf{\dfrac{1 - 4^2}{-5}}$

$\dfrac{1 - 4^2}{-5}$ Even though you do not see parentheses – the top is grouped together.

So we work the top first.

$= \dfrac{1 - 16}{-5}$

$= \dfrac{-15}{-5}$

$= 3$

Exercise 1.4 NAME:_____

Write the following in exponential form

1. $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
2. $-5 \cdot 5 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$
3. $(-3) \cdot (-3) \cdot (-3) \cdot 4 \cdot 4$
4. $-x \cdot x \cdot x$
5. $x \cdot x \cdot x \cdot (-y) \cdot (-y)$
6. $a \cdot b \cdot b \cdot b \cdot b \cdot b$

Evaluate the following

7. 3^4
8. 2^3
9. 5^2
10. $(-2)^2$
11. -4^4
12. $-(5)^2$
13. a^2 , $for\ a = 9$
14. a^2b^3 , $for\ a = -2\ and\ b = 3$
15. Why is the answer different between -2^4 and $(-2)^4$?

Simplify the following

16. $3 + 2 \cdot 7$

17. $-4 - 6 \div 3$

18. $-2^3 \cdot 3 + 2$

19. 7 +(-6) – 4

20. $12 \div 4 \cdot 6$

21. $7 \cdot 4 + 6 - 3$

22. $(2 + 7)^2 - 7$

23. $-3^2 - (7 - 8)$

24. $4 - 7 + 3(5 - 3)^3$

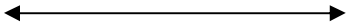
25. $\frac{2^4-1}{7-2}$

26. $5 \cdot (2 - 3) + 7^2 - 5 \cdot 4 + 3$

27. Evaluate $ab^2 - 2b,\ for\ a = -3\ and\ b = -2$

Unit 1 Review NAME:_____

1. Plot the following on a number line, label each point

3, -5 , -3 

Find the absolute value of the following

2. $|-50|$ 3. $|14|$ 4. $-|-7|$

5. Put the following in order from least to greatest

6, 7, -11, 4 , -2

6. 2 +(-2) 7. 6 – 21 8. -4 – 11

9. -5 – (-12) 10. 3 – 4 – (-3)

11. Evaluate a – b , for a = 2 and b = -4

12. $-5 \cdot 8$ 13. $-7(-9)$ 14. $-2 \cdot 7(-3)$

15. $121 \div -11$ 16. $\frac{-70}{-7}$

Write the following in exponential form

17. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 11 \cdot 11$ 18. $x \cdot x \cdot x \cdot x \cdot (-y) \cdot (-y)$

Evaluate the following

19. 5^3

20. $(-3)^2$

21. -2^4

Simplify the following

22. $3 + 2 \cdot 6$

23. $3 \cdot 4 + 7 - 3$

24. $-4^2 - (16 - 8)$

25. $4 - 11 + 2(8 - 3)^2$

26. $16 \div 2 \cdot 3$

27. Evaluate $ab^4 - b,\ for\ a = 7\ and\ b = -2$

28. What is warmer - 31 degrees or - 57 degrees?

29. Sam is in debt $30 to Jill and then gets his pay check for $151. After paying off Jill how much money does he have?

30. Bob owes 5 people $4 each, how much money is he in debt? (use a signed number to represent debt.)

Unit 2 – Fractions Objective Overview

The following is a small subset of possible problems that could represent each objective. Refer to notes, homework and reviews for a more complete picture.

Section 1 – Fraction Review

By the end of section 1 you should be able to:

a) **Write a fraction that represents the shaded area.**

b) **Turn a fraction into a mixed number.**

$\frac{36}{5}$ =

c) **Turn a mixed number into a fraction.**

$2\frac{1}{3} =$

d) **Write equivalent form of a fraction.**

$\frac{4}{10} = \frac{?}{5}$

e) **Write fractions in simplest form.**

$\frac{14}{12}$ =

f) **Order fractions by placing a > or < in between them.**

$$-\frac{1}{3} \qquad -\frac{1}{2}$$

Section 2 – Multiplying and Dividing Fractions

By the end of section 2 you should be able to:

a) **Multiply fractions.**

$-\frac{10}{3} \cdot -\frac{1}{5} =$

b) **Multiply mixed numbers.**

$-1\frac{1}{3} \cdot 2\frac{1}{4} =$

c) Divide fractions.

$\frac{1}{3} \div \frac{2}{5} =$

d) Divide mixed numbers.

$2\frac{1}{2} \div \frac{5}{8} =$

e) Complete application problems involving multiplication and division.

- **Find the Area of the triangle whose base is 3 and height is 2.**

- **How many $\frac{1}{2} oz$ servings fit inside a 32 oz bag of chips?**

Section 3 – Adding and Subtracting Fractions

By the end of section 3 you should be able to:

a) Add/ Subtract fractions with a common denominator.

$\frac{1}{5} + \frac{2}{5} =$

b) Add / Subtract fractions with uncommon denominator.

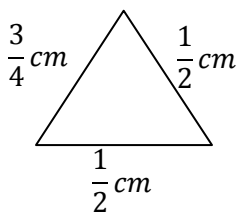
$-\frac{1}{3} + \frac{1}{2} =$

c) Add/Subtract Mixed numbers

$-3\frac{1}{2} - 2\frac{1}{3} =$

d) Complete applications involving adding or subtracting fractions.

Find the perimeter of the triangle below.



Section 4 – Exponents and Order of Operations

By the end of section 4 you should be able to:

a) Apply exponents to fractions.

- $\left(-\frac{2}{3}\right)^2 =$
- $-\left(\frac{2}{3}\right)^2 =$
- $-\frac{2^2}{3} =$

b) Apply Order of Operations to fractions.

- $\frac{1}{3} + \frac{2}{3} \cdot \frac{1}{2} =$
- $\left(\frac{3}{2}\right)^2 - 2 \cdot \frac{1}{3} =$

c) Simplify complex fractions.

- $\frac{\frac{3}{5}}{-\frac{1}{3}} =$
- $\frac{5-\frac{1}{2}}{\frac{2}{3}} =$

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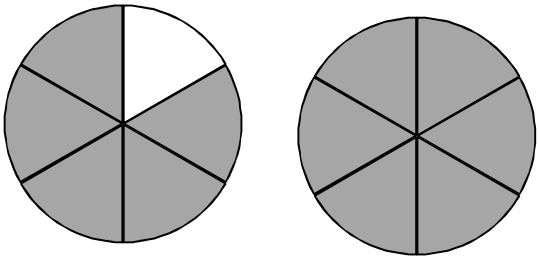
Activity 2.1 - Fractions

Write a fraction for the shaded area in the following shape.

Are there other fractions that can represent the same shaded area?

Write a fraction for the following shapes combined.



Consider $\frac{1}{3}\ and\ \frac{1}{2}$, which is greater? Draw a picture to help support your view.

Consider $-\frac{1}{3}\ and\ -\frac{1}{2}$, which is greater? Why ?

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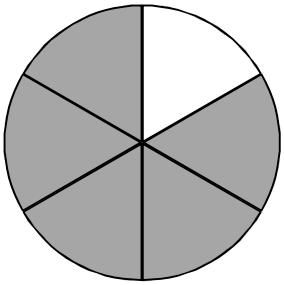
Unit 2 - Fractions

Section 1 – Fraction Review

What is a fraction?



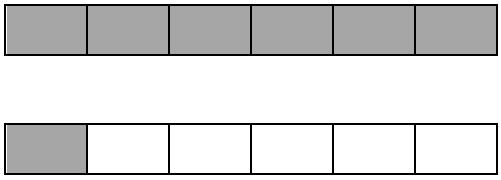
A fraction is part of a whole. In this case the whole is divided into 6 pieces. Five of the six pieces are shaded in. Therefore we can use the fraction $\frac{5}{6}$ to represent the shaded region.

Numerator – How many pieces there are.

$$\frac{5}{6}$$

Denominator – How many pieces make up a whole unit.

In the following notice we have two separate bars – each bar makes up one unit.



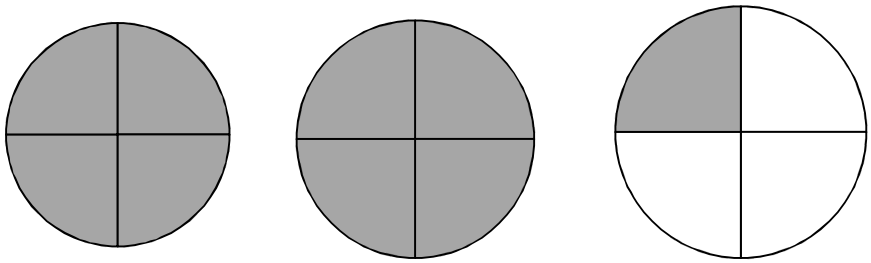
Each whole unit consists of 6 pieces. There are seven shaded pieces total. Therefore the numerator is 7 and the denominator is 6. In other words $\frac{7}{6}$. *When the numerator is bigger than the denominator a fraction can be called an "improper" fraction.*

This can also be seen as a mixed number $1\frac{1}{6}$. This is because there is 1 whole bar and 1 piece out of 6 of the next.

Fractions can be seen as Division!

Fractions ⟹ Mixed numbers

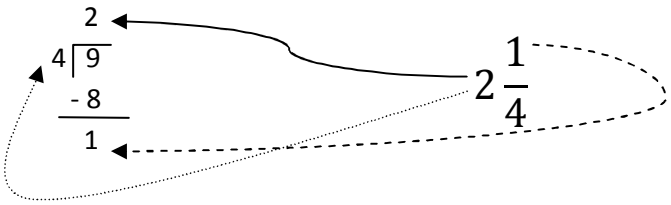
Consider the fraction $\frac{9}{4}$. This means you have 9 pieces but it only takes 4 pieces to make a whole. You can arrange the pieces in the following way.



Notice there are 2 wholes and $\frac{1}{4}$ of another circle. That means the fraction $\frac{9}{4}$ is the same as **the mixed number** $2\frac{1}{4}$.

An easy way to turn a fraction into a mixed number is to divide the denominator into the numerator, For example with the fraction $\frac{9}{4}$ we could do $9 \div 4$.

Notice the denominator stays the same.



Example1)

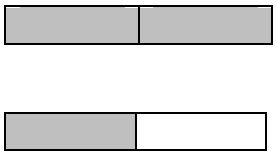
Turn $\frac{21}{5}$ into a mixed number.

$21 \div 5 = 4\ with\ 1\ left\ over.$

Therefore $\frac{21}{5} = 4\frac{1}{5}$.

Mixed numbers ⟹ Improper Fraction

Consider $1\frac{1}{2}$



Notice that there are 3 shaded pieces and it takes 2 pieces to make a whole. Therefore the fraction can be written $\frac{3}{2}$

Example2)

Write $3\frac{1}{4}$ as a improper fraction.

$3\frac{1}{4}$ means you have 3 full circles and 1 out of 4 pieces of another.

If all the circles are broke into four pieces then the three whole circles are made up of $(3 \cdot 4 = 12)$ 12 pieces. Add in the one in the additional circle you get 13 total pieces. Notice we did not change the size of the piece. Therefore $3\frac{1}{4}$ becomes $\frac{13}{4}$.

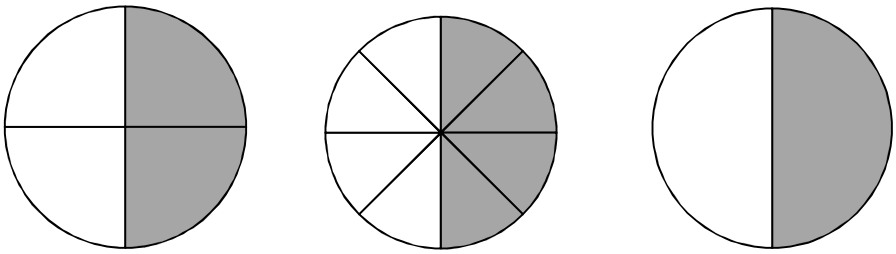
Example 3)

Write $-2\frac{3}{5}$ as an improper fraction.

$2 \cdot 5 = 10$	The whole number times the denominator gives you the number of pieces that make up the whole circles.
10+3 = 13	Add in the numerator, now you have the total number of pieces. This number becomes the numerator.
$-\frac{13}{5}$	Keep the same sign and the same denominator.

Equivalent Fractions

Consider the following



All of the above have exactly half of the circle shaded. The first has 2 out of the four pieces shaded in other words $\frac{2}{4}$. The second is $\frac{4}{8}$ and the final circle is $\frac{1}{2}$.

$$\frac{2}{4} = \frac{4}{8} = \frac{1}{2}$$

These are **equivalent fractions** – fractions that represent the same amount.

Equivalent fractions can be found by multiplying or dividing both the numerator and denominator of a fraction by the same number.

$$\frac{a}{b} = \frac{a \cdot c}{b \cdot c} \text{ or } \frac{a}{b} = \frac{a \div d}{b \div d}$$

Example 4)

Find an equivalent fraction with the given denominator

$$\frac{\mathbf{6}}{\mathbf{20}} = \frac{?}{\mathbf{10}}$$

Since the original denominator (20) can be divided by 2 to get the new denominator (10) – We can divide the original numerator by the same number to get the new numerator.

$$6 \div \mathbf{2} = 3$$
$$\frac{6}{20} = \frac{?}{10}$$
$$20 \div \mathbf{2} = 10$$

Therefore the equivalent fraction to $\frac{6}{20}$, with a denominator of 10 is $\frac{3}{10}$.

Example5)

Find an equivalent fraction with the given denominator

$$-\frac{3}{8} = \frac{?}{40}$$

Since $8 \cdot \mathbf{5} = 40$, we can calculate $-3 \cdot \mathbf{5} = -15$ to be our new numerator. In other words the answer is $-\frac{3}{8} = -\frac{15}{40}$

Writing fractions in simplest form

We often want our answers in **Simplest form** – the numerator and denominator do not share any common factor other than 1.

Example 6)

Write $\frac{32}{12}$ in simplest form.

One way is to look at the prime factors of the numerator and denominator.

$32 = 2 \cdot 16 = 2 \cdot 2 \cdot 8 = 2 \cdot 2 \cdot 2 \cdot 4 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$12 = 2 \cdot 6 = 2 \cdot 2 \cdot 3$

$\frac{32}{12} = \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 3}$ If there are any common factors on top and bottom we can cancel..

$= \frac{2 \cdot 2 \cdot 2}{3} = \frac{8}{3}$

Therefore $\frac{8}{3}$ *is our fraction in simplest form.*

Example 7)

Write $\frac{12x^2}{21x}$ in simplest form.

We start by looking at the prime factors in the numerator and denominator

$$12x^2 = 2 \cdot 2 \cdot 3 \cdot x \cdot x$$

$$21x = 3 \cdot 7 \cdot x$$

$\frac{12x^2}{21x} = \frac{2\cdot2\cdot3\cdot x\cdot x}{3\cdot7\cdot x}$.

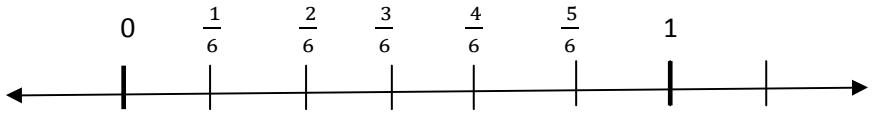
Notice they both have a 3 as well as an x. That means we can cancel a 3 and an x from both top and bottom.

$= \frac{2\cdot2\cdot x}{7} = \frac{4x}{7}$

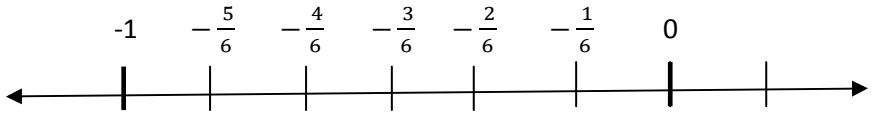
So the fraction in simplest form is $\frac{4x}{7}$.

Ordering signed fractions

Consider the number line. Since $\frac{1}{6}$ falls to the left of $\frac{5}{6}$ on the number line, we know $\frac{1}{6} < \frac{5}{6}$.



Since the numbers on the negative side of the number line get larger in absolute value as you move to the left we know $-\frac{1}{6}$ falls to the right of $-\frac{5}{6}$ on the number line, and therefore $-\frac{1}{6} > -\frac{5}{6}$.



Example8)

Order the following by using the > or < symbols

$-\frac{\mathbf{1}}{\mathbf{3}}$ $-\frac{\mathbf{2}}{\mathbf{5}}$

First we need to make the pieces the same size (Find a common denominator).

$-\frac{1\cdot5}{3\cdot5}$ $-\frac{2\cdot3}{5\cdot3}$

$-\frac{5}{15}$ $-\frac{6}{15}$ Six is larger than five, however they are both **negative**.

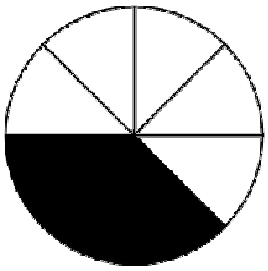
$-\frac{5}{15} > -\frac{6}{15}$

$-\frac{1}{3} > -\frac{2}{5}$ Rewriting the numbers in their original form.

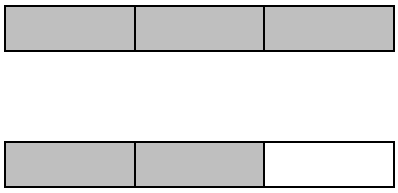
Exercise 2.1 NAME:_____

Write a fraction that can represent the shaded area in the following. If the answer can be written as a mixed number, write the mixed number answer as well.

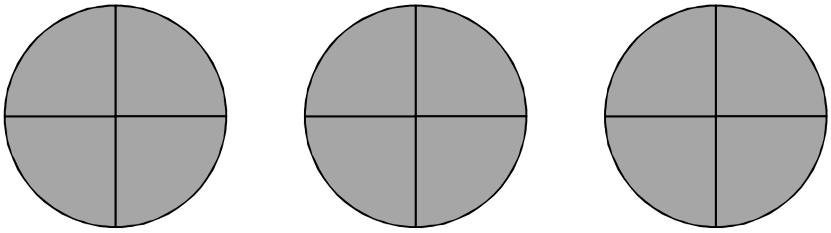
1.



2.



3.



Write the following Mixed numbers as fractions

4. $-4\frac{2}{3}$

5. $5\frac{3}{8}$

6. $-3\frac{3}{4}$

7. -3

8. - 4

9. 7

Write the following improper fractions as Mixed numbers.

10. $-\frac{17}{4}$ 11. $\frac{13}{5}$ 12. $-\frac{7}{6}$

13. $\frac{9}{1}$ 14. $-\frac{12}{1}$ 15. $\frac{7}{1}$

Write an equivalent fraction with the given denominator.

16. $-\frac{2}{8}=\frac{?}{4}$ 17. $\frac{3}{4}=\frac{?}{32}$ 18. $-\frac{5}{7}=\frac{?}{35}$

19. $-4=\frac{?}{3}$ 20. $-2=\frac{?}{7}$ 21. $6=\frac{?}{8}$

Write the fractions in simplest form.

22. $\frac{15}{45}$ 23. $-\frac{48}{28}$ 24. $\frac{42}{21}$

25. $\frac{26x^3}{6x^2}$ 26. $-\frac{10a}{14}$ 27. $\frac{42x}{36x^2}$

Order the following by using the > or < symbols

28. $\frac{3}{5}$ $\frac{2}{5}$ 29. $-\frac{7}{8}$ $-\frac{3}{8}$ 30. $-\frac{1}{7}$ $-\frac{3}{7}$

31 . $-\frac{1}{4}$ $-\frac{2}{5}$ 32. $\frac{4}{9}$ $\frac{10}{21}$ 33. $\frac{7}{10}$ $\frac{13}{25}$

Activity 2.2 - Multiplying and Dividing Fractions

PART A

Draw a picture that shows what $\frac{1}{3}$ looks like.

What would half of that look like?

So what is half of $\frac{1}{3}$?

Can you write a mathematical statement that represents what we did above?

PART B

Draw a picture of $\frac{1}{2}$?

How many $\frac{1}{4}$ can fit inside $\frac{1}{2}$?

Can you write a mathematical statement that represents the math behind part B?

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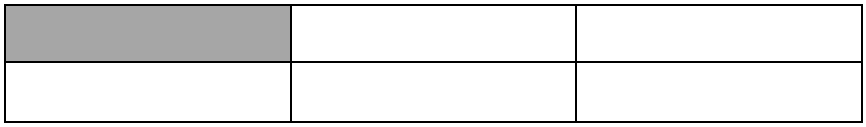
Unit 2 - Fractions

Section 2 – Multiplying and Dividing

Multiplying Fractions

Consider $\frac{1}{2} \cdot \frac{1}{3}$. In words this is read " half of a third". So lets think of a shape that is broke into thirds

Now lets cut it in half.



Notice the resulting size. It now takes 6 pieces to make a whole.

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

Multiplication of fractions

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}, \qquad note\ b \neq 0\ and\ d \neq 0$$

Example 1)

Multiply $-\frac{2}{5} \cdot \frac{3}{5}$

$-\frac{2}{5} \cdot \frac{3}{5} = -\frac{2 \cdot 3}{5 \cdot 5} = -\frac{6}{25}$

Recall: A negative times a positive will give you a negative answer

---

Example 2)

Multiply $-\frac{4}{5}\cdot\left(-\frac{10}{3}\right)$

$-\frac{4}{5}\cdot\left(-\frac{10}{3}\right)$

$=\frac{-4(-10)}{5\cdot 3}$

$=\frac{40}{15}$ We need to reduce to lowest terms.

$=\frac{2\cdot 2\cdot 2\cdot 5}{3\cdot 5}$ Here we use the prime factorization to help us.

$=\frac{2\cdot 2\cdot 2}{3}$ Cancel common factors.

$=\frac{8}{3}$

Example 2) Revisted with cross canceling.

Another way to get to the answer in lowest terms is to cross cancel – This keeps the numbers smaller and easier to work with!

$-\frac{4}{5}\cdot\left(-\frac{10}{3}\right)$ Notice that both fractions are in lowest terms.

$-\frac{4}{5}\cdot\left(-\frac{2\cdot 5}{3}\right)$ There is a factor of 5 on the top and on the bottom – they cancel.

$-\frac{4}{1}\cdot\left(-\frac{2}{3}\right)$ Notice there is a 1 left behind when we canceled the 5.

$\frac{-4\cdot -2}{1\cdot 3}=\frac{8}{3}$

Canceling common factors can shorten the work – I showed every step however the "work" can be much more condensed.

We did get the same answer. Notice we left the answer as an "improper" fraction in both cases. We could have also given the mixed number answer $2\frac{2}{3}$.

Multiplying with Mixed Numbers

When multiplying with mixed numbers we begin by making them improper fractions so we can multiply the same as in the previous examples.

Example 3)

Multiply $-2\frac{2}{3}\cdot 3\frac{4}{5}$

$-2\frac{2}{3}\cdot 3\frac{4}{5}=-\frac{8}{3}\cdot\frac{19}{5}$ We must turn mixed numbers in to improper fractions.

$=-\frac{8\cdot 19}{3\cdot 5}=-\frac{152}{15}$ Multiplying straight across.

$=-10\frac{2}{15}$

Example 4)

Multiply $-2\frac{2}{3}\cdot\left(-3\ \frac{3}{4}\right)$

$-2\frac{2}{3}\cdot\left(-3\ \frac{3}{4}\right)$

$=-\frac{8}{3}\cdot-\frac{15}{4}$ We must make mixed numbers improper fractions.

$=-\frac{2\cdot 4}{3}\cdot-\frac{3\cdot 5}{4}$ We can cross cancel common factors.

$=-\frac{2}{1}\cdot-\frac{5}{1}$

$=-2\cdot-5$

= 10

Example 5)

Multiply $6\cdot\frac{5}{21}$

$6\cdot\frac{5}{21}$

$=\frac{6}{1}\cdot\frac{5}{21}$ We begin by writing 6 as a fraction.

$= \frac{2 \cdot 3}{1} \cdot \frac{5}{3 \cdot 7}$ Then cross cancel any common factors.

$= \frac{2}{1} \cdot \frac{5}{7}$

$= \frac{2 \cdot 5}{1 \cdot 7}$ Multiply straight across.

$= \frac{10}{7}$

Example 6)

Multiply $\frac{2}{x} \cdot \frac{3}{x}$

Even though there are variables we still follow the same rules - we still multiply across the top for the numerator and across the bottom for the new denominator.

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

$= \frac{2 \cdot 3}{x \cdot x}$ Multiplying straight across.

$= \frac{6}{x^2}$

Dividing Fractions

Division means to multiply by the reciprocal

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{a \cdot d}{b \cdot c}, \qquad note\ b \neq 0, d \neq 0\ and\ c \neq 0$$

Example 7)

Divide $\frac{3}{4} \div \frac{9}{32}$

$\frac{3}{4} \div \frac{9}{32}$ To divide we multiply by the reciprocal.

$= \frac{3}{4} \cdot \frac{32}{9}$ Notice it is the second fraction that flips.

$= \frac{3 \cdot 1}{4 \cdot 1} \cdot \frac{4 \cdot 8}{3 \cdot 3}$ Look for common factors to cross cancel.

$= \frac{1}{1} \cdot \frac{8}{3}$ Multiply straight across.

$= \frac{8}{3}$

Example 8)

Divide $\mathbf{2\frac{1}{2} \div 3}$

$2\frac{1}{2} \div 3$

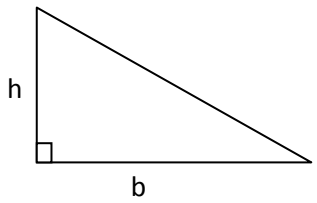
$= \frac{5}{2} \div \frac{3}{1}$ We need to turn all numbers into improper fractions.

$= \frac{5}{2} \cdot \frac{1}{3}$

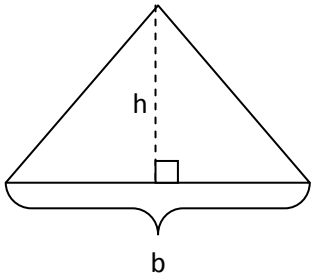
$= \frac{5}{6}$

Applications

A triangle can be formed by cutting a rectangle(or parallelogram) in half – so it has exactly half the area of a rectangle.



$A = \frac{1}{2} b \cdot h$



$A = \frac{1}{2} b \cdot h$

Notice the b and h have to meet at a 90 degree angle.

Example 9)

Find the Area of a triangle whose base is 10m and whose height is 3m.

$A = \frac{1}{2} b \cdot h$

$A = \frac{1}{2} \cdot 10 \cdot 3$

$A = 5 \cdot 3$

$A = 15$

The area is $15m^2$

Example 10)

How big of a serving would 5 people get if they split a 7 oz bag of potato chips?

This is a division problem because we need to divide up the chips, so

$7 \div 5$

$= \frac{7}{1} \div \frac{5}{1}$

$= \frac{7}{1} \cdot \frac{1}{5}$

$= \frac{7}{5}$

Each person gets $\frac{7}{5}$oz.

Exercise 2.2 NAME:_____

Multiply

1. $\frac{2}{3} \cdot \frac{1}{5}$
2. $-\frac{2}{5} \cdot \frac{1}{3}$
3. $\frac{7}{9} \cdot \frac{4}{5}$
4. $-\frac{4}{5} \cdot -\frac{1}{2}$
5. $\frac{9}{11} \cdot -\frac{2}{3}$
6. $\frac{7}{12} \cdot \frac{3}{14}$
7. $\frac{4}{5} \cdot -\frac{10}{2}$
8. $-\frac{5}{2} \cdot \frac{1}{10}$
9. $-\frac{15}{2} \cdot -\frac{2}{5}$
10. $\frac{12}{35} \cdot \frac{20}{3}$
11. $-\frac{32}{7} \cdot \frac{21}{20}$
12. $-\frac{10}{3} \cdot \frac{1}{3}$
13. $-3\frac{1}{2} \cdot -\frac{2}{3}$
14. $-1\frac{4}{5} \cdot -3\frac{1}{3}$
15. $2\frac{2}{5} \cdot -1\frac{1}{4}$
16. $1\frac{1}{2} \cdot -4$
17. $-2 \cdot -\frac{2}{5}$
18. $-5 \cdot 3\frac{2}{7}$

Divide

19. $\frac{2}{5} \div \frac{1}{3}$

20. $-\frac{3}{7} \div \frac{2}{3}$

21. $\frac{7}{11} \div \frac{2}{5}$

22. $-\frac{4}{5} \div \left(-\frac{1}{7}\right)$

23. $\frac{9}{11} \div \left(-\frac{2}{3}\right)$

24. $\frac{7}{3} \div \frac{35}{18}$

25. $-\frac{15}{2} \div \frac{10}{3}$

26. $-\frac{18}{5} \div \frac{81}{20}$

27. $-\frac{10}{3} \div \frac{1}{3}$

28. $-2\frac{1}{5} \div -3\frac{1}{3}$

29. $1\frac{3}{5} \div -2$

30. $-5 \div 3\frac{2}{7}$

Multiply

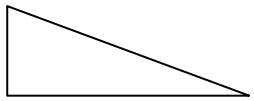
31. $\frac{x}{3} \cdot \frac{x}{6}$

32. $\frac{x^2}{4} \cdot \frac{6}{x}$

33. $\frac{2}{x} \cdot \frac{3}{x}$

The area of a triangle can be found by the formula $A = \frac{1}{2}bh$.

Find the area of the shape with the given base (b) and height (h)



34. b =10in and h = 4in

35. b = 3ft and h = 5ft

Complete the following by using fractions and leaving your answer as a mixed number.

36. A bottle of Ketch up contains 40 oz of Ketchup. How many $\frac{1}{2}$ oz servings can you get out of one bottle?

37. A recipe that serves 6 people needs to be doubled to serve a dinner party of 12. The original recipe calls for $1\frac{2}{3}$ cups of flour. How much flour should you use to double the recipe?

38. A bag of pretzels contains 16 oz. If you want to give 20 people equal servings how many ounces should you give each person?

39. A recipe for 15 servings calls for $2\frac{1}{3}\ cups$ of sugar. If you are cutting the recipe in half, how much sugar should you use?

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Unit 2 **NAME:_____**

Mid-Unit Quick Review 2.1 and 2.2

1. Write a fraction that represents the following

2. Write $-\frac{15}{4}$ as a mixed number.

3. Write $-2\frac{3}{8}$ as an improper fraction.

4. Find an equivalent fraction with the given denominator.

$-\frac{2}{5} = \frac{?}{40}$

5. Simplify the following

$-\frac{72}{42}$

Multiply or Divide

6. $-\frac{3}{5} \cdot \frac{7}{4}$

7. $-\frac{2}{15} \cdot -\frac{35}{4}$

8. $3\frac{2}{5} \cdot -10$

9. $-\frac{5}{8} \div -\frac{15}{16}$

10. $-1\frac{2}{9} \div 3$

Activity 2.3 - Adding and Subtracting Fractions

PART A

Draw a picture that represent $\frac{1}{3}$.

Draw a picture that represents $\frac{1}{2}$.

Draw a picture that illustrates $\frac{1}{3}+\frac{1}{2}$

Are you able to describe your answer as a number? What do you have to do to be able to do that?

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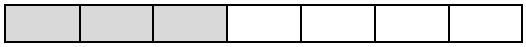
Unit 2 - Fractions

Section 3 – Adding and Subtracting

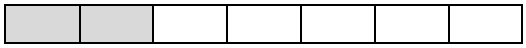
Adding and Subtracting with common denominators

If you have the same denominator then you have fractions that are describing the same size pieces. You can add or subtract the numerators to get your answers.

Adding $\frac{3}{7}$



To $\frac{2}{7}$



Is as easy as adding 2 +3

The answer is $\frac{5}{7}$.

Example 1)

Add $\frac{1}{12}+\frac{7}{12}$

$\frac{1}{12}+\frac{7}{12}$ adding 1+7 you get the new numerator of 8

$=\frac{8}{12}$ This answer needs to be reduced

$=\frac{2\cdot 4}{3\cdot 4}$ The common factor is 4

$=\frac{2}{3}$

Example 2)

Subtract $\frac{7}{12}-\frac{5}{12}$

$\frac{7}{12}-\frac{5}{12}$ Subtracting the numerators 7-5 = 2 gives the new numerator

$=\frac{2}{12}$ This answer needs to be written in lowest terms.

$=\frac{1}{6}$

Example 3)

Subtract $-\frac{3}{4}-\frac{1}{4}$

$-\frac{3}{4}-\frac{1}{4}$

$=\frac{-3-1}{4}$

$=\frac{-4}{4}$

$=-1$

This problem can also be seen as
$-\frac{3}{4}+\left(-\frac{1}{4}\right)$
So the math becomes
-3 +(-1) = -4

Example 4)

$-\frac{8}{9}-\left(-\frac{2}{9}\right)$

$-\frac{8}{9}-\left(-\frac{2}{9}\right)$ Recall subtracting a negative numbers becomes adding a positive.

$=-\frac{8}{9}+\frac{2}{9}$

$=-\frac{6}{9}$ Reduce to lowest terms.

$=-\frac{2}{3}$

Mixed numbers

If the problem begins with mixed numbers there are a few ways you can handle it. You can leave them as mixed numbers – add the whole numbers to the other whole numbers and the fraction parts to the other fraction parts. This method might require you adjust your answer if you end up with an incorrect form for a fraction.

Or you could change both mixed numbers into improper fractions then add. We will complete the next example both ways

---

Example 5) Using Mixed numbers

$\mathbf{3\frac{1}{5}+6\frac{2}{5}}$

Adding the whole number 3+6 = 9 so the new whole number is 9 , adding the numerators 1+2 = 3 and keeping the common denominator of 5 gives us a new fraction part of $\frac{3}{5}$.

$3\frac{1}{5}+6\frac{2}{5}$

$= (3+6)+\left(\frac{1}{5}+\frac{2}{5}\right)$

$= (9)+\left(\frac{3}{5}\right)$

$= 9\frac{3}{5}$ is the answer as a mixed number.

Example 5) Using improper fractions

$\mathbf{3\frac{1}{5}+6\frac{2}{5}}$

$3\frac{1}{5}+6\frac{2}{5}$

$= \frac{16}{5}+\frac{32}{5}$

$= \frac{48}{5}$ is the answer as an improper fraction.

Notice that since 5 goes into 48 9 times with 3 left over.

$\frac{48}{5} = 9\frac{3}{5}$. Unless you are asked to write your answer a specific way either answer is correct.

Example 6) Using Mixed Numbers

$-\mathbf{4}\frac{\mathbf{1}}{\mathbf{3}}+\mathbf{2}\frac{\mathbf{2}}{\mathbf{3}}$

$-4\frac{1}{3}+2\frac{2}{3}$ Since the signs are different this is a subtraction problem.

We always do the number with the largest absolute value minus the smaller absolute value. So we need to do $4\frac{1}{3}-2\frac{2}{3}$. However the fraction we are taking away from must be larger. So we must borrow from the whole number 4. So

$$4\frac{1}{3}=4+\frac{1}{3}=3+1+\frac{1}{3}=3+\frac{3}{3}+\frac{1}{3}=\ 3+\frac{4}{3}=3\frac{4}{3}.$$

Therefore $4\frac{1}{3}-2\frac{2}{3}$ becomes $3\frac{4}{3}-2\frac{2}{3}$.

$3\frac{4}{3}-2\frac{2}{3}=1\frac{2}{3}$

However the original problem was $-4\frac{1}{3}+2\frac{2}{3}$, so the negative number was larger making the end answer negative.

$-4\frac{1}{3}+2\frac{2}{3}=-1\frac{2}{3}$

Example 6) Using improper fractions

$-\mathbf{4}\frac{\mathbf{1}}{\mathbf{3}}+\mathbf{2}\frac{\mathbf{2}}{\mathbf{3}}$

$-4\frac{1}{3}+2\frac{2}{3}$ Write both fractions as improper fractions

$=-\frac{13}{3}+\frac{8}{3}$ Recall -13 +8 = -5

$=-\frac{5}{3}$ or $-1\frac{2}{3}$

Adding and subtracting with uncommon denominators

In order to add or subtract fractions they must have the same denominator. So if they do not we must create the common denominator.

Example 7)

$\mathbf{\frac{1}{6}+\frac{5}{8}}$

$\frac{1}{6}+\frac{5}{8}$

$=\frac{1\cdot4}{6\cdot4}+\frac{5\cdot3}{8\cdot3}$

$=\frac{4}{24}+\frac{15}{24}$

$=\frac{19}{24}$

The LCD or Lowest Common Denominator is the Least Common Multiple between 6 and 8. The smallest number we can turn them both into is 24. In other words we need to add a factor of 4 to the 6, and a factor of 3 to the 8.

Example 8)

$\mathbf{-\frac{5}{12}-\frac{7}{18}}$

$-\frac{5}{12}-\frac{7}{18}$

$=-\frac{5\cdot3}{12\cdot3}-\frac{7\cdot2}{18\cdot2}$

$=-\frac{15}{36}-\frac{14}{36}$

$=-\frac{29}{36}$

Sometimes it helps to look at the prime factors when looking for the LCD

$12=2\cdot2\cdot3$

$18=2\cdot3\cdot3$

The LCD needs to contain every factor above two 2's and two 3's.

Example 9)

$\mathbf{-\frac{5}{21}+\frac{1}{6}}$

$-\frac{5}{21}+\frac{1}{6}$

$=-\frac{5}{3\cdot7}+\frac{1}{2\cdot3}$

$=-\frac{5\cdot2}{3\cdot7\cdot2}+\frac{1\cdot7}{2\cdot3\cdot7}$

$=-\frac{10}{42}+\frac{7}{42}$

$=-\frac{3}{42}$

$=-\frac{1}{14}$

To change the denominator we multiply both the numerator and denominator by the factors that were missing to obtain the LCD.

Always reduce if you can.

Example 10)

$\mathbf{6 - 3\frac{4}{11}}$

$6 - 3\frac{4}{11}$ We need to borrow 1 from the 6 to get a fraction to take away from.

$= 5\frac{11}{11} - 3\frac{4}{11}$ $1 = \frac{11}{11}$ So $6 = 5\frac{11}{11}$.

$= 2\frac{7}{11}$

Example 11)

$\mathbf{\frac{3}{x} - \frac{1}{2}}$

$\frac{3}{x} - \frac{1}{2}$

$= \frac{3 \cdot 2}{x \cdot 2} - \frac{1 \cdot x}{2 \cdot x}$

$= \frac{6}{2x} - \frac{x}{2x}$

$= \frac{6-x}{2x}$

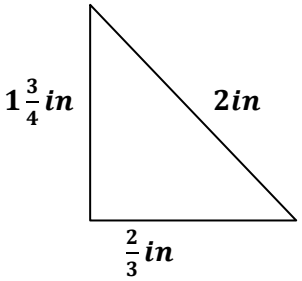
The LCD has to have an x because the first fraction has a denominator of x. It also must have a 2 since the second fraction has a denominator of 2.
The LCD is 2x.
We multiply in the factor that is missing.

Perimeter

The **perimeter** of a shape can be found by adding together all the sides . The perimeter is the distance around a shape.

Example 12)

Find the Perimeter of the triangle below



Perimeter = add up all 3 sides = $1\frac{3}{4}+2+\frac{2}{3}$

$1\frac{3}{4}+\frac{2}{1}+\frac{2}{3}$

$=\frac{7}{4}+\frac{2}{1}+\frac{2}{3}$

$=\frac{7\cdot3}{4\cdot3}+\frac{2\cdot12}{1\cdot12}+\frac{2\cdot4}{3\cdot4}$

$=\frac{21}{12}+\frac{24}{12}+\frac{8}{12}$

$=\frac{53}{12}$

The Perimeter is $\frac{53}{12}in$ or $4\frac{5}{12}in.$

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Exercise 2.3 NAME:_____

Add or subtract

1. $\frac{1}{5}-\frac{3}{5}$
2. $-\frac{3}{7}+\frac{2}{7}$
3. $-\frac{5}{9}-\frac{2}{9}$
4. $\frac{3}{4}-\frac{1}{4}$
5. $\frac{2}{9}+\frac{1}{9}$
6. $\frac{1}{12}-\left(-\frac{5}{12}\right)$
7. $3\frac{1}{3}+2\frac{1}{3}$
8. $2\frac{3}{4}-1\frac{1}{4}$
9. $3\frac{4}{5}-1\frac{2}{5}$
10. $-2\frac{1}{5}-3\frac{3}{5}$
11. $2\frac{1}{4}-7\frac{3}{4}$
12. $-3\frac{1}{6}-\left(-4\frac{5}{6}\right)$
13. $\frac{1}{3}-\frac{1}{4}$
14. $-\frac{4}{5}-\frac{1}{3}$
15. $\frac{3}{4}-\left(-\frac{1}{5}\right)$
16. $\frac{3}{4}-\left(-\frac{1}{6}\right)$
17. $-\frac{2}{5}+\frac{1}{12}$
18. $\frac{2}{3}-\frac{1}{6}$

19. $5 + 3\frac{2}{5}$

20. $3 - 5\frac{2}{3}$

21. $6\frac{2}{5} + 2\frac{2}{3}$

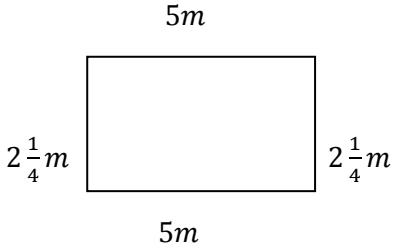
22. $-5\frac{1}{2} + 2\frac{3}{5}$

23. $2\frac{1}{5} - 6$

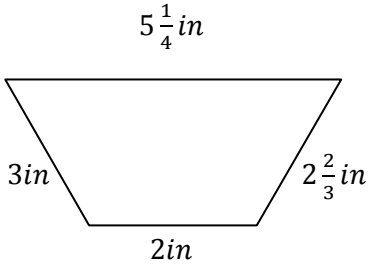
24. $-2\frac{2}{7} - 4\frac{5}{6}$

Find the perimeter of the following shapes

25.



26.



Activity 2.4 - Exponents and Order of Operations

Write each of the following as an exponent and solve

$\left(-\frac{2}{3}\right)\cdot\left(-\frac{2}{3}\right)\cdot\left(-\frac{2}{3}\right)\cdot\left(-\frac{2}{3}\right)$

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

$\frac{-2\cdot2\cdot2\cdot2}{3}$

Are you answers different? Should they be?

Complete the following

$\frac{2}{3}+\frac{1}{2}\cdot\frac{8}{9}$

$\frac{4}{5}\div\frac{1}{2}\cdot\frac{4}{7}$

What do you do first? Why?

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Unit 2 - Fractions

Section 4 – Exponents and Order of operations

Exponents

Exponents work the same with fractions as they did with Integers. There are a few things we need to be aware of.

Exponent

$$\left(\frac{3}{5}\right)^3 = \left(\frac{3}{5}\right)\cdot\left(\frac{3}{5}\right)\cdot\left(\frac{3}{5}\right)$$

Base

Notice the exponent is on the parentheses, that is why the entire parentheses repeats.

Example 1)

Simplify $\left(-\frac{2}{3}\right)^2$

$\left(-\frac{2}{3}\right)^2 = \left(-\frac{2}{3}\right)\cdot\left(-\frac{2}{3}\right)$ Notice the entire parentheses repeats 2 times.

$= \frac{4}{9}$

Example 2)

Simplify $-\left(\frac{4}{5}\right)^2$

$-\left(\frac{4}{5}\right)^2 = -\left(\frac{4}{5}\right)\cdot\left(\frac{4}{5}\right)$ Notice the parentheses repeats but the negative does not .

$= -\frac{16}{25}$

In both Example 1 and 2 there are parentheses. Notice that in both examples the parentheses are what is repeated. In example 2 the negative sign did not get repeated because it was not "caught" by the parentheses.

Example 3)

$\boldsymbol{Simplify}\ -\frac{\mathbf{3^2}}{\mathbf{4}}$

$-\frac{3^2}{4} = -\frac{3\cdot 3}{4}$

$= -\frac{9}{4}$

Notice the only thing that repeats is the 3!
Why?
The exponent is touching just the 3.

Order of Operations

Order of Operations work the same with fractions as it did with Integers. We can use PEMDAS to help us remember the order.

Example 4)

$\boldsymbol{Simplify}\ \ \frac{\mathbf{2}}{\mathbf{7}}+\frac{\mathbf{3}}{\mathbf{4}}\cdot\frac{\mathbf{6}}{\mathbf{7}}$

$\frac{2}{7}+\frac{3}{4}\cdot\frac{6}{7}$	Multiplication comes before addition.
$=\frac{2}{7}+\frac{3}{2}\cdot\frac{3}{7}$	Cross cancelling before you multiply.
$=\frac{2}{7}+\frac{9}{14}$	Multiplying straight across.
$=\frac{4}{14}+\frac{9}{14}$	Find a common denominator.
$=\frac{13}{14}$	Adding the fractions.

Example 5)

$\boldsymbol{Simplify}\ \ \frac{\mathbf{1}}{\mathbf{4}}\div\frac{\mathbf{3}}{\mathbf{8}}\cdot\frac{\mathbf{9}}{\mathbf{4}}$

$\frac{1}{4}\div\frac{3}{8}\cdot\frac{9}{4}$	Remember that multiplication and division have the same priority.
$=\frac{1}{4}\cdot\frac{8}{3}\cdot\frac{9}{4}$	Division is done first and turns into multiply in the first step.
$=\frac{1}{1}\cdot\frac{2}{3}\cdot\frac{9}{4}$	Cross cancel with the first 2 numbers.
$=\frac{2}{3}\cdot\frac{9}{4}$	Multiply the first 2 numbers.

Example 5) continued…

$\frac{2}{3}\cdot\frac{9}{4} = \frac{1}{1}\cdot\frac{3}{2}$ Cross cancel.

$= \frac{3}{2}$ Always check to see if you can reduce.

The answer as an improper fraction is $\frac{3}{2}$, a mixed number answer would be $1\frac{1}{2}$.

Example 6)

$\boldsymbol{Simplify}\ -\frac{5}{6}+\frac{3}{4}\left(\frac{1}{2}+\frac{2}{3}\right)$

$-\frac{5}{6}+\frac{3}{4}\left(\frac{1}{2}+\frac{2}{3}\right)$ Using order of operations we begin inside the Parentheses.

$= -\frac{5}{6}+\frac{3}{4}\left(\frac{1\cdot3}{2\cdot3}+\frac{2\cdot2}{3\cdot2}\right)$ We need a common denominator to add fractions.

$= -\frac{5}{6}+\frac{3}{4}\left(\frac{3}{6}+\frac{4}{6}\right)$

$= -\frac{5}{6}+\frac{3}{4}\left(\frac{7}{6}\right)$ Remember a number next to Parentheses means multiply.

$= -\frac{5}{6}+\frac{3}{4}\cdot\frac{7}{6}$ According to PEMDAS - multiplication comes before addition.

$= -\frac{5}{6}+\frac{1}{4}\cdot\frac{7}{2}$ Cross cancel.

$= -\frac{5}{6}+\frac{7}{8}$ Multiply.

$= -\frac{5\cdot4}{6\cdot4}+\frac{7\cdot3}{8\cdot3}$ Find a common denominator,

$= -\frac{20}{24}+\frac{21}{24}$

$= \frac{1}{24}$

Complex Fractions

Recall that fractions are really division.

Consider $\dfrac{-\frac{2}{3}}{-\frac{15}{6}}$

Since fractions are really division we can rewrite this as

$= -\frac{2}{3} \div -\frac{15}{6}$

To divide we multiply by the reciprocal,

$= -\frac{2}{3} \cdot -\frac{6}{15}$

Cross canceling leaves

$= -\frac{2}{1} \cdot -\frac{2}{15}$

Multiplying

$= \frac{4}{15}$

Example 7)

$\boldsymbol{Simplify} \quad \frac{-\frac{3}{4}}{\frac{15}{8}}$

$\frac{-\frac{3}{4}}{\frac{15}{8}}$

$= -\frac{3}{4} \div \frac{15}{8}$ Rewrite as division.

$= -\frac{3}{4} \cdot \frac{8}{15}$ Multiply by the reciprocal.

$= -\frac{1}{1} \cdot \frac{2}{5}$ Cross cancel to simplify.

$= -\frac{2}{5}$

Example 8)

$\boldsymbol{Simplify} \quad \frac{4}{3-\frac{1}{2}}$

Example 8) continued…

$\dfrac{4}{3-\frac{1}{2}}$ The fraction bar separates this into 2 grouping.

$= \dfrac{4}{\frac{6}{2}-\frac{1}{2}}$ We add the bottom fractions together by first finding the LCD.

$= \dfrac{4}{\frac{5}{2}}$

$= 4 \div \frac{5}{2}$ Write the larger fraction as division.

$= \frac{4}{1} \cdot \frac{2}{5}$ Multiply by the reciprocal.

$= \frac{8}{5}$

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Exercise 2.4 NAME:_____

Simplify

1. $\left(\frac{2}{3}\right)^2$
2. $\left(\frac{1}{5}\right)^3$
3. $\left(-\frac{4}{7}\right)^2$
4. $-\frac{5}{6}^2$
5. $-\left(\frac{2}{7}\right)^2$
6. $-\frac{4^3}{12}$
7. $\left(\frac{3}{5}\right)^2\left(\frac{1}{2}\right)^3$
8. $\left(-\frac{2}{3}^2\right)\left(\frac{5}{3}\right)^2$
9. $-\left(\frac{7}{8}\right)^2\left(\frac{1}{2}\right)$
10. $\frac{2}{3} \div \frac{1}{4} \cdot \frac{5}{6}$
11. $\frac{1}{4} + \frac{2}{5} \cdot \frac{10}{3}$
12. $\frac{1}{3} - \frac{2}{5} \div \frac{3}{5}$
13. $\frac{4}{5} \cdot \left(\frac{1}{5} + \frac{2}{3}\right) - \frac{3}{5}$
14. $-\frac{1}{2} + \frac{1}{3}\left(\frac{1}{4} + \frac{1}{2}\right)$
15. $\left(\frac{1}{8} - \frac{1}{3}\right) \div \frac{19}{24}$

16. $\left(\frac{2}{3}-\frac{1}{6}\right)^2+\frac{1}{18}$

17. $-\frac{2}{3}+\left(\frac{1}{2}-\frac{3}{4}\right)^3$

18. $\frac{4}{5}\left(\frac{1}{3}+\frac{1}{2}\right)^2-\frac{3}{5}$

19. $\dfrac{\frac{3}{5}}{\frac{2}{7}}$

20. $\dfrac{\frac{6}{5}}{\frac{2}{15}}$

21. $\dfrac{\frac{4}{11}}{\frac{9}{22}}$

22. $\dfrac{\frac{1}{2}+\frac{3}{5}}{\frac{2}{7}}$

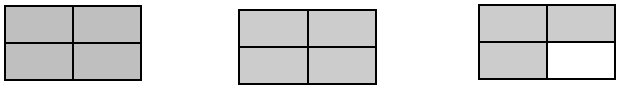
23. $\dfrac{\frac{2}{5}}{1-\frac{2}{3}}$

24. $\dfrac{\frac{1}{8}-\frac{3}{2}}{\frac{1}{3}}$

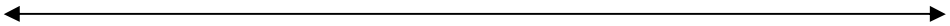
Unit 2 Review NAME:_____

1. Write a fraction that represents the following.

2. Write an IMPROPER FRACTION and a MIXED NUMBER that represents the following.



3. Draw a number line, clearly label 0, $-\frac{2}{3}$, and $\frac{2}{3}$.



Find the absolute value of the following.

4. $\left|\frac{2}{3}\right|$

5. $\left|-\frac{5}{8}\right|$

6. $-\left|-\frac{6}{11}\right|$

Rewrite the following fractions to have the given denominator

7. $\frac{4}{7}=\frac{?}{28}$

8. $-\frac{35}{40}=\frac{?}{8}$

9. $-6=\frac{?}{9}$

Write the following in lowest terms

10. $-\frac{15}{60}$

11. $-\frac{21}{70}$

12. $\frac{3x^2}{15x}$

Complete the following – show all steps.

13. $-\frac{2}{3}\cdot\frac{7}{9}$

14. $\left(-\frac{15}{28}\right)\cdot\left(-\frac{35}{3}\right)$

15. $2\frac{1}{3}\cdot\left(-3\frac{1}{2}\right)$

16. $\frac{4}{7}\div\frac{20}{21}$

17. $\left(-\frac{2}{3}\right)\div 4$

18. $5\frac{1}{3}\div\left(-4\frac{1}{3}\right)$

19. If you have a 32 oz. bag of pretzels and the serving size is $\frac{1}{3}oz$, How many servings are in the bag?

20. If you can fit 78 people in a restaurant and the restaurant is $\frac{1}{2}$ full, how many people are in the restaurant?

21. If the equation to find area of a rectangle is $A = b \cdot h$, and you know that $b = \frac{5}{7}in$ and $h = \frac{3}{10}in$ find the Area.

22. $-\frac{3}{5}-\frac{2}{5}$

23. $-\frac{4}{7}-\left(-\frac{1}{7}\right)$

24. $-\frac{5}{8}+\frac{1}{8}$

25. $\frac{1}{4}-\frac{3}{8}$

26. $-\frac{2}{3}+\frac{1}{6}$

27. $-4+\frac{2}{3}$

28. $-3\frac{1}{4}-7\frac{7}{8}$

29. $3\frac{1}{8}-2\frac{1}{12}$

30. $2-\left(-\frac{2}{3}\right)$

31. You are putting in a new counter in your kitchen, You must first put in a padding that is $\frac{1}{8}in$ thick and the counter it self is $\frac{3}{4}in$ thick. How much thickness are you adding to the counter?

32. $\left(\frac{2}{3}\right)^3$

33. $\left(-\frac{5}{6}\right)^2$

34. $-\frac{7^2}{3}$

35. $\frac{1}{2} \div \frac{3}{4} \cdot \frac{3}{7}$

36. $\frac{5}{7} + \frac{1}{7} \cdot \frac{5}{3}$

37. $\left(\frac{3}{8} - \frac{3}{4}\right)^2 + \frac{1}{2} \cdot 6$

38. $\dfrac{\frac{2}{5}}{\frac{3}{10}}$

39. $\dfrac{\frac{3}{2}+\frac{1}{4}}{3}$

40. $\dfrac{\frac{1}{4}}{3-\frac{1}{3}}$

Unit 3 – Decimals Objective Overview

The following is a small subset of possible problems that could represent each objective. Refer to notes, homework and reviews for a more complete picture.

Section 1 - Introduction to Decimals

By the end of section 1 you should be able to:

- **Identify place value**
  Consider the number -21.123. Identify the number in the hundredths place.

  Consider the number 25.23456. What place value is the 4 in?

- **Write a decimal in words**
  Write 312.1258

- **Translate words into numbers**
  Write "Two and thirty six ten-thousandths" as a number.

- **Find the absolute value of a number**
  $|-2.23| =$

  $|4.256| =$

  $-|-0.2| =$

- **Order the following by placing a < or > in between them.**
  12.0234 12.0324

  -1.203 -1.23

- **Write a Decimal as a fraction**

  Write 2.12 as a Fraction.

- **Round to the nearest given place value**
  Round 2.12458 to the nearest thousandths place.

- **Rounding with money.**
  Round $2.1235 to the nearest cent.

  Round $325.25 to the nearest dollar.

Section 2 – Adding and Subtracting Decimals

By the end of section 2 you should be able to:

- **Add decimals with the same sign**
  $5.235 + 7.2 =$

  $-6.235 + (-4.1) =$

- **Add decimals with different signs**
  $-7.32 + 3.2567 =$

- **Subtract signed decimals**
  $-15.23 - 7 =$

  $2.23 — 3.2564 =$

Section 3 – Multiplying and Dividing Decimals

By the end of section 3 you should be able to:

- **Multiply decimals**
  $-7.213 \cdot -2.2 =$

  $-3.25 \cdot 8.23 =$

- **Multiply decimals by a power of 10.**
  $-2.356 \cdot 100$

  $-54.356 \cdot 0.01$

- **Find the Circumference of a circle.**
  Find the circumference of a circle with radius 2cm.

  Find the circumference of a circle with diameter 6m.

- **Divide decimals**
  $\frac{-5.5}{5} =$

  $-3.6 \div -0.04 =$

  $Divdide\ and\ round\ answer\ to\ nearest\ hundredth\ -3.62 \div -0.3 =$

- **Write the following fractions as decimals (using repeating bare when necessary.)**
  $\frac{1}{8}$

  $-\frac{2}{9}$

- **Order fractions and decimals by placing > or < in between them.**
  $-\frac{3}{8} \qquad -0.37$

Section 4 – Exponents, Order of Operations, and Square roots

By the end of section 4 you should be able to:

- **Evaluate exponents**

  -2.2^4 =

  $(-1.2)^2$ =

- **Use the order of operations to evaluate expressions**
  $1.6 \div 2 \cdot 3.3$

  $2.27 + 7.1 \cdot 4$

  $2(1.1)^2 + 4.2 \cdot 0.3$

- **Find the Area of a circle with the given dimensions**
  Find the area of a circle with radius 2cm.

  Find the area of a circle with diameter 6m.

- **Find an average.**
  Find the mean of 22,26,27

- **Compute a square root**
  $\sqrt{49}$

  $-\sqrt{144}$

Activity 3.1 - Decimals

Part A

What number is smaller 2.301 or 2.31 ? Why?

What number is smaller – 2.301 or – 2.31? Why?

Part B

At the gas station the board says that gas cost $\$3.89\frac{9}{10}$. What does that mean?

After pumping gas the pump says you owe $56.67890. How much do you actually pay?

After pumping gas the pump says you owe $79.99998. How much do you pay?

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Unit 3 - Decimals

Section 1 – Introduction to Decimals

Place Value

Consider the number 526,351,346.15136785

	5	2	6	3	5	1	3	4	6	.	1	5	1	3	6	7	8	5	
…	hundred- millions	ten-millions	millions	hundred-thousands	ten-thousands	thousands	hundreds	tens	ones	.	tenths	hundredths	thousandths	ten-thousandths	hundred-thousandths	millionths	ten-millionths	hundred-millionths	…

Example 1)

Consider the number - 3. 124567

What number is in the hundredths place?

2

The number to the right of the decimal is the tenths place, the next one over is the hundredths.

Example 2)

Consider the number - 432.64853

What place value is the 5 in?

The 5 is in the Ten-thousandths places.

The order after the Decimal point is tenths, hundredths, thousandths, ten-thousandths, hundred-thousandths, etc..

Writing Decimals in Words

The word “and” is used to represent the decimal point in a number.

So the number 4.5 is said “Four and five tenths.”

Consider the number 23.345.

We start by saying the number before the decimal, then the word "and" followed by the number after the decimal, followed by the place value of the last digit.

So we would say "Twenty-three and three hundred forty-five thousandths."

Example 3)

Write 34.5678 in words.

Thirty-four and five thousand six hundred seventy-eight ten-thousandths

---

Example 4)

Write -2.045678 in words.

Negative two and forty-five thousand six hundred seventy-eight millionths.

Example 5)

Write Thirty-four and two hundred three thousandths as a number.

34.203

Example 6)

Write Four hundred thirteen and twenty-three ten-thousandths.

413._ _ _ _

413._ _ 23

413.0023

Notice the 23 must end in the ten-thousandths place.

Absolute Value

We handle absolute value the same as with integers and fractions. Remember absolute value is the distance from zero. It is the number disregarding the sign. What is inside the absolute value bars becomes positive.

Example 7)

$|2.34|$

= 2.34 This number is already positive so the absolute value is the same as the number itself.

Example 8)

$|-34.678|$

= 34.678 Notice the number is the same, we took away the negative sign.

Example 9)

$-|-24.987|$

$= -24.987$ Note: The negative sign on the *outside* of the absolute value is unaffected.

Ordering Decimals

When ordering decimals it is important to remember that place value is important.

Consider 5.23 and 5.203, at first glance it may be easy to order these incorrectly.

One strategy is to add the zero to 5.23 so the place value matches the other number.

5.23 = 5.230. Since 230 > 203, 5.230 > 5.203.

We could also compare digits in place values. The first number that is different can help you determine which number is larger.

Both numbers begin in the ones place with a 5.

Both numbers have a 2 in the tenths place.

One number has a 3 in the hundredths place the other has a 0.

Since 3 > 0 , 5.23 > 5.203.

Example 10)

Compare the following:

23.045 23.0123

Since the first place value that is different is the hundredths place we compare 4 and 1.

Since 4 > 1

23.045 >23.0123

Converting Decimals to Fractions

Converting terminating decimals to fractions can be done by placing the number in the decimal section of a number in the numerator and making the denominator equal the fractional equivalent to the place value the decimal ends in.

$$2.341 \qquad 2\frac{341}{1000}$$

Notice 2.341 ended in the thousandths place, that is why we wrote the decimal over 1000.

We always reduce the fraction to the lowest terms.

Example 11)

Write 2.35 as a fraction.

$2.35 = -2\frac{35}{100}$ This fraction ends in the hundredths place, so we write the decimal portion over 100.

$= -2\frac{7}{20}$ Top and bottom shared a factor of 5, so we reduce to lowest terms.

Rounding Decimals

Different fields of study may round in different ways, in math we tend to round up if a number is 5 or higher.

Example 12)

Round 34.5637 to the nearest hundredth.

34.5637 First we locate the hundredth place.

Next we look at the number to the right of it. (In this case the thousandths place.)

34.56 Since 3 <5 we will keep the number a 6 and drop the numbers after the hundredth place.

Example 13)

Round 23.45654 to the nearest thousandth.

23.45654	First we locate the thousandth place.
	Next we look at the number to the right of it. (In this case the ten-thousandths place.)
23.457	Since $5 \geq 5$ we round up changing the 6 into a 7.

Example 14)

Round - 256.96789 to the nearest tenths place.

- 256.96789	First we locate the tenths place.
	Next we look at the number to the right of it. (In this case the hundredths place.
-257.0	Since 6 > 5 we round up, but 9 cannot become 10 without moving the one over to the next place - the ones place.

In this example 256.9 become 256 + 1.0 = 257.0

Example 15)

You just got gas and the pump reads that you owe $56.71563. How much money do you have to pay?

$56.72	The smallest unit of money is cents. This is the equivalent to the hundredths place.

Example 16)

A television cost $2341.67. Round this number to the nearest dollar.

$2342	The nearest dollar is equivalent to the ones place.

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Exercise 3.1 NAME:_____

Consider the number -23.345678. For the following state the digit that is in the requested place value.

1. Hundredths
2. Ten-Thousandths
3. Thousandths

What place value is the 5 in?

4. 128.5689
5. -98.889567
6. -3.98527

Write the following in words.

7. 34.567

8. 2.5689

9. 12.98

Write the following as a number.

10. Two and thirty two hundredths

11. Thirty three and five hundred thirty two ten-thousandths

12. Five and sixty two thousandths

Evaluate the following absolute values

13. $|2.46|$
14. $-|-34.678|$
15. $|-21.787|$

Order the following by inserting < or >

16. 32.24 32.2041

17. 7.2123 7.212

18. 5.213 5.21

19. -1.23 -1.203

20. -21.134 -21.1342

21. -2.34 -2.034

Write the following as a fraction

22. -23.457

23. -15.7

24. -13.49

25. 13.25

26. -19.222

27. 1.125

Round the following to the nearest thousandths place

28. 1.23556

29. - 13.11118

30. 2.12342

Round to the nearest Hundredth.

31. 36.5555

32. 8.99999

33. 21.1599

34. You fill up with gas and the pump reads $59.34568, how much do you pay?

35. A computer cost $1229.88. How much does it cost to the nearest dollar?

36. When you calculated sales tax the calculator said 12.34567, How much did you pay in sales tax?

Activity 3.2 - Adding and Subtracting Decimals

Part A

You go to the store to pick up 3 items. They cost $4.89, $3.67, and $7.22. You have $15 with you. Do you have enough for all 3 items if there is no tax?

Part B

Your account has $346.21. You pay rent for $450. What is the status of your account? If the payment goes through what would the bank say your balance is?

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Unit 3 - Decimals

Section 2 – Adding and Subtracting Decimals

Adding Signed Decimals

The most important thing about adding Decimals is making sure you are adding the same place values together.

Be sure you stack the decimals so place values line up!

Example 1)

$\boldsymbol{Add\ 23.456 + 1.45}$

$$\begin{array}{r} 23.456 \\ +1.45 \\ \hline \end{array}$$

Start by lining up the decimal point.

$$\begin{array}{r} 23.456 \\ +1.450 \\ \hline 24.906 \end{array}$$

Adding zeros for any missing place values can keep things in line.

Example 2)

$\boldsymbol{Add\ -7.1 + (-1.236)}$

$$\begin{array}{r} -7.1 \\ -1.236 \\ \hline \end{array}$$

Start by lining up the decimal point.

$$\begin{array}{r} -7.100 \\ -1.236 \\ \hline -8.336 \end{array}$$

Since both numbers are negative, we add the numbers and keep the sign.

Example 3)

$\boldsymbol{Add\ -35.67\ +\ 4.578}$

$$\begin{array}{r} -35.67 \\ \underline{\ \ 4.578} \end{array}$$

Start by lining up the decimal point.

$$\begin{array}{r} -35.670 \\ +\ 4.578 \\ \hline -31.092 \end{array}$$

Since the numbers are opposite signs, we subtract and keep the larger numbers sign.

Subtracting Signed Decimals

Remember subtraction is adding the opposite.

Example 4)

$\boldsymbol{Add\ 3.46\ -\ \ 4.271}$

This is the same as 3.46 + (-4.271)

$$\begin{array}{r} -4.271 \\ \underline{\ \ 3.46} \end{array}$$

Start by lining up the decimal point.

$$\begin{array}{r} -4.271 \\ +\ 3.460 \\ \hline -0.811 \end{array}$$

Since the numbers are opposite signs, we subtract and keep the larger numbers sign.

Example 5)

$\boldsymbol{Add\ -2.3434 - (-34)}$

$-2.3434 - (-34) = -2.3434 + 34$

$$\begin{array}{r} 34. \\ \underline{-2.3434} \end{array}$$

Start by lining up the decimal point. The decimal is after the 4 in 34.

$$\begin{array}{r} 34.0000 \\ -2.3434 \\ \hline 31.6566 \end{array}$$

Since the numbers are opposite signs, we subtract and keep the larger numbers sign.

Exercise 3.2 NAME:_____

Add or Subtract

1. 23.56 + 23.4

2. $-34.789 + (-23.4)$

3. $54.7 + (-23.45)$

4. $-4 + 54.33$

5. 4.565 + 9.7568

6. $-3.45 + (-2.945)$

7. $-3.456 + (-54.78)$

8. 567.21 + (-23)

9. 7.23 + 667.1

10. 24.21 – 54.671

11. $45.34 - (-12.374)$

12. $-4 - 7.21$

13. – 7.21 – (-12.1)

14. 12 – 14.124

15. $-4.361 - (-21)$

16. 21 – 7.219

17. $-3.214 - (-2.7874)$

18. 36.21 – 107.521

19. You have $345.65 in your account and then use your debit card to get gas. The total was 45.89. What is the balance on your account when your transaction clears?

20. You got paid twice this month. One check was for $341 and the other was for $299.58. How much did you get paid all together?

21. You need to buy three items at the store. They cost $3.41, $7.11, and $22.89 (no tax). You have $33 cash , do you have enough money?

Activity 3.3 - Multiplying and Dividing Fractions

Part A – Complete the following

$(-0.23)(-1.23)$ $-27.72 \div 12$

How did you decide on the sign of your answer?

Part B - Order the following by placing > or < between the numbers.

$\frac{7}{9}$ .78 $-\frac{2}{3}$ -0.6

What thought process did you use to determine which number is greater?

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Unit 3 - Decimals

Section 3 – Multiplying and Dividing Decimals

Multiplying Decimals

When multiplying decimals we multiply the numbers normally, then we add together the number of decimal places in our original problem and add that many decimal places to our answer.

$3.45 \cdot 2.3$

$$\begin{array}{rl} 3.45 & 2\ decimals\ places \\ \times\ 2.3 & 1\ decimal\ \ places \\ \hline 1035 & \\ 6900 & \\ \hline 7.935 & 3\ decimal\ places \end{array}$$

Since there are 3 decimal places in the original numbers, we add in three decimal points to the answer

---

Example1)

$(-2.67)(5.3)$

First we write the problem vertically

$$\begin{array}{r} -2.67 \\ \times\ 5.3 \\ \hline 801 \\ 13350 \\ \hline -14.151 \end{array}$$

The original problem is a negative times a positive, therefore our answer is negative. The original problem had 2 decimal places in one number and 1 decimal place in the second , so the answer has 3 decimal places

---

Example 2)

$0.00034\ (0.00023)$

$$\begin{array}{rl} 0.00034 & \longleftarrow\ 5\ \text{decimal places} \\ \times\ 0.00023 & \longleftarrow\ 5\ \text{decimal places} \\ \hline 102 & \\ 680 & \\ \hline 0.0000000782 & \longleftarrow\ 10\ \text{decimal places} \end{array}$$

In this problem we had to add zeros in front of the 782 so we could ensure we have 10 decimal places in your answer.

Multiplying Decimals by a power of 10

Consider the following problems and their solutions

$$2.34567 \times 10 = 23.4567$$

$$2.34567 \times 100 = 234.567$$

$$2.34567 \times 1000 = 2345.67$$

$$2.34567 \times 10000 = 23456.7$$

$$2.34567 \times 100000 = 234567.$$

$$2.34567 \times 1000000 = 2345670.$$

$$\vdots$$

Notice in each case the numbers stayed the same, but the number of places the decimal place moved to the right matched the number of 0's in the power of 10 you are multiplying by.

The pattern continues in the opposite direction as well

$$2.34567 \times .1 = 0.234567$$

$$2.34567 \times .01 = 0.0234567$$

$$2.34567 \times .001 = 0.00234567$$

$$2.34567 \times .0001 = 0.000234567$$

$$\vdots$$

In this case the number the decimal places you move the decimal to the left matches the number of decimal places the 1 is over.

Example 3)

$(-\mathbf{56.789})(\mathbf{100})$

$(-56.789)(100)$	Notice that in this problem we are multiplying by 100
-5678.9	Two zeros, moves the decimal place 2 places

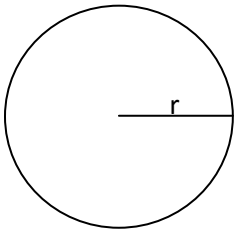
Example 4)

$\mathbf{-245.6 \cdot 0.0001}$

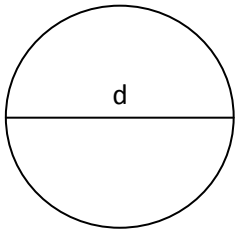
$-245.6 \cdot 0.0001$	0.0001 will move the decimal 4 places to the left.
-0.02456	The leading zero is not necessary

Circumference of a circle

A **circle** is a set of points a set distance(**radius**) from a given point (**center**). The **diameter** of a circle is the distance across the entire circle.



Where r is the radius.



Where d is the diameter. Notice $d = 2r \text{ or } r = \frac{d}{2}$.

The **Circumference** of a circle is like perimeter of a rectangle.

To calculate Circumference we use the formula

$C = 2\pi r \text{ or } C = d\pi$ $\quad Where\ \pi = 3.14159265\ldots,\ r = radius, and\ d = diameter.$

For this class we will use the approximation $\pi \approx 3.14$.

Example 5)

Find the circumference of the circle whose radius is 7cm.

$C = 2\pi r$

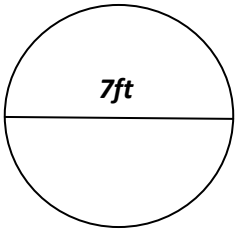
$C \approx 2 \cdot 3.14 \cdot 7cm$

$C \approx 6.28 \cdot 7cm$

$C \approx 43.96cm$

$$\begin{array}{r} 6.28 \\ \times\ 7 \\ \hline 43.96 \end{array}$$

Example 6) Find the Circumference of the following circle.



In this example we are given the diameter so we will use the formula $C = d\pi$.

$C = d\pi$

$C \approx 7ft \cdot 3.14$

$C \approx 21.98\ ft$

Dividing Decimals

Consider the following

$$
\begin{array}{r}
12.345 \\
34\overline{)\,419.730} \\
34 \\
\hline
79 \\
68 \\
\hline
117 \\
102 \\
\hline
153 \\
136 \\
\hline
170 \\
170 \\
\hline
0
\end{array}
$$

Notice the decimal point in the answer is directly above the decimal point in the dividend.

The number your are dividing by(the **divisor**) cannot have a decimal. If there is a decimal you must move the decimal over in both the Divisor and the Dividend so that the divisor does not contain one.

Example 7)

$\mathbf{8.135 \div (-.25)}$

$$
\begin{array}{r}
-32.54 \\
-25\overline{)\,813.50} \\
75 \\
\hline
63 \\
50 \\
\hline
135 \\
125 \\
\hline
100 \\
100 \\
\hline
0
\end{array}
$$

Notice that the answer is -32.54 *Since a positive divided by a negative is a negative.*

Example 8)

$\mathbf{-1 \div 3}$

$$\begin{array}{r} -0.333\ldots \\ -3\overline{)1.000} \\ \underline{9} \\ 10 \\ \underline{9} \\ 10 \\ \underline{9} \\ 1 \end{array}$$

Notice that the process is repeating. We could continue forever.

$-0.33333\ldots = -.\overline{3}$

So the answer is $-.\overline{3}$

Dividing Decimals by a Power of 10

Notice the following pattern

$$2.34567 \div 10 = 0.234567$$

$$2.34567 \div 100 = 0.0234567$$

$$2.34567 \div 1000 = 0.00234567$$

$$2.34567 \div 10000 = 0.000234567$$

$$2.34567 \div 100000 = 0.0000234567$$

$$2.34567 \div 1000000 = 0.000002345670$$

$$\vdots$$

The pattern continues the other way as well

$$2.34567 \div 0.1 = 23.4567$$

$$2.34567 \div 0.01 = 234.567$$

$$2.34567 \div 0.001 = 2345.67$$

$$2.34567 \div 0.0001 = 23456.7$$

Writing fractions as Decimals

We can rewrite fractions as decimals by treating the fraction as division.

Example9)

Rewrite $\frac{5}{11}$ as a Decimal.

$$\begin{array}{r} 0.454\ldots \\ 11\overline{)\,5.0000} \\ \underline{44} \\ 60 \\ \underline{55} \\ 50 \\ \underline{44} \\ 60 \end{array}$$

Since the 4 and the 5 both repeat the answer is written $0.\overline{45}$

Comparing Number

If you are asked to order two numbers such as $\frac{2}{9}$ and 0.23. You may find it easier to turn them into decimals.

Since $\frac{2}{9} = 0.\overline{2}$, or 0.22222222….,

It is easy to see 0.23 >.222…, Therefore $0.23 > \frac{2}{9}$ OR $\frac{2}{9} < 0.23$.

Exercise 3.3 NAME:_____

Multiply

1. $0.24(5.23)$

2. $23 \cdot 13.26$

3. $12.45(3.1)$

4. $-12.1 \cdot 5.2$

5. $0.45(-22.1)$

6. $-7.1 \cdot .3$

7. $-5.2(-3.34)$

8. $(-2.1)(-1.38)$

9. $-0.3(-0.7)$

10. $(-0.00023)(-0.0012)$

11. $(-0.000235)(0.0012)$

12. $0.003(-2.1)$

13. $1.23 \cdot 0.00001$

14. $-2.135 \cdot 1000$

15. $-13.3 \cdot 10$

For the following calculate the **Circumference.**

16. r = 3*m*

17. d=7*in*

18. d=6*ft*

Divide

19. $45.36 \div 36$

20. $27.048 \div (-12)$

21. $-2.55 \div 15$

22. $-0.27 \div 0.12$

23. $-25.83 \div (-2.1)$

24. $-3.9 \div 1.2$

In the following round your answers to the nearest thousandths place.

25. $7.2 \div 3.1$ 26. $-5.23 \div 6$ 27. $-1.23 \div (-0.23)$

Write the following fractions as a decimal, If answer repeats show that in your answer using the bar above the repeating portion.

28. $\frac{4}{9}$ 29. $-\frac{2}{5}$ 30. $-\frac{2}{3}$

Order the following by adding < or >

31. $\frac{2}{5}$ 0.46 32. 0.21 $\frac{1}{8}$ 33. $-\frac{1}{7}$ $-.14$

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Unit 3 **NAME:_____**

Mid-Unit Quick Review 3.1 – 3.3

1. Write 2.035 in words

2. Write the number

Three and twenty-one ten-thousandths

3. $|-2.5|$

4. $-|-2.1|$

5. Write 3.42 as a fraction in lowest terms.

6. Write $\frac{3}{8}$ as a decimal.

Perform the indicated operation

7. $-3.462 - 2.1431$

8. $2.13 + 3.4$

9. $-2.75 - (-2.1)$

10. $3(-2.25)$

11. $-115 \div (-0.25)$

Order the following by placing a < or > in between the numbers.

12. $\frac{2}{3}$ $.67$

13. $-\frac{4}{9}$ -0.4

14. Round -3.42563 to the nearest hundredths place.

15. Circumference can be found by the formula $C = 2\pi r$. Find the circumference of the circle whose radius is 4m, using $\pi \approx 3.14$.

Activity 3.4 - Exponents, Order of operations, Square roots

Part A – Complete the following

$(-3.1)^2$

-4.6^2

$2(1.1)^3 + 3$

$4.2 \div 0.2 \cdot 3.1$

3.4 - 2(3.1)

Part B

What number times itself is 9?

What number times itself is 64?

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Unit 3 - Decimals

Section 4 – Exponents, Order of Operations , Square Roots

Decimals with Exponents

Exponents work the same way with decimals as they do with Integers and Fractions.

Example 1)

$\mathbf{2.3^2}$

2.3^2

$= 2.3 \cdot 2.3$

$= 5.29$

Example 2)

$\mathbf{(-3.4)^2}$

$(-3.4)^2$

$= (-3.4)(-3.4)$

$= 11.56$

Notice everything in the parentheses repeats, including the negative.

Example 3)

$\mathbf{-1.5^2}$

-1.5^2

$= -1.5 \cdot 1.5$

$= -2.25$

Notice only the number itself repeats, not the negative.

Example 4)

$(-\mathbf{1.4})^{\mathbf{3}}$

$(-1.4)^3$

$= (-1.4)(-1.4)(-1.4)$ Notice everything in the parentheses repeats 3 times.

$= 1.96(-1.4)$ Multiply the first two numbers.

$= -2.744$ Multiply the remaining numbers.

Example 5)

$-(-\mathbf{1.2})^{\mathbf{2}}(\mathbf{3.3})^{\mathbf{3}}$

$-(-1.2)^2(3.3)^3$

$= -[(-1.2)(-1.2)][(3.3)(3.3)(3.3)]$ Following PEMDAS , we evaluate both exponents first.

$= -(1.44)(35.937)$ Notice the negative in front had no exponent applied.

$= -51.74928$

Order of Operations

Order of operations are applied the same way to decimals as they were to Integers and fractions. We can use PEMDAS to remind us of the order.

Recall from 1.4

The order that we are expected to follow in called **The order of operations**

1. Start with grouping symbols (parenthesis, etc)
2. Simplify any exponents
3. Complete any multiplication and Division – going from left to right.
4. Complete and addition and subtraction – going from left to right.

Example 6)

$\mathbf{0.25} + \mathbf{0.13}(\mathbf{4.3})$

$0.25 + 0.13(4.3)$

$= 0.25 + 0.559$ We multiply before we add.

$= 0.809$

Example 7)

$\mathbf{2.25 \div 0.5 \cdot 6.23}$

$2.25 \div 0.5 \cdot 6.23$

$= 4.5 \cdot 6.23$

$= 28.035$

We divide before we multiply because Multiplication and division have the same priority and we work left to right.

Example 8)

$\mathbf{2(2.03)^2 - 3 \cdot 0.5}$

$2(2.03)^2 - 3 \cdot 0.5$

$= 2 \cdot 4.1209 - 3 \cdot 0.5$ First we compute the exponent.

$= 8.2418 - 1.5$ Then both multiplications.

$= 6.7418$ Last we subtract.

Finding the Area of a circle

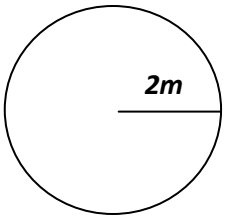
To Find the Area of a circle we use the formula

$$A = \pi r^2 \qquad Where\ \pi = 3.14159265\ \ldots\ \ and\ r = radius$$

For this class we will use the approximation $\pi \approx 3.14$.

Example 9)

Find the area of the following circle



In this example we are given the radius so we will use the formula $A = \pi r^2$

$A = \pi r^2$

$A = \pi(2m)^2$

$A \approx 3.14 \cdot (2m)^2$

$A \approx 3.14 \cdot 4m^2$ Using PEMDAS

$A \approx 12.56m^2$

Example 10)

Find the area of a circle whose diameter is *5 in*.

We will still use $A = \pi r^2$, how ever we have to find r first. **Since** $= \frac{d}{2}$**,** $\boldsymbol{r = \frac{5}{2} in = 2.5 in.}$

$A = \pi r^2$

$A \approx 3.14(2.5\ in)^2$ $\qquad 2.5in \cdot 2.5in = 2.5 \cdot 2.5 \cdot in \cdot in = 6.25in^2$

$A \approx 3.14 \cdot 6.25in^2$

$A \approx 19.625in^2$

Calculating a Mean

One application of order of operations is calculating an average, called the mean. Say you took 3 tests and scored 77, 81, and 84. If all the tests were out of 100, then to calculate your average you will add the 3 test scores together and divide by the number of test scores.

$\frac{77+81+84}{3}$ We divide by 3 because we are averaging 3 scores

$= \frac{242}{3}$

= 80.666666666….

$= 80.\bar{6}$ Or rounded to the nearest whole 81.

Example 11)

Find the average of 77,88, 78 , and 81.

$\frac{77+88+78+81}{4}$ We divide by 4 because we are averaging 4 scores.

$= \frac{324}{4}$ Following PEMDAS, first we add since the top is grouped together.

= 81

Square roots

Perfect squares are numbers that are the product of a number and itself. They are 1, 4, 9, 16, 25, 36, 49,…

$$1 = 1 \cdot 1$$

$$4 = 2 \cdot 2$$

$$9 = 3 \cdot 3$$

$$16 = 4 \cdot 4$$

$$25 = 5 \cdot 5$$

$$36 = 6 \cdot 6$$

$$49 = 7 \cdot 7$$

$$64 = 8 \cdot 8$$

$$81 = 9 \cdot 9$$

$$100 = 10 \cdot 10$$

$$121 = 11 \cdot 11$$

$$144 = 12 \cdot 12$$

$$169 = 13 \cdot 13$$

$$196 = 14 \cdot 14$$

$$225 = 15 \cdot 15$$

$$\vdots$$

$$400 = 20 \cdot 20$$

$$\vdots$$

$$900 = 30 \cdot 30$$

$$\vdots$$

The square root of a number is the number that you would times itself by to get the number. For perfect squares the numbers are nice and clean.

$\sqrt{9} = 3$ This is read "The square root of 9 is 3". Note $9 = 3 \cdot 3$

Example 12)

$\sqrt{\mathbf{100}}$

$\sqrt{100}$

$=\sqrt{10 \cdot 10}$

$= 10$

Example 13)

$\sqrt{\mathbf{25}}$

$\sqrt{25}$

$=\sqrt{5 \cdot 5}$

$= 5$

If I were to ask $x^2 = 9$, then there would be two answers. Notice $3 \cdot 3 = 9$ and $-3 \cdot -3 = 9$. So there are two square roots of 9. One is 3 and the other is -3. In the above we found the positive root. To obtain the negative root we need to add a negative sign in front of the root.

Example 14)

$-\sqrt{\mathbf{36}}$

$-\sqrt{36}$ Notice this example has the negative in front of the root.

$= -\sqrt{6 \cdot 6}$

$=-6$ Therefore the answer is negative.

Exercise 3.4 **NAME:_____**

Simplify the following

1. $(-2.1)^2$

2. $(-0.9)^3$

3. -1.5^2

4. $1.5(3.2)^3$

5. $(-1.2)^2(1.1)^3$

6. $-2.1^2(0.2)^2$

7. $1.1 - 5.6(1.3)$

8. $2.4 - 3.2 + 4.5$

9. $7.2 \div 0.5 \cdot 1.1$

10. $2(0.8)^2 - 6.3 \div 0.3$

11. $(4.1 - 3.6)^2 + 4 \cdot .02$

12. $(4.7 - 1.2)^2 + 4 \div 0.2$

For the following calculate the **Area** of each circle with the given dimension**.**

13. r = 3*m*

14. d=7*in*

15. d=6*ft*

For problems 13-15 compute the mean of the scores listed, round to the nearest hundredth if necessary.

16. 62,77,75,81

17. 88,81,85

18. 90,82,98

Find the following Square roots

19. $\sqrt{121}$

20. $\sqrt{64}$

21. $\sqrt{225}$

22. $-\sqrt{144}$

23. $-\sqrt{196}$

24. $-\sqrt{1600}$

Unit 3 Review NAME:_____

1. Write 34.78266 in words.

2. Write 2.00067 in words.

3. Write the following as a number.

Twenty-three and fifty-six thousandths

4. Write the following as a number.

Thirty-five ten-thousandths

Find the absolute value of the following.

5. $|-21.1|$ 6. $|5.23|$ 7. $-|-4.25|$

Order the following by placing < or > between the numbers.

8. 32.1234 32.123 9. 2.301 2.31 10. -25.34 -25.304

11. Write -3.63 as a fraction.

12. Write 5.625 as a fraction.

13. Round -34.56782 to the nearest thousandth.

14. Round -2.34567 to the nearest hundredth.

15. Round 2.34723 to the nearest ten-thousandth.

16. Round to the nearest dollar : $ 34.76

17. You calculate the cost of a single item bought in bulk as $ 4.34567. How much would you pay for it?

Perform the indicated operation

18. $-23.11 + 34.786$

19. $-78.123 + (-34.27)$

20. $-275.1 - 43.213$

21. $-25.75 - (-344.678)$

22. $8.375 - 6.4$

23. $-345.1 + 34.345$

24. Sue has$ 34.44 in an account and writes a check for $50. If the check clears, what is Sues account balance?

Perform the indicated operation.

25. $-23.45(-3.2)$

26. $-2.324 \cdot 5.5$

27. $(-3.7)(-2.54)$

28. $-23.456(10000)$

29. $5.678(-10)$

30. $3.234 \cdot 0.001$

31. Given the formula for circumference is $C = 2\pi r \quad with \;\; \pi \approx 3.14$. find the circumference of a circle whose radius, r, equal to 3 m.

32. $31.8 \div 15$

33. $385.5 \div 12$

34. $25 \div 6$

35. $12.56 \div 0.2$

36. $5 \div 0.9$

37. $1495.56 \div 1.21$

Round the following to the nearest Thousandth.

38. $456 \div 2.3$

39. $23 \div 7$

40. $4.23 \div 0.7$

41. Write $\frac{7}{9}$ as a decimal.

42. Write $\frac{1}{8}$ as a decimal.

Order the following by placing a < or > in between the numbers

43. $0.85 \quad \frac{6}{7}$

44. $\frac{3}{8} \quad 0.4$

Complete the following

45. $(-2.1)^2$

46. -1.2^2

47. $-(0.4)^3$

48. $2.1(0.2)^4$

49. $3.1\ (-1.1)^3$

50. $2.3 + 1.2(0.2)$

51. $3.6 \div 0.3 \cdot 2.12$

52. $2(0.2)^2 + 3.2(4.1)$

53. $3.25 \div 0.05 + 3.2 \cdot 1.25$

54. Find the average of 77, 75, and 70.

55. $\sqrt{36}$

56. $\sqrt{121}$

57. $-\sqrt{49}$

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Unit 4 – Equations Objective Overview

The following is a small subset of possible problems that could represent each objective. Refer to notes, homework and reviews for a more complete picture.

Section 1 – Variables and Combining Like Terms

By the end of section 1 you should be able to:

- **Evaluate an expression**
  Evaluate $x - 3\ ,\ for\ x\ =\ 5$

- **Combine like terms**
  $3x - x + 7$

- $5a^2b - 4ab - 3a^2b + 7ab^2$

- **Distribute**
  $3(x - 4)$

- **Distribute and Combine like terms**
  $7x - 3(x + 2)$

Section 2 – Solving One-Step Equations

By the end of section 2 you should be able to:

- **Solve equations of the form $x + a = b$**
  $x + 2 = 9$

  $3 + x = 7$

- **Solve equations of the form $x - a = b$**
  $x - 4 = -3$

- **Solve equations of the form $ax = b$**
  $-2x = 18$

- **Simplify then Solve equations**

  $2x - 6x = 12$

- **Set up and Solve equations**
  The sum of a number and 7 is 10.

Section 3 – Solving Two-Step Equations

By the end of section 3 you should be able to:

- **Solve equations of the form $ax + b = c$**
  $3x - 6 = 18$

- **Simplify and Solve**
  $5x - 2(x - 3) = 21$

Section 4 – Solve Multi-Step Equations

By the end of section 4 you should be able to:

- **Solve equations of the form $ax + b = cx + d$**
  $7x - 3 = 2x + 12$

- **Simplify and Solve**
  $4(x-1)-3(x+2)=-4(x+1)+9$

Section 5 – Solve Equations involving Fractions

By the end of section 5 you should be able to:

- **Solve One-step Equations**
  $\frac{3}{2}x=7$

  $x-\frac{1}{2}=\frac{2}{3}$

- **Solve Two Step Equations**
  $\frac{2}{3}x-6=\frac{7}{2}$

- **Solve Multi-step Equations**
  $\frac{4}{5}x-3=\frac{1}{5}x+2$

Section 6 – Solve Equations involving Decimals

By the end of section 6 you should be able to:

- **Solve One-step Equations**
  $2.3x = -2.53$

  $3.1 + x = -0.023$

- **Solve Two Step Equations**
  $3x + 0.2 = .263$

- **Solve Multi-step Equations**
  $0.4x - 3 = 0.2x + 2.63$

Activity 4.1 - Variables and Combining Like Terms

In each of the following describe the result in words.

If you have 7 boxes and add on 4 more boxes to your load, how many boxes do you have?

If you have 7 boxes and add on 12 crates to your load, how many boxes do you have?

If you have 7x and add on 9x, how many do you have total?

If you have 7x and 9y , what do you have total?

If you have 9 boxes of apples that hold x many apples each and 7 more apples, how many apples do you have? (Write an expression using math symbols and variables.)

What is the simplest way to write your answer? Why?

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Unit 4 - Equations

Section 1 – Variables and Combining Like terms

Variables

As stated before, variables are place holders. They can represent the part of a formula that changes.

We have evaluated expressions before, for example:

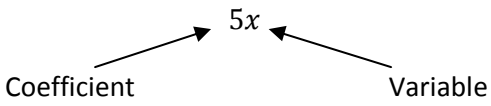
Example 1)

$\boldsymbol{Evaluate \quad x + 25, \quad for\ x = 5}$

$x + 25$

$= 5 + 25$

$= 30$



Simplifying Expressions

When the variables match you can combine two terms by adding (or subtracting) the coefficients.

Example 2)

Simplify $5x + 3x$

$5x + 3x$ 5 + 3 = 8

$= 8x$

Note: $1x = x \quad and \quad -1x = -x.$

Example 4)

Simplify $7x - 8x$

$7x - 8x$

$= -1x$

$= -x$

You can combine multiple terms as long as the variables match.

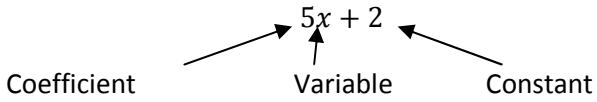
Example 5)

Simplify $10s - 3s + 4s$

$10s - 3s + 4s$

$= 7s + 4s$

$= 11s$



You can combine terms were the variables match, if you have a number by itself, a constant, it can only combine with other constants.

Example 6)

Simplify $4x + 2 + 3x$

$4x + 2 + 3x$

$= 4x + 3x + 2$ The constant 2 stays separate from the term with the Variable.

$= 7x + 2$

Example 7)

Simplify $2x + 3y - 4 + 5x - 6y$

$2x + 3y - 4 + 5x - 6y$

$= 2x + 5x + 3y - 6y \ - 4$

$= 7x - 3y \ - 4$

Notice only the terms with exactly the same variables and exponents combine.

When the variables have exponents, the exponents must match as well to be "like terms".

Example 8)

Simplify $3x^2 - 2x + 3 - 4x^2 - 8x$

$3x^2 - 2x + 3 - 4x^2 - 8x$

$= 3x^2 - 4x^2 - 2x - 8x + 3$ The terms with x^2 combine together,

$= -1x^2 - 10x + 3$ the terms with that have an x combine.

$= -x^2 - 10x + 3$

Example 9)

Simplify $3ab^2 + 4ab - 7a^2b + 2ab^2$

$3ab^2 + 4ab - 7a^2b + 2ab^2$

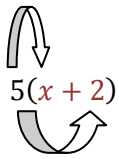
$= 3ab^2 + 2ab^2 + 4ab - 7a^2b$ Notice ab^2 and a^2b are not like terms.

$= 5ab^2 + 4ab - 7a^2b$

$= -7a^2b + 5ab^2 + 4ab$

Distributive Property

If there is a number on the outside of pair of parentheses and then the number gets multiplied to each term on the inside of the parentheses – this is called the Distributive Property.



$5 \cdot x + 5 \cdot 2$

$5x + 10$

Example 10)

Distribute $3(x - 7)$

$3(x - 7)$

$= 3 \cdot x - 3 \cdot 7$

$= 3x - 21$

Example 11)

Distribute $6(2x + 5)$

$6(2x + 5)$

$= 6 \cdot 2x + 6 \cdot 5$

$= 12x + 30$

Distributing a negative changes all signs inside the parentheses.

Example 12)

Distribute $-2(x+4)$

$-2(x+4)$

$= -2 \cdot x - 2 \cdot 4$

$= -2x - 8$

Distributing the negative changes the addition in the parentheses into subtraction.

Example 13)

Distribute $-3(4x-7)$

$-3(4x-7)$

$= -3 \cdot 4x - (-3) \cdot 7$ Distributing the -3 to the -7 turns it into +21.

$= -12x + 21$

If there are more terms outside the parentheses, we can continue to simplify by combining like terms.

Example 14)

Distribute and Simplify $3(x-2)+3$

$3(x-2)+3$

$= 3 \cdot x - 3 \cdot 2 + 3$ Distribute to drop the parentheses.

$= 3x - 6 + 3$

$= 3x - 3$ Combine like terms.

Example 15)

Distribute and simplify $\mathbf{5-(x+3)}$

$5-(x+3)$

$=5-x-3$

$=2-x$

$=-x+2$

Example 16)

Distribute and Simplify $\mathbf{5(2x-7)-3(x-4)}$

$5(2x-7)-3(x-4)$

$=5\cdot 2x-5\cdot 7-3\cdot x-(-3)\cdot 4$ Distribute both sets of parentheses.

$=10x-35-3x+12$

$=10x-3x-35+12$ Combine both sets of like terms.

$=7x-23$

Exercise 4.1 NAME:_____

Evaluate the following

1. $x + 5,\ for\ x = 4$
2. $4y,\quad for\ y = 7$
3. $a - 7,\quad for\ a = 5$
4. $-2b,\quad for\ b = 8$
5. $10 - x,\quad for\ x = 9$
6. $8z,\quad for\ z = 12$

Simplify the following

7. $6x - x$
8. $-12a + 3a$
9. $-2z - 5z$
10. $5t - 3t + 7t$
11. $-6r - r - 7r$
12. $-6v - 7v + 15v$
13. $13s - 5 - s$
14. $7x - 3 + x$
15. $-8d - 4 - 4d$
16. $7m - 4n + 5m$
17. $4s + 7t - 9s$
18. $4k + 6k - 8p$
19. $21m + m - 2n + 5$
20. $-12k - j - 7j + 4$
21. $5h + 4 - 3h + 2f$

22. $3x^2 - 2x + 4x^2 + 5$

23. $-4x^2 + 6x - 7x - x^2$

24. $3x^2 + 2x - 4$

25. $2ab^2 - ab + 3ab^2$

26. $2ab^2 - 3a^2b + ab^2$

27. $5xy^2 - xy + 3xy^2$

28. $45xy^2 + 4xy - 12x^2y - 7xy^2$

29. $5ab^2 - 3ab + 4a^2b - 7$

30. $5xy - 2x + 5y + 12 - 8xy$

Distribute

31. $6(x + 5)$

32. $3(x - 2)$

33. $7(x + 3)$

34. $-2(x + 4)$

35. $-3(x + 2)$

36. $-6(x + 5)$

37. $-4(3x - 2)$

38. $-2(-2x - 7)$

39. $-3(5x - 7)$

Distribute then simplify

40. $2(x+4)-x$

41. $5(3x-2)+7$

42. $3(x-8)-4$

43. $6+3(2x-7)$

44. $3x+2(x+3)$

45. $5+5(2x+1)$

46. $5-2(x+1)$

47. $3-5(x-2)$

48. $-x-4(x-1)$

49. $4(x-2)-3(2x+2)$

50. $5(2x+3)-4(5x-5)$

51. $3(x-2)-(-3x+7)$

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Activity 4.2 - Solving One-Step Equations

Part A

Consider the following

If $x = 4$, does $x + 2 = 6$? Why or why not?

If $y = 4$, can $y + 7 = 8$? Why or why not?

Part B

If $a + 3 = 7$, can you determine what a equals? Why or why not? What "math" do you do with the 3 and the 7?

If $5x = 35$, can you determine what x equals? Why or why not? What "math" do you do with the 5 and the 35?

Part C

Consider the equation

$x + 9 = 13$ Can I subtract 3 from both sides of this equation? Does it get me closer to the value of x?

Consider the equation

$x + 9 = 13$ Can I subtract 9 from both sides of this equation? Does it get me closer to the value of x?

Part D

A number increased by 15 is 22, find the number.

Can you write a math equation that might represent this? What would you use to represent "a number"?

Unit 4 - Equations

Section 2 – Solving One-Step Equations

In this section we will be looking for solutions to equations.

A **solution** is a number that can be plugged into an equation that keeps the equation true.

Is $x = 3$ a solution to $x + 7 = 10$?

$x + 7 = 10$

$\downarrow$

$3 + 7 = 10$

$10 = 10$

Since this is a true statement **, $x = 3$ is a solution to $x + 7 = 10$.**

Is $x = 2$ a solution to $x + 7 = 10$?

$x + 7 = 10$

$2 + 7 = 10$

$9 = 10$

Since $9 \neq 10$, **$x = 2$ is NOT a solution of $x + 7 = 10$**.

We can solve equations and find solutions as long as we keep the equations balanced as we work the problem. Think of the "=" a the tip of a balance or a scale. Adding pebbles to one side of a scale would through it off balance. In order to not change the balance you have to add pebbles to the other side of the scale as well.

When I solve equations the first thing I do is look for my variable and think about how the numbers are attached. I then do the opposite to "unattach" them.

Solving Equations of the Form $x + a = b$

For problems that have a number added to the variable – I do the opposite of add – I subtract the number from both sides.

Example 1)

Solve $x + 4 = 15$

$$\begin{array}{r} x + 4 = 15 \\ -4 \quad -4 \\ \hline x + 0 = 11 \end{array}$$
$$x = 11$$

We can Subtract 4 to get x by itself, but we must do it to both sides of the = sign.

The Solution is 11 .

We can check to be sure this is correct by plugging $x = 11$ into the original problem.

$$\begin{aligned} x + 4 &= 15 \\ 11 + 4 &= 15 \\ 15 &= 15 \end{aligned}$$

Since the result is the same on both sides the solution is correct.

For problems that have a number subtracted from the variable – I do the opposite of subtract – I add the number to both sides.

Example 2)

Solve $y - 7 = 12$

$$\begin{array}{r} y - 7 = 12 \\ +7 \quad +7 \\ \hline y + 0 = 19 \end{array}$$

We can add 7 to get y by itself, but we must do it to both sides of the = sign.

$y = 19$

Check: This solution is correct since 19 – 7 = 12.

Example 3)

$\boldsymbol{b - 3 = -15}$

$$\begin{array}{rcl} b - 3 & = & -15 \\ +3 & & +3 \\ b + 0 & = & -12 \end{array}$$

$b = -12$

We can add 3 to get b by itself, but we must do it to both sides of the = sign.

Check: This solution is correct since $-12 - 3 = -15$.

Solving Equations of the Form $ax = b$

For problems that have a number multiplied to the variable – I do the opposite of multiply – I divide by the number on both sides.

Example 4)

$\boldsymbol{5x = 25}$

$$\frac{5x}{5} = \frac{25}{5}$$
$$1x = 5$$

$x = 5$

We can divide by 5 to get x by itself, but we must do it to both sides of the = sign.

Check: The solution is correct since $5 \cdot 5 = 25$.

Example 5)

$\boldsymbol{-7y = 42}$

$$\begin{array}{rcl} -7y & = & 42 \\ -7 & & -7 \end{array}$$

$1y = -6$

$y = -6$

We can divide by -7 to get y by itself, but we must do it to both sides of the = sign.

Check: The solution is correct since $-7 \cdot -6 = 42$.

Example 6)

$-3a = -36$

$-3a = -36$
$-3 \quad -3$

$a = 12$

We can divide by 5 to get a by itself, but we must do it to both sides of the = sign.

Check: The solution is correct since $-3 \cdot 12 = -36$.

What do you do to get x by itself?

Example 7) Consider the following problems

a) $2x = -10$ **b)** $x - 10 = -15$

a) $2x = -10$

Since the 2 is held to the x by multiply – I will do the opposite of multiply and divide.

$2x = -10$

$\frac{2x}{2} = \frac{-10}{2}$

$1x = -5$

$x = -5$

Check:
$2 \cdot -5 = 10$

b) $x - 10 = -15$

Since the 10 is being subtracted from the x – I will do the opposite of subtract and add.

$x - 10 = -15$

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

$x + 0 = -5$

$x = -5$

Check:
$-5 - 10 = -15$

If there are like terms on the same side of the "=", we begin by combining them before considering what operation to do to both sides.

Example 8)

$\boldsymbol{x + 8 = 12 - 5}$

$x + 8 = 12 - 5$ We combine like terms before getting x by itself.

$$\begin{array}{r} x + 8 = 7 \\ -8 \quad -8 \\ \hline x + 0 = -1 \end{array}$$

$x = -1$

Check: The solution is correct since $-1 + 8 = 12 - 5$.

Example 9)

$\boldsymbol{7x - 3x = 70 - 46}$

$7x - 3x = 70 - 46$ First combine like terms.

$\frac{4x}{4} = \frac{24}{4}$

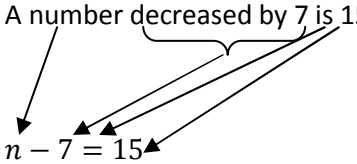
$x = 6$

Check: The solution is correct since $7 \cdot 6 - 3 \cdot 6 = 70 - 46$.

Words to Equations

It is essential to understand how words can build equations. Consider the following:

A number decreased by 7 is 15.



$n - 7 = 15$

Words that mean math – add to the list as you come across new words!

+	-
Add to Increased by	Decreased by
X	**÷**
Product of Twice (X 2)	Quotient Divided Among Half (÷2)

= is

Example10)

The product of a number and three is twenty – seven, find the number.

Equation: $3 \cdot n = 27$ Product means multiply 3 and the number "n".

$\frac{3n}{3} = \frac{27}{3}$

$n = 9$

The number is 9.

Check: $3 \cdot 9 = 27$

Exercise 4.2 NAME:_____

Solve the following.

1. $x + 4 = 7$

Check:

2. $x + 7 = 17$

Check:

3. $x + 8 = 22$

Check:

4. $x - 13 = 10$

Check:

5. $x - 4 = 15$

Check:

6. $x - 3 = 7$

Check:

7. $x + 10 = -15$

Check:

8. $x - 3 = -10$

Check:

9. $x - 1 = -12$

Check:

10. $2x = 12$

Check:

11. $3x = 24$

Check:

12. $5x = 45$

Check:

13. $-4x = 16$

Check:

14. $-7x = 42$

Check:

15. $-3x = -15$

Check:

16. $-4x = -24$

Check:

17. $-9x = -72$

Check:

18. $-8x = 32$

Check:

Solve

19. $x - 3 = -13$

20. $-4x = -16$

21. $-2x = -18$

22. $5x - 3x = 10$

23. $-4x - 7x = -33$

24. $-5x + 8x = 27$

25. $5x = -72 + 47$

26. $9x = -42 - 3$

27. $-3x = 25 - 16$

28. $x - 10x + 12x = 13 - 7$

29. $4x + 3x - 5x = 54 - 12$

30. $15x - 7x = -12 - 52$

Write an equation for the following and then solve.

31. Twice a number is 16, find the number.

Equation:

32. A number increased by 20 is 35, find the number.

Equation:

33. The product of a number and 5 is 55, find the number.

Equation:

Activity 4.3 - Solving Two-Step Equations

Is x =3 a solution to 2x + 7 = 13 ? Show all steps clearly.

What did you do first? Why?

What did you do 2nd ? Why?

If you wanted to "undo" what you did , what would you have to do first?

Consider 2x + 7 = 13. Can you divide both sides by 2? Should you? What would it look like?

Consider 2x + 7 = 13. Can you subtract 7 from both sides? Should you? What would it look like?

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Unit 4 - Equations

Section 3 – Solving Two-Step Equations

When solving equations with more than one thing attached to the variable, it helps to think about how each thing is attached and how order of operations would be applied. We need to "undo" the order of operations so we will work backwards.

> Think about putting on socks and shoes. You must put on your socks before your shoes. However you have to take off your shoes before you take off your socks.

Example 1) Solve

$\mathbf{5x + 7 = 37}$

If we were to use order of operations while evaluating this example we would multiply before we add. Reversing this to get x by itself, we must get rid of the addition before the multiplication.

Step 1)

$$\begin{array}{r} 5x + 7 = 37 \\ -7 \quad -7 \\ \hline 5x + 0 = 30 \end{array}$$

To get rid of the "+7" we " – 7"from both sides.

$5x = 30$

Step 2)

$\frac{5x}{5} = \frac{30}{5}$ To get rid of the multiply by 5, we divide by 5.

$x = 6$

The Solution is $x = 6$. As before we can plug is this solution for x in the original problem and we should get a true statement.

Check: $5(6) + 7 = 30 + 7 = 37$

P
E
MD
AS ↑

Notice we are using PEMDAS backwards!

Example 2)

$\boldsymbol{2x - 3 = -15}$

Step 1) We move the – 3 before the times by 2. Subtraction is weaker than multiply.

$$\begin{array}{r} 2x - 3 = -15 \\ +3 \quad\quad +3 \\ \hline 2x + 0 = -12 \end{array}$$

$2x = -12$

Step 2)

$$\frac{2x}{2} = \frac{-12}{2}$$

$x = -6$

Check: $2(-6) - 3 = -12 - 3 = -15$

Example 3)

$\boldsymbol{-7 + 2x = -9}$

Step 1)

$$\begin{array}{r} -7 + 2x = -9 \\ +7 \quad\quad\quad +7 \\ \hline 0 + 2x = -2 \end{array}$$

$2x = -2$

Step 2)

$$\frac{2x}{2} = \frac{-2}{2}$$

$x = -1$

Check: $-7 + 2(-1) = -7 - 2 = -9$

Example 4)

$\mathbf{15 - (-5) = 7x - 4x - 1}$

Step 1) Combine like terms on both sides of the equal sign.

$15 - (-5) = 7\text{x} - 4\text{x} - 1$

$20 = 3x - 1$

Step 2)

$$\begin{array}{r} 20 = 3x - 1 \\ +1 \qquad +1 \\ \hline 21 = 3x + 0 \end{array}$$

$21 = 3x$

Step 3)

$$\frac{21}{3} = \frac{3x}{3}$$

$7 = x$

Check: $15 - (-5) = 7(7) - 4(7) - 1$

$20 = 49 - 28 - 1$

$20 = 21 - 1$

If there are parentheses, you can distribute first and then solve the same way.

Example 5)

$\mathbf{5(x - 2) = 30}$

Step 1)

$5(\text{x} - 2) = 30$

$5x - 10 = 30$ Distribute.

Step 2)

$$\begin{array}{r} 5x - 10 = 30 \\ +10 \ +10 \\ \hline 5x + \ 0 \ = 40 \end{array}$$

Example 5) continued…

Step 3)

$\frac{5x}{5} = \frac{40}{5}$

$x = 8$

Check : $5(8-2) = 5(6) = 30$

Example 6)

$\boldsymbol{2(x-4)+4x=40}$

Step 1)

$2(x-4)+4x=40$

$2x-8+4x=40$ Distribute to drop the parentheses.

$6x-8=40$ Combine Like Terms.

Step 2)

$$\begin{array}{r} 6x-8=40 \\ +8\quad +8 \\ \hline 6x+0=48 \end{array}$$

$6x = 48$

Step 3)

$\frac{6x}{6} = \frac{48}{6}$

$x = 8$

Check: $2(8-4)+4(8) = 2(4)+4(8) = 8+32 = 40$

Exercise 4.3 NAME:_____

Solve the following.

1. $3x - 2 = 10$

Check

2. $22 = 5x + 7$

Check

3. $7x - 2 = 40$

Check

4. $-50 = 8x - 10$

Check

5. $-4x + 6 = -6$

Check

6. $-41 = 9x - 5$

Check

7. $7 - 2x = -15$

Check

8. $4 - 3x = 22$

Check

9. $3 - 8x = -53$

Check

10. $6(x-3)=-54$

11. $12=4(x-1)$

12. $3(2x-5)=15$

Check

Check

Check

13. $5x-3x+2=18$

14. $-7x-2x+7=-11$

15. $5-(-2)=-3x-5x-9$

16. $6-2(x+7)=10-24$

17. $5(x-2)+3x-7=11-(-4)$

Activity 4.4 - Multi-Step Equations

Is $x = 2$ a solution to $3x + 5 = 5x + 1$? Show all steps clearly. (Do not solve it – plug it in to check.)

Can you get x by itself by solving this? Which x would you try to isolate?

Consider $3x + 5 = 5x + 1$, can you divide both sides by 3x? Should you? What would it look like?

Consider $3x + 5 = 5x + 1$, can you subtract 3x from both sides? Should you? What would it look like?

What should you do first to solve $3x + 5 = 5x + 1$ for x?

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Unit 4 - Equations

Section 4 – Solving Multi-Step Equations

If there is an x on both sides of the equal sign, we must find away to combine them by first getting them on the same side of the equation.

Example 1) Solve

$$\boldsymbol{2x + 7 = -3x + 22}$$

There is an x on both sides of the equal sign. The first step is to move them to the same side.

Step 1)

$$\begin{array}{r} 2x + 7 = -3x + 22 \\ +3x \qquad\quad +3x \\ \hline 5x + 7 = \quad 0 \quad + 22 \end{array}$$

To move the "- 3x" to the other side we do the opposite and "+ 3x" to both sides.

$$5x + 7 = 22$$

Step 2)

$$\begin{array}{r} 5x + 7 = 22 \\ -7 \quad -7 \\ \hline 5x + 0 = 15 \end{array}$$

To get rid of the " + 7 " we " – 7 " from both sides.

$$5x = 15$$

Step 3)

$$\frac{5x}{5} = \frac{15}{5}$$

To get rid of the multiply by 5, we divide by 5 on both sides.

$$x = 3$$

The Solution is $= 3$. As before we can plug is this solution for x in the original problem and we should get a true statement.

Check: $2(3) + 7 = -3(3) + 22$

$$6 + 7 = -9 + 22$$

$$13 = 13$$

If you are working a problem with like terms that can be combined on the SAME SIDE of the equal sign, it makes the problem significantly easier to begin by combining them.

Example 2)

$\boldsymbol{2x + 7 - 6x = 7x - 19 + 4}$

We need to combine like terms ON THE SAME SIDE of the "=" before doing anything else.

Step 1)

$2x + 7 - 6x = 7x - 19 + 4$

$-4x + 7 = 7x - 15$ Combine like terms.

Step 2)

$$\begin{array}{l} -4x + 7 = 7x - 15 \\ \underline{-7x \quad\quad -7x} \\ -11x + 7 = 0 \ -15 \end{array}$$

Move the variable to one side.

$-11x + 7 = -15$

Step 3)

$$\begin{array}{r} -11x + 7 = -15 \\ \underline{\quad\quad -7 \quad -7} \\ -11x + 0 = -22 \end{array}$$

Get rid of the addition, then the multiplication.

$-11x = -22$

Step 4)

$$\frac{-11x}{-11} = \frac{-22}{-11}$$

$x = 2$

The solution is $x = 2$. We can verify the solution by plugging 2 in for x in the original problem.

Check: $2(2) + 7 - 6(2) = 7(2) - 19 + 4$

$4 + 7 - 12 = 14 - 19 + 4$

$11 - 12 = -5 + 4$

$-1 = -1$

Sometimes it is necessary to distribute so you can simplify both sides of an equation.

Example 3)

$\mathbf{3(2x-4)+7=5x-15}$

Step 1)

$3(2x-4)+7=5x-15$

$6x-12+7=5x-15$ Begin by distributing to drop the parentheses.

$6x-5=5x-15$ Combine like terms on the same side of the equal sign.

Step 2)

$$\begin{array}{r} 6x-5=5x-15 \\ -5x\quad -5x \\ \hline x-5=0-15 \end{array}$$

Move the x to the same side of the equal sign.

$x-5=-15$

Step 3)

$$\begin{array}{r} x-5=-15 \\ +5\quad +5 \\ \hline x+0=-10 \end{array}$$

Move the – 5 by adding 5 to both sides.

$x=-10$

The Solution is $x=-10$.

Check: $3(2(-10)-4)+7=5(-10)-15$

$3(-20-4)+7=-50-15$

$3(-24)+7=-65$

$-72+7=-65$

$-65=-65$

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Exercise 4.4 NAME:_____

Solve the following.

1. $5x - 6 = -2x + 15$

2. $4x - 3 = 8x + 9$

3. $4 - 3x = 2x - 36$

4. $7x - 3x + 2 = 5 - 2x + 9$

5. $6x - 3 + 2x = 7x - x + 15$

6. $-2x + 7 - 12 + 3x = 5x - 7x + 10$

7. $3(x - 2) + 7x = 2(x + 3) - 4$

8. $5(x - 3) + 3 = 3x - (4 + 2x)$

9. $7x - 2(x - 5) = -3x + 2(x - 4)$

Unit 4 **NAME:_____**

Mid Unit Review 4.1 – 4.4

Simplify

1. $12y - 3y$

2. $5x + 2y - x$

3. $-3(x - 2)$

4. $2 - 5(x + 1)$

Solve

5. $x + 5 = -7$

6. $4 = x - 10$

7. $3x = -24$

8. $-12 = -2x$

9. $3x - x = 7 - (-3)$

10. $4x + 1 = -15$

11. $2x + 2 = 5x + 17$

12. $4(x - 1) + 10 = 3x + 4(-x - 1)$

How comfortable are you feeling solving equations?

Activity 4.5 - Solving Equations with Fractions

Solve the following

1. $x - \frac{3}{4} = -\frac{1}{2}$

2. $\frac{2}{5}x = \frac{6}{25}$

3. $\frac{1}{6}x - \frac{2}{3} = -\frac{1}{2}$

4. $\frac{1}{2}x - 2 = \frac{2}{3}x + \frac{1}{5}$

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Unit 4 - Equations

Section 5 – Solving Equations with Fractions

We solve equations with Fractions the same way as equations with integers.

One- step equations are solved by considering how the number is attached to the variable as in 4.2.

Example 1) Solve

$\frac{2}{3}x = \frac{7}{6}$

Since the $\frac{2}{3}$ is held by multiplication we will divide to isolate the x.

$\frac{2}{3}x = \frac{7}{6}$

$\frac{3}{2} \cdot \frac{2}{3}x = \frac{3}{2} \cdot \frac{7}{6}$

$x = \frac{7}{4}$

Recall: Dividing by a fraction is the same as multiplying by the reciprocal.

The solution is $= \frac{7}{4}$. Remember we can double check this by plugging it in to the original equation.

Check: $\frac{2}{3}\left(\frac{7}{4}\right) = \frac{7}{6}$

Example 2) Solve

$x - \frac{2}{3} = \frac{1}{6}$

Since the $\frac{2}{3}$ is held by subtraction, we will add it to both sides.

$$\begin{array}{r} x - \frac{2}{3} = \frac{1}{6} \\ +\frac{2}{3} \quad +\frac{2}{3} \\ \hline x + 0 = \left(\frac{1}{6} + \frac{2}{3}\right) \end{array}$$

We need to find a common denominator to add $\frac{1}{6} + \frac{2}{3}$.

$x = \frac{1}{6} + \frac{2}{3} = \frac{1}{6} + \frac{4}{6}$

Example 2) continued….

$x = \frac{5}{6}$

The solution is $x = \frac{5}{6}$.

Check: $\frac{5}{6} - \frac{2}{3} = \frac{5}{6} - \frac{4}{6} = \frac{1}{6}$

With two step equations we handle it by peeling off things the opposite way as the order of operations would be applied as in 4.3.

Example 3)

$\boldsymbol{\frac{5}{3}x - \frac{1}{6} = \frac{1}{2}}$

We have to decide if we will move the $\frac{5}{3}$ or the $\frac{1}{6}$ first.

Step 1)

$$\begin{array}{r} \frac{5}{3}x - \frac{1}{6} = \frac{1}{2} \\ +\frac{1}{6} \quad +\frac{1}{6} \\ \hline \frac{5}{3}x + 0 = \frac{4}{6} \end{array}$$

We add $\frac{1}{6}$ to both sides first.

$\frac{5}{3}x = \frac{2}{3}$

Step 2)

$\frac{3}{5} \cdot \frac{5}{3}x = \frac{3}{5} \cdot \frac{2}{3}$

We then move the $\frac{5}{3}$ by multiplying by the reciprocal.

$x = \frac{2}{5}$

The solution is $= \frac{2}{5}$.

Check: $\frac{5}{3}\left(\frac{2}{5}\right) - \frac{1}{6} = \frac{1}{2}$

$\frac{2}{3} - \frac{1}{6} = \frac{1}{2}$

$\frac{4}{6} - \frac{1}{6} = \frac{1}{2}$

$\frac{3}{6} = \frac{1}{2}$

Just as with equations with integers, it is possible to simplify before combining like terms.

Example 4)

$\frac{1}{8}-\frac{1}{4}\left(x-\frac{1}{2}\right)=\frac{3}{4}$

Step 1) Distribute and combine like terms.

$\frac{1}{8}-\frac{1}{4}\left(x-\frac{1}{2}\right)=\frac{3}{4}$

$\frac{1}{8}-\frac{1}{4}x+\frac{1}{8}=\frac{3}{4}$

$-\frac{1}{4}x+\frac{1}{4}=\frac{3}{4}$

We can combine $\frac{1}{8}+\frac{1}{8}=\frac{2}{8}=\frac{1}{4}$

Step 2) Remove the term added to the variable.

$$\begin{array}{r} -\frac{1}{4}x+\frac{1}{4}=\frac{3}{4} \\ -\frac{1}{4}\quad -\frac{1}{4} \\ \hline -\frac{1}{4}x+0=\frac{1}{2} \end{array}$$

Note: $\frac{3}{4}-\frac{1}{4}=\frac{2}{4}=\frac{1}{2}$

$-\frac{1}{4}x=\frac{1}{2}$

Step 3) Remove the multiply by $-\frac{1}{4}$ by multiplying by the reciprocal $\left(-\frac{4}{1}\right)$.

$\left(-\frac{4}{1}\right)\cdot-\frac{1}{4}x=\left(-\frac{4}{1}\right)\cdot\frac{1}{2}$

$x=-2$

The solution is $x=-2$.

Check: $\frac{1}{8}-\frac{1}{4}\left(-2-\frac{1}{2}\right)=\frac{3}{4}$

$\frac{1}{8}-\frac{1}{4}\left(-\frac{5}{2}\right)=\frac{3}{4}$

$\frac{1}{8}+\frac{5}{8}=\frac{3}{4}$

$\frac{6}{8}=\frac{3}{4}$

When there is a variable on both sides of the equal sign, we must move them to one side to combine like terms and isolate the variable as in 4.4.

Example 5)

$\frac{1}{3}x - 1 = \frac{2}{5}x + \frac{1}{3}$

Step 1) We move the terms with x to one side.

$$\begin{array}{r} \frac{1}{3}x - 1 = \frac{2}{5}x + \frac{1}{3} \\ -\frac{2}{5}x \qquad -\frac{2}{5}x \\ \hline -\frac{1}{15}x - 1 = \ 0 \ + \frac{1}{3} \end{array}$$

$-\frac{1}{15}x - 1 = \frac{1}{3}$

Step2) Next we move the -1 by adding 1.

$$\begin{array}{r} -\frac{1}{15}x - 1 = \frac{1}{3} \\ +1 \quad +1 \\ \hline -\frac{1}{15}x + 0 = \frac{4}{3} \end{array}$$

$-\frac{1}{15}x = \frac{4}{3}$

Step 3) Remove the $-\frac{1}{15}$.

$\left(-\frac{15}{1}\right) \cdot -\frac{1}{15}x = \left(-\frac{15}{1}\right) \cdot \frac{4}{3}$

$\boldsymbol{x = -20}$

Check: $\frac{1}{3}(-20) - 1 = \frac{2}{5}(-20) + \frac{1}{3}$

$-\frac{20}{3} - 1 = -8 + \frac{1}{3}$

$-\frac{20}{3} - \frac{3}{3} = -\frac{24}{3} + \frac{1}{3}$

$-\frac{23}{3} = -\frac{23}{3}$

Exercise 4.5 NAME:_____

Solve the following.

1. $\frac{1}{2}x = \frac{3}{4}$
2. $\frac{3}{2}x = -\frac{9}{5}$
3. $\frac{5}{3}x = \frac{7}{10}$
4. $x + \frac{1}{2} = \frac{3}{4}$
5. $x - \frac{1}{3} = \frac{2}{3}$
6. $x - \frac{1}{8} = \frac{1}{4}$
7. $\frac{1}{2}x - \frac{1}{6} = \frac{1}{3}$
8. $\frac{3}{4}x - 1 = -\frac{2}{3}$
9. $\frac{2}{3}x - \frac{1}{3} = \frac{1}{3}$

10. $\frac{1}{2}(x-1)+2=1$

11. $\frac{2}{3}(x+1)-2x=\frac{1}{3}$

12. $\frac{1}{4}-\frac{1}{12}(x+1)=\frac{1}{3}$

13. $\frac{1}{3}x-2=\frac{2}{3}x+1$

14. $\frac{1}{6}x-\frac{2}{3}=\frac{1}{3}x+\frac{1}{2}$

15. $\frac{5}{6}x-\frac{1}{3}=\frac{1}{2}x+1$

Activity 4.6 - Equations with Decimals

Solve the following

1. $x - 4.2 = 0.25$

2. $1.2x = 1.44$

3. $0.2x - 1.68 = -0.25$

4. $0.25x - 3 = .5x + 2.2$

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Unit 4 - Equations

Section 6 – Solving Equations with Decimals

We solve equations with Decimals the same way as equations with integers.

One- step equations are solved by considering how the number is attached to the variable as in 4.2.

Example 1)

$\mathbf{0.5}x = -\mathbf{1.2}$

$\frac{0.5x}{0.5} = \frac{-1.2}{0.5}$ Since the 0.5 is held on by multiplication we divide on both sides.

$x = -\mathbf{2.4}$

As before we can check to verify this solution by plugging the answer into the original problem.

Check : $0.5(-2.4) = -1.2$

Example 2)

$x - \mathbf{3.1} = -\mathbf{7.025}$

$x - 3.1 = -7.025$
$+3.1 \quad +3.1$
$x + \ 0 = -3.925$ Since the 3.1 is held to the variable by subtraction, we add to both sides.

$x = -\mathbf{3.925}$

Check: $-3.925 - 3.1 = -7.025$

With two step equations we handle it by peeling off things the opposite way as the order of operations would be applied as in 4.3.

Example 3)

$\mathbf{0.25x - 3 = 4.1}$

Step 1) First we remove the subtraction.

$$\begin{array}{r} 0.25x - 3 = 4.1 \\ +3 \quad +3 \\ \hline 0.25x + 0 = 7.1 \end{array}$$

$0.25x = 7.1$

Step 2) Next we remove the multiplication.

$$\frac{0.25x}{0.25} = \frac{7.1}{0.25}$$

$\boldsymbol{x = 28.4}$

Check: $0.25(28.4) - 3 = 4.1$

$7.1 - 3 = 4.1$

When there is a variable on both sides of the equal sign, we must move them to one side to combine like terms and isolate the variable as in 4.4.

Example 4)

$\mathbf{0.2x + 0.2 = 0.5x + 1.7}$

Step 1)

$$\begin{array}{r} 0.2x + 0.2 = 0.5x + 1.7 \\ -0.5x \quad -0.5x \\ \hline -0.3x + 0.2 = 0 + 1.7 \end{array}$$

$-0.3x + 0.2 = 1.7$

Step 2)

$$\begin{array}{r} -0.3x + 0.2 = 1.7 \\ -0.2 \quad -0.2 \\ \hline -0.3x + 0 = 1.5 \end{array}$$

$-0.3x = 1.5$

Example 4) Continued…

Step 3)

$$\frac{-0.3x}{-0.3} = \frac{1.5}{-0.3}$$

$$\boldsymbol{x = -5}$$

Check: $0.2 \cdot -5 + 0.2 = 0.5 \cdot -5 + 1.7$

$$-1 + 0.2 = -2.5 + 1.7$$

$$-0.8 = -0.8$$

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Exercise 4.6 NAME:_____

Solve the following.

1. $0.2x = 0.82$
2. $-1.2x = 1.44$
3. $-1.6x = -0.48$
4. $x - 1.52 = 4.63$
5. $x + 7.06 = 2.1$
6. $x + 4.1 = -3.275$
7. $0.3x - 2 = 0.1$
8. $0.4x - 7 = 2.5$
9. $1.3x + 0.20 = -1.49$

10. $0.3x - 0.5 = 0.2x + 0.3$

11. $2.1x + 7.45 = 1.1x - 3.2$

12. $0.7x - 1.2 = 0.3x + 3.24$

13. $0.2(0.1x + 2) - 0.6 = 5.2$

14. $4.1(x - 0.2) + 3.3x = 0.4(x - 1) + 2.1$

Unit 4 Review NAME:_____

Evaluate the following

1. $x + 5, \quad for\ x = -6$

2. $3b + 4, \quad for\ b = -7$

Simplify

3. $4x - 3x + x$

4. $2x + 5y - 3x$

5. $15k - 5j + 2k + j$

6. $5x^2 - 3x + 2$

7. $2x^2y - 5xy + 5xy^2 + 3xy$

Distribute and simplify

8. $3(x + 2)$

9. $5(x - 7)$

10. $-2(x - 4)$

11. $-2(3x + 6)$

12. $2 + 3(x - 4)$

13. $5x - 2(x - 4)$

Solve

14. $x + 7 = -13$

15. $x - 4 = -22$

16. $-4 = x + 22$

Solve

17. $4x = 24$

18. $-11x = 55$

19. $-7x = -49$

20. $3x + 7x = 15 - (-5)$

21. $2x + 5 - x = 14$

22. A number increased by five is twenty. Find the number.

23.The product of a number and 7 is 28. Find the number.

Solve

24. $2x - 7 = 9$

25. $4 - 3x = 31$

Solve

26. $3(x-1)+2=5$

27. $4-2(x+1)=7-(-3)$

28. $4x-5=2x+17$

29. $3x-5=2(x+7)-3$

30. $\frac{2}{7}x=\frac{5}{7}$

31. $x-\frac{7}{3}=\frac{2}{3}$

32. $\frac{4}{5}x - \frac{1}{3} = \frac{1}{6}$

33. $\frac{1}{2}x - \frac{2}{3} = \frac{5}{2}x - \frac{1}{3}$

34. $0.4x = 0.64$

35. $x - 2.5 = 3.65$

36. $0.25x + 4.1 = -2.55$

Unit 5 – Proportions and Percents
Objective Overview

The following is a small subset of possible problems that could represent each objective. Refer to notes, homework and reviews for a more complete picture.

Section 1 – Ratios

By the end of section 1 you should be able to:

- **Write a ratio in lowest terms**
  26 in. to 39 in.

  $1\frac{3}{4}\ m\ to\ \frac{1}{2}m$

  $1.4ft\ to\ 7ft$

- **Write a ratio in lowest terms that require unit conversions.**
  2 weeks to 6 days

Section 2 – Rates

By the end of section 2 you should be able to:

- **Find the rate.**
  There are 90 ornaments to decorate and 20 children doing the decorating. Find the rate of ornaments to children.

- **Find the unit rate**
  If you drove 300 miles in 5 hours, what speed were you traveling (Miles per Hour)?

- **Find the best deal.**
  You are looking to buy honey at a local market – which of the following options are the best deal?
  A 12 oz bottle for 1.20
  A 24 oz bottle for 2.64
  A 32 oz bottle for 3.24

Section 3 – Proportions

By the end of section 3 you should be able to:

- **Solve proportion**
  $\frac{x}{3} = \frac{9}{27}$

  $\frac{1\frac{1}{2}}{x} = \frac{6}{35}$

  $\frac{3.2}{2} = \frac{x}{4.1}$

- **Set up and then solve proportions.**
  You have a recipe that serves 4 but want to make it for a party of 10. If the recipe calls for 1 cup of flour , how much should you use to make it for 10?

Section 4 – Percents

By the end of section 4 you should be able to:

- **Convert a percent in to a decimal.**
  Write 34% as a decimal.

- **Convert a decimal in to a percent.**
  Write 0.232 as a percent.

- **Convert a percent in to a fraction.**
  Write 24% as a fraction.

- **Convert a fraction in to a percent.**
  Write $\frac{1}{8}$ as a percent.

Section 5 – Solving Percents using Proportions

By the end of section 5 you should be able to:

- **Set up a proportion and solve a proportion**
  What is 30% of 200?

  What percent of 30 is 300?

  10 is what 30% of what number?

- **Set up and solve a word problem.**

  If a stereo normally cost $250, and today it is on sale for 80% the normal cost. How much would you pay if you bought it today?

Section 6 – Solving Percents with Equations

By the end of section 6 you should be able to:

- **Set up an equation and solve.**
  What is 30% of 200?

  What percent of 30 is 300?

  10 is what 30% of what number?

- **Set up and solve a word problem.**

  If a stereo normally cost $250, and today it is on sale for 80% the normal cost. How much would you pay if you bought it today?

Section 7 – Solving Percents Problems

By the end of section 7 you should be able to:

- **Finding Percent increase/decrease.**
  If a book was $150 last year and $200 this year, what was the percent increase?

  If there were 15 sections of Math 32 this semester but only 12 next year what was the percent decrease?

- **Calculate a tip.**

  How much tip should you leave on a $34.26 bill if you wanted to leave a 10% tip? What about 15%?

Activity 5.1 - Ratios

A **RATIO** is a comparison of two whole numbers with the same units. We do not use Decimals or mixed numbers to represent a ratio. A ratio can look like a reduced fraction when you are done simplifying it.

Examples: $\frac{2}{1}$, $\frac{7}{4}$, $\frac{4}{5}$ or 2:1, 7:4, 4:5

1. Write a ratio that represents 4 feet to 6 feet

2. Write a ratio to represents 2 cm to 4 cm.

3. Write a ratio the represents 0.5 in to 0.25 in.

4. How would you write the ratio of 5 feet to 10 inches? Does this follow the description above?

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Unit 5 – Proportions and Percents

Section 1 –Ratios

A **ratio** compares two whole numbers with the same units.

Writing Ratios

If you wanted to write \$5 to \$2 as a ratio we would write

$\frac{\$5}{\$2}$ Since the units are the same – they cancel and the ratio is:

$$\frac{5}{2}$$

Notice we leave this as a "improper" fraction so it is a whole number to a whole number.

If we asked for the ratio \$2 to \$5, we would write the 2 on top and the 5 on bottom, in other words:

$$\frac{2}{5}$$

Whichever one is written first gets written on top.

Example 1)

Write $\$15$ *to* $\$21$ as a ratio

$\$15$ *to* $\$21$

$= \frac{15}{21}$

$= \frac{3 \cdot 5}{3 \cdot 7}$ We reduce by canceling the common factor of 3.

$= \frac{5}{7}$

Lowest terms

Every ratio needs two numbers one written in the numerator and one written in the denominator.

Example 2)

20 feet to 4 feet

20 feet to 4 feet

$= \frac{20}{4}$

$= \frac{5}{1}$ Note: we need to keep it over 1 to have a ratio.

We might need to manipulate the ratio following the rules of fractions to get the ratio to in proper form.

Example 3)

$\mathbf{2\frac{1}{2}m\ \ to\ 3m}$

$2\frac{1}{2}\ to\ 3$

$= \frac{2\frac{1}{2}}{3}$ We cannot leave it here. We need a whole number in the numerator not a fraction.

$= \frac{\frac{5}{2}}{\frac{3}{1}}$ We treat it as a fraction to simplify – make both improper fractions.

$= \frac{5}{2} \div \frac{3}{1}$ The fraction bar can be read as division.

$= \frac{5}{2} \cdot \frac{1}{3}$

$= \frac{5}{6}$

If the ratio begins with decimals, we must eliminate the decimals. One way is to multiply both numbers by the same power of 10 so all the decimals are removed.

Example 4)

$1.25cm$ *to* $3.5cm$

$1.25\ cm\ \ to\ 3.5\ cm$

$= \frac{1.25}{3.5}$

$= \frac{1.25 \cdot 100}{3.5 \cdot 100}$ We choose to multiply by 100 to get rid of **all** the decimals.

$= \frac{125}{350}$ It is still necessary to reduce the fraction.

$= \frac{5 \cdot 5 \cdot 5}{2 \cdot 5 \cdot 5 \cdot 7}$ We can use the prime factorization to reduce.

$= \frac{5}{2 \cdot 7}$

$= \frac{5}{14}$

Unit Analysis

We find often in real life situations that we need to compare items that were measured in different ways. To be a ratio and get a clearer picture at the difference between numbers we need to get them all in the same units.

Example 5)

3 days to 2 weeks

We need to turn days to weeks or weeks to days. It is often easier to replace the larger unit.

3 days to 2 weeks Note: There are 7 days in 1 week.

= 3 days to 2 (7 days)

= 3 days to 14 days

$= \frac{3}{14}$ Since the units are now the same they cancel out.

Example 6)

5 feet to 2 yards

5 feet to 2 yards	Note: There are 3 feet in one yard.
= 5 feet to 2 (3 feet)	
= 5 feet to 6 feet	
$=\frac{5}{6}$	Since the units are now the same they cancel out.

Example 7)

6 hours to 1 day

6 hours to 1 day	
= 6 hours to 1 (24 hours)	Note: There are 24 hours in 1 day.
= 6 hours to 24 hours	
$=\frac{6}{24}$	Since the units are the same they cancel out.
$=\frac{1}{4}$	We always reduce to lowest terms.

Example 8)

2 gallons to 2 quarts

2 gallons to 2 quarts	
=2 (4 quarts) to 2 quarts	Note: There are 4 quarts in a gallon.
= 8 quarts to 2 quarts	
$=\frac{8}{2}$	
$=\frac{4}{1}$	Notice when we reduce to lowest terms we keep the 1 in the denominator so it is a ratio.

Helpful Conversions

Lengths	
1 foot	12 inches
1 yard	3 feet
1 mile	5,280 feet
1 meter	*100 centimeters*
1 decimeter	*10 centimeters*
1 kilometer	*1000 meters*
Fluids	
1 pint	2 cups
1 quart	2 pints
1 gallon	4 quarts
1 kiloliter	*1,000 liters*
Time	
1 minute	60 seconds
1 hour	60 minutes
1 day	24 hours
1 week	7 days
Weight	
1 pound	16 ounces
1 ton	2,000 pounds
Mass	
1 kilogram	*1,000 grams*
1 hectogram	*100 grams*
1 decagram	*10 grams*
Counts	
1 dozen	12
1 gross	144

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Exercise 5.1 NAME:_____

Write each ratio as a fraction in lowest terms.

1. $3 to $11

2. 5 days to 7 days

3. 2 hours to 9 hours

4. 3 days to 12 days

5. 25 minutes to 5 minutes

6. $14 to $21

7. $4.50 to $2.50

8. 2.5 days to 4.25 days

9. 1.5 feet to 2 feet

10. $1\frac{1}{2}m \text{ to } 2m$

11. $1\frac{1}{4} hours \text{ to } 2\frac{1}{2} hours$

12. 3 feet to $1\frac{1}{2}$ feet

Write each ratio as a fraction in lowest terms, begin by converting units.

13. 3 feet to 30 inches

14. 20 ounces to 1 pound

15. 50 minutes to 2 hours

16. 2 quarts to 6 cups

17. 8 days to 2 weeks

18. 1 mile to 2000 feet

19. Consider the rectangle with width 10cm and length 15cm, write a ratio of the length to the width.

20. Using the rectangle in number 19. Write the ratio of the width to the length.

21. If you spend 4 hours a week studying for English and 5.5 hours studying for math what is the ratio of time spent studying in math to studying for English?

22. An employee plays $125 towards health insurance, while the employer pays $550. What is the ratio of the employers contribution to the employees contribution?

Activity 5.2 - Rates

Part A

If you travel 200 miles in 3 hours at what rate did you travel?

If it takes you 4 hours to travel 250 miles at what was your miles per hour?

Part B

You are at the store and see three different packages of flour, what is the better deal?

30 oz for $6.60

20 oz for $4.20

16 oz for $3.68

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Unit 5 – Proportions and Percents

Section 2 – Rates

A Rate is a comparison with different units, such as miles per gallon, money per hour, and miles per hour.

Rates

You will notice that with rates the units do not cancel.

Example 1)

We drove 430 miles on 13 gallons of gas. Write a fraction that represents that rate.

$\frac{430\ miles}{13\ gallons}$ We cannot reduce or simplify this answer.

Example 2)

We made $120 for finishing a project that took 18 hours to complete. Write a fraction that represents that rate.

$\frac{\$120}{18\ hours}$

$\frac{\$120 \div 6}{18\ hours \div 6}$ We always reduce to get the rate in lowest terms.

$\frac{\$20}{3\ hours}$ Note the units are part of the answer.

Example 3)

We drove 400 miles in 6 hours. Write the fraction that represents that rate.

$\frac{400\ miles \div 2}{6\ hours \div 2}$

$\frac{200\ miles}{3\ hours}$

Unit Rate

If you find a rate and turn the denominator into a decimal, you get that "unit rate".

When you purchase a car one thing you may take in to consideration is how many miles per gallon it gets. You can calculate the miles per gallon your car gets by taking the miles you traveled and dividing it by the amount of gas you use.

Example 4)

Calculate you miles per gallon if you traveled 320 miles on 13 gallons of gas. (round your answer to the nearest hundredths place.)

If you traveled 320 miles on 13 gallons of gas your rate is

$$\frac{320\ miles}{13\ gallons}$$

Your "Unit rate" or "price per gallon" can be found by finding $320 \div 13$, we will round to the nearest hundredth.

$$\begin{array}{r} 24.615 \\ 13\overline{)320.000} \\ \underline{26} \\ 60 \\ \underline{52} \\ 80 \\ \underline{78} \\ 20 \\ \underline{13} \\ 70 \\ \underline{65} \\ 5 \end{array}$$

So the car got 24.62 mpg (miles per gallon).

This is per single gallon, in other words we made the denominator 1 (a single "unit").

Another real life application is finding the cheapest item at a grocery store. We can calculate the cost per unit of items sold in bulk to determine what is the best deal.

Example 5)

You are trying to decide on which pancake mix to buy for your family. There are 3 options on the shelf:

10 oz package cost $5.36

24 oz package cost $12.20

30 oz package cost $15.60

What is the best deal?

To find the truly best deal we need to calculate the cost per ounce. We take each cost and divide it by the number of ounces.

$$\$5.36 \div 10oz = \$0.536/oz$$

$$\$12.20 \div 24oz = \$0.508\overline{3}/oz$$

$$\$15.60 \div 30oz = \$0.52/oz$$

The best deal is the lowest cost per ounce, so the 24 oz package for $12.20 is the best deal.

Note: $0.536/oz is read "0.536 dollars per ounce."

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Exercise 5.2 NAME:_____

Write the following rates as a fraction in lowest terms.

1. 200 miles in 7 hours

2. 323 miles on 11 gallons

3. 14 cars for 15 people

4. 214 pieces for 10 people

5. $300 for 25 hours

6. 12 teachers for 280 students

Find the unit rate for each of the following.

7. $1600 for 4 weeks

8. 180 miles in 3hours

9. $12 for 4 dozen

10. $250 for 4 people

11. $12.50 for 2 hours

12. 35 sacks for 2 acres

13. You are buying black beans for a burrito recipe. Which of the following would be the best value?

16 oz for $1.28

32 oz for $2.40

14. You are at a grocery store and need to buy flour for holiday baking. You know you will be able to any size before it goes bad so you are looking for the best buy. There are 4 options with some of the sizes on sale : a 10 oz bag for $2.50, a 16 oz bag for $3.25, a 30 oz bag for $6.10, or a 48 oz bag for $10.08. Which is the best value?

15. You are going to go skiing the winter and are trying to decide whether or not to buy single day passes, a value pack or a season pass. You know that you will be able to go 3 times for sure and no more. What is the best deal?

A single day pass $30

A 3 visit pass for $ 81

An season pass for $120

16. You are renting a house in Cancun for a week at $ 3600, what is the cost per day?

17. You are going on a long trip and want to calculate your Miles per gallon. When you start your trip your odometer read 87,256 miles. At the end of your trip your odometer reads 87,820miles. You started with a full tank and to return to a full tank you put in 25.64 gallons of gas total. What is your miles per gallon?

18. Someone offers you $1200 to work for 2 - 40 hour weeks. How much would you make per hour?

Activity 5.3 - Proportions

1. If it takes 2 cups of flour to make 3 dozen cookies, how much flour do you need to make 9 dozen?

2. If it takes 3 tablespoons of butter to make 3 dozen cookies, how much butter do you need to make 5 dozen cookies?

3. If it takes 60 minutes to drive 45 miles on a curvy road, how long will it take to drive 60 miles?

4. In problems 1-3 what made it possible to find the answer?

5. Describe what a proportion is in your own words.

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Unit 5 – Proportions and Percents

Section 3 –Proportions

When we say things are proportional we are saying they have the same rate or ratio.

Checking for Proportionality Method 1) Write as fractions in lowest terms.

So we can check to see if things are proportion but turning them into proper ratios – fractions in lowest terms

Consider the proportion

$\frac{3.5}{7} = \frac{1}{2}$

We need to make $\frac{3.5}{7}$ a proper ratio, starting by getting rid of the decimal point by multiplying by 10.

$\frac{3.5}{7} = \frac{3.5 \cdot 10}{7 \cdot 10} = \frac{35}{70} = \frac{1}{2}$

Since both fraction written in lowest terms are the same , $\frac{3.5}{7} = \frac{1}{2}$ is a true proportion.

Checking for Proportionality Method 2) Cross-Multiplying

Another option is to cross-multiply.

$\frac{3.5}{7} = \frac{1}{2}$

Becomes

$3.5 \cdot 2 = 7 \cdot 1$

$7 = 7$

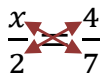
Since we ended with the same number on both sides the proportion is true.

Solving proportions

We can use the idea of cross multiplying to solve proportion equations for a variable.

Example 1)

$\frac{x}{2} = \frac{4}{7}$



Cross Multiply.

$x \cdot 7 = 2 \cdot 4$

$7x = 8$

$\frac{7x}{7} = \frac{8}{7}$ Then Divide to get rid of the multiplication.

$x = \frac{8}{7}$

Using cross multiply allows us to solve proportions where x is on the bottom as well.

Example 2)

$\frac{2}{3} = \frac{8}{x}$

$\frac{2}{3} = \frac{8}{x}$

$2 \cdot x = 3 \cdot 8$ Cross multiply.

$2x = 24$

$\frac{2x}{2} = \frac{24}{2}$ Then divide.

$x = 12$

It is important to remember that even if the problem starts off looking more complicated, If it is a proportion you can still Cross multiply.

Example 3)

$$\frac{\mathbf{1\frac{1}{2}}}{\mathbf{3}} = \frac{\boldsymbol{x}}{\mathbf{2\frac{1}{3}}}$$

$\frac{1\frac{1}{2}}{3} = \frac{x}{2\frac{1}{3}}$ We begin by turning the mixed numbers into fractions.

$\frac{\frac{3}{2}}{3} = \frac{x}{\frac{7}{3}}$

$\frac{3}{2} \cdot \frac{7}{3} = 3 \cdot x$ We cross-multiply.

$\frac{7}{2} = 3x$

$\frac{1}{3} \cdot \frac{7}{2} = \frac{1}{3} \cdot \frac{3}{1} x$ Then "divide" by multiplying by the reciprocal.

$\frac{7}{6} = x$

Example 4)

$$\frac{\mathbf{7.2}}{\boldsymbol{x}} = \frac{\mathbf{2}}{\mathbf{1\frac{1}{2}}}$$

$\frac{7.2}{x} = \frac{2}{1\frac{1}{2}}$ We begin by turning the fraction into a decimal.

$\frac{7.2}{x} = \frac{2}{1.5}$

$7.2 \cdot 1.5 = x \cdot 2$ Then Cross multiply.

$10.8 = 2x$

$\frac{10.8}{2} = \frac{2x}{2}$ And divide.

$5.4 = x$

Applications

When things happen at a constant rate or in the same ratio, it may possible to up a proportion to solve problems involving them.

Example 5)

You travelled 312 miles in 5 hours. Assuming you are able to maintain this rate, how long would it take to travel 450 miles more? (Round to the nearest tenth of an hour, if necessary)

You were traveling at a rate of $\frac{312\ miles}{5hours}$. Your rate for the next 450 miles will be $\frac{450\ miles}{x\ hours}$,Where x is the number of hours it will take to drive the 450 miles. We are assuming the rate was maintained , so these two rates are equal to each other.

$$\frac{312\ miles}{5hours} = \frac{450\ miles}{x\ hours}$$

$$\frac{312}{5} = \frac{450}{x}$$

$$312 \cdot x = 5 \cdot 450$$

$$312x = 2250$$

$$\frac{312x}{312} = \frac{2250}{312}$$

$$x = 7.21\ldots$$

It would take 7.2 hours to travel 450miles.

Notice the units match – miles is on top in both rates and hours is on bottom. We can cancel the units before proceeding.

Example 6)

You have a recipe that serves 20 people that you want to make for your family of 4. The Original recipe calls for $1\frac{1}{2}\ cups$ of flour. How much flour should you use to scale the recipe down to serve 4?

Since the amount of flour needed is proportional to the number of servings you are making, the rate of servings to cups will be the same.

$$\frac{20\ servings}{1\frac{1}{2}cups} = \frac{4\ servings}{x\ cups}$$

$$\frac{20}{1\frac{1}{2}} = \frac{4}{x}$$

Example 6) Continued…

$\frac{20}{\frac{3}{2}} = \frac{4}{x}$

$20x = \frac{3}{2} \cdot 4$

$20x = 6$

$\frac{20x}{20} = \frac{6}{20}$

$x = \frac{3}{10}$

You need $\frac{3}{10}$ cup of flour – which is just less than a third of a cup.

Using shadows to find height

The height of objects and their shadows are proportional. So we can use the shadow of an object with a known height to find the height of another object.

Example7)

Joe wants to find out how tall the light post is outside his house. He knows he is 6 feet tall and measures his shadow to be 4 feet long. The shadow of the light post is 11 feet long. Set up a proportion and then find the height of the lamp post.

$\frac{6}{4} = \frac{x}{11}$ Notice the length of the shadows are both in the denominator.

$6 \cdot 11 = 4 \cdot x$ Cross multiplying.

$66 = 4x$

$\frac{66}{4} = \frac{4x}{4}$ Then divide.

$x = \frac{66}{4} = 16.5$

The lamp post is 16.5 feet tall.

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Exercise 5.3 NAME:_____

Solve the following proportions

1. $\frac{2}{3}=\frac{x}{9}$

2. $\frac{x}{7}=\frac{6}{14}$

3. $\frac{3}{2}=\frac{x}{9}$

4. $\frac{4}{x}=\frac{7}{3}$

5. $\frac{2}{3}=\frac{13}{x}$

6. $\frac{2}{5}=\frac{5}{x}$

7. $\frac{\frac{1}{2}}{1\frac{2}{3}}=\frac{x}{\frac{2}{5}}$

8. $\frac{2}{1\frac{3}{5}}=\frac{\frac{2}{3}}{x}$

9. $\frac{x}{\frac{1}{5}}=\frac{2\frac{1}{4}}{3\frac{2}{3}}$

10. $\frac{0.25}{1.4}=\frac{3}{x}$

11. $\frac{1.5}{2.4}=\frac{x}{3}$

12. $\frac{x}{1.2}=\frac{5}{3.3}$

For the following set up a proportion and solve.

13. A model is built that has a scale of 1 inch to every 2.5 feet. If the length of the actual structure is 15 feet, what is the length of the model?

14. You are walking with a group of friends down a creek, you know that the pace you are walking is roughly 3 miles per hour. After you have been walking $1\frac{1}{2}\ hours$, how far have you walked?

15. You are baking for the next holiday and are expecting 18 people. You have a new recipe that you want to try out but it only serves 6. If the recipe calls for $1\frac{1}{2}\ cups\ of\ milk$, how much will you add to make enough for all 18 people?

16. If 13 gallons of gas can get you 250 miles, how much gas will you need to travel 1200 miles?

17. You are cooking Thanks giving at your house this year and are expecting 12 people. You do some research on line and find a website that suggests 3 pounds of turkey for every 4 people. How big of a turkey should you buy?

18. A study shows 2 out of every 5 people prefer a certain type of soda. If there is a group of 250 people, how many of them would you expect to prefer that soda?

19. Sally is trying to determine how tall the tree in your front yard is. Since she knows that a shadow is proportional to an objects height, she measures her shadow and find it is 3.5 feet tall. Sally is 5.5 feet tall. If the trees shadow is 7 feet tall, how tall is the tree?

20. In math classes 1 out of every 6 use the tutoring services, how many out of a class of 36 use tutoring?

21. You buy a bulk bag of toys knowing that 1 out of every 5 is defective, if there was 145 how many toys can you assume are good?

22. It cost $5 for 2 hotdog meals, How much will it cost for 9?

23. A cup of rice has 10 grams of fiber, How much fiber is in $2\frac{1}{2} cups$ of rice?

24. One out of every four car owners have not followed up on a recent recall, if the company has sold 2300 cars that are affected by the recall, how many people have not followed up on the recall?

Activity 5.4 - Percents

Part A – Individually read the following questions and write your best idea of an answer down.

1. What do we call 100 years?

2. How many pennies are in a dollar? How much money is 1 penny?

3. What does the word “per” often signify in math?

4. If I said “21 per cent” , what would that look like?

Part B – Do not begin until instructed to do so.

1. Can you write 56% as a fraction? Use the definition of “percent” we discussed from above.

2. Recall dividing by a power of 10 moves the decimal, compute the following
   a. $52 \div 10$
   b. $575 \div 100$
   c. $34.25 \div 1000$

3. If I say to write 45% as a decimal what am I asking you to divide 45 by? How many times and in what direction do we move the decimal?

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Unit 5 – Proportions and Percents

Section 4 –Percents

What is a percent?

We often translate the word "per" to division. "Cent" as in Century (100 years) or cent (100 cents makes a dollar) means 100.

$$56\%$$

Or

56 Percent

$$56 \div 100$$

So $56\% = 56 \div 100 = \frac{56}{100}$

Percents to Decimals

Since dividing by 100 moves the decimal to the left two places, we can turn a percent into a decimal by moving the decimal two places to the left.

Example 1)

Write 125.75% *as a decimal*.

125.75%

$= 125.75 \div 100$ We replace the "%" with $\div 100$.

$= 1.25.75$ Dividing by 100, moves the decimal 2 places to the left.

$= 1.2575$

$125.75\% = 1.2575$

Example 2)

Write 26% as a decimal.

26%

$= 26.\%$

$= 26.\div 100$

$= 0.2\ 6.$ Dividing by 100, moves the decimal 2 places to the left.

$= 0.26$

Example 3)

Write 3% as a decimal.

3%

$= 3.\%$ We are still dividing by 100.

$= 0.03.$ We move the decimal 2 places to the left.

$= 0.03$

Example 4)

Write 0.25% as a decimal.

Even though this already looks like a decimal, we still need to move the decimal two places to the left.

So

0.25%

$= 0.00.25$ We move the decimal 2 places to the left.

$= 0.0025$

Decimals to Percents

To turn a decimal into a percent we have to do exactly the opposite – we need to **multiply the decimal by 100** – so we can add the % ($\div 100$) without changing the number.

Example 5)

Write 1.25 as a percent.

1.25

$= 1.25 \cdot 100\%$

$= (1.25 \cdot 100)\%$ Multiplying by 100, moves the decimal 2 places to the right.

$= 1.25.\%$

$= 125\%$

Example 6)

Write 0.6 as a percent.

0.6

$= 0.6 \cdot 100\%$ Multiplying by 100, moves the decimal 2 places to the right.

$= 0.60.\%$

$= 60\%$

Example 7)

Write 4 as a percent.

4

$= 4. \cdot 100\%$

$= 400\%$ Notice 400% is the same as 4 times the quantity.

Percents to Fractions

If we want to turn a percent into a fraction we can write the "percent" as a denominator and reduce the fraction.

Example 8)

Write 32% as a fraction.

32%

$= \frac{32}{100}$ 32 "per" cent = 32 / 100

$= \frac{8}{25}$ Always reduce to lowest terms

Example 9)

Write 125% as a fraction.

125%

$= \frac{125}{100}$

$= \frac{5}{4}$ Notice that since 125% >100% , our answer is greater than 1.

Even when the percent includes a decimal or a fraction, we still write it over 100 and then clean it up by getting rid of the decimals and double-decker fractions.

Example 10)

Write 22.5% as a fraction.

22.5%

$= \frac{22.5}{100}$ We still write the number over 100.

$= \frac{225}{1000}$ Multiply top and bottom by 10 to eliminate the decimal.

$= \frac{9}{40}$ Reduce the fraction.

Example 11)

Write $20\frac{1}{5}\%$ as a fraction.

$20\frac{1}{5}\%$

$= \frac{20\frac{1}{5}}{100}$ Remember fractions are division!

$= \frac{\frac{101}{5}}{\frac{100}{1}}$ Make them "improper" fractions.

$= \frac{101}{5} \div \frac{100}{1}$

$= \frac{101}{5} \cdot \frac{1}{100}$ Multiply by the reciprocal.

$= \frac{101}{500}$

Fractions to Percent

Turning any number into a Percent can be done by multiplying by 100%. Even if the number is a fraction, we still proceed the same way.

Example 12)

Write $\frac{3}{8}$ as a percent.

$\frac{3}{8}$

$= \frac{3}{8} \cdot 100\%$ To turn it into a % we multiply by 100%.

$= \frac{3}{8} \cdot \frac{100}{1}\%$

$= \frac{3}{2} \cdot \frac{25}{1}\%$

$= \frac{75}{2}\%$ We will convert to a mixed number.

$= 37\frac{1}{2}\%$

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Exercise 5.4 NAME:_____

Write the following Percents as Decimals.

1. 32%
2. 34%
3. 45%
4. 132.4%
5. 342.56%
6. 673.12%
7. 0.12%
8. 0.2%
9. 0.22%
10. 3%
11. 9%
12. 1%

Write the following Decimals as a Percent.

13. 0.21
14. 0.33
15. 0.21
14. 2.25
16. 3.12
17. 5.12
18. 3
19. 4
20. 8

Write the following Percents as a Fraction

21. 25%
22. 40%
23. 75%

24. 21.2%

25. 54.2%

26. 30.5%

27. 120%

28. 452%

29. 350%

30. $22\frac{1}{2}\%$

31. $40\frac{1}{3}\%$

32. $31\frac{1}{5}\%$

Write the following Fractions as Percents

33. $\frac{2}{3}$

34. $\frac{1}{8}$

35. $\frac{3}{5}$

Unit 5 **NAME:_____**

Mid-Unit Review 5.1 – 5.4

1. Write the ratio of dogs to cats in lowest terms, if the number of cats is 26 and the number of dogs is 10.

2. Using the appropriate conversions, write the ratio for 3 inches to 2 feet.

3. You are thinking about renting a house in Tahoe for $531 for 3 days. What is the daily rate?

4. You are buying flour and are looking for the best deal. You can buy a 16 oz bag for $1.28, or a 32 oz bag for $2.40. Which is the better deal? Be sure to use math to support your answer – no credit will be given without work being shown.

5. Solve for x

$\frac{12}{7} = \frac{48}{x}$

6. You are walking down a creek for $2\frac{1}{2}$ hours. Knowing that you walk about 3 miles per hour, how far have you walked? Set up a proportion and solve.

7. Write 10.3% as a Decimal.

8. Write 0.3 as a Percent.

9. Write 4.2% as a Fraction.

10. Write $\frac{3}{8}$ as a Percent.

Activity 5.5 - Solving Percents with Proportions

1. Write 23% as a fraction.

2. If 46 out of 200 was written as a ratio, what would it look like

3. What do you notice about your answers to 1 and 2?

4. Can you write a proportion that represents 50% of 70 is 35?

5. Can you set up a proportion that would help find the answer to the following problems?

   25% of 40 is what number?

   40% of what number is 32?

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Unit 5 – Proportions and Percents

Section 5 –Solving Percents using Proportions

Percent Proportion

A percent is the rate out of 100, we can use a proportion to find the missing value following the rules of proportions.

$$\frac{Percent}{100} = \frac{part}{whole\ or\ original\ or\ base}$$

Finding the percent

Once we identify the part and the whole, we can set up the percent portion to find the percent.

Example1)

What percent of 100 is 30?

The " whole" is what we are finding the percent of. Usually we can find the whole after the key word "of". The 30 is the part.

$\frac{x}{100} = \frac{30}{100}$ *Since it is already out of 100 – it is 30%.*

$x = 30$

The answer is 30%.

Example 2)

What Percent of 250 cars is 90 cars?

Here we are looking for a percent "of" the whole. So the whole is 250.

$\frac{x}{100} = \frac{90}{250}$ Cross Multiply.

$250x = 9000$ Then Divide.

$x = 36$

The answer is 36%.

Sometimes the "part" is larger the "whole", using the words in the problem can help you decide which number is the whole.

Example 3)

A store sells an item for $600, What percent is that of $300?

The whole is the $300 even thought the $600 is the larger number. Notice we are still using the rule we want to know the percent "of" the whole.

$\frac{x}{100} = \frac{600}{300}$

$\frac{x}{100} = \frac{2}{1}$ Her we reduced to keep the numbers small.

$x = 200$ Cross multiplying give the answer.

So the answer is 200%. It makes sense to get an answer larger than 100% because the part was more than the whole.

Finding the part

If we are given the percent and asked to find the part we will still set up the problem the same way. We will just use our variable in a different part of the percent equation.

Example 4)

What is 20% of 200 people?

Using the key word "of" helps us identify 200 as the whole.

$\frac{20}{100} = \frac{x}{200}$

4000=100x Cross Multiply.

X=40 Then Divide.

The answer is 40 people – that is the "part" we were looking for.

Example 5)

Tax in a certain state to 7.5%. You are trying to calculate tax on a Television that cost $1325. What is 7.5% of $1325?

$\frac{7.5}{100} = \frac{x}{1325}$

$9937.5 = 100x$ Cross Multiply.

$99.375 = x$ Then Divide.

Since we are talking a money amount that we need to pay – we should round our answers to the nearest cent.

$99.38 is the Tax.

Example 6)

If you Pre order a book you can get a discounted price of $24. If you buy it after its release date the price is 125% of that price. What is the price after the release date?

$\frac{125}{100} = \frac{x}{24}$ 24 is the whole- it was 125% "of" $24.

$3000 = 100x$ Cross Multiply.

$30 = x$ Then Divide.

The answer is $30.

Finding the whole

When it is the whole that we are looking for we will use the variable where the "whole" is in the equation.

Example 7)

50% of what number is 70?

$\frac{50}{100} = \frac{70}{x}$

$7000 = 50x$ Cross multiply , then divde.

140 = x The number is 140.

Example 8)

You are out with 5 friends and split a bill 5 ways. You are asked to pay $32. That is 20% of what amount?

$\frac{20}{100} = \frac{32}{x}$ $32 is the part you pay of the whole.

$3200 = 20x$

$160 = x$

The bill was $160.

Example 9)

You need to buy books for the next semester. You get reimbursed for the books but not the tax. If tax is 8.5% - That means your bill is 108.5% of the price of just your books. If the total including tax was 216.32, what was the total?

$\frac{108.5}{100} = \frac{216.32}{x}$ *The total including tax is the part, without tax matches up with the 100%.*

$21632 = 108.5x$

$199.373 \ldots = x$

The books cost $199.37.

You will have to decide which information is given to determine how to set up your proportion equation. Use the words in the problem to decide which values are the whole, the part and the percent. The key word "of" often comes before the whole. The "is" often separates **the part** from the **whole and the percent.**

Exercise 5.5 NAME:_____

Solve each of the following using the Percent Proportion.

1. What is 20% of 15?

2. What is 36% of 200?

3. What is 128% of 30?

4. 300 is what percent of 15?

5. 2 is 15% of what number?

6. 4 is what percent of 20?

7. 10is 20% of what number?

8. 20 is 15% of what number?

9. 320 is 120% of what number?

10. If you currently eat 1800 calories in a day and your doctor tells you to reduce the calories you take in by 20% - how many calories is he asking you to cut back?

11. Sacramento normally get 17.93 inches of rain a year. If it rains 15 inches this year, what percent of normal is that?

12. I saw 23 boats on the river last weekend. They said that was only 20% of normal. How many boats are normally on the river?

13. There were 15 tornados in the county last year; there is usually an average of 10. What percent of the average was there?

14. A local fundraiser is held every year. This year only 120 people showed up. That is only 80% the regular attendance in the past. What number of people have shown up in the past?

15. Your apartment manager has told you that your rent is going up 5%. If you currently pay $560, how much more money will you need to pay with the increase?

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Activity 5.6 - Solving Percents with Equations.

PART A

Consider the following:

13% of 50 is what number?

How can you write 13% as a decimal?

What does the word "of" often mean in mathematics?

What does the word "is" often mean in mathematics?

What do we use to represent a "number" we do not know?

13% of 50 is what number?

____ ___ _____ ___ ____

Part B – Use the above strategy to translate into an equation then solve.

1. What Percent of 200 is 80?

2. 20% of what number is 100?

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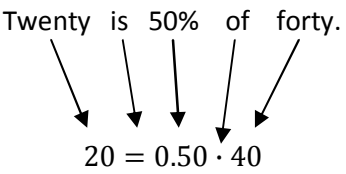
Unit 5 – Proportions and Percents

Section 6 –Solving Percents using equations

Another way to solve Percent problems is to translate them into equations.

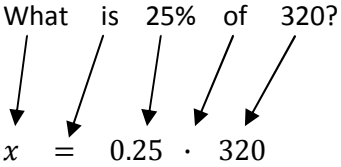
Consider the following:



The word "is" is the equivalent of "=" and "of" often refers to multiply. We build our equation by translating into math symbols in the same order.

Example 1)

What is 25% of 320?

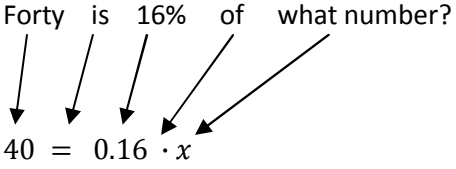


$x = 80$

80 is 25% of 320.

Example 2)

Forty is 16% of what number?



$40 = 0.16x$

$\frac{40}{0.16} = \frac{0.16x}{0.16}$

$250 = x$

Forty is 16% of 250.

Example 3)

What Percent of 500 is 50?

What percent of 500 is 50?

$x \cdot 500 = 50$

$500x = 50$

$\frac{500x}{500} = \frac{50}{500}$

$x = 0.1$

$x = 0.1 \cdot 100\%$

$x = 10\%$

Example 4)

For the last 7 years the attendance at a conference has averaged 2500 people. This year attendance is up about 20%. How many more people attended this year?

The number "2500" is the number we are trying to find the percent of. In other words:

What is 20% of 2500 people?

$x = 0.20 \cdot 2500$

$x = 500$

There are 500 more people this year.

Exercise 5.6 NAME:_____

1. What is 15% of 120?

2. What is 112% of 130?

3. What is 25% of 700?

4. 20 is what percent of 4?

5. What percent of 120 is 6?

6. What percent of 300 is 15?

7. 3 is 12% of what number?

8. 250 is 80% of what number?

9. 20 is 10% of what number?

10. You are buying a $20 item from your neighbor's son for a fundraiser. You have to calculate 8.75% sales tax. What is 8.75% of $20?

11. Sacramento normally gets 17.93 inches of rain a year. If it rains 15 inches this year, what percent of normal is that?

12. A car dealer ship sold 52 cars last month. That is 120% of an average month. How many cars do they normally sell?

13. If today's snow level of 10 feet was 20% of normal for this time of year, what is normal for this time of year?

14. A stereo is normally $540, and today is on sale for 25% off. How much do you save buying it today?

15. I ate 12 oz of a 16oz bag of chips. What percent did I eat?

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Activity 5.7 - More Percent Problems

PART A

You are at a Restaurant and are about to pay the bill. The total is $62.45. How much would you tip if:

You wanted to leave a 10% tip?

You wanted to leave a 15% tip?

You wanted to leave a 20% tip?

PART B

1. Gas has increased from $3.50/gal to $3.99/gal. in a 3 month period of time. What is the percent increase?

2. Home prices fell in one neighborhood from $320,000 to $190,000. What was the Percent decrease?

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Unit 5 – Proportions and Percents

Section 7 – Solving Percentage Problems

Finding the Percent Increase/Decrease

When we find the percent increase (or decrease) we always are finding the percent increase (or decrease) of the original "base" amount.

The Percentage proportion from 5.5 becomes

$$\frac{amount\ of\ increase (or\ decrease)}{original\ amount} = \frac{\%}{100}$$

The percentage equation from 5.6 becomes

$$\% \cdot (original\ amount) = (amount\ of\ increase\ or\ decrease)$$

Using either method will result in the same answer.

Example 1)

The price on a certain model of television has decreased since its release. Originally it cost $3500, However now you can find it for $2000. What is the percent decrease in price?

Since the price decreased from $3500 to $2000, the decrease was $3500 - $2000 = $1500. Here we will use the percent proportion from section 5.5.

$\frac{1500}{3500} = \frac{x}{100}$

$150000 = 3500x$

$\frac{150000}{3500} = \frac{3500x}{3500}$

$42\frac{3}{35} = x$

The percent decrease is $42\frac{3}{35}\%$.

Example 2)

You work a job at the local coffee shop, you made $8.50 but just received a raise to $9.25. What is the percent increase in pay(round to the nearest hundredth of a percent)?

The "original" amount was $ 8.50. The "increase" is 9.25-8.50 = 0.75.

$\frac{x}{100} = \frac{0.75}{8.50}$

8.5x=75

$x \approx 8.82$

It was a 8.82% increase in pay.

Calculating Quick Tips

If you went out to dinner with your family and the bill was $52.63, calculating a tip quickly can be useful.

If you want to leave a 10% tip:

$52.63 \cdot 10\% = 5.263$ To find 10% - move the decimal to the left 1 place.

You would leave $5.26 on top of the bill.

If you wanted to leave a 20% tip:

You would double 10%

$52.63 \cdot 10\% = 5.263$ Calculate 10% first.

$5.26 \cdot 2 = 10.52$ Double that to get 20%

You would leave $10.52 on top of the bill.

If you wanted to leave a 15% tip:

$52.63 \cdot 10\% = 5.263$ Calculate 10% first.

$5.26 \div 2 = 2.63$ Divide that in half to find 5%

5.26 + 2.63 =7.89 Add the 10% to the 5%

You would leave $7.89 on top of the bill.

Exercise 5.7 NAME:_____

Compute the following rounding to the nearest hundredth or hundredth of a percent where necessary.

1. The governor is proposing to increase fees for community college students from $26 a unit to $36 a unit beginning July 2011. What percent increase is that?

2. The university of California could increase by 8% for the 2011-2012 school year, In 2010-2011 tuition was $10,152. What would it be in 2011-2012 school year with this increase?

3. The state legislative office is supporting a bill that would increase fees for community college from $26 to $40 per unit for the 2011-2012 school year. What percent increase is that?

4. An average class attrition rate is roughly 28%. In other words the percent decrease is roughly 28%. If a class starts with 42 students, how many fewer students do you expect at the end of the semester?

5. At the beginning of the semester a math 100 class had 42 students; at the end it had 35. What percent decrease it that?

6. Sally works at a local coffee shop. She has had her hours decreased by 20% this week. If she was working 36 hours a week, what is she be working this week?

7. There were 20 vendors at a local craft fair last year, this year you were told there will 30. What is the percent increase in vendors?

8. Joe had to put his daughter in childcare for 40 hours a week last semester, because of changes in his schedule he only needs 30 hours of childcare this year. What is the percent decrease in childcare needed?

9. Marie noticed she was eating 2100 calories a day, she began a diet and limited herself to 1300 calories a day What is the percent decrease?

For Problems 10 – 12 consider the following scenario.

You are at a restaurant and receive a bill from $65.82. How much tip should you leave if you wanted to leave the following percentage? What is the total with tip?

10. 20% tip

11. 15% tip

12. 10% tip

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Unit 5 Review NAME:_____

1. If there are 7 dogs and 14 cats, write a ratio of cats to dogs.

Write a ratio for the following in lowest terms.

2. $2\frac{1}{3}cm \ \ to \ 4cm$

3. $5.25m \ \ to \ 2.25m$

4. 8 days to 2 weeks

5. If you drove 400 miles on 25 gallons of gas, what is your miles per gallon?

6. You need to buy a special seasoning for your holiday meal and have several options to choose from. What is the best deal?

4 oz for $5.89

4.5oz for $6.61

5oz for $7.40

7. $\frac{2}{3} = \frac{7}{x}$

8. $\frac{3.5}{7} = \frac{x}{1.5}$

9. $\frac{1\frac{1}{3}}{x} = \frac{4\frac{1}{2}}{9}$

10. If it takes 4 cups of flour to make a recipe for 6 people, How much flour do you need to make enough for 9 people?

11. A study showed that 2 out of every 5 people voted in an election, how many people out of 750 can you assume voted?

12. You were able to drive 350 miles on $17\frac{1}{2}\ gallons$. How many gallons would you need to drive 725 miles?

Write the following a s a decimal

13. 12%

14. 34.34%

15. 0.01%

Write each of the following a s a percent

16. 2.25

17. 0.58

18. 0.3

Write each of the following as a fraction

19. 22%

20. 15.5%

21. $11\frac{1}{2}\%$

22. Write $\frac{5}{8}$ as a percent.

23. What is 50% of 80?

24. What is 100% of 75?

25. What is 10% of 64?

26. What is 4% of 80?

27. 35 is 55 % of what number?

28. 70 is 150% of what number?

29. 15 is what percent of 150?

30. 34 is what percent of 17?

31.You currently pay $650 for rent and were just told by your manager to expect a 8% increase next month. How much will the increase be?

32. The parks and recreation department just announced they will only have 80% of the budget they had last year. If they had a budget of $450,000 last year, how much will they have this year?

33. A certain class has 23 females out of 40 students. What percent females are there?

34. If Bob had $ 120 in his account at the end of the month and that was only 75% of what he had last month, how much did he have last month?

35. If a school had 700 parking places at 200 of them were filled up , what percent are full?

36. If the school raised its tuition from $26 to $42 what would the percent increase be?

37. If you paid your credit card down to $450 from $675, what is the percent decrease?

If you went to a restaurant and had a bill for $75.36 , how much would you leave for a tip if you want to leave:

38. 10% tip?

39. 15% tip?

40. 20% tip ?

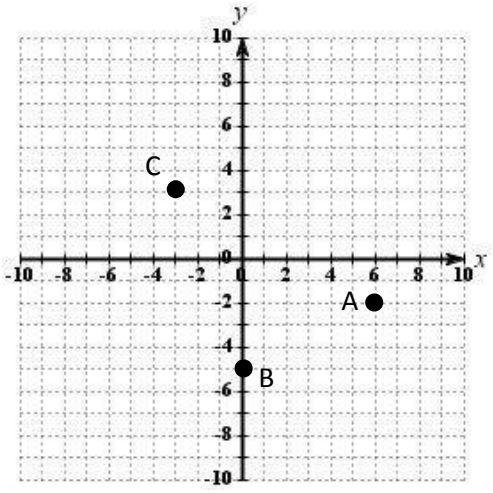
Unit 6 – Coordinate Plane and Geometry
Objective Overview

The following is a small subset of possible problems that could represent each objective. Refer to notes, homework and reviews for a more complete picture.

Section 1 – Graphing in the Coordinate Plane

By the end of section 1 you should be able to:

- **Identify coordinates of point on a Coordinate plane**
  Find the coordinates for each point below.

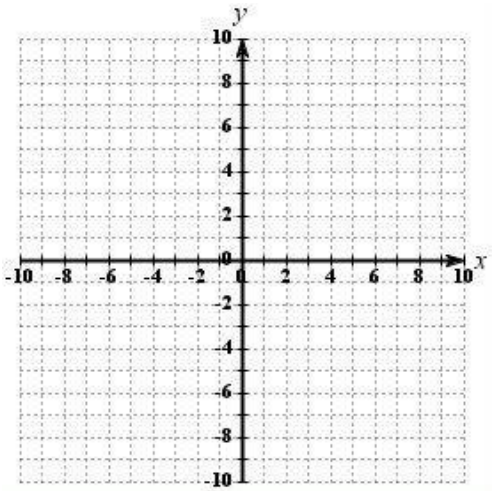


A (____, ____)

B (____, ____)

C (____, ____)

- **Plot points on a coordinate plane .**
  Plot the following points on the coordinate plane.



$A\ (3, -4)$

$B\ (5, 0)$

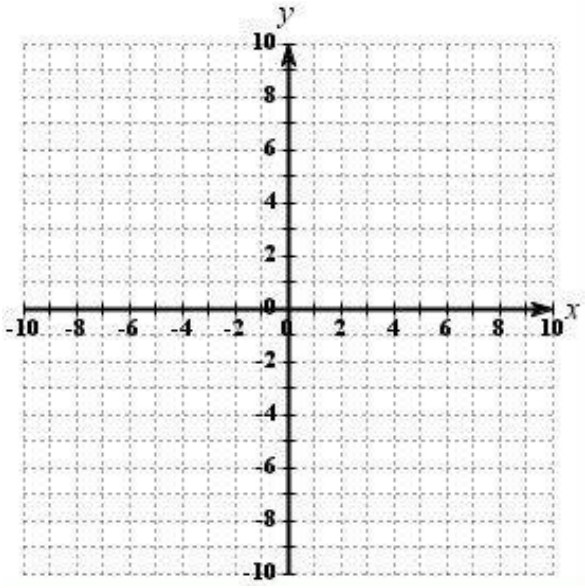
$C\ (-2, -6)$

- **Evaluate an equation and plot the points on the graph.**

  F ill out the chart below, then plot each point on the grid.

  $y = 4x - 8$

x	y
0	
1	
2	
3	

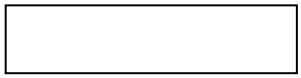


Section 2 – Area and Perimeter

By the end of section 2 you should be able to:

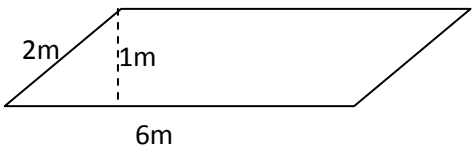
- **Find the Area of different Geometric Shapes.**

  Find the area of a rectangle whose bas is 10 cm and Height is 3 cm.



  Find the Area of a square with side length of 5m.

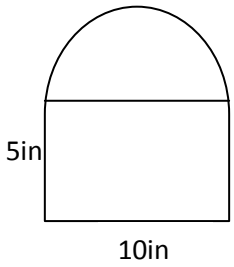
  Find the area of the Parallelogram below



Find the Area of a triangle whose base is 8m and whose height is 3m.

Find the area of the circle whose radius is 3m.

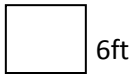
Find the area of the composite shape below



- **Find the Perimeter or Circumference of different shapes**

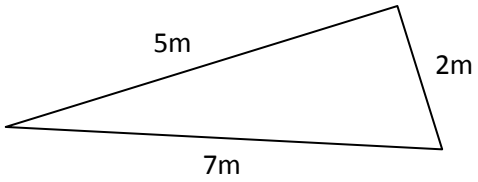
  Find the perimeter of a rectangle whose length is 5cm and width is 10cm.

Find the Perimeter of the square whose side length is 6ft.



If the length of a Parallelogram is 7 cm, and the width is 5 cm, find the Perimeter.

Find the Perimeter of the triangle below.



If the radius of a circle is 2m, find the circumference.

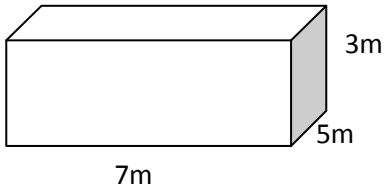
- **Solve for the unknown side given the Area or Perimeter.**
  If the Area of a square is $81m^2$, what is the side length?

The perimeter of a parallelogram is 32m, and the width is 4m. Find the length.

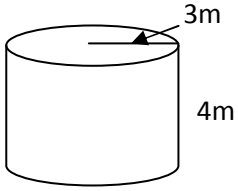
Section 3 – Volume

By the end of section 3 you should be able to:

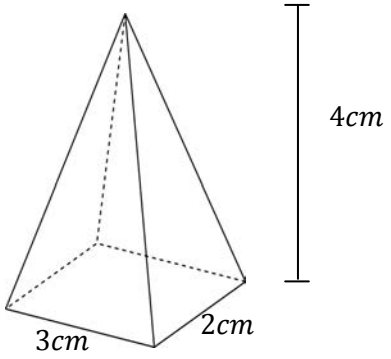
- **Find the Volume of different geometric shapes.**
  Find the Volume of the rectangular prism below.



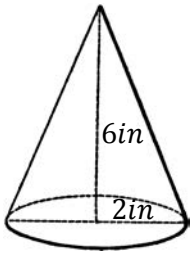
Find the volume of the cylinder.



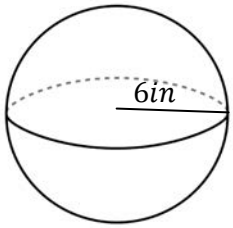
Find the Volume of the Pyramid below.



Find the Volume of the cone below



Find the Volume of the sphere below.



Section 4 – Square Roots and the Pythagorean Theorem

By the end of section 4 you should be able to:

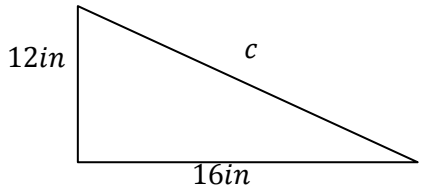
- **Calculate Square Roots.**

  $\sqrt{121}$

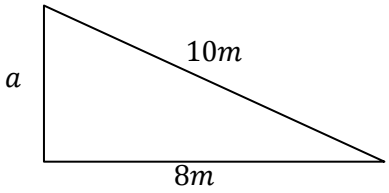
- **Determine what whole numbers a square root falls between.**
  What whole numbers does $\sqrt{17}$ fall between?

- **Use the Pythagorean Theorem to find the missing side of the triangle.**

  Find the missing side of the triangle.



  Find the missing side of the triangle.

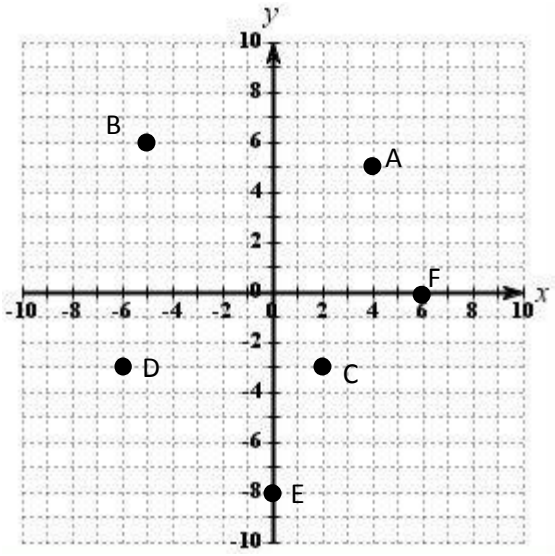


Activity 6.1 - Graphing in the Coordinate Plane

Complete part A and B, and compare answers with neighbors.

PART A

Below is a grid that is labeled with the "Cartesian Coordinate System". Can you describe the location of the points A-F that have been placed on the grid?



Describe the location of each point

A _____

B _____

C _____

D _____

E _____

F _____

PART B

Think about the following equation

$y = 2x - 1$

If $x = 2$ can you find y? What would it have to be to keep the equation a true statement?

If $x = 0$ can you find y? What would it have to be to keep the equation a true statement?

If $x = 4$ can you find y? What would it have to be to keep the equation a true statement?

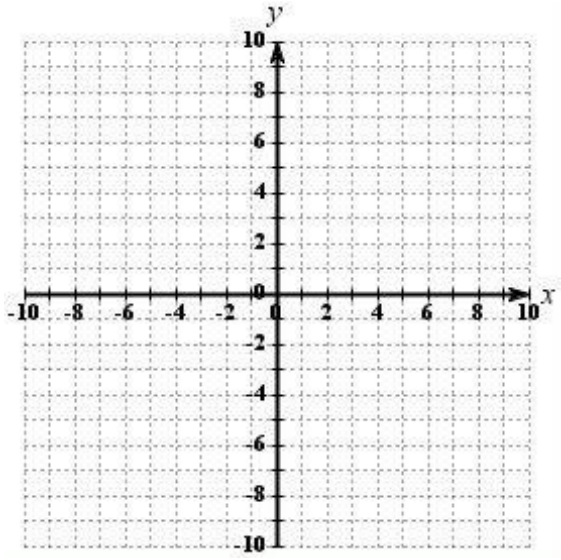
PART C – Only complete this after being told to.

Complete the following chart by evaluating the equation for each given x value.

x	y
0	
1	
2	
3	

$y = 2x - 2$

Plot each of the above points on the grid below



What do you notice about these points? Do they behave in a special way?

Unit 6 – Coordinate Plane and Geometry

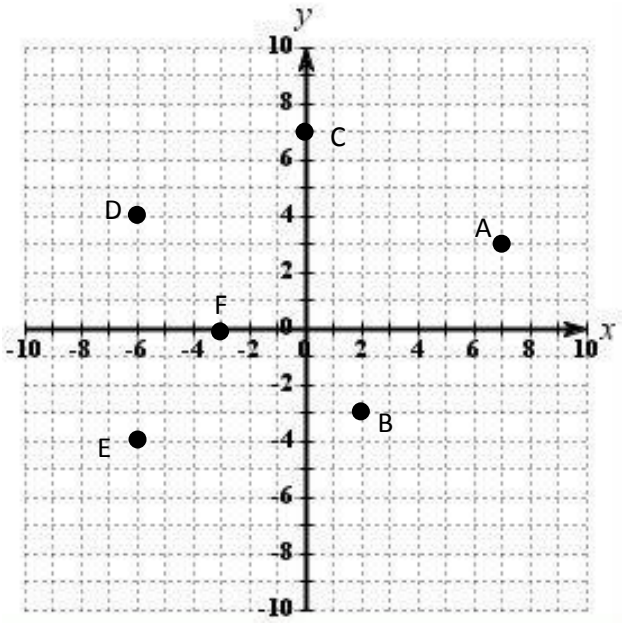
Section 1 –Graphing in the Coordinate Plane

Finding Coordinates of Given Points

We can describe the location of a point by listing what are called its coordinates, The dark Horizontal line is called the "**x – axis**", The dark Vertical line is the "**y-axis**".

We can describe a points location by listing the x – coordinate – its horizontal position, and then it's y – coordinate – it's vertical position.

Example 1) Find the coordinates for each point below.



Point A is above the 7 in the x direction and level with the 3 in the y direction. So it is located at (7, 3).

Point B is below the 2 on the x-axis, and at the same vertical level as the -3 on the y-axis. (2, -3).

Point C is above the 0 in the x direction and on the 7 in the y direction (0,7)

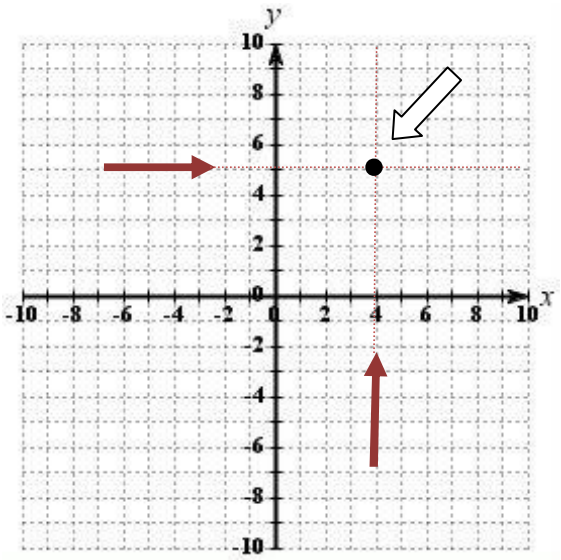
Point D (-6, 4)

Point E (-6, -4)

Point F (-3, 0)

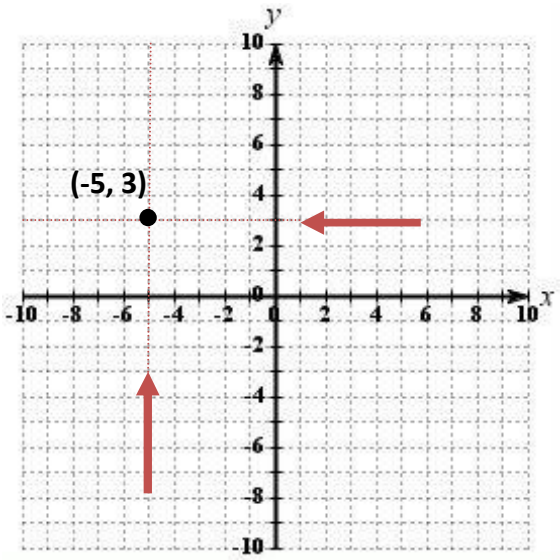
Plotting Points on a Graph

If you were asked to plot the point (4,5) on a graph. You would locate the 4 on the x axis, Locate the 5 on the y axis and see where they meet.



Example 2)

Plot the point (- 5, 3).



We begin by finding -5 on the x-axis and 3 on the y-axis.

Extending the lines out helps us see where they cross.

Where they meet is the location of the point.

Evaluating Equations and Plotting the Results

Consider $y = 2x - 3$

If x = 1, then it becomes $y = 2(1) - 3 = 2 - 3 = -1.$

In other words when x = 1 , y = -1. We could write this as an ordered pair (1, -1).

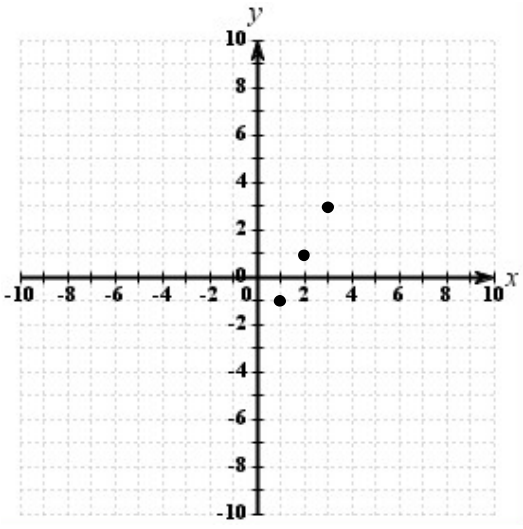
If x = 2, then it becomes $y = 2(2) - 3 = 4 - 3 = 1.$

This is the ordered pair (2 , 1)

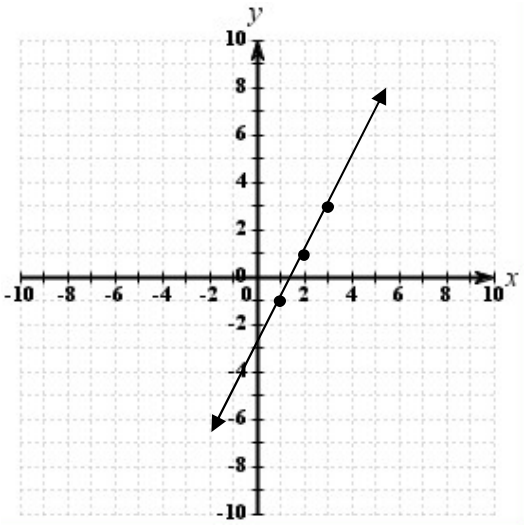
If x = 3 , then it becomes $y = 2(3) - 3 = 6 - 3 = 3.$

This is the ordered pair (3 , 3)

If we plot (1, -1), (2, 1) and (3, 3) on the same graph this is what it looks like



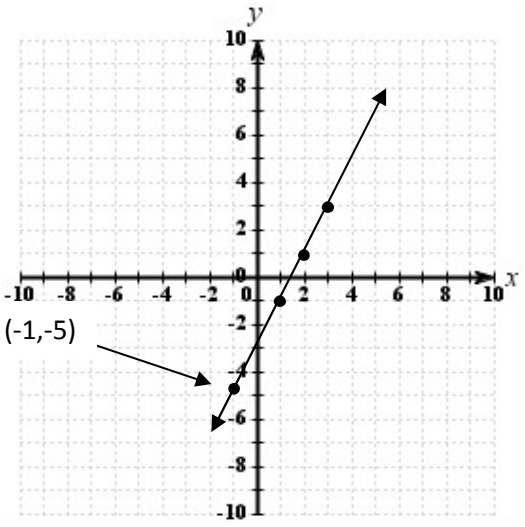
If we connect them what do they seem to form? They all seem to “line” up.



In fact any other pair we get from evaluating $y = 2x - 3$ will also fall on the line.

If x = -1, $y = 2x - 3$ becomes $y = 2(-1) - 3 = -2 - 3 = -5$.

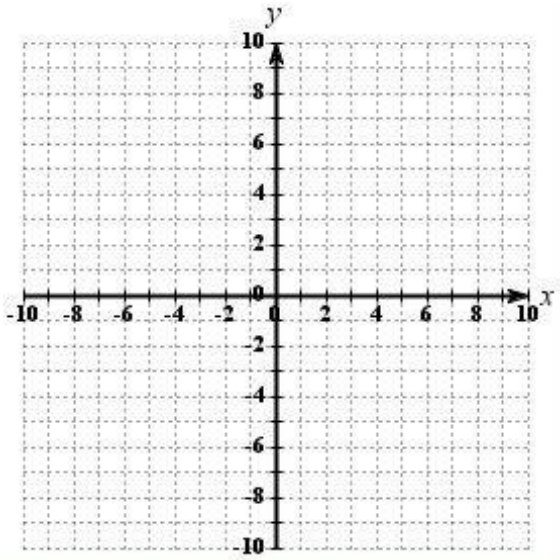
So (-1, -5) should also be on the line.



And it is.

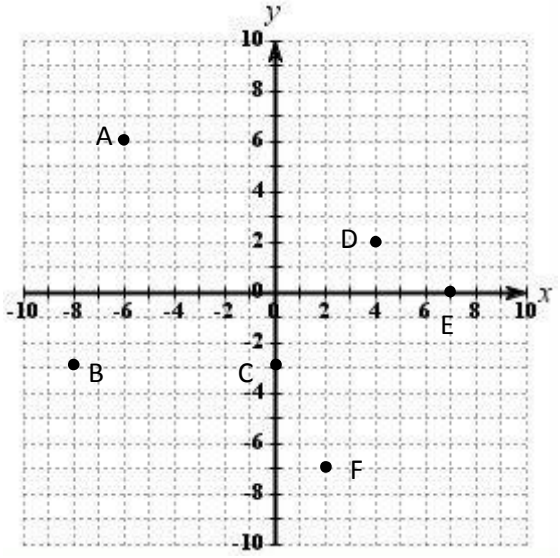
Exercise 6.1 NAME:_____

Graph the following on the given coordinate grid, clearly label each point.



1. A (5, 8)
2. B (-5,-9)
3. C (3,-8)
4. D (-5, 7)
5. E (4,0)
6. F (0, -3)

Identify the coordinates for each of the following points.

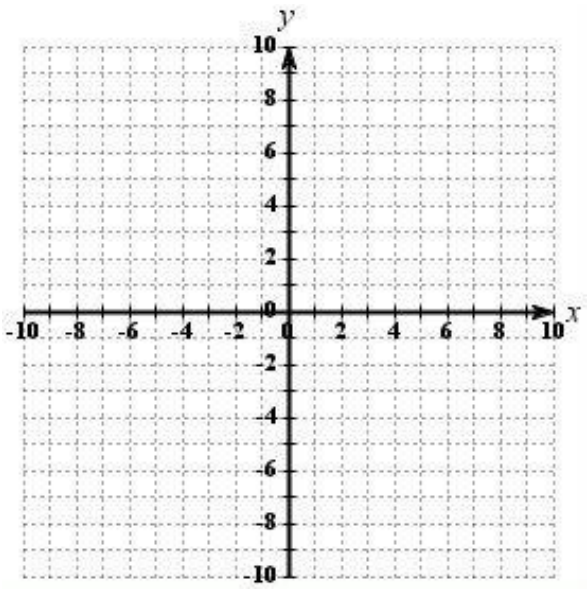


7. A (_____ , _____)
8. B (_____ , _____)
9. C (_____ , _____)
10. D (_____ , _____)
11. E (_____ , _____)
12. F(_____ , _____)

13. Fill out the chart below, then plot each point on the grid.

$y = 3x - 4$

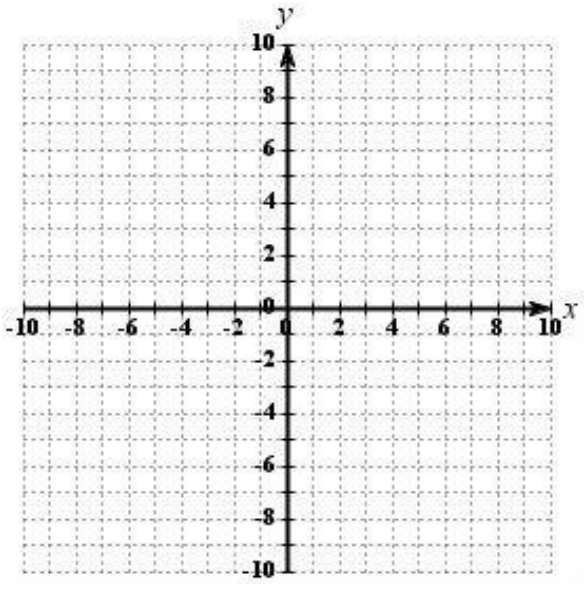
x	y
0	
1	
2	
3	



14. . Fill out the chart below, then plot each point on the grid.

$y = -2x + 3$

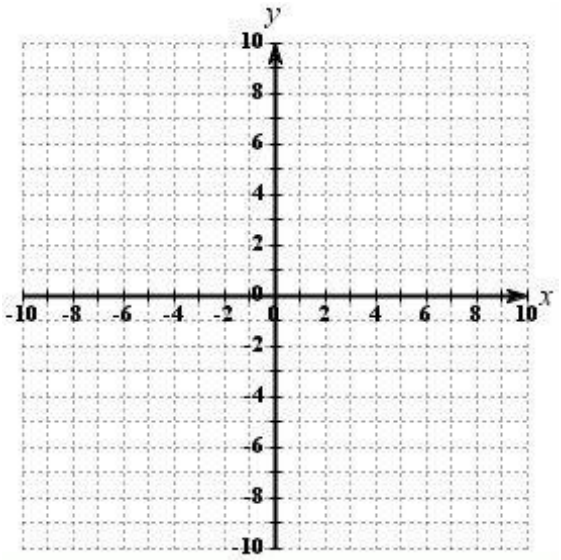
x	y
0	
1	
2	
3	



15. Fill out the chart below, then plot each point on the grid.

$y = x - 5$

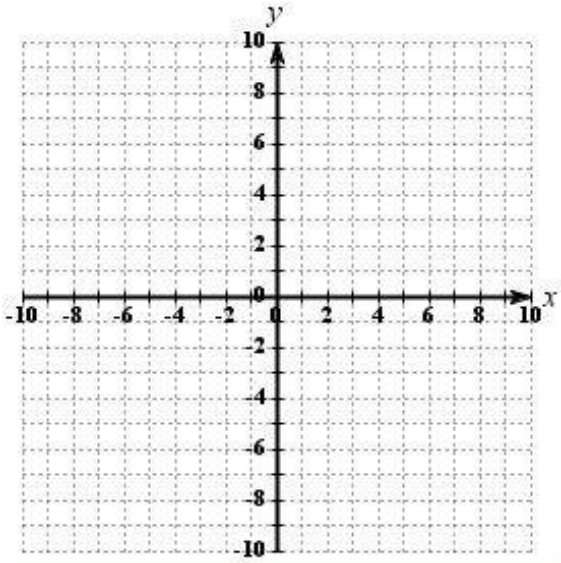
x	y
-1	
0	
1	
2	



16. Fill out the chart below, then plot each point on the grid.

$y = 5x - 2$

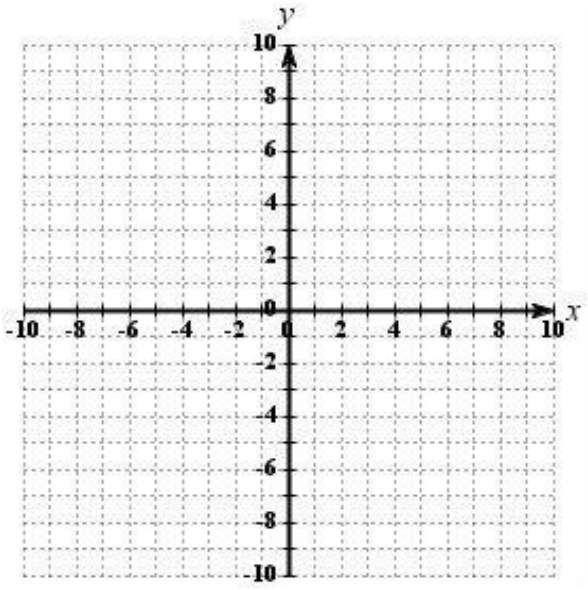
x	y
-1	
0	
1	
2	



17. Fill out the chart below, then plot each point on the grid.

$y = -3x$

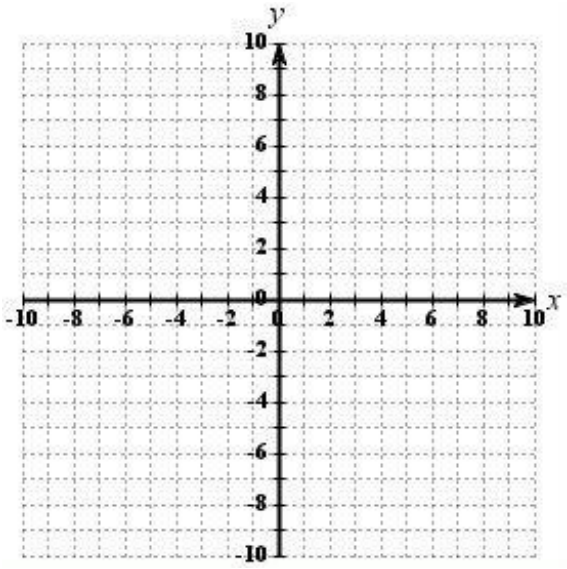
x	y
-2	
0	
2	
3	



18. Fill out the chart below, then plot each point on the grid.

$y = -2x + 5$

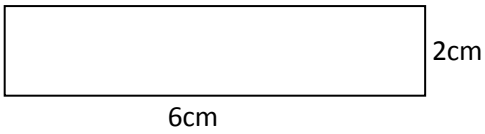
x	y
-2	
0	
2	
4	



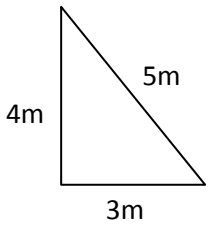
19. Do you see a pattern when you plot the points that work in these equations? How many points do you need to create the pattern or path they will fall on?

Activity 6.2 - Area and Perimeter

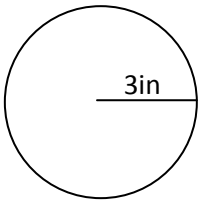
1. Find the area and Perimeter for the rectangle below.



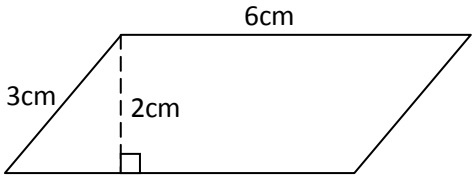
2. Find the area and perimeter for the triangle below.



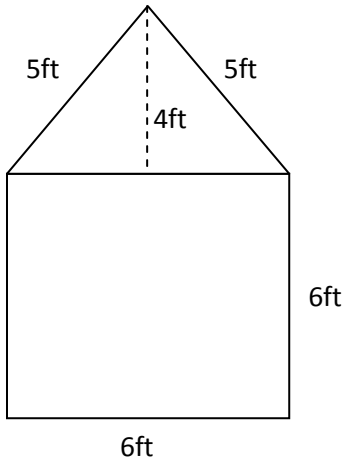
3. Find the Area and Circumference of the circle below



4. Find the Area and Perimeter for the parallelogram below… (hint: Can you make the pieces a rectangle to find the area?)



5. Find the area and perimeter of the composite shape below.



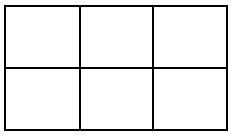
Unit 6 – Coordinate Plane and Geometry

Section 2 –Area and Perimeter

AREA

When we find the area of a shape we are looking for the number of 1 unit X 1 unit squares that will fit into the shape.

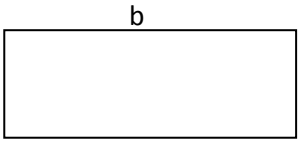
Consider a rectangle that is 3 inches wide and 2 inches tall.



Notice that it is made up of 2X3 = 6 boxes that are exactly 1 inch on each side. So we say the rectangle has an area of $6in^2$, or 6 square inches.

Rectangle

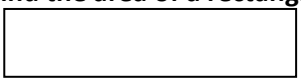
As seen above the area of a rectangle can be found by multiplying the base times the height.



$A = b \cdot h$ or $A = l \cdot w$

Example 1)

Find the area of a rectangle whose has is 10 cm and Height is 3 cm.



10cm

$A = b \cdot h$

$A = 10cm \cdot 3\ cm$

$A = 30cm^2$

The area in 30 square cm.

Example 2)

If the Area of a rectangle is $32m^2$, and we know the length is 4m. Find the width.

$A = l \cdot w$

$32m^2 = 4m \cdot w$

To simplify the way this looks I am going to take out the units $m \ and \ m^2$. Then it is easy to see the one variable w, that we need to solve for.

$32 = 4w$

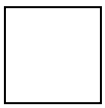
$\frac{32}{4} = \frac{4w}{4}$

$8 = w$

So the width is $8m$.

Square

Since in a square the base and the height are the same we can use the formula:



$A = b \cdot h$

$A = s^2$

Example 3)

Find the area of a square whose side length is 4cm.

$s = 4cm$

$A = s^2$

$A = (4cm)^2$

$A = 16cm^2$

Example 4)

If the area of a square is $25ft^2$, what is the length of the side?

$A = 25ft^2$

$A = s^2$

$s^2 = 25ft^2$ Note : $5ft \cdot 5ft = 25ft^2$

$s = 5ft$

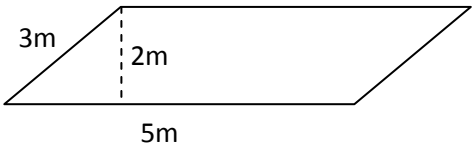
Parallelogram

$A = b \cdot h$

NOTICE $A = l \cdot w$ does not work since the length and width are not perpendicular to each other.

Example 5)

Find the area of the Parallelogram below



The area formula for a Parallelogram is $A = b \cdot h$. The base is 5m and the height is perpendicular to the base, so the height is 2m.

$A = b \cdot h$

$A = 5m \cdot 2m$

$A = 10m^2$

Example 6)

If the area of a Parallelogram is $30in^2$, and the height if $5in$, find the base.

$A = b \cdot h$

$30 = b \cdot 5$

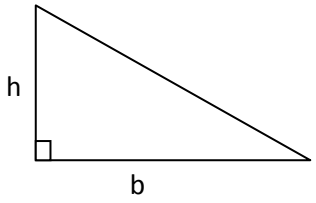
$\frac{30}{5} = \frac{5b}{5}$

$6 = b$

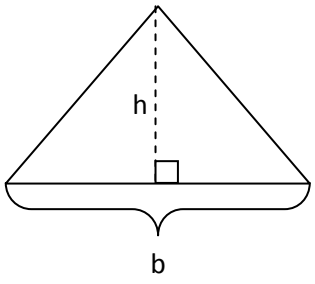
The base is 6 inches.

Triangle

A triangle can be formed by cutting a rectangle(or parallelogram) in half – so it has exactly half the area of a rectangle.



$A = \frac{1}{2}b \cdot h$



$A = \frac{1}{2}b \cdot h$

Notice the b and h have to meet at a 90 degree angle.

Example 7)

Find the Area of a triangle whose base is 10m and whose height is 3m.

$A = \frac{1}{2}b \cdot h$

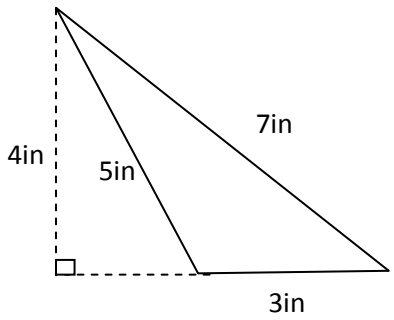
$A = \frac{1}{2} \cdot 10 \cdot 3$

$A = 5 \cdot 3$

$A = 15$

The area is $15m^2$

Example 8) Find the area of the Triangle below



The Formula for the area of a triangle is $A = \frac{1}{2}b \cdot h$.

The base and height meet at a $90°$ angle (a perfect corner)

So the base is the 3in and the height must be 4in.

$A = \frac{1}{2}b \cdot h$

$A = \frac{1}{2} \cdot 3 \cdot 4$

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

$A = 6$

The area is $6in^2$.

Example 9)

If the Area of a triangle is $14cm^2$, and the base is 7cm, find the height.

$A = \frac{1}{2}b \cdot h$

$14 = \frac{1}{2} \cdot 7 \cdot h$

$2 \cdot 14 = 2 \cdot \frac{1}{2} \cdot 7 \cdot h$

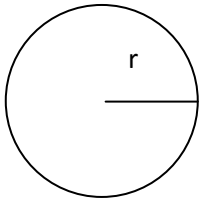
$28 = 7 \cdot h$

$\frac{28}{7} = \frac{7h}{7}$

$4 = h$

The height is 4cm.

Circle



$A = \pi r^2$

Example 10)

If a circle has a radius of 5mi, Find the Area of the circle.

$A = \pi r^2$

$A \approx 3.14 \cdot 5^2$

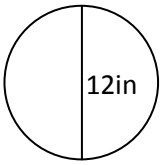
$A \approx 3.14 \cdot 25$

$A \approx 78.5$

The Area is approximately $78.5mi^2$.

Example 11)

Find the area of the circle below.



In this example we are given the diameter not the radius. Recall the radius is half the diameter. So if the diameter is 12 in , the radius in 6in.

$A = \pi r^2$

$A \approx 3.14 \cdot 6^2$

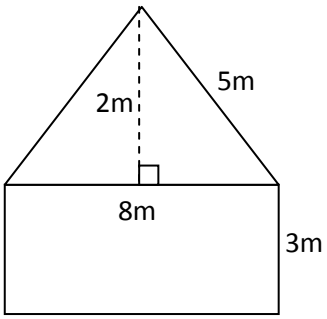
$A \approx 3.14 \cdot 36$

$A \approx 113.04$

The area is approximately $113.04 in^2$

Composite shapes

If a shape can be broken down in to other shapes we know how to find the area of we can find the area of the known shapes and add them together to get the area of the composite shape.



This shape is made up of a triangle on top of a rectangle

(Area of the triangle) + (Area of the rectangle) = Area of the composite shape.

$\left(\frac{1}{2} b \cdot h\right) + (b \cdot h) = \left(\frac{1}{2} 8 \cdot 2\right) + (8 \cdot 3) = 8 + 24 = 32$

The area above is $32 m^2$

PEREMETER

Perimeter is the distance around the shape. We can add up all the lengths of each side to find the total length around the shape.

Rectangle

Since the opposite sides of a rectangle are the same we can use the formula:

$P = 2l + 2w$

Example 12)

Find the perimeter of a rectangle whose length is 2cm and width is 5 cm.

$P = 2l + 2w$

$P = 2 \cdot 2 + 2 \cdot 5$

$P = 4 + 10$

$P = 14$

The perimeter is 1 14 cm.

Example 13)

If the Perimeter of a rectangle is 24ft and the length is 7ft, find the Width of the rectangle.

$P = 2l + 2w$

$24 = 2 \cdot 7 + 2w$

$24 = 14 + 2w$

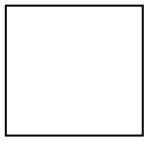
$10 = 2w$

$5 = w$

The width of the rectangle is 5ft.

Square

Since all 4 sides of a square are the same we can condense the formula even more.



$$P = 4s$$

Example 14)

Find the Perimeter of the square whose side length is 5in.

$P = 4s$

$P = 4 \cdot 5$

$P = 20$

The perimeter is 20in.

Example 15)

If the Perimeter of a square is 36mm, find the side length.

$P = 4s$

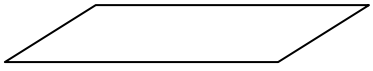
$36 = 4s$

$9 = s$

The side length of the square is 9mm.

Parallelogram

In a parallelogram the opposite sides are the same , so the formula is the same as a rectangle.



$$P = 2l + 2w$$

Example 16)

If the Perimeter of a Parallelogram is 100 cm, and the width is 7 cm, find the length.

$P = 2l + 2w$

$100 = 2l + 2 \cdot 7$

$100 = 2l + 14$

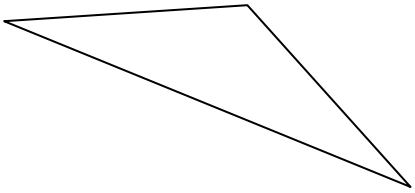
$86 = 2l$

$43 = l$

The length is 43cm.

Triangle

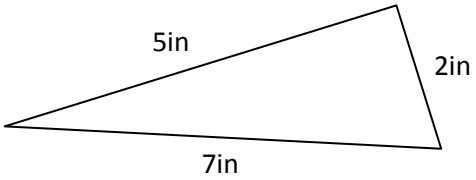
In a triangle all sides can be different so we find the perimeter by adding all the sides together.



$P = a + b + c$

Example 17)

Find the Perimeter of the triangle below.



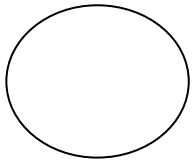
The perimeter can be found by adding up all the sides.

5+2+7=14

The Perimeter is 14in.

Circle

The distance around a circle is actually called the circumference.



$C = 2\pi r$

Example 18)

If the radius of a circle is 7cm, find the circumference.

$C = 2\pi r$

$C \approx 2 \cdot 3.14 \cdot 7cm$

$C \approx 6.28 \cdot 7cm$

$C \approx 43.96cm$

Example 19)

If the diameter of a circle is 12ft, find its circumference.

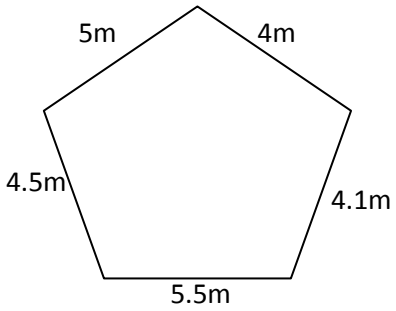
$C = \pi d$

$C \approx 3.14 \cdot 12ft$

$C \approx 37.68ft$

Other Shapes

Remember we can find the Perimeter of any shape by adding up all the sides. So no matter how unusually the shape looks you can still find the perimeter by adding all the sides together.



5+4+4.5+4.1+5.5 =23.1

The Perimeter is 23.1m.

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Exercise 6.2 NAME:_____

For problem 1-6, consider the following rectangle.

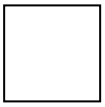
Find the area of the rectangle with dimensions below.

1. $b = 3m,\ h = 4m$ 2. $b = 7ft, h = 5ft$ 3. $b = 11cm,\ h = 4cm$

Use the given information to find the missing information.(A stands for Area.)

4. $A = 27in^2,\ b = 3in,\ h = ?$ 5. $A = 54m^2,\ b = 9m, h = ?$ 6. $A = 72mi^2, h = 4mi, b = ?$

For Problems 7-12, consider the square:



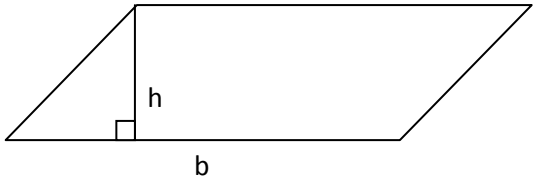
Find the area of the square with dimensions below.

7. $s = 7mm$ 8. $s = 15ft$ 9. $s = 8m$

Determine the length of the side of the square with the given Area.

10. $A = 36in^2$ 11. $A = 49cm^2$ 12. $A = 9km^2$

For problem 13-18, consider the following parallelogram.



Find the area of the parallelogram with dimensions below.

13. $b = 4m,\ h = 10m$ 14. $b = 2ft, h = 7ft$ 15. $b = 12cm,\ h = 5cm$

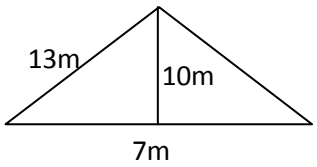
Use the given information to find the missing information.(A stands for Area.)

16. $A = 22in^2,\ b = 2in$ 17. $A = 56m^2,\ b = 7m$ 18.. $A = 144mi^2, h = 36mi$

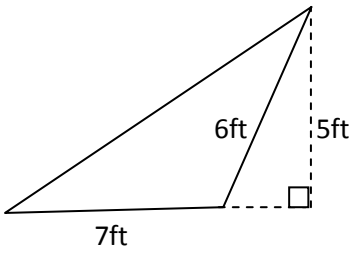
$h =?$ $h =?$ $b =?$

Find the area of the triangles below

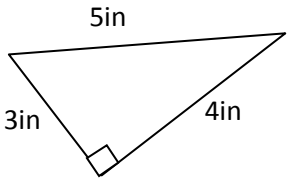
19.



20.



21.



For problems 22-24, find the missing dimension for the triangle.

22. $A = 15in^2,\ b = 3in$ $h = ?$

23. $A = 20m^2,\ b = 4m$ $h = ?$

24. $A = 17mi^2, h = 2mi$ $b = ?$

For Problems 25-27 find the area of the circle with the given dimensions.

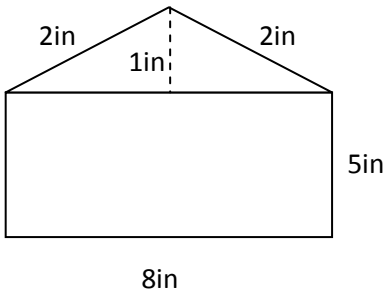
25. $r = 7cm$

26. $d = 10in$

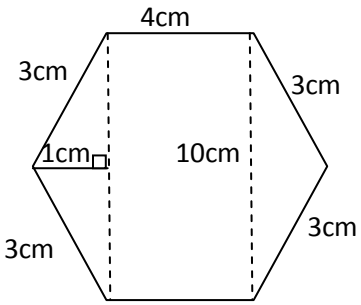
27. $r = 5m$

Find the area of the shapes below

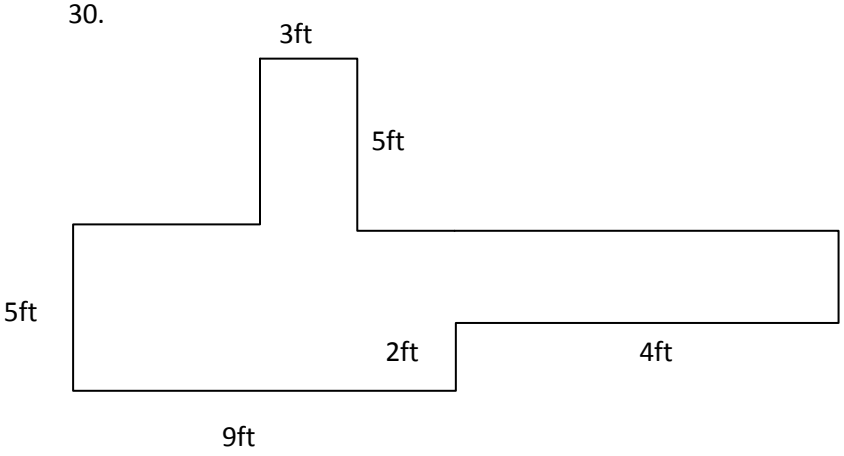
28.



29.

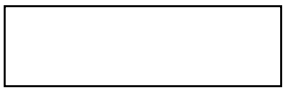


30.

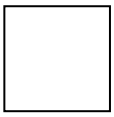


Find the Perimeter (or circumference)of the shapes below

31. Rectangle

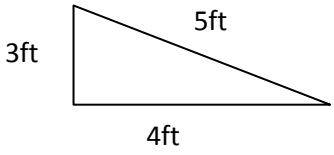


32. Square

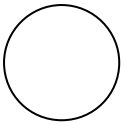


33. Parallelogram

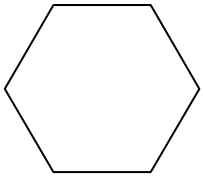
34. Triangle



35. Circle



36. Hexagon

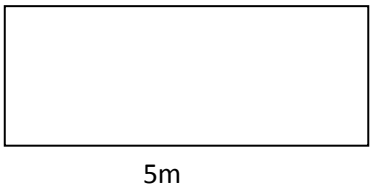


37. If the base of a rectangle is 5 m and the Perimeter is 40 m, what is the Height?

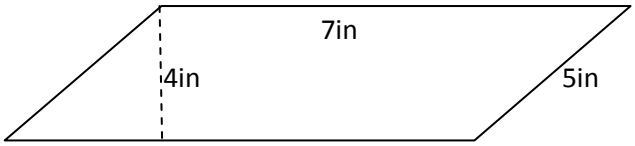
38. If the Perimeter of a square is 28cm, what is the length of each side?

39. If the width of a Parallelogram is 6in, and its perimeter is 38in, find the length.

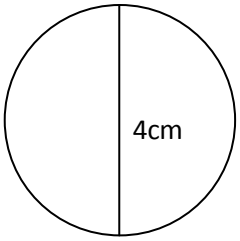
40. Find the Area and perimeter of the rectangle below:



41. Find the Area and Perimeter of the Parallelogram below.



42. Find the Area and Circumference for the Circle Below.



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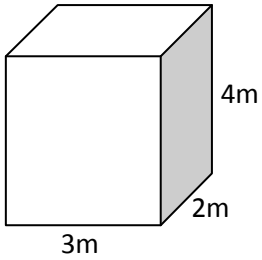
Activity 6.3 - Volume

How many 1mX1mX1m boxes would fit inside this prism?



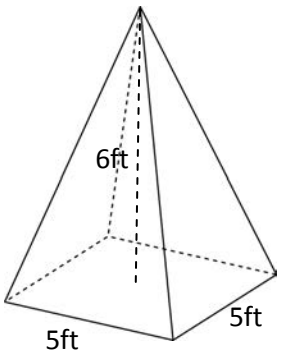
The formula to find Volume of a prism is :_____.

A cylinder is similar, the formula is : _____.

In fact no matter what the shape of the base the formula for a prism is:_____.

Consider a Pyramid:

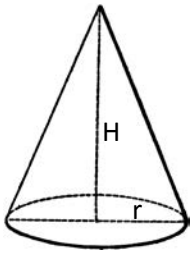
Volume = $50ft^3$



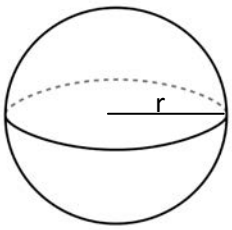
Notice it only has a fraction of the area of the prism with the same base.

The formula for the volume of a Pyramid is _____.

After being told what the equation for the volume of a pyramid is can you make a guess about the formula for a cone?



A sphere is round - the formula will include π just like the Area and Circumference formulas for circles.



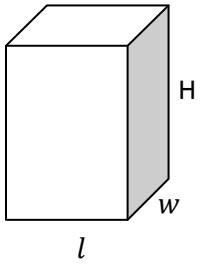
Unit 6 – Coordinate Plane and Geometry

Section 3 –Volume

Volume

When we find the Volume of a shape, we are finding the number of 1 unit X 1 unit X 1 units boxes fit in the shape.

Volume of a Rectangular Prism



$Volume = (Area\ of\ the\ Base) \cdot Hieght$

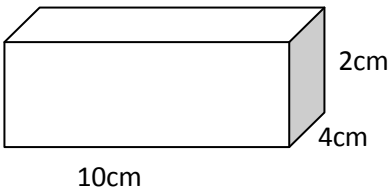
$V = B \cdot H$

$V = (b \cdot h) \cdot H$

$V = l \cdot w \cdot H$

Example 1)

Find the Volume of the rectangular prism below.



$V = l \cdot w \cdot H$

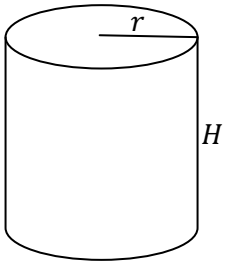
$V = 10cm \cdot 4cm \cdot 2cm$

$V = 80$

The Volume is $80cm^3$.

Notice the units are to the 3rd power – we increase a power for each dimension.

Volume of a cylinder

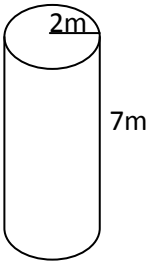


$Volume = (Area\ of\ the\ Base) \cdot Height$

$V = B \cdot H$

$V = (\pi r^2) \cdot H$

Example 2) Find the volume of the cylinder below.



$V = (\pi r^2) \cdot H$

$V = (3.14 \cdot 2^2) \cdot 7$

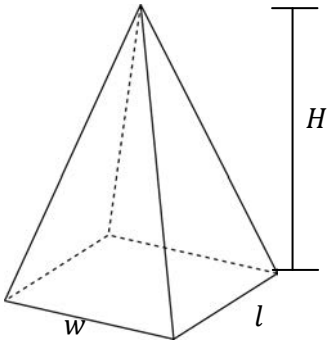
$V = 3.14 \cdot 4 \cdot 7$

$V = 12.56 \cdot 7$

$V = 87.92$

The Volume is $87.92m^3$.

Volume of a Pyramid



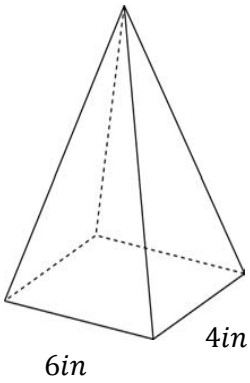
$Volume = \frac{1}{3}(Area\ of\ the\ Base) \cdot Hieght$

$V = \frac{1}{3}B \cdot H$

$V = \frac{1}{3}(b \cdot h) \cdot H$

$V = \frac{1}{3}l \cdot w \cdot H$

Example 3) Find the Volume of the Pyramid below.



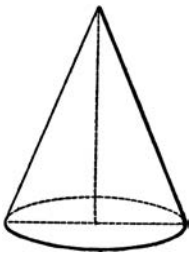
$V = \frac{1}{3} l \cdot w \cdot H$

$V = \frac{1}{3} \cdot 4 \cdot 6 \cdot 10$

$V = 80$

The Volume is $80in^3$

Volume of a Cone

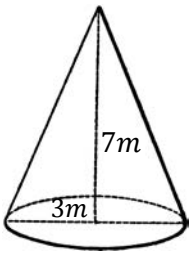


$Volume = \frac{1}{3}(Area\ of\ the\ Base) \cdot Hieght$

$V = \frac{1}{3} B \cdot H$

$V = \frac{1}{3}(\pi r^2) \cdot H$

Example 4) Find the Volume of the cone below.



$V = \frac{1}{3}(\pi r^2) \cdot H$

$V \approx \frac{1}{3}(3.14 \cdot 3^2) \cdot 7$

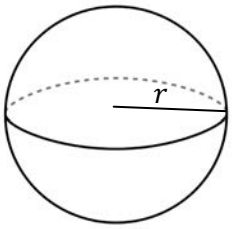
$V \approx \frac{1}{3} \cdot 3.14 \cdot 9 \cdot 7$

$V \approx 65.94$

Multiplying $\frac{1}{3} \cdot 9$ eliminates the fraction.

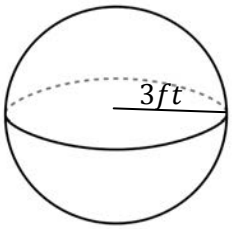
The Volume is approximately $65.94m^3$

Volume of a Sphere



$$Volume = \frac{4}{3}\pi r^3$$

Example 5) Find the Volume of the sphere below.



$$V = \frac{4}{3}\pi r^3$$

$$V \approx \frac{4}{3} \cdot 3.14 \cdot 3^3$$

$$V \approx \frac{4}{3} \cdot 3.14 \cdot 27$$

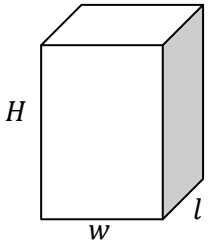
$$V \approx 113.04$$

The Volume of the sphere is $113.04 ft^3$

Exercise 6.3 NAME:_____

Calculate the volume of each of the following.

For problems 1-3 consider the rectangular prism below.

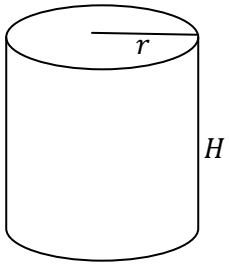


1. $l = 2ft, w = 3ft, H = 4ft$

2. $l = \frac{2}{3}m, w = 5m, H = \frac{1}{2}m$

3. $l = 2.5in, w = 1.2in, H = 4in$

For problems 4-6 consider the cylinder below.

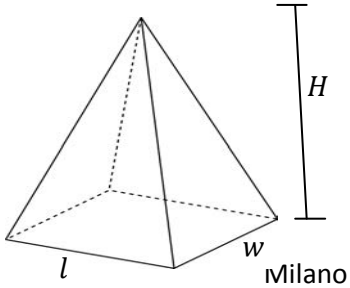


4. $r = 2.1cm, H = 3cm$

5. $r = 5in, H = 4in$

6. $r = \frac{1}{3}ft, H = 5ft$

For Problems 7-9 consider the Rectangular pyramid below

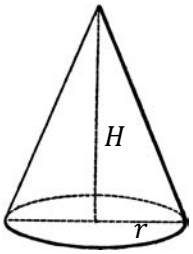


7. $l = \frac{1}{2}cm, w = 3cm, H = 4cm$

8. $l = 2.1m, w = 3m, H = 4m$

9. $l = 5ft, w = 2ft, H = 6ft$

For Problems 10-12 consider the cone below

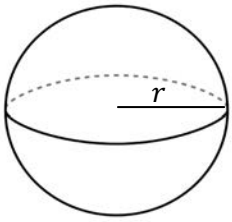


10. $r = 2.5cm, H = 4cm$

11. $r = \frac{1}{5}ft, H = 4ft$

12. $r = 6m, H = 2m$

For Problems 13-15 consider the sphere below



13. $r = 5m$

14. $r = \frac{1}{2}cm$

15. $r = 2.2ft$

Activity 6.4 - Square Roots &Pythagorean Theorem

Complete the pattern below

$$\sqrt{4} = 2$$

$$\sqrt{9} = 3$$

$$\sqrt{16} =$$

$$\sqrt{\quad} = 5$$

$$\sqrt{36} =$$

$$\sqrt{\quad} = 7$$

$$\sqrt{64} =$$

$$\sqrt{\quad} = 9$$

$$\sqrt{100} =$$

$$\sqrt{\quad} = 11$$

$$\sqrt{144} =$$

$$\sqrt{\quad} = 13$$

$$\sqrt{196} =$$

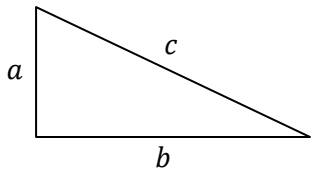
$$\sqrt{\quad} = 15$$

What about $\sqrt{1600} =$

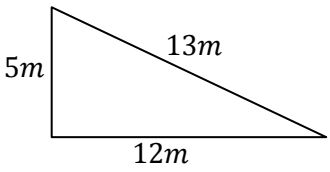
Consider what numbers the following square roots fall between

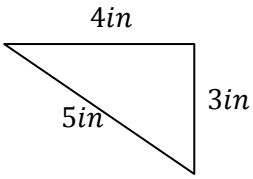
$\sqrt{8}$ $\sqrt{18}$

Consider the formula $a^2 + b^2 = c^2$. This formula holds true for any right triangle – a triangle who has two sides that make a right angle – a "perfect corner". It is called the Pythagorean Theorem.



Do the sides of the following triangles work in this formula?





Does $a + b = c$?

Unit 6 – Coordinate Plane and Geometry

Section 4 – Pythagorean Theorem

Square Roots Revisited

In Chapter 3 Section 4 we discussed square roots – we will review a few more examples here.

Example 1)

$\sqrt{\mathbf{49}}$

$\sqrt{49}$

What number times itself is 49?

$7 \cdot 7 = 49$

$\sqrt{49}$ =7

Example 2)

$\sqrt{\mathbf{64}}$

$\sqrt{64} = \sqrt{8 \cdot 8} = 8$

Example 3)

What numbers does $\sqrt{8}$ fall between?

Since $4 < 8 < 9$,

$\sqrt{4} < \sqrt{8} < \sqrt{9}$

$2 < \sqrt{8} < 3$

So $\sqrt{8}\ falls\ between\ 2\ and\ 3.$

Challenge:

Simplify $\sqrt{8}$.

$\sqrt{8}$

$= \sqrt{4 \cdot 2}$

$= \sqrt{4} \cdot \sqrt{2}$

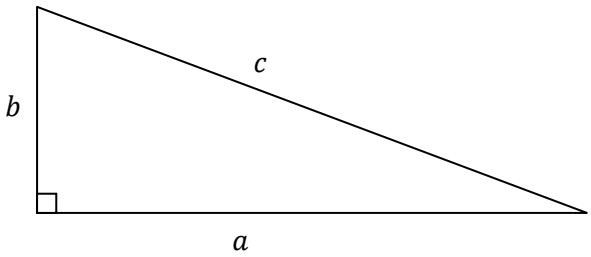
$= 2\sqrt{2}$

We begin by looking for the perfect square in 8.

$4 \cdot 2 = 8$

Pythagorean Theorem

In a ***right triangle*** -there is a special relationship between the sides of the triangle.



$a^2 + b^2 = c^2$

Where c is the hypotenuse (the longest side) and a and b are the legs of the triangle.

Example 4)

If $a = 9cm$ and $b = 12cm$, find c.

$a^2 + b^2 = c^2$

$9^2 + 12^2 = c^2$

$81 + 144 = c^2$

$225 = c^2$

Note: $225 = c^2$ *has TWO solutions.*
c =15 and c= - 15
We are dealing with length so the answer must be positive.

225 is a perfect square since 15 x15 =225 – length is always positive.

c must be 15 , so the Hypotenuse is 15cm.

Example 5)

If $c = 39ft$ and $a = 36ft$, find b.

$a^2 + b^2 = c^2$

$36^2 + b^2 = 39^2$

$1296 + b^2 = 1521$ We need to subtract 1296 from both sides

$b^2 = 225$ Then think of the square root of 225.

Since b is the side of a triangle is must be positive - So b=15ft

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Exercise 6.4 NAME:_____

Find the following square roots

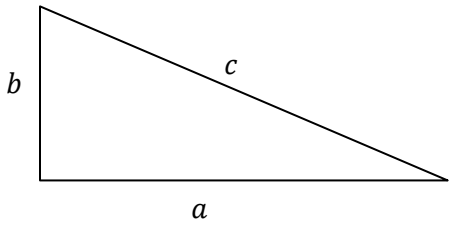
1. $\sqrt{4}$ 2. $\sqrt{9}$ 3. $\sqrt{25}$

4. $\sqrt{144}$ 5. $\sqrt{900}$ 6. $\sqrt{196}$

What whole numbers do the following square roots fall between?

7. $\sqrt{7}$ 8. $\sqrt{22}$ 9. $\sqrt{120}$

For Problems 10-15, refer to the triangle below.



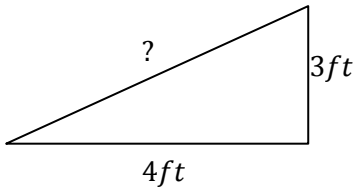
10. $a = 3in, b = 4in, c =?$ 11. $a = 5m, b = 12m, c =?$ 12. $a = 6ft, b = 8ft, c =?$

13. $c = 26ft, a = 24ft, b =?$

14. $c = 5m, a = 3m, b =?$

15. $c = 15in, b = 12\ in, a =?$

16. A wheel chair ramp raises a wheel chair a vertical distance of 3 feet, in a horizontal distance of 4 feet. How long is the ramp the wheel chair travels on?



Challenge: break the following into simplified roots

a. $\sqrt{20}$ b. $\sqrt{18}$ c. $\sqrt{32}$

Formulas

$$\pi \approx 3.14$$

$$r = \frac{d}{2}$$

$$d = 2r$$

$$P = 2l + 2w$$

$$P = 4s$$

$$C = 2\pi r$$

$$C = d\pi$$

$$A = \pi r^2$$

$$A = bh$$

$$A = s^2$$

$$A = lw$$

$$A = \frac{1}{2}bh \qquad A = \frac{bh}{2}$$

$$V = Bh$$

$$V = lwh$$

$$V = \pi r^2 h$$

$$V = \frac{lwh}{3} \qquad V = \frac{1}{3}lwh$$

$$V = \frac{1}{3}\pi r^2 h \qquad V = \frac{\pi r^2 h}{3}$$

$$V = \frac{4}{3}\pi r^3$$

$$hyp = \sqrt{leg^2 + leg^2} \qquad leg = \sqrt{hyp^2 - leg^2}$$

$$a^2 + b^2 = c^2$$

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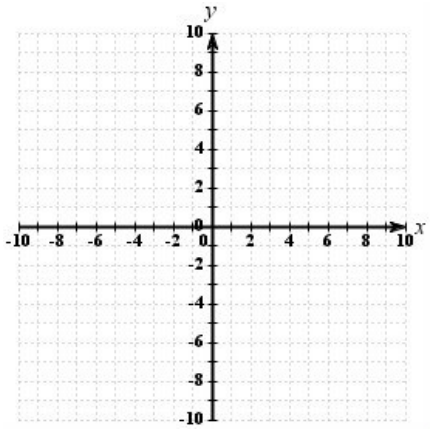
Unit 6 **NAME:_____**

Review 6.1 – 6.4

1. Complete the chart below by evaluating

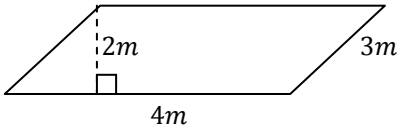
y = 2x + 1 Then plot the points on the graph.

x	y
0	
1	
2	
3	



2. Find the area of a rectangle whose base is 3 cm and hieght is 7cm.

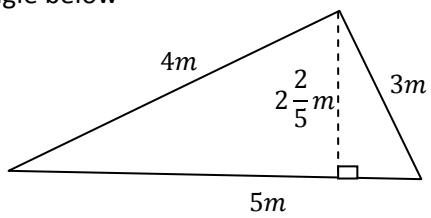
3. Find the Perimeter of a parallelogram below



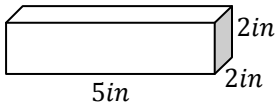
4. Find the area of a circle with a radius of 7feet.

5. If the Perimeter of a recantgle is 26ft, and the width is 7ft, find the length.

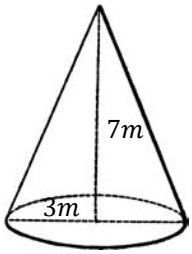
6. Find the area of the triangle below



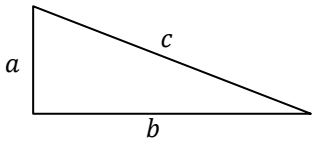
7. Find the volume of the rectangular prism below.



8. Find the Volume of the cone below



For problems 9 and 10 consider the triangle



9. If $a = 3ft \text{ and } b = 4ft$, $find\ c$

10. If $c = 13ft \text{ and } b = 5ft$, $find\ a$

Review Unit 1-3 NAME:_____

UNIT 1

1. Plot the following on a number line, label each point

7, - 4 , -10 

Find the absolute value of the following

2. $|-21|$ 3. $|50|$ 4. $-|-10|$

5. Put the following in order from least to greatest

7, 4, -2 , 0, -10, 8

6. -7 +(-5) 7. -5 – (-3) 8. 4 – 7

9. – 10 – (- 21) 10. 65 – 5 – (-20)

11. Evaluate a - b , for a = 7 and b = -7

12. $-2 \cdot (-11)$ 13. $-3 \cdot 4$ 14. $-5(-2)(-6)$

15. $-156 \div -3$ 16. $\frac{54}{-9}$

Write the following in exponential form

17. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7$ 18. $x \cdot x \cdot y \cdot y \cdot y$

Evaluate the following

19. 6^2

20. $(-3)^2$

21. -2^4

Simplify the following

22. $4 - 2 \cdot 13$

23. $6 \cdot 4 - 12 \div 3 \cdot 4$

24. $5 \cdot 4 - (6 - 9)^2$

25. $2 - 4 + 5(3^3 - 2 \cdot 7)$

26. $18 \div 3 \cdot 5$

27. Evaluate $ab^2 + 2b,\ for\ a = -2\ and\ b = -3$

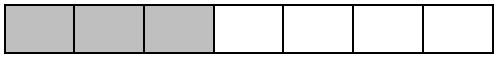
28. What is colder - 25 degrees or - 30 degrees?

29. Sam account is overdrawn by $21. He deposits a paycheck for $231. What is his new balance?

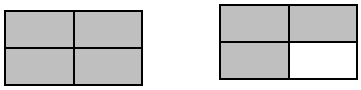
30. You owe $5 for each day you leave your car parked at a car lot. If you leave your car for 6 days how much will you owe?

Unit 2

1. Write a fraction that represents the following.



2. Write an IMPROPER FRACTION and a MIXED NUMBER that represents the following.



3. Draw a number line, clearly label $0,\ -\frac{3}{5},\ \frac{3}{5},\ 1\ and\ -1.$

Find the absolute value of the following.

4. $\left|-\frac{4}{3}\right|$

5. $\left|\frac{3}{7}\right|$

6. $-\left|-\frac{2}{11}\right|$

Rewrite the following fractions to have the given denominator

7. $\frac{3}{5}=\frac{?}{15}$

8. $-\frac{35}{20}=\frac{?}{4}$

9. $-3=\frac{?}{2}$

Write the following in lowest terms

10. $-\frac{24}{60}$

11. $-\frac{36}{90}$

12. $\frac{4x^2}{20x}$

Complete the following – show all steps.

13. $-\frac{5}{7}\cdot\frac{2}{9}$

14. $\left(-\frac{12}{25}\right)\cdot\left(-\frac{35}{8}\right)$

15. $1\frac{2}{3}\cdot\left(-2\frac{2}{3}\right)$

16. $\frac{3}{5}\div\frac{4}{15}$

17. $\left(-\frac{1}{3}\right)\div 9$

18. $3\frac{1}{3}\div\left(-2\frac{1}{2}\right)$

19. If you have a 32 oz. bag of chips and the serving size is $\frac{1}{2}oz$, How many servings are in the bag?

20. You are renting a bus to go to Reno, the bus can hold 66 people and currently you have reserved $\frac{1}{3}$ the seats. How many seats have you reserved?

21. If the equation to find area of a rectangle is $A = b \cdot h$, and you know that $b = \frac{1}{2}in$ and $h = \frac{5}{8}in$ find the Area.

22. $-\frac{2}{7}-\frac{1}{7}$

23. $-\frac{3}{5}-\left(-\frac{1}{5}\right)$

24. $-\frac{3}{8}+\frac{1}{8}$

25. $\frac{3}{4}-\frac{1}{8}$

26. $-\frac{1}{3}+\frac{5}{6}$

27. $-5+\frac{1}{3}$

28. $-4\frac{1}{5}-7\frac{3}{10}$

29. $8\frac{1}{6}-4\frac{5}{12}$

30. $5-\left(-\frac{2}{5}\right)$

31. You are putting in a new counter in your kitchen, You must first put in a padding that is $\frac{1}{3}in$ thick and the counter it self is $\frac{3}{4}in$ thick. How much thickness are you adding to the counter?

32. $\left(\frac{2}{5}\right)^3$

33. $\left(-\frac{3}{11}\right)^2$

34. $-\frac{4}{5}^2$

35. $\frac{4}{5} \div \frac{14}{15} \cdot \frac{3}{7}$

36. $\frac{2}{3} + \frac{1}{3} \cdot \frac{5}{3}$

37. $\left(\frac{3}{12} - \frac{3}{4}\right)^2 + \frac{1}{2} \cdot 10$

38. $\dfrac{\frac{1}{5}}{\frac{7}{10}}$

39. $\dfrac{\frac{5}{6}+\frac{1}{3}}{3}$

40. $\dfrac{\frac{1}{2}}{2-\frac{1}{3}}$

Unit 3

1. Write 4.786 in words.

2. Write 5.00671 in words.

3. Write the following as a number.

Three and four hundred twenty-one thousandths

4. Write the following as a number.

Seven hundred-thousandths

Find the absolute value of the following.

5. $|-0.251|$ 6. $|7.123|$ 7. $-|-0.235|$

Order the following by placing < or > between the numbers.

8. 4.0256 4.025 9. 3.715 3.0715 10. -5.26 -5.206

11. Write -5.47 as a fraction.

12. Write 3.255 as a fraction.

13. Round -42.23715 to the nearest thousandth.

14. Round -0.025467 to the nearest hundredth.

15. Round 235.45678948 to the nearest ten-thousandth.

16. Round to the nearest dollar : $ 25.86

17. You calculate the cost of a single item bought in bulk as $ 3.2655478. How much would you pay for it?

Perform the indicated operation

18. $-2.36 + 1.369$

19. $-523.365 + (-21.1)$

20. $-2.251 - 5.33$

21. $-2.4— 5.232$

22. $43.52 - 6.4253$

23. $-35.1 + 234.34$

24. Sue has$ 236 in an account and writes a check for $250. If the check clears, what is Sues account balance?

Perform the indicated operation.

25. $-23.45(-5.2)$

26. $-4.34 \cdot 5.5$

27. $(-3.7)(-7)$

28. $-23.4556(100)$

29. $5.238(-10000)$

30. $3.2234 \cdot 0.01$

31. Given the formula for circumference is $C = 2\pi r \quad with \;\; \pi \approx 3.14$. find the circumference of a circle whose radius, r, equal to 2in.

32. $27.56 \div 13$

33. $106.7 \div 5$

34. $28 \div 3$

35. $12.588 \div 0.2$

36. $7 \div 0.9$

37. $5.2756 \div 1.21$

Round the following to the nearest Thousandth.

38. $423 \div 2.3$

39. $20 \div 7$

40. $536 \div 0.7$

41. Write $\frac{5}{9}$ as a decimal.

42. Write $\frac{3}{8}$ as a decimal.

Order the following by placing a < or > in between the numbers

43. $0.67 \quad \frac{2}{3}$

44. $\frac{4}{5} \quad 0.81$

Complete the following

45. $(-3.5)^2$

46. -0.5^2

47. $-(0.2)^3$

48. $3.1(0.2)^4$

49. $4\,(-0.3)^3$

50. $5.8 + 12.3(0.2)$

51. $4.8 \div 0.3 \cdot 2.22$

52. $2(0.3)^2 + 3.2(5.1)$

53. $4.25 \div 0.05 + 3.3 \cdot 4.123$

54. Find the average of 87, 75, and 81.

55. $\sqrt{196}$

56. $\sqrt{900}$

57. $-\sqrt{36}$

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Review unit 4 - 6 **NAME:_____**

Unit 4

Evaluate the following

1. $x - 7, \quad for\ x = -5$

2. $2b + 4, \quad for\ b = -2$

Simplify

3. $47x - 3x + 4x$

4. $12x + 4y - 3y$

5. $22k + j - 12k - j$

6. $4x^2 + 3x - 12$

7. $3x^2y + xy + 8xy^2 - 5xy$

Distribute and simplify

8. $4(x - 3)$

9. $8(x + 2)$

10. $-5(x - 4)$

11. $-3(2x + 6)$

12. $2 + 5(x - 2)$

13. $3x - 6(x - 4)$

Solve

14. $x + 4 = -10$

15. $x - 5 = -14$

16. $-3 = x + 28$

Solve

17. $6x = -24$

18. $-7x = -42$

19. $-8x = 72$

20. $-2x + 7x = 72 - (-3)$

21. $8x + 10 - 7x = 4$

22. A number decreased by thirty is twenty-two. Find the number.

23.The product of a number and 4 is 32. Find the number.

Solve

24. $-3x - 7 = 8$

25. $-2 - 3x = 31$

Solve

26. $2(x-1)+12=-10$

27. $5-2(x+1)=12-(-3)$

28. $8x-5=2x+13$

29. $5x-5=4(x+7)-3$

30. $\frac{1}{5}x=\frac{3}{7}$

31. $x-\frac{1}{2}=\frac{2}{3}$

32. $\frac{2}{3}x - \frac{1}{3} = \frac{1}{6}$

33. $\frac{1}{2}x - 2 = \frac{3}{2}x - \frac{1}{2}$

3 4. $0.3x = 3.9$

35. $x + 1.3 = -2.23$

36. $0.25x - 3.2 = -2.55$

Unit 5

1. If you spend 6 hours studying to every 2 hours in class, what is the ratio of hours in class to hours studying?

Write a ratio for the following in lowest terms.

2. $1\frac{1}{2}cm \ \ to \ 2cm$

3. $4.2m \ \ to \ 3.22m$

4. 20 hours to 2 days

5. If you drove 300miles on 25 gallons of gas, what is your miles per gallon?

6. You need to by a special seasoning for your holiday meal and have several options to choose from. What is the best deal?

4 oz for $10.21

4.5oz for $11.50

5oz for $12.00

7. $\frac{3}{5} = \frac{8}{x}$

8. $\frac{2.5}{7} = \frac{x}{1.4}$

9. $\frac{2\frac{1}{3}}{x} = \frac{4\frac{1}{2}}{6}$

10. If it takes 2 cups of flour to make a recipe for 6 people, How much flour do you need to make enough for 8 people?

11. A study showed that 3 out of every 5 people voted in an election, how many people out of 1250 can you assume voted?

12. You were able to drive 400 miles on $18\frac{1}{2}\ gallons$. How many gallons would you need to drive 800 miles?

Write the following a s a decimal

13. 36%

14. 25.42%

15. 0.0008%

Write each of the following as a percent

16. 3.10

17. 0.46

18. 0.5

Write each of the following as a fraction

19. 96%

20. 21.5%

21. $15\frac{1}{2}\%$

22. Write $\frac{5}{6}$ as a percent.

23. What is 50% of 150?

24. What is 100% of 300?

25. What is 10% of 28?

26. What is 4% of 30?

27. 33 is 60 % of what number?

28. 90 is 150% of what number?

29. 15 is what percent of 180?

30. 560 is what percent of 56?

31.You currently pay $700 for rent and were just told by your manager to expect a 5% increase next month. How much will the increase be?

32. The parks and recreation department just announced they will only have 75% of the budget they had last year. If they had a budget of $400,000 last year, how much will they have this year?

33. A certain class has 26 females out of 42 students. What percent females are there?

34. If Bob had $ 320 in his account at the end of the month and that was only 25% of what he had last month, how much did he have last month?

35. If the school raised its tuition from $32 to $40 what would the percent increase be?

36. If you paid your credit card down to $250 from $450, what is the percent decrease?

If you went to a restaurant and had a bill for $58.63 , how much would you leave for a tip if you want to leave:

37. 10% tip?

38. 15% tip?

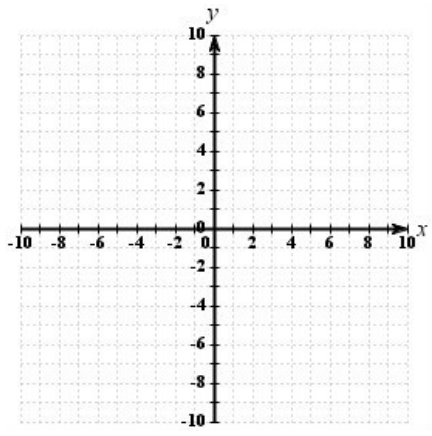
39. 20% tip ?

Unit 6

1. Complete the chart below by evaluating

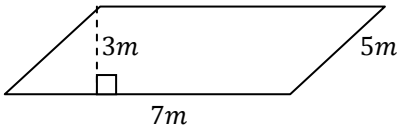
y = 4x - 3 Then plot the points on the graph.

x	y
0	
1	
2	
3	



2. Find the area of a rectangle whose base is 15 cm and hieght is 4cm.

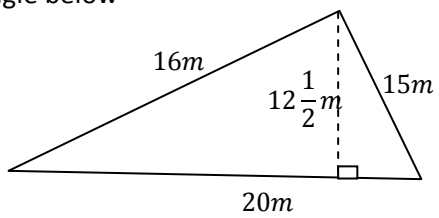
3. Find the Perimeter of a parallelogram below



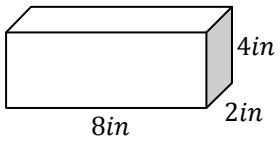
4. Find the area of a circle with a radius of 3 feet.

5. If the Perimeter of a recantgle is 36ft, and the length is 5ft, find the width.

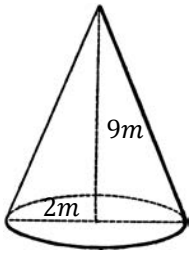
6. Find the area of the triangle below



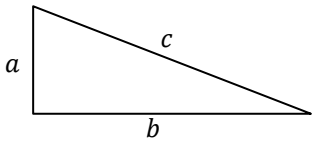
7. Find the volume of the rectangular prism below.



8. Find the Volume of the cone below



For problems 9 and 10 consider the triangle



9. If $a = 5ft \text{ and } b = 12ft$, $find\ c$

10. If $c = 5ft \text{ and } b = 3ft$, $find\ a$

Unit 1 Answers

Exercise 1.1 NAME:_____

For problems 1 – 9 Write the positive or negative number that best represents the given information.

1. $35 overdrawn

−35

2. $36 in your account

3. 48 ft above sea level

4. 250ft. above sea level

250

5. 13° below zero

6. $21 overdrawn

7. 72° above zero

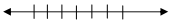
72

8. 51 ft. below sea level

9. 7° below zero

Plot the following on a number line, label each point

10. 3, -2, 0



-2 0 3

11. 5, 2, -5

12. 6, -2 , -7

Evaluate the following absolute values

13. |3|

3

14 . |−7|

15. |8|

16. |−9|

9

17. −|12|

18. |0|

Order the following numbers by placing a > or < in between them.

19. 0 > -8

20. 0 4

21. 3 -2

22. -4 < 7

23. -6 -8

24. -11 -2

Put the following in order from least to greatest

25. -3, 3, 0

-3, 0, 3

26. -5, -3, -9

27. 6, 7, -11

28. |−3|, −4 , −|−5|

−|−5|, −4, |−3|

29. |0|, −2 , |−2|

30. −|3|, 0 , |3|

31. What temperature is colder -21 degrees or – 15 degrees?

- 21 degrees is colder

32. Is it better if sally is overdrawn by $10, or overdrawn by $30? (Which case is she in less debt?)

33. You are in a submarine and are at a depth of 75 feet below sea level. Your depth changes to 25 feet below sea level. Did you go up or down?

Exercise 1.2 NAME:_____

1. -3 + 4

1

2. 6 + (-3)

3. -4 + 9

4. 7 + (-11)

-4

5. -15 +7

6. -13 +8

7. 6 +-6

0

8. 5 + 5

9. -12 + -12

10. -23 + 7

-16

11. -16 + (-11)

12. 13 + -11

13. 3 – 5

-2

14. 8 – 15

15. 9 – 12

16. -4 – 5

-9

17. -7 – 12

18. -6 – 11

19. – 3 - (-2)

-1

20. 7 – (-5)

21. -3 – (-4)

22. 3 – 4 + (-12)

-13

23. 2 – 9 – (-4)

24. -5 + (-4) – 7

Evaluate the following for the given values

25. a + b , for a = -3 and b = -2

-5

26. a – b , for a = 4 and b = -5

27. a +b for a = 7 and b = -10

28. If Joe had a checking account balance of $35 and need to pay a bill for $57. If he writes a check for the bill, what would his account balance be?

-22 dollars

29. If you are in a submarine and are at a depth of 55 feet below sea level and rise 15 feet, what depth are you at?

30. It is $32°F$ and the temperature is expected to drop $50°$ in the next month, what is the temperature expected to be?

Exercise 1.3 NAME:_____

Multiply

1. $3(-4)$ 2. $-4 \cdot 6$ 3. $-4 \cdot 7$

-12

4. $-3(-5)$ 5. $-8(-8)$ 6. $-11(-7)$

15

7. $-8 \cdot 3(-2)$ 8. $6 \cdot (-2) \cdot 5$ 9. $(-5)(-6)(-2)$

48

10. Find the product of 8 and -13.

-104

11. Find the product of -7 and – 4

12. Find the product of -6 and 9

13. $Evaluate\ xy, for\ x = -6\ and\ y = 9$

-54

14. $Evaluate\ 6ab,\ for\ a = -3\ and\ b = -7$

15. Evaluate $-7xy, for\ x = -1\ and\ y = 6$

Dividing

16. $-33 \div 3$ 17. $-95 \div -5$ 18. $240 \div -12$

-11

19. $\frac{-36}{-12}$ 20. $\frac{-28}{7}$ 21. $\frac{64}{-8}$

3

22. Evaluate $\frac{-a}{b}$, $for\ a = 72, and\ b = -4.$

23. Evaluate $\frac{a}{b}, for\ a = 22\ and\ b = -2.$

18

24. Evaluate $a \div b, for\ a = 56, and\ b = 8.$

For problem 25-27, consider the following rectangle.

Find the area of the rectangle with dimensions below.

25. $b = 3m,\ h = 4m$ 26. $b = 7ft, h = 5ft$ 27. $b = 11cm,\ h = 4cm$

$12m^2$

Exercise 1.4 NAME:_____

Write the following in exponential form

1. $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3$ 2. $-5 \cdot 5 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$ 3. $(-3) \cdot (-3) \cdot (-3) \cdot 4 \cdot 4$

$2^3 3^4$

4. $-x \cdot x \cdot x$ 5. $x \cdot x \cdot x \cdot (-y) \cdot (-y)$ 6. $a \cdot b \cdot b \cdot b \cdot b \cdot b$

$-x^3$

Evaluate the following

7. 3^4 8. 2^3 9. 5^2

81

10. $(-2)^2$ 11. -4^4 12. $-(5)^2$

4

13. $a^2\ ,\ for\ a = 9$ 14. $a^2b^3\ , for\ a = -2\ and\ b = 3$

81

15. Why is the answer different between $-2^4\ and\ (-2)^4$?

Simplify the following

16. $3 + 2 \cdot 7$

17. $-4 - 6 \div 3$

18. $-2^3 \cdot 3 + 2$

17

19. $7 + (-6) - 4$

20. $12 \div 4 \cdot 6$

21. $7 \cdot 4 + 6 - 3$

-3

22. $(2 + 7)^2 - 7$

23. $-3^2 - (7 - 8)$

24. $4 - 7 + 3(5 - 3)^3$

74

25. $\frac{2^4-1}{7-2}$

26. $5 \cdot (2 - 3) + 7^2 - 5 \cdot 4 + 3$

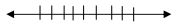
3

27. Evaluate $ab^2 - 2b,\ for\ a = -3\ and\ b = -2$

Unit 1 Review **NAME:**_____

1. Plot the following on a number line, label each point

3, -5 , -3



-5 -3 3

Find the absolute value of the following

2. $|-50|$

3. $|14|$

4. $-|-7|$

50

14

-7

5. Put the following in order from least to greatest

6, 7, -11, 4 , -2

-11, -2, 4, 6, 7

6. 2 +(-2)

7. 6 – 21

8. -4 – 11

0

-15

-15

9. -5 – (-12)

10. 3 – 4 – (-3)

7

2

11. Evaluate a – b , for a = 2 and b = -4

6

12. $-5 \cdot 8$

13. $-7(-9)$

14. $-2 \cdot 7(-3)$

-40

63

42

15. $121 \div -11$

16. $\frac{-70}{-7}$

-11

10

Write the following in exponential form

17. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 11 \cdot 11$

18. $x \cdot x \cdot x \cdot x \cdot (-y) \cdot (-y)$

$6^4 11^2$

$x^4(-y)^2$

Evaluate the following

19. 5^3

20. $(-3)^2$

21. -2^4

125

9

-16

Simplify the following

22. $3 + 2 \cdot 6$

23. $3 \cdot 4 + 7 - 3$

15

16

24. $-4^2 - (16 - 8)$

25. $4 - 11 + 2(8 - 3)^2$

-24

43

26. $16 \div 2 \cdot 3$

27. Evaluate $ab^4 - b,\ for\ a = 7\ and\ b = -2$

24

114

28. What is warmer - 31 degrees or - 57 degrees?

-31 degrees is warmer.

29. Sam is in debt $30 to Jill and then gets his pay check for $151. After paying off Jill how much money does he have?

$121

30. Bob owes 5 people $4 each, how much money is he in debt? (use a signed number to represent debt.)

-20 dollars

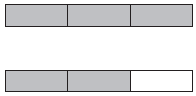
Unit 2 Answers

Exercise 2.1 NAME:_____

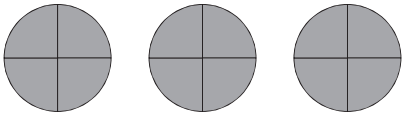
Write a fraction that can represent the shaded area in the following. If the answer can be written as a mixed number, write the mixed number answer as well.

1. $\frac{3}{8}$

2.



3.



Write the following Mixed numbers as fractions

4. $-4\frac{2}{3}$ 5. $5\frac{3}{8}$ 6. $-3\frac{3}{4}$

$-\frac{14}{3}$

7. -3 8. - 4 9. 7

$-\frac{3}{1}$

Write the following improper fractions as Mixed numbers.

10. $-\frac{17}{4}$ 11. $\frac{13}{5}$ 12. $-\frac{7}{6}$

$-4\frac{1}{4}$

13. $\frac{9}{1}$ 9 14. $-\frac{12}{1}$ 15. $\frac{7}{1}$

Write an equivalent fraction with the given denominator.

16. $-\frac{2}{8}=\frac{?}{4}$ 17. $\frac{3}{4}=\frac{?}{32}$ 18. $-\frac{5}{7}=\frac{?}{35}$

$-\frac{1}{4}$

19. $-4=\frac{?}{3}$ 20. $-2=\frac{?}{7}$ 21. $6=\frac{?}{8}$

$-\frac{12}{3}$

Write the fractions in simplest form.

22. $\frac{15}{45}$ 23. $\frac{48}{28}$ 24. $\frac{42}{21}$

$\frac{1}{3}$

25. $\frac{26x^3}{6x^2}$ 26. $-\frac{10a}{14}$ 27. $\frac{42x}{36x^2}$

$\frac{13x}{3}$

Order the following by using the > or < symbols

28. $\frac{3}{5}$ $\frac{2}{5}$ 29. $-\frac{7}{8}$ $-\frac{3}{8}$ 30. $-\frac{1}{7}$ $-\frac{3}{7}$

>

31 . $-\frac{1}{4}$ $-\frac{2}{5}$ 32. $\frac{4}{9}$ $\frac{10}{21}$ 33. $\frac{7}{10}$ $\frac{13}{25}$

>

Exercise 2.2 NAME:_____

Multiply

1. $\frac{2}{3}\cdot\frac{1}{5}$ 2. $-\frac{2}{5}\cdot\frac{1}{3}$ 3. $\frac{7}{9}\cdot\frac{4}{5}$

$\frac{2}{15}$

4. $-\frac{4}{5}\cdot-\frac{1}{2}$ 5. $\frac{9}{11}\cdot-\frac{2}{3}$ 6. $\frac{7}{12}\cdot\frac{3}{14}$

$\frac{2}{5}$

7. $\frac{4}{5}\cdot-\frac{10}{2}$ 8. $-\frac{5}{2}\cdot\frac{1}{10}$ 9. $-\frac{15}{2}\cdot-\frac{2}{5}$

-4

10. $\frac{12}{35}\cdot\frac{20}{3}$ 11. $-\frac{32}{7}\cdot\frac{21}{20}$ 12. $-\frac{10}{3}\cdot\frac{1}{3}$

$\frac{16}{7}$

13. $-3\frac{1}{2}\cdot-\frac{2}{3}$ 14. $-1\frac{4}{5}\cdot-3\frac{1}{3}$ 15. $2\frac{2}{5}\cdot-1\frac{1}{4}$

$\frac{7}{3}$

16. $1\frac{1}{2}\cdot-4$ 17. $-2\cdot-\frac{2}{5}$ 18. $-5\cdot3\frac{2}{7}$

-6

Divide

19. $\frac{2}{5} \div \frac{1}{3}$

$\frac{6}{5}$

20. $-\frac{3}{7} \div \frac{2}{3}$

21. $\frac{7}{11} \div \frac{2}{5}$

22. $-\frac{4}{5} \div \left(-\frac{1}{7}\right)$

$\frac{28}{5}$

23. $\frac{9}{11} \div \left(-\frac{2}{3}\right)$

24. $\frac{7}{3} \div \frac{35}{18}$

25. $-\frac{15}{2} \div \frac{10}{3}$

$-\frac{9}{4}$

26. $-\frac{18}{5} \div \frac{81}{20}$

27. $-\frac{10}{3} \div \frac{1}{3}$

28. $-2\frac{1}{5} \div -3\frac{1}{3}$

$\frac{33}{50}$

29. $1\frac{3}{5} \div -2$

30. $-5 \div 3\frac{2}{7}$

Multiply

31. $\frac{x}{3} \cdot \frac{x}{6}$

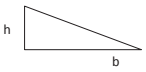
$\frac{x^2}{18}$

32. $\frac{x^2}{4} \cdot \frac{6}{x}$

33. $\frac{2}{x} \cdot \frac{3}{x}$

The area of a triangle can be found by the formula $A = \frac{1}{2}bh$.

Find the area of the shape with the given base (b) and height (h)



34. b =10in and h = 4in

$20in^2$

35. b = 3ft and h = 5ft

Complete the following by using fractions and leaving your answer as a mixed number.

36. A bottle of Ketch up contains 40 oz of Ketchup. How many $\frac{1}{2}$ oz servings can you get out of one bottle?

37. A recipe that serves 6 people needs to be doubled to serve a dinner party of 12. The original recipe calls for $1\frac{2}{3}$ cups of flour. How much flour should you use to double the recipe?

$3\frac{1}{3} cups$

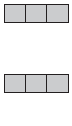
38. A bag of pretzels contains 16 oz. If you want to give 20 people equal servings how many ounces should you give each person?

39. A recipe for 15 servings calls for $2\frac{1}{3}$ *cups* of sugar. If you are cutting the recipe in half, how much sugar should you use?

Unit 2 **NAME:**_____

Mid-Chapter Quick Review 2.1 and 2.2

1. Write a fraction that represents the following



$\frac{8}{3}$

2. Write $-\frac{15}{4}$ as a mixed number.

$-3\frac{3}{4}$

3. Write $-2\frac{3}{8}$ as an improper fraction.

$\frac{-19}{8}$

4. Find an equivalent fraction with the given denominator.

$-\frac{2}{5} = \frac{?}{40}$

$-\frac{16}{40}$

5. Simplify the following

$-\frac{72}{42}$

$-\frac{12}{7}$

Multiply or Divide

6. $-\frac{3}{5} \cdot \frac{7}{4}$

$-\frac{21}{20}$

7. $-\frac{2}{15} \cdot -\frac{35}{4}$

$\frac{7}{6}$

8. $3\frac{2}{5} \cdot -10$

-34

9. $-\frac{5}{8} \div -\frac{15}{16}$

$\frac{2}{3}$

10. $-1\frac{2}{9} \div 3$

$-\frac{11}{27}$

Exercise 2.3 NAME:_____

Add or subtract

1. $\frac{1}{5}-\frac{3}{5}$

$-\frac{2}{5}$

2. $-\frac{3}{7}+\frac{2}{7}$

3. $-\frac{5}{9}-\frac{2}{9}$

4. $\frac{3}{4}-\frac{1}{4}$

$\frac{1}{2}$

5. $\frac{2}{9}+\frac{1}{9}$

6. $\frac{1}{12}-\left(-\frac{5}{12}\right)$

7. $3\frac{1}{3}+2\frac{1}{3}$

$5\frac{2}{3}$

8. $2\frac{3}{4}-1\frac{1}{4}$

9. $3\frac{4}{5}-1\frac{2}{5}$

10. $-2\frac{1}{5}-3\frac{3}{5}$

$-5\frac{4}{5}$

11. $2\frac{1}{4}-7\frac{3}{4}$

12. $-3\frac{1}{6}-\left(-4\frac{5}{6}\right)$

13. $\frac{1}{3}-\frac{1}{4}$

$\frac{1}{12}$

14. $-\frac{4}{5}-\frac{1}{3}$

15. $\frac{3}{4}-\left(-\frac{1}{5}\right)$

16. $\frac{3}{4}-\left(-\frac{1}{6}\right)$

$\frac{11}{12}$

17. $-\frac{2}{5}+\frac{1}{12}$

18. $\frac{2}{3}-\frac{1}{6}$

19. $5+3\frac{2}{5}$

$8\frac{2}{5}$

20. $3-5\frac{2}{3}$

21. $6\frac{2}{5}+2\frac{2}{3}$

22. $-5\frac{1}{2}+2\frac{3}{5}$

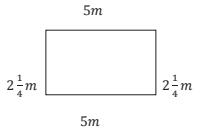
$-2\frac{9}{10}$

23. $2\frac{1}{5}-6$

24. $-2\frac{2}{7}-4\frac{5}{6}$

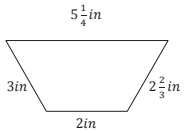
Find the perimeter of the following shapes

25.



$P = 14\frac{1}{2}m$

26.



Exercise 2.4 NAME:_____

Simplify

1. $\left(\frac{2}{3}\right)^2$

$\frac{4}{9}$

2. $\left(\frac{1}{5}\right)^3$

3. $\left(-\frac{4}{7}\right)^2$

4. $-\frac{5}{6}^2$

$-\frac{25}{6}$

5. $-\left(\frac{2}{7}\right)^2$

6. $-\frac{4^3}{12}$

7. $\left(\frac{3}{5}\right)^2\left(\frac{1}{2}\right)^3$

$\frac{9}{200}$

8. $\left(-\frac{2}{3}^2\right)\left(\frac{5}{3}\right)^2$

9. $-\left(\frac{7}{8}\right)^2\left(\frac{1}{2}\right)$

10. $\frac{2}{3}\div\frac{1}{4}\cdot\frac{5}{6}$

$\frac{20}{9}$

11. $\frac{1}{4}+\frac{2}{5}\cdot\frac{10}{3}$

12. $\frac{1}{3}-\frac{2}{5}\div\frac{3}{5}$

13. $\frac{4}{5}\cdot\left(\frac{1}{5}+\frac{2}{3}\right)-\frac{3}{5}$

$\frac{7}{75}$

14. $-\frac{1}{2}+\frac{1}{3}\left(\frac{1}{4}+\frac{1}{2}\right)$

15. $\left(\frac{1}{8}-\frac{1}{3}\right)\div\frac{19}{24}$

16. $\left(\frac{2}{3}-\frac{1}{6}\right)^2+\frac{1}{18}$

$\frac{11}{36}$

17. $-\frac{2}{3}+\left(\frac{1}{2}-\frac{3}{4}\right)^3$

18. $\frac{4}{5}\left(\frac{1}{3}+\frac{1}{2}\right)^2-\frac{3}{5}$

19. $\frac{\frac{3}{5}}{\frac{2}{7}}$

$\frac{21}{10}$

20. $\frac{\frac{6}{5}}{\frac{2}{15}}$

21. $\frac{\frac{4}{11}}{\frac{9}{22}}$

22. $\frac{\frac{1}{2}+\frac{3}{5}}{\frac{2}{7}}$

$\frac{77}{20}$

23. $\frac{\frac{2}{5}}{1-\frac{2}{3}}$

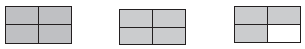
24. $\frac{\frac{1}{8}-\frac{3}{2}}{\frac{1}{3}}$

Unit 2 Review **NAME:**_____

1. Write a fraction that represents the following.

$\frac{5}{9}$

2. Write an IMPROPER FRACTION and a MIXED NUMBER that represents the following.



$\frac{11}{4} = 2\frac{3}{4}$

3. Draw a number line, clearly label $0, \ -\frac{2}{3}, \ and \ \frac{2}{3}$.

Find the absolute value of the following.

4. $\left|\frac{2}{3}\right|$

$\frac{2}{3}$

5. $\left|-\frac{5}{8}\right|$

$\frac{5}{8}$

6. $-\left|-\frac{6}{11}\right|$

$-\frac{6}{11}$

Rewrite the following fractions to have the given denominator

7. $\frac{4}{7} = \frac{?}{28}$

$\frac{16}{28}$

8. $-\frac{35}{40} = \frac{?}{8}$

$-\frac{7}{8}$

9. $-6 = \frac{?}{9}$

$-\frac{54}{9}$

Write the following in lowest terms

10. $-\frac{15}{60}$

$-\frac{1}{4}$

11. $-\frac{21}{70}$

$-\frac{3}{10}$

12. $\frac{3x^2}{15x}$

$\frac{x}{5}$

Complete the following – show all steps.

13. $-\frac{2}{3} \cdot \frac{7}{9}$

$-\frac{14}{27}$

14. $\left(-\frac{15}{28}\right) \cdot \left(-\frac{35}{3}\right)$

$\frac{25}{4}$

15. $2\frac{1}{3} \cdot \left(-3\frac{1}{2}\right)$

$-\frac{49}{6}$

16. $\frac{4}{7} \div \frac{20}{21}$

$\frac{3}{5}$

17. $\left(-\frac{2}{3}\right) \div 4$

$-\frac{1}{6}$

18. $5\frac{1}{3} \div \left(-4\frac{1}{3}\right)$

$-\frac{16}{13}$

19. If you have a 32 oz. bag of pretzels and the serving size is $\frac{1}{3}oz$, How many servings are in the bag?

96 servings

20. If you can fit 78 people in a restaurant and the restaurant is $\frac{1}{2}$ full, how many people are in the restaurant?

39 people

21. If the equation to find area of a rectangle is $A = b \cdot h$, and you know that $b = \frac{5}{7}in$ and $h = \frac{3}{10}in$ find the Area.

$\frac{3}{14}in^2$

22. $-\frac{3}{5} - \frac{2}{5}$

-1

23. $-\frac{4}{7} - \left(-\frac{1}{7}\right)$

$-\frac{3}{7}$

24. $-\frac{5}{8} + \frac{1}{8}$

$-\frac{1}{2}$

25. $\frac{1}{4} - \frac{3}{8}$

$-\frac{1}{8}$

26. $-\frac{2}{3} + \frac{1}{6}$

$-\frac{1}{2}$

27. $-4 + \frac{2}{3}$

$-\frac{10}{3}$

28. $-3\frac{1}{4} - 7\frac{7}{8}$

$-11\frac{1}{8}$

29. $3\frac{1}{8} - 2\frac{1}{12}$

$1\frac{1}{24}$

30. $2 - \left(-\frac{2}{3}\right)$

$2\frac{2}{3}$

31. You are putting in a new counter in your kitchen, You must first put in a padding that is $\frac{1}{8}in$ thick and the counter it self is $\frac{3}{4}in$ thick. How much thickness are you adding to the counter?

$\frac{7}{8}in$ thick

32. $\left(\frac{2}{3}\right)^3$

$\frac{8}{27}$

33. $\left(-\frac{5}{6}\right)^2$

$\frac{25}{36}$

34. $-\frac{7}{3}^2$

$-\frac{49}{3}$

35. $\frac{1}{2} \div \frac{3}{4} \cdot \frac{3}{7}$

$\frac{2}{7}$

36. $\frac{5}{7} + \frac{1}{7} \cdot \frac{5}{3}$

$\frac{20}{21}$

37. $\left(\frac{3}{8} - \frac{3}{4}\right)^2 + \frac{1}{2} \cdot 6$

$3\frac{9}{64}$

38. $\frac{\frac{2}{5}}{\frac{3}{10}}$

$\frac{4}{3}$

39. $\frac{\frac{3}{2}+\frac{1}{4}}{3}$

$\frac{7}{12}$

40. $\frac{\frac{1}{4}}{3-\frac{1}{3}}$

$\frac{3}{32}$

Unit 3 Answers

Exercise 3.1 NAME:_____

Consider the number -23.345678. For the following state the digit that is in the requested place value.

1. Hundredths
2. Ten-Thousandths
3. Thousandths

4

What place value is the 5 in?

4. 128.5689
5. -98.889567
6. -3.98527

tenths

Write the following in words.

7. 34.567

Thirty-four and five hundred sixty-seven thousandths

8. 2.5689

9. 12.98

Write the following as a number.

10. Two and thirty two hundredths

2.32

11. Thirty three and five hundred thirty two ten-thousandths

12. Five and sixty two thousandths

Evaluate the following absolute values

13. $|2.46|$
14. $-|-34.678|$
15. $|-21.787|$

2.46

Order the following by inserting < or >

16. 32.24 32.2041
17. 7.2123 7.212
18. 5.213 5.21

>

19. -1.23 -1.203
20. -21.134 -21.1342
21. -2.34 -2.034

<

Write the following as a fraction

22. -23.457
23. -15.7
24. -13.49

$-23\frac{457}{1000}$

25. 13.25
26. -19.222
27. 1.125

$13\frac{1}{4}$

Round the following to the nearest thousandths place

28. 1.23556
29. - 13.11118
30. 2.12342

1.236

Round to the nearest Hundredth.

31. 36.5555
32. 8.99999
33. 21.1599

36.56

34. You fill up with gas and the pump reads $59.34568, how much do you pay?

$59.35

35. A computer cost $1229.88. How much does it cost to the nearest dollar?

36. When you calculated sales tax the calculator said 12.34567, How much did you pay in sales tax?

Exercise 3.2 NAME:_____

Add or Subtract

1. 23.56 + 23.4
2. -34.789 + (- 23.4)
3. 54.7 + (-23.45)

46.96

4. –4 + 54.33
5. 4.565 + 9.7568
6. -3.45 + (-2.945)

50.33

7. -3.456 + (- 54.78)
8. 567.21 + (-23)
9. 7.23 + 667.1

-58.236

10. 24.21 – 54.671
11. 45.34 – (- 12.374)
12. -4 – 7.21

-30.461

13. – 7.21 – (-12.1) 14. 12 – 14.124 15. - 4.361 – (-21)

4.89

16. 21 – 7.219 17. -3.214 – (- 2.7874) 18. 36.21 – 107.521

13.781

19. You have $345.65 in your account and then use your debit card to get gas. The total was 45.89. What is the balance on your account when your transaction clears?

299.76

20. You got paid twice this month. One check was for $341 and the other was for $299.58. How much did you get paid all together?

21. You need to buy three items at the store. They cost $3.41, $7.11, and $22.89 (no tax). You have $33 cash , do you have enough money?

Exercise 3.3 **NAME:**_____

Multiply

1. $0.24(5.23)$ 2. $23 \cdot 13.26$ 3. $12.45(3.1)$

1.2552

4. $-12.1 \cdot 5.2$ 5. $0.45(-22.1)$ 6. $-7.1 \cdot .3$

-62.92

7. $-5.2(-3.34)$ 8. $(-2.1)(-1.38)$ 9. $-0.3(-0.7)$

17.368

10. $(-0.00023)(-0.0012)$ 11. $(-0.000235)(0.0012)$ 12. $0.003(-2.1)$

0.000000276

13. $1.23 \cdot 0.00001$ 14. $-2.135 \cdot 1000$ 15. $-13.3 \cdot 10$

0.0000123

For the following calculate the **Circumference.**

16. r = 3*m* 17. d=7*in* 18. d=6*ft*

C=18.84m

Divide

19. $45.36 \div 36$ 20. $27.048 \div (-12)$ 21. $-2.55 \div 15$

1.26

22. $-0.27 \div 0.12$ 23. $-25.83 \div (-2.1)$ 24. $-3.9 \div 1.2$

-2.25

In the following round your answers to the nearest thousandths place.

25. $7.2 \div 3.1$ 26. $-5.23 \div 6$ 27. $-1.23 \div (-0.23)$

2.323

Write the following fractions as a decimal, If answer repeats show that in your answer using the bar above the repeating portion.

28. $\frac{4}{9}$ 29. $-\frac{2}{5}$ 30. $-\frac{2}{3}$

$0.\overline{4}$

Order the following by adding < or >

31. $\frac{2}{5}$ 0.46 32. 0.21 $\frac{1}{8}$ 33. $-\frac{1}{7}$ −.14

<

Unit 3 **NAME:_____**
Mid-Chapter Quick Review 3.1 – 3.3

1. Write 2.035 in words

Two and Thirty-five thousandths

2. Write the number

Three and twenty-one ten-thousandths

3.0021

3. $|-2.5|$

2.5

4. $-|-2.1|$

-2.1

5. Write 3.42 as a fraction in lowest terms.

$3\frac{21}{50}$ or $\frac{171}{50}$

6. Write $\frac{3}{8}$ as a decimal.

0.375

Perform the indicated operation

7. $-3.462 - 2.1431$

-5.6051

8. $2.13 + 3.4$

5.53

9. $-2.75 - (-2.1)$

-0.65

10. $3(-2.25)$

-6.75

11. $-115 \div (-0.25)$

460

Order the following by placing a < or > in between the numbers.

12. $\frac{2}{3}$ .67

<

13. $-\frac{4}{9}$ -0.4

<

14. Round -3.42563 to the nearest hundredths place.

-3.43

15. Circumference can be found by the formula $C = 2\pi r$. Find the circumference of the circle whose radius is 4m, using $\pi \approx 3.14$.

$25.12m^2$

Exercise 3.4 **NAME:_____**

Simplify the following

1. $(-2.1)^2$

4.41

2. $(-0.9)^3$

3. -1.5^2

4. $1.5(3.2)^3$

49.152

5. $(-1.2)^2(1.1)^3$

6. $-2.1^2(0.2)^2$

7. $1.1 - 5.6(1.3)$

-6.18

8. $2.4 - 3.2 + 4.5$

9. $7.2 \div 0.5 \cdot 1.1$

10. $2(0.8)^2 - 6.3 \div 0.3$

-19.72

11. $(4.1 - 3.6)^2 + 4 \cdot .02$

12. $(4.7 - 1.2)^2 + 4 \div 0.2$

For the following calculate the **Area** of each circle with the given dimension.

13. r = 3*m*

14. d=7*in*

15. d=6*ft*

$28.26m^2$

For problems 13-15 compute the mean of the scores listed, round to the nearest hundredth if necessary.

16. 62,77,75,81

17. 88,81,85

18. 90,82,98

73.75

Find the following Square roots

19. $\sqrt{121}$

20. $\sqrt{64}$

21. $\sqrt{225}$

11

22. $-\sqrt{144}$

23. $-\sqrt{196}$

24. $-\sqrt{1600}$

-12

Unit 3 Review **NAME:**_____

1. Write 34.78266 in words.

Thirty-Four and Seventy-eight thousand two hundred sixty-six hundred-thousandths

2. Write 2.00067 in words.

Two and Sixty Seven hundred thousandths

3. Write the following as a number.

Twenty-three and fifty-six thousandths

23.056

4. Write the following as a number.

Thirty-five ten-thousandths

0.0035

Find the absolute value of the following.

5. $|-21.1|$ 6. $|5.23|$ 7. $-|-4.25|$

21.1 5.23 -4.25

Order the following by placing < or > between the numbers.

8. 32.1234 32.123 9. 2.301 2.31 10. -25.34 -25.304

> < <

11. Write -3.63 as a fraction.

$-3\frac{63}{100}$

12. Write 5.625 as a fraction.

$5\frac{5}{8}$

13. Round -34.56782 to the nearest thousandth.

-34.568

14. Round -2.34567 to the nearest hundredth.

-2.35

15. Round 2.34723 to the nearest ten-thousandth.

2.3472

16. Round to the nearest dollar : $ 34.76

$35

17. You calculate the cost of a single item bought in bulk as $ 4.34567. How much would you pay for it?

$4.35

Perform the indicated operation

18. $-23.11 + 34.786$ 19. $-78.123 + (-34.27)$ 20. $-275.1 - 43.213$

11.676 -112.393 -318.313

21. $-25.75 - (-344.678)$ 22. $8.375 - 6.4$ 23. $-345.1 + 34.345$

318.928 1.975 -310.755

24. Sue has$ 34.44 in an account and writes a check for $50. If the check clears, what is Sues account balance?

-15.56

Perform the indicated operation.

25. $-23.45(-3.2)$ 26. $-2.324 \cdot 5.5$ 27. $(-3.7)(-2.54)$

75.04 -12.782 9.398

28. $-23.456(10000)$ 29. $5.678(-10)$ 30. $3.234 \cdot 0.001$

-234560 -56.78 0.003234

31. Given the formula for circumference is $C = 2\pi r \quad with \quad \pi \approx 3.14$. find the circumference of a circle whose radius, r, equal to 3 m.

C = 18.84m

32. $31.8 \div 15$ 33. $385.5 \div 12$ 34. $25 \div 6$

2.12 32.125 $4.\overline{16}$

35. $12.56 \div 0.2$ 36. $5 \div 0.9$ 37. $1495.56 \div 1.21$

62.8 $5.\overline{5}$ 1236

Round the following to the nearest Thousandth.

38. $456 \div 2.3$ 39. $23 \div 7$ 40. $4.23 \div 0.7$

198.261 3.286 6.043

41. Write $\frac{7}{9}$ as a decimal.

$.\overline{7}$

42. Write $\frac{1}{8}$ as a decimal.

0.125

Order the following by placing a < or > in between the numbers

43. 0.85 $\frac{6}{7}$ 44. $\frac{3}{8}$ 0.4

< <

Complete the following

45. $(-2.1)^2$

4.41

46. -1.2^2

-1.44

47. $-(0.4)^3$

-0.064

48. $2.1(0.2)^4$

0.00336

49. $3.1\,(-1.1)^3$

4.1261

50. $2.3 + 1.2(0.2)$

2.54

51. $3.6 \div 0.3 \cdot 2.12$

25.44

52. $2(0.2)^2 + 3.2(4.1)$

13.2

53. $3.25 \div 0.05 + 3.2 \cdot 1.25$

69

54. Find the average of 77, 75, and 70.

74

55. $\sqrt{36}$

6

56. $\sqrt{121}$

11

57. $-\sqrt{49}$

-7

Unit 4 Key

Exercise 4.1 NAME:_____

Evaluate the following

1. $x + 5,\ for\ x = 4$

9

2. $4y,\quad for\ y = 7$

3. $a - 7,\quad for\ a = 5$

4. $-2b,\quad for\ b = 8$

-16

5. $10 - x,\quad for\ x = 9$

6. $8z,\quad for\ z = 12$

Simplify the following

7. $6x - x$

5x

8. $-12a + 3a$

9. $-2z - 5z$

10. $5t - 3t + 7t$

9t

11. $-6r - r - 7r$

12. $-6v - 7v + 15v$

13. $13s - 5 - s$

12s-5

14. $7x - 3 + x$

15. $-8d - 4 - 4d$

16. $7m - 4n + 5m$

12m-4n

17. $4s + 7t - 9s$

18. $4k + 6k - 8p$

19. $21m + m - 2n + 5$

22m-2n+5

20. $-12k - j - 7j + 4$

21. $5h + 4 - 3h + 2f$

22. $3x^2 - 2x + 4x^2 + 5$

$7x^2 - 2x + 5$

23. $-4x^2 + 6x - 7x - x^2$

24. $3x^2 + 2x - 4$

25. $2ab^2 - ab + 3ab^2$

$5ab^2 - ab$

26. $2ab^2 - 3a^2b + ab^2$

27. $5xy^2 - xy + 3xy^2$

28. $45xy^2 + 4xy - 12x^2y - 7xy^2$

$38xy^2 + 4xy - 12x^2y$

29. $5ab^2 - 3ab + 4a^2b - 7$

30. $5xy - 2x + 5y + 12 - 8xy$

Distribute

31. $6(x + 5)$

6x+30

32. $3(x - 2)$

33. $7(x + 3)$

34. $-2(x + 4)$

-2x-8

35. $-3(x + 2)$

36. $-6(x + 5)$

37. $-4(3x - 2)$

-12x+8

38. $-2(-2x - 7)$

39. $-3(5x - 7)$

Distribute then simplify

40. $2(x + 4) - x$

X+8

41. $5(3x - 2) + 7$

42. $3(x - 8) - 4$

43. $6 + 3(2x - 7)$

6x-15

44. $3x + 2(x + 3)$

45. $5 + 5(2x + 1)$

46. $5 - 2(x + 1)$

-2x+3

47. $3 - 5(x - 2)$

48. $-x - 4(x - 1)$

49. $4(x - 2) - 3(2x + 2)$

-2x-14

50. $5(2x + 3) - 4(5x - 5)$

51. $3(x - 2) - (-3x + 7)$

Exercise 4.2 NAME:_____

Solve the following.

1. $x+4=7$

X=3

Check:

2. $x+7=17$

Check:

3. $x+8=22$

Check:

4. $x-13=10$

X=23

Check:

5. $x-4=15$

Check:

6. $x-3=7$

Check:

7. $x+10=-15$

X=-25

Check:

8. $x-3=-10$

Check:

9. $x-1=-12$

Check:

10. $2x=12$

X=6

Check:

11. $3x=24$

Check:

12. $5x=45$

Check:

13. $-4x=16$

X=-4

Check:

14. $-7x=42$

Check:

15. $-3x=-15$

Check:

16. $-4x=-24$

X=6

Check:

17. $-9x=-72$

Check:

18. $-8x=32$

Check:

Solve

19. $x-3=-13$

X=-10

20. $-4x=-16$

21. $-2x=-18$

22. $5x-3x=10$

X=5

23. $-4x-7x=-33$

24. $-5x+8x=27$

25. $5x=-72+47$

X=-5

26. $9x=-42-3$

27. $-3x=25-16$

28. $x-10x+12x=13-7$

X=2

29. $4x+3x-5x=54-12$

30. $15x-7x=-12-52$

Write an equation for the following and then solve.

31. Twice a number is 16, find the number.

Equation:

2n=16

N=8

32. A number increased by 20 is 35, find the number.

Equation:

33. The product of a number and 5 is 55, find the number.

Equation:

Exercise 4.3 NAME:_____

Solve the following.

1. $3x - 2 = 10$

X=4

Check

2. $22 = 5x + 7$

Check

3. $7x - 2 = 40$

Check

4. $-50 = 8x - 10$

X=-5

Check

5. $-4x + 6 = -6$

Check

6. $-41 = 9x - 5$

Check

7. $7 - 2x = -15$

X=11

Check

8. $4 - 3x = 22$

Check

9. $3 - 8x = -53$

Check

10. $6(x - 3) = -54$

X=-6

Check

11. $12 = 4(x - 1)$

Check

12. $3(2x - 5) = 15$

Check

13. $5x - 3x + 2 = 18$

X=8

14. $-7x - 2x + 7 = -11$

15. $5 - (-2) = -3x - 5x - 9$

16. $6 - 2(x + 7) = 10 - 23$

X=3

17. $5(x - 2) + 3x - 7 = 11 - (-4)$

Exercise 4.4 NAME:_____

Solve the following.

1. $5x - 6 = -2x + 15$

X=3

2. $4x - 3 = 8x + 9$

3. $4 - 3x = 2x - 36$

4. $7x - 3x + 2 = 5 - 2x + 9$

X=2

5. $6x - 3 + 2x = 7x - x + 15$

6. $-2x + 7 - 12 + 3x = 5x - 7x + 10$

7. $3(x - 2) + 7x = 2(x + 3) - 4$

X=1

8. $5(x - 3) + 3 = 3x - (4 + 2x)$

9. $7x - 2(x - 5) = -3x + 2(x - 4)$

Unit 4 **NAME:_____**
Mid Chapter Review 4.1 – 4.4

Simplify

1. $12y - 3y$

9y

2. $5x + 2y - x$

4x+2y

3. $-3(x - 2)$

-3x+6

4. $2 - 5(x + 1)$

-5x-3

Solve

5. $x + 5 = -7$

X=-12

6. $4 = x - 10$

x=14

7. $3x = -24$

X=-8

8. $-12 = -2x$

x=6

9. $3x - x = 7 - (-3)$

X=5

10. $4x + 1 = -15$

x=-4

11. $2x + 2 = 5x + 17$

-5=x

12. $4(x - 1) + 10 = 3x + 4(-x - 1)$

X=-2

How comfortable are you feeling solving equations?

Exercise 4.5 **NAME:_____**

Solve the following.

1. $\frac{1}{2}x = \frac{3}{4}$

$x = \frac{3}{2}$

2. $\frac{3}{2}x = -\frac{9}{5}$

3. $\frac{5}{3}x = \frac{7}{10}$

4. $x + \frac{1}{2} = \frac{3}{4}$

$x = \frac{1}{4}$

5. $x - \frac{1}{3} = \frac{2}{3}$

6. $x - \frac{1}{8} = \frac{1}{4}$

7. $\frac{1}{2}x - \frac{1}{6} = \frac{1}{3}$

$x = 1$

8. $\frac{3}{4}x - 1 = -\frac{2}{3}$

9. $\frac{2}{3}x - \frac{1}{3} = \frac{1}{3}$

10. $\frac{1}{2}(x - 1) + 2 = 1$

$x = -1$

11. $\frac{2}{3}(x + 1) - 2x = \frac{1}{3}$

12. $\frac{1}{4} - \frac{1}{12}(x + 1) = \frac{1}{3}$

13. $\frac{1}{3}x - 2 = \frac{2}{3}x + 1$

$x = -9$

14. $\frac{1}{6}x - \frac{2}{3} = \frac{1}{3}x + \frac{1}{2}$

15. $\frac{5}{6}x - \frac{1}{3} = \frac{1}{2}x + 1$

Exercise 4.6 NAME:_____

Solve the following.

1. $0.2x = 0.82$

X=4.1

2. $-1.2x = 1.44$

3. $-1.6x = -0.48$

4. $x - 1.52 = 4.63$

X=6.15

5. $x + 7.06 = 2.1$

6. $x + 4.1 = -3.275$

7. $0.3x - 2 = 0.1$

X=7

8. $0.4x - 7 = 2.5$

9. $1.3x + 0.20 = -1.49$

10. $0.3x - 0.5 = 0.2x + 0.3$

X=8

11. $2.1x + 7.45 = 1.1x - 3.2$

12. $0.7x - 1.2 = 0.3x + 3.24$

13. $0.2(0.1x + 2) - 0.6 = 5.2$

X=270

14. $4.1(x - 0.2) + 3.3x = 0.4(x - 1) + 2.1$

Unit 4 Review NAME:_____

Evaluate the following

1. $x + 5, \quad for\ x = -6$

-1

2. $3b + 4, \quad for\ b = -7$

-17

Simplify

3. $4x - 3x + x$

2x

4. $2x + 5y - 3x$

-x+5y

5. $15k - 5j + 2k + j$

17k-4j

6. $5x^2 - 3x + 2$

$5x^2 - 3x + 2$

7. $2x^2y - 5xy + 5xy^2 + 3xy$

$2x^2y - 2xy + 5xy^2$

Distribute and simplify

8. $3(x + 2)$

3x+6

9. $5(x - 7)$

5x-35

10. $-2(x - 4)$

-2x+8

11. $-2(3x + 6)$

-6x-12

12. $2 + 3(x - 4)$

3x-10

13. $5x - 2(x - 4)$

3x+8

Solve

14. $x + 7 = -13$

X=-20

15. $x - 4 = -22$

x=-18

16. $-4 = x + 22$

-26=x

Solve

17. $4x = 24$

X=6

18. $-11x = 55$

x=-5

19. $-7x = -49$

x=7

20. $3x + 7x = 15 - (-5)$

X=2

21. $2x + 5 - x = 14$

x=9

22. A number increased by five is twenty. Find the number.

X=15

23.The product of a number and 7 is 28. Find the number.

X=4

Solve

24. $2x - 7 = 9$

X=8

25. $4 - 3x = 31$

x=-9

Solve

26. $3(x-1)+2=5$

X=2

27. $4-2(x+1)=7-(-3)$

x=-4

28. $4x-5=2x+17$

X=11

29. $3x-5=2(x+7)-3$

x=16

30. $\frac{2}{7}x=\frac{5}{7}$

$x=\frac{5}{2}$

31. $x-\frac{7}{3}=\frac{2}{3}$

x=3

32. $\frac{4}{5}x-\frac{1}{3}=\frac{1}{6}$

$x=\frac{5}{8}$

33. $\frac{1}{2}x-\frac{2}{3}=\frac{5}{2}x-\frac{1}{3}$

$x=-\frac{1}{6}$

34. $0.4x=0.64$

X=1.6

35. $x-2.5=3.65$

x=6.15

36. $0.25x+4.1=-2.55$

X=26.6

Unit 5 Key

Exercise 5.1 NAME:_____

Write each ratio as a fraction in lowest terms.

1. $3 to $11

$\frac{3}{11}$

2. 5 days to 7 days

3. 2 hours to 9 hours

4. 3 days to 12 days

$\frac{1}{4}$

5. 25 minutes to 5 minutes

6. $14 to $21

7. $4.50 to $2.50

$\frac{9}{5}$

8. 2.5 days to 4.25 days

9. 1.5 feet to 2 feet

10. $1\frac{1}{2}m \text{ to } 2m$

11. $1\frac{1}{4} hours \text{ to } 2\frac{1}{2} hours$

12. 3 feet to $1\frac{1}{2}$ feet

$\frac{3}{4}$

Write each ratio as a fraction in lowest terms, begin by converting units.

13. 3 feet to 30 inches

$\frac{6}{5}$

14. 20 ounces to 1 pound

15. 50 minutes to 2 hours

16. 2 quarts to 6 cups

$\frac{4}{3}$

17. 8 days to 2 weeks

18. 1 mile to 2000 feet

19. Consider the rectangle with width 10cm and length 15cm, write a ratio of the length to the width.

$\frac{3}{2}$

20. Using the rectangle in number 19. Write the ratio of the width to the length.

21. If you spend 4 hours a week studying for English and 5.5 hours studying for math what is the ratio of time spent studying in math to studying for English?

22. An employee plays $125 towards health insurance, while the employer pays $550. What is the ratio of the employers contribution to the employees contribution?

$\frac{22}{5}$

Exercise 5.2 NAME:_____

Write the following rates as a fraction in lowest terms.

1. 200 miles in 7 hours

$\frac{200\ miles}{7\ hours}$

2. 323 miles on 11 gallons

3. 14 cars for 15 people

4. 214 pieces for 10 people

$\frac{107 pieces}{5\ people}$

5. $300 for 25 hours

6. 12 teachers for 280 students

Find the unit rate for each of the following.

7. $1600 for 4 weeks

$\$400/week$

8. 180 miles in 3hours

9. $12 for 4 dozen

10. $250 for 4 people

$\$62.50/person$

11. $12.50 for 2 hours

12. 35 sacks for 2 acres

13. You are buying black beans for a burrito recipe. Which of the following would be the best value?

16 oz for $1.28

32 oz for $2.40

32 oz is the better value.

14. You are at a grocery store and need to buy flour for holiday baking. You know you will be able to any size before it goes bad so you are looking for the best buy. There are 4 options with some of the sizes on sale : a 10 oz bag for $2.50, a 16 oz bag for $3.25, a 30 oz bag for $6.10, or a 48 oz bag for $10.08. Which is the best value?

15. You are going to go skiing the winter and are trying to decide whether or not to buy single day passes, a value pack or a season pass. You know that you will be able to go 3 times for sure and no more. What is the best deal?

A single day pass $30

A 3 visit pass for $ 81

An season pass for $120

16. You are renting a house in Cancun for a week at $ 3600, what is the cost per day?

$\$514/day$

17. You are going on a long trip and want to calculate your Miles per gallon. When you start your trip your odometer read 87,256 miles. At the end of your trip your odometer reads 87,820miles. You started with a full tank and to return to a full tank you put in 25.64 gallons of gas total. What is your miles per gallon?

18. Someone offers you $1200 to work for 2 - 40 hour weeks. How much would you make per hour?

Exercise 5.3 **NAME:**_____

Solve the following proportions

1. $\frac{2}{3}=\frac{x}{9}$
2. $\frac{x}{7}=\frac{6}{14}$
3. $\frac{3}{2}=\frac{x}{9}$

$x=6$

4. $\frac{4}{x}=\frac{7}{3}$
5. $\frac{2}{3}=\frac{13}{x}$
6. $\frac{2}{5}=\frac{5}{x}$

$x=\frac{12}{7}$

7. $\frac{\frac{1}{2}}{1\frac{2}{3}}=\frac{x}{\frac{2}{5}}$
8. $\frac{2}{1\frac{3}{5}}=\frac{\frac{2}{3}}{x}$
9. $\frac{x}{\frac{1}{5}}=\frac{2\frac{1}{4}}{3\frac{2}{3}}$

$x=\frac{3}{25}$

10. $\frac{0.25}{1.4}=\frac{3}{x}$
11. $\frac{1.5}{2.4}=\frac{x}{3}$
12. $\frac{x}{1.2}=\frac{5}{3.3}$

$x=16.8$

For the following set up a proportion and solve.

13. A model is built that has a scale of 1 inch to every 2.5 feet. If the length of the actual structure is 15 feet, what is the length of the model?

$6\ in.$

14. You are walking with a group of friends down a creek, you know that the pace you are walking is roughly 3 miles per hour. After you have been walking $1\frac{1}{2}\ hours$, how far have you walked?

15. You are baking for the next holiday and are expecting 18 people. You have a new recipe that you want to try out but it only serves 6. If the recipe calls for $1\frac{1}{2}\ cups\ of\ milk,$ how much will you add to make enough for all 18 people?

16. If 13 gallons of gas can get you 250 miles, how much gas will you need to travel 1200 miles?

$62.4\ gallons$

17. You are cooking Thanks giving at your house this year and are expecting 12 people. You do some research on line and find a website that suggests 3 pounds of turkey for every 4 people. How big of a turkey should you buy?

18. A study shows 2 out of every 5 people prefer a certain type of soda. If there is a group of 250 people, how many of them would you expect to prefer that soda?

19. Sally is trying to determine how tall the tree in your front yard is. Since she knows that a shadow is proportional to an objects height, she measures her shadow and find it is 3.5 feet tall. Sally is 5.5 feet tall. If the trees shadow is 7 feet tall, how tall is the tree?

11 feet tall

20. In math classes 1 out of every 6 use the tutoring services, how many out of a class of 36 use tutoring?

21. You buy a bulk bag of toys knowing that 1 out of every 5 is defective, if there was 145 how many toys can you assume are good?

22. It cost $5 for 2 hotdog meals, How much will it cost for 9?

$22.50

23. A cup of rice has 10 grams of fiber, How much fiber is in $2\frac{1}{2} cups$ of rice?

24. One out of every four car owners have not followed up on a recent recall, if the company has sold 2300 cars that are affected by the recall, how many people have not followed up on the recall?

Exercise 5.4 NAME:_____

Write the following Percents as Decimals.

1. 32%

0.32

2. 34%

3. 45%

4. 132.4%

1.324

5. 342.56%

6. 673.12%

7. 0.12%

0.0012

8. 0.2%

9. 0.22%

10. 3%

0.03

11. 9%

12. 1%

Write the following Decimals as a Percent.

13. 0.21

21%

14. 0.33

15. 0.21

14. 2.25

225%

16. 3.12

17. 5.12

18. 3

300%

19. 4

20. 8

Write the following Percents as a Fraction

21. 25%

$\frac{1}{4}$

22. 40%

23. 75%

24. 21.2%

$\frac{53}{250}$

25. 54.2%

26. 30.5%

27. 120%

$\frac{6}{5}$

28. 452%

29. 350%

30. $22\frac{1}{2}\%$

$\frac{9}{40}$

31. $40\frac{1}{3}\%$

32. $31\frac{1}{5}\%$

Write the following Fractions as Percents

33. $\frac{2}{3}$

$66\frac{2}{3}\%$

34. $\frac{1}{8}$

35. $\frac{3}{5}$

Unit 5 NAME:_____
Mid- Chapter Review 5.1 – 5.4

1. Write the ratio of dogs to cats in lowest terms, if the number of cats is 26 and the number of dogs is 10.

$\frac{5}{13}$

2. Using the appropriate conversions, write the ratio for 3 inches to 2 feet.

$\frac{1}{8}$

3. You are thinking about renting a house in Tahoe for $531 for 3 days. What is the daily rate?

$\$177/day$

4. You are buying flour and are looking for the best deal. You can buy a 16 oz bag for $1.28, or a 32 oz bag for $2.40. Which is the better deal? Be sure to use math to support your answer – no credit will be given without work being shown.

32 oz is the better deal.

5. Solve for x

$\frac{12}{7} = \frac{48}{x}$

$x = 28$

6. You are walking down a creek for $2\frac{1}{2}$ hours. Knowing that you walk about 3 miles per hour, how far have you walked? Set up a proportion and solve.

7.5 *miles*

7. Write 10.3% as a Decimal.

0.103

8. Write 0.3 as a Percent.

30%

9. Write 4.2% as a Fraction.

$\frac{21}{500}$

10. Write $\frac{3}{8}$ as a Percent.

37.5%

Exercise 5.5 **NAME:**_____

Solve each of the following using the Percent Proportion.

1. What is 20% of 15?

3

2. What is 36% of 200?

3. What is 128% of 30?

4. 300 is what percent of 15?

2000%

5. 2 is 15% of what number?

6. 4 is what percent of 20?

7. 10is 20% of what number?

50

8. 2 is 15% of what number?

9. 320 is 120% of what number?

10. If you currently eat 1800 calories in a day and your doctor tells you to reduce the calories you take in by 20% - how many calories is he asking you to cut back?

360 calories

11. Sacramento normally get 17.93 inches of rain a year. If it rains 15 inches this year, what percent of normal is that?

12. I saw 23 boats on the river last weekend. They said that was only 20% of normal. How many boats are normally on the river?

13. There were 15 tornados in the county last year; there is usually an average of 10. What percent of the average was there?

150%

14. A local fundraiser is held every year. This year only 120 people showed up. That is only 80% the regular attendance in the past. What number of people have shown up in the past?

15. Your apartment manager has told you that your rent is going up 5%. If you currently pay $560, how much more money will you need to pay with the increase?

Exercise 5.6 NAME:_____

1. What is 15% of 120?

18

2. What is 112% of 130?

3. What is 25% of 700?

4. 20 is what percent of 4?

500%

5. What percent of 120 is 6?

6. What percent of 300 is 15?

7. 3 is 12% of what number?

25

8. 250 is 80% of what number?

9. 20 is 10% of what number?

10. You are buying a $20 item from your neighbor's son for a fundraiser. You have to calculate 8.75% sales tax. What is 8.75% of $20?

$1.75

11. Sacramento normally gets 17.93 inches of rain a year. If it rains 15 inches this year, what percent of normal is that?

12. A car dealer ship sold 52 cars last month. That is 120% of an average month. How many cars do they normally sell?

13. If today's snow level of 10 feet was 20% of normal for this time of year, what is normal for this time of year?

50

14. A stereo is normally $540, and today is on sale for 25% off. How much do you save buying it today?

15. I ate 12 oz of a 16oz bag of chips. What percent did I eat?

Exercise 5.7 NAME:_____

Compute the following rounding to the nearest hundredth or hundredth of a percent where necessary.

1. The governor is proposing to increase fees for community college students from $26 a unit to $36 a unit beginning July 2011. What percent increase is that?

38.46%

2. The university of California could increase by 8% for the 2011-2012 school year, In 2010-2011 tuition was $10,152. What would it be in 2011-2012 school year with this increase?

3. The state legislative office is supporting a bill that would increase fees for community college from $26 to $40 per unit for the 2011-2012 school year. What percent increase is that?

4. An average class attrition rate is roughly 28%. In other words the percent decrease is roughly 28%. If a class starts with 42 students, how many fewer students do you expect at the end of the semester?

11.76

5. At the beginning of the semester a math 100 class had 42 students; at the end it had 35. What percent decrease it that?

6. Sally works at a local coffee shop. She has had her hours decreased by 20% this week. If she was working 36 hours a week, what is she be working this week?

7. There were 20 vendors at a local craft fair last year, this year you were told there will 30. What is the percent increase in vendors?

50%

8. Joe had to put his daughter in childcare for 40 hours a week last semester, because of changes in his schedule he only needs 30 hours of childcare this year. What is the percent decrease in childcare needed?

9. Marie noticed she was eating 2100 calories a day, she began a diet and limited herself to 1300 calories a day. What is the percent decrease?

For Problems 10 – 12 consider the following scenario.

You are at a restaurant and receive a bill from $65.82. How much tip should you leave if you wanted to leave the following percentage? What is the total with tip?

10. 20% tip

$13.16

11. 15% tip

12. 10% tip

Unit 5 Review **NAME:**_____

1. If there are 7 dogs and 14 cats, write a ratio of cats to dogs.

$\frac{2}{1}$

Write a ratio for the following in lowest terms.

2. $2\frac{1}{3}cm \ \ to \ 4cm$

$\frac{7}{12}$

3. $3.5.25m \ \ to \ 2.25m$

$\frac{7}{3}$

4. 8 days to 2 weeks

$\frac{4}{7}$

5. If you drove 400 miles on 25 gallons of gas, what is your miles per gallon?

16 mpg

6. You need to by a special seasoning for your holiday meal and have several options to choose from. What is the best deal?

4 oz for $5.89

4.5oz for $6.61 4.5oz is the best deal

5oz for $7.40

7. $\frac{2}{3} = \frac{7}{x}$

x=10.5

8. $\frac{3.5}{7} = \frac{x}{1.5}$

x= 0.75

9. $\frac{1\frac{1}{3}}{x} = \frac{4\frac{1}{2}}{9}$

$x=\frac{8}{3}$

10. If it takes 4 cups of flour to make a recipe for 6 people, How much flour do you need to make enough for 9 people?

6 cups

11. A study showed that 2 out of every 5 people voted in an election, how many people out of 750 can you assume voted?

300 people voted

12. You were able to drive 350 miles on $17\frac{1}{2}\ gallons$. How many gallons would you need to drive 725 miles?

36.25 gallons

Write the following a s a decimal

13. 12%

0.12

14. 34.34%

0.3434

15. 0.01%

0.0001

Write each of the following a s a percent

16. 2.25

225%

17. 0.58

58%

18. 0.3

30%

Write each of the following as a fraction

19. 22%

$\frac{11}{50}$

20. 15.5%

$\frac{31}{200}$

21. $11\frac{1}{2}\%$

$\frac{23}{200}$

22. Write $\frac{5}{8}$ as a percent.

62.5%

23. What is 50% of 80?

40

24. What is 100% of 75?

75

25. What is 10% of 64?

6.4

26. What is 4% of 80?

3.2

27. 35 is 55 % of what number?

63.63…

28. 70 is 150% of what number?

$46\frac{2}{3}$

29. 15 is what percent of 150?

10%

30. 34 is what percent of 17?

200%

31.You currently pay $650 for rent and were just told by your manager to expect a 8% increase next month. How much will the increase be?

$52

32. The parks and recreation department just announced they will only have 80% of the budget they had last year. If they had a budget of $450,000 last year, how much will they have this year?

$360000

33. A certain class has 23 females out of 40 students. What percent females are there?

57.5%

34. If Bob had $ 120 in his account at the end of the month and that was only 75% of what he had last month, how much did he have last month?

$160

35. If a school had 700 parking places at 200 of them were filled up , what percent are full?

28.57%

36. If the school raised its tuition from $26 to $42 what would the percent increase be?

61.54%

37. If you paid your credit card down to $450 from $675, what is the percent decrease?

33.3%

If you went to a restaurant and had a bill for $75.36 , how much would you leave for a tip if you want to leave:

38. 10% tip?

$7.54

39. 15% tip?

$11.31

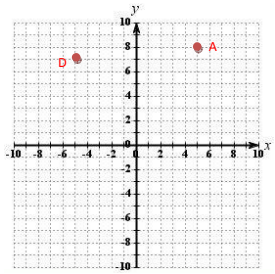
40. 20% tip ?

$15.08

Unit 6 Key

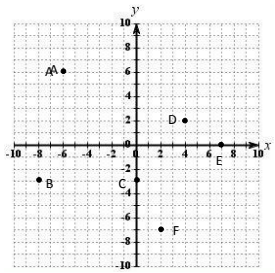
Exercise 6.1 NAME:_____

Graph the following on the given coordinate grid, clearly label each point.



1. A (5, 8)
2. B (-5,-9)
3. C (3,-8)
4. D (-5, 7)
5. E (4,0)
6. F (0, -3)

Identify the coordinates for each of the following points.

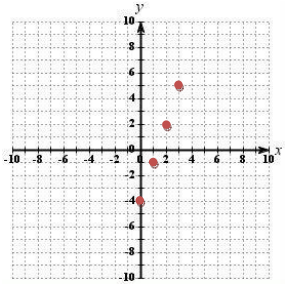


7. A (-6 , 6)
8. B (_____ , _____)
9. C (_____ , _____)
10. D (4 , 2)
11. E (_____ , _____)
12. F(_____ , _____)

13. Fill out the chart below, then plot each point on the grid.

$y = 3x - 4$

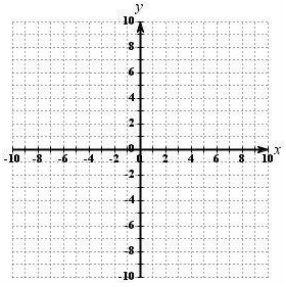
x	y
0	-4
1	-1
2	2
3	5



14. . Fill out the chart below, then plot each point on the grid.

$y = -2x + 3$

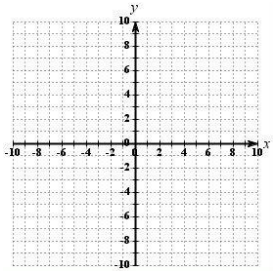
x	y
0	
1	
2	
3	



15. Fill out the chart below, then plot each point on the grid.

$y = x - 5$

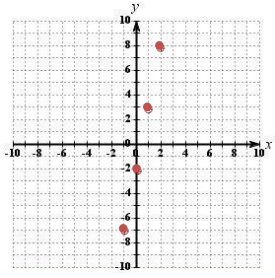
x	y
-1	
0	
1	
2	



16. Fill out the chart below, then plot each point on the grid.

$y = 5x - 2$

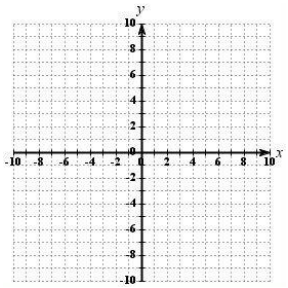
x	y
-1	-7
0	-2
1	3
2	8



17. Fill out the chart below, then plot each point on the grid.

$y = -3x$

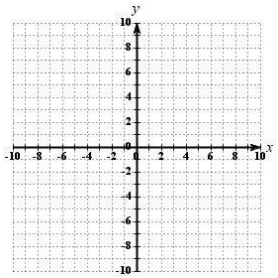
x	y
-2	
0	
2	
3	



18. Fill out the chart below, then plot each point on the grid.

$y = -2x + 5$

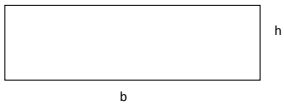
x	y
-2	
0	
2	
4	



19. Do you see a pattern when you plot the points that work in these equations? How many points do you need to create the pattern or path they will fall on? The create a line – 2 points will be enough.

Exercise 6.2 NAME:_____

For problem 1-6, consider the following rectangle.



Find the area of the rectangle with dimensions below.

1. $b = 3m,\ h = 4m$ 2. $b = 7ft, h = 5ft$ 3. $b = 11cm,\ h = 4cm$

$12m^2$

Use the given information to find the missing information.(A stands for Area.)

4. $A = 27in^2,\ b = 3in,\ h = ?$ 5. $A = 54m^2,\ b = 9m, h = ?$ 6. $A = 72mi^2, h = 4mi, b = ?$

$9in$

For Problems 7-12, consider the square:

Find the area of the square with dimensions below.

7. $s = 7mm$ 8. $s = 15ft$ 9. $s = 8m$

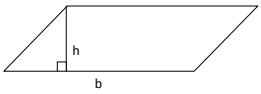
$49mm^2$

Determine the length of the side of the square with the given Area.

10. $A = 36in^2$ 11. $A = 46cm^2$ 12. $A = 9km^2$

$6in$

For problem 13-18, consider the following parallelogram.



Find the area of the parallelogram with dimensions below.

13. $b = 4m,\ h = 10m$ 14. $b = 2ft, h = 7ft$ 15. $b = 12cm,\ h = 5cm$

$40m^2$

Use the given information to find the missing information.(A stands for Area.)

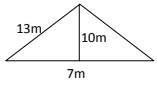
16. $A = 22in^2,\ b = 2in$ 17. $A = 56m^2,\ b = 7m$ 18. $A = 144mi^2, h = 36mi$

$h = ?$ $h = ?$ $b = ?$

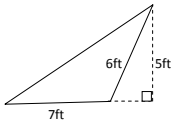
$11in$

Find the area of the triangles below

19.

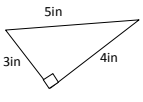


20.



$35m^2$

21.



For problems 22-24, find the missing dimension for the triangle.

22. $A = 15in^2,\ b = 3in$ 23. $A = 20m^2,\ b = 4m$ 24. $A = 17mi^2, h = 2mi$

$h = ?$ $h = ?$ $b = ?$

$10in$

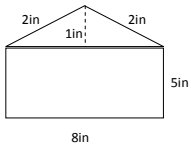
For Problems 25-27 find the area of the circle with the given dimensions.

25. $r = 7cm$ 26. $d = 10in$ 27. $r = 5m$

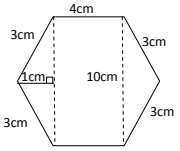
$153.86cm^2$

Find the area of the shapes below

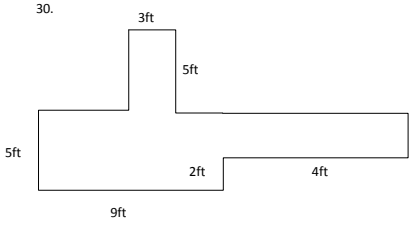
28. $44in^2$



29.

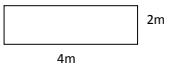


30.



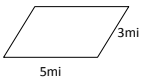
Find the Perimeter (or circumference)of the shapes below

31. Rectangle



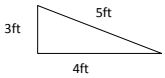
32. Square

33. Parallelogram



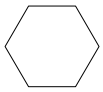
12m

34. Triangle



35. Circle

36. Hexagon



12ft.

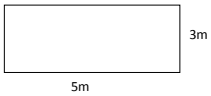
37. If the base of a rectangle is 5 m and the Perimeter is 40 m, what is the Height?

15m

38. If the Perimeter of a square is 28cm, what is the length of each side?

39. If the width of a Parallelogram is 6in, and its perimeter is 38in, find the length.

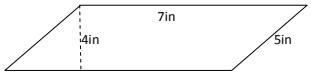
40. Find the Area and perimeter of the rectangle below:



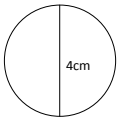
$A = 15m^2$

P=16m

41. Find the Area and Perimeter of the Parallelogram below.



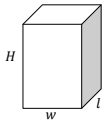
42. Find the Area and Circumference for the Circle Below.



Exercise 6.3 NAME:_____

Calculate the volume of each of the following.

For problems 1-3 consider the rectangular prism below.



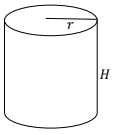
1. $l = 2ft, w = 3ft, H = 4ft$

$V = 24ft^3$

2. $l = \frac{2}{3}m, w = 5m, H = \frac{1}{2}m$

3. $l = 2.5in, w = 1.2in, H = 4in$

For problems 4-6 consider the cylinder below.



4. $r = 2.1cm, H = 3cm$

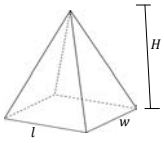
$V = 41.5422cm^3$

41.5422cm

5. $r = 5in, H = 4in$

6. $r = \frac{1}{3}ft, H = 5ft$

For Problems 7-9 consider the Rectangular pyramid below

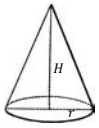


7. $l = \frac{1}{2}cm, w = 3cm, H = 4cm$ $V = 2cm^3$

8. $l = 2.1m, w = 3m, H = 4m$

9. $l = 5ft, w = 2ft, H = 6ft$

For Problems 10-12 consider the cone below



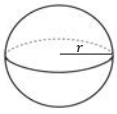
10. $r = 2.5cm, H = 4cm$

$V = 26\frac{1}{6}cm^3$

11. $r = \frac{1}{5}ft, H = 4ft$

12. $r = 6m, H = 2m$

For Problems 13-15 consider the sphere below



13. $r = 5m$

$V = 523\frac{1}{3}m^3$

14. $r = \frac{1}{2}cm$

15. $r = 2.2ft$

Exercise 6.4 NAME:_____

Find the following square roots

1. $\sqrt{4}$ 2. $\sqrt{9}$ 3. $\sqrt{25}$

2

4. $\sqrt{144}$ 5. $\sqrt{900}$ 6. $\sqrt{196}$

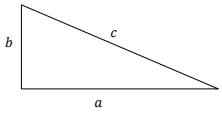
12

What whole numbers do the following square roots fall between?

7. $\sqrt{7}$ 8. $\sqrt{22}$ 9. $\sqrt{120}$

2 and 3

For Problems 10-15, refer to the triangle below.



10. $a = 3in, b = 4in, c =?$ 11. $a = 5m, b = 12m, c =?$ 12. $a = 6ft, b = 8ft, c =?$

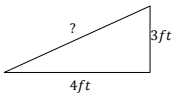
5in

13. $c = 26ft, a = 24ft, b =?$ 14. $c = 5m, a = 3m, b =?$

5ft

15. $c = 15in, b = 12\ in, a =?$

16. A wheel chair ramp raises a wheel chair a vertical distance of 3 feet, in a horizontal distance of 4 feet. How long is the ramp the wheel chair travels on?



5ft

Challenge: break the following into simplified roots

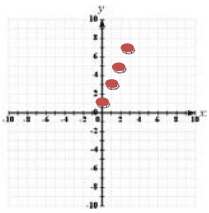
a. $\sqrt{20}$ $2\sqrt{5}$ b. $\sqrt{18}$ c. $\sqrt{32}$

Unit 6 Review 6.1 – 6.4 NAME:_____

1. Complete the chart below by evaluating

y = 2x + 1 Then plot the points on the graph.

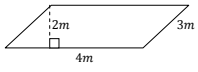
x	y
0	1
1	3
2	5
3	7



2. Find the area of a rectangle whose base is 3 cm and hieght is 7cm.

$21cm^2$

3. Find the Perimeter of a parallelogram below



14m

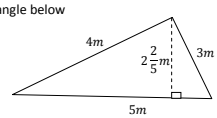
4. Find the area of a circle with a radius of 7feet.

$153.86ft^2$

5. If the Perimeter of a recantgle is 26ft, and the width is 7ft, find the length.

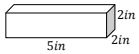
6ft

6. Find the area of the triangle below



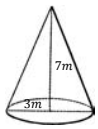
$6m^2$

7. Find the volume of the rectangular prism below.



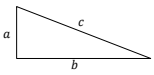
$20in^3$

8. Find the Volume of the cone below



$65.94m^3$

For problems 9 and 10 consider the triangle



9. If $a = 3ft\ and\ b = 4ft$, $find\ c$

5ft

10. If $c = 13ft\ and\ b = 5ft$, $find\ a$

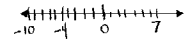
12ft

Review Unit 1-3 NAME: Key

UNIT 1

1. Plot the following on a number line, label each point

7, -4, -10



Find the absolute value of the following

2. $|-21|$ → 21

3. $|50|$ → 50

4. $-|-10|$ → -10

5. Put the following in order from least to greatest

7, 4, -2, 0, -10, 8

-10, -2, 0, 4, 7, 8

6. $-7+(-5)$ → -12

7. $-5-(-3)$ → $-5+3$ → -2

8. $4-7$ → -3

9. $-10-(-21)$ → $-10+21$ → +11

10. $65-5-(-20)$ → $60+20$ → 80

11. Evaluate $a-b$, for $a=7$ and $b=-7$

$7-(-7) = 7+7 = 14$

12. $-2\cdot(-11)$ → 22

13. $-3\cdot 4$ → -12

14. $-5(-2)(-6)$ → $10\cdot -6$ → -60

15. $-156 \div -3$ → 52

16. $\frac{54}{-9}$ → -6

Write the following in exponential form

17. $2\cdot 2\cdot 2\cdot 2\cdot 2\cdot 7$ → $2^5\cdot 7$

18. $x\cdot x\cdot y\cdot y\cdot y$ → $x^2\cdot y^3$

Evaluate the following

19. 6^2 → $6\cdot 6$ → 36

20. $(-3)^2$ → $(-3)(-3)$ → 9

21. -2^4 → $-2\cdot 2\cdot 2\cdot 2$ → $-4\cdot 2\cdot 2$ → $-8\cdot 2$ → -16

Simplify the following

DEMDAS

22. $4-2\cdot 13$ → $4-26$ → -22

23. $6\cdot 4-12\div 3\cdot 4$ → $24-4\cdot 4$ → $24-16$ → 8

24. $5\cdot 4-(6-9)^2$ → $20-(-3)^2$ → $20-9$ → 11

25. $2-4+5(3^3-2\cdot 7)$ → $2-4+5(27-14)$ → $-2+5(13)$ → $-2+65$ → 63

26. $18\div 3\cdot 5$ → $6\cdot 5$ → 30

27. Evaluate ab^2+2b, for $a=-2$ and $b=-3$

$-2(-3)^2+2(-3)$ → $-2\cdot 9-6$ → $-18-6$ → -24

28. What is colder -25 degrees or -30 degrees?

-30° is colder

29. Sam account is overdrawn by $21. He deposits a paycheck for $231. What is his new balance?

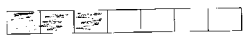
$-21+231$ → $210

30. You owe $5 for each day you leave your car parked at a car lot. If you leave your car for 6 days how much will you owe?

$(-5)\cdot 6$ → -30

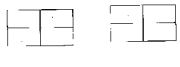
Unit 2

1. Write a fraction that represents the following.



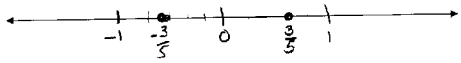
$\frac{3}{7}$

2. Write an IMPROPER FRACTION and a MIXED NUMBER that represents the following.



$\frac{7}{4} = 1\frac{3}{4}$

3. Draw a number line, clearly label $0, -\frac{3}{5}, \frac{3}{5}, 1$ and -1.



Find the absolute value of the following.

4. $\left|-\frac{4}{3}\right|$ → $\frac{4}{3}$

5. $\left|\frac{3}{7}\right|$ → $\frac{3}{7}$

6. $-\left|-\frac{2}{11}\right|$ → $-\frac{2}{11}$

Rewrite the following fractions to have the given denominator

7. $\frac{3}{5} = \frac{?}{15}$ → $\frac{9}{15}$

8. $-\frac{35}{20} = \frac{?}{4}$ → $\frac{-7}{4}$

9. $-3 = \frac{?}{2}$ → $\frac{-6}{2}$

Write the following in lowest terms

10. $-\frac{24}{60}$ → $-\frac{2}{5}$

11. $-\frac{36}{90}$ → $\frac{-6}{15}$ → $\frac{-2}{5}$

12. $\frac{4x^2}{20x}$ → $\frac{x}{5}$

Complete the following – show all steps.

13. $-\frac{5}{7}\cdot\frac{2}{9} = \frac{-5\cdot 2}{7\cdot 9} = \frac{-10}{63}$

14. $\left(-\frac{3}{5}\right)\cdot\left(-\frac{7}{2}\right) = \frac{-3\cdot 7}{5\cdot 2} = \frac{+21}{10}$

15. $1\frac{2}{3}\cdot\left(-2\frac{2}{5}\right)$ → $\frac{5}{3}\cdot\frac{-8}{3}$ → $\frac{-40}{9}$

16. $\frac{3}{5}\div\frac{4}{15}$ → $\frac{3}{5}\cdot\frac{15}{4}$ → $\frac{9}{4}$

17. $\left(-\frac{1}{3}\right)\div 9$ → $-\frac{1}{3}\cdot\frac{1}{9}$ → $\frac{-1}{27}$

18. $3\frac{1}{3}\div\left(-2\frac{1}{2}\right)$ → $\frac{10}{3}\div\frac{-5}{2}$ → $\frac{10}{3}\cdot\frac{2}{-5}$ → $\frac{-4}{3}$

19. If you have a 32 oz. bag of chips and the serving size is $\frac{1}{2}oz$, How many servings are in the bag?

$32\div\frac{1}{2}$

$\frac{32}{1}\cdot\frac{2}{1}$ → 64 servings

20. You are renting a bus to go to Reno, the bus can hold 66 people and currently you have reserved $\frac{1}{3}$ the seats. How many seats have you reserved?

$\frac{1}{3}\cdot 66 = \frac{1}{3}\cdot\frac{66}{1} = 22$

22 seats

21. If the equation to find area of a rectangle is $A=b\cdot h$, and you know that $b=\frac{1}{2}in$ and $h=\frac{5}{8}in$ find the Area.

$A=bh$

$A=\frac{1}{2}\cdot\frac{5}{8}$

$=\frac{5}{16}in^2$

22. $-\frac{2}{7}-\frac{1}{7}=\frac{-2-1}{7}$

$=\boxed{\frac{-3}{7}}$

23. $-\frac{3}{5}-\left(-\frac{1}{5}\right)$

$=\frac{-3+1}{5}$

$=\boxed{\frac{-2}{5}}$

24. $-\frac{3}{8}+\frac{1}{8}=\frac{-3+1}{8}$

$=\frac{-2}{8}$

$=\boxed{\frac{-1}{4}}$

25. $\frac{3}{4}-\frac{1}{8}$

$\frac{6}{8}-\frac{1}{8}=\boxed{\frac{5}{8}}$

26. $-\frac{1}{3}+\frac{5}{6}$

$-\frac{2}{6}+\frac{5}{6}$

$\frac{3}{6}$

$\boxed{\frac{1}{2}}$

27. $-5+\frac{1}{3}$

$-\frac{15}{3}+\frac{1}{3}$

$\boxed{\frac{-14}{3}}$

28. $-4\frac{1}{5}-7\frac{3}{10}$

$-\left(4+7+\frac{2}{10}+\frac{3}{10}\right)$

$-11\frac{5}{10}$

$\boxed{-11\frac{1}{2}}$

29. $8\frac{1}{6}-4\frac{5}{12}$

$7\frac{7}{6}\cdot\frac{2}{12}\quad\frac{14}{6}$

$-4\frac{5}{12}\quad-\frac{5}{12}$

$3\frac{9}{12}$

$\boxed{3\frac{3}{4}}$

30. $5-\left(-\frac{2}{5}\right)$

$\frac{25}{5}+\frac{2}{5}$

$\boxed{\frac{27}{5}}$

$\boxed{5\frac{2}{5}}$

31. You are putting in a new counter in your kitchen, You must first put in a padding that is $\frac{1}{3}$ *in* thick and the counter it self is $\frac{3}{4}$ *in* thick. How much thickness are you adding to the counter?

$\frac{1}{3}+\frac{3}{4}$

$\frac{4}{12}+\frac{9}{12}$

$\frac{13}{12}=\boxed{1\frac{1}{12}\text{ in}}$

32. $\left(\frac{2}{5}\right)^3$

$\boxed{\frac{8}{125}}$

33. $\left(-\frac{3}{11}\right)^2=\left(\frac{3}{11}\right)\left(\frac{3}{11}\right)$

$=\boxed{\frac{9}{121}}$

34. $-\frac{4^2}{5}=\frac{-4\cdot4}{5}$

$=\boxed{\frac{-16}{5}}$

35. $\frac{4}{5}\div\frac{14}{15}\cdot\frac{3}{7}$

$\frac{2}{5}\cdot\frac{15}{14}\cdot\frac{3}{7}$

$\boxed{\frac{18}{49}}$

36. $\frac{2}{3}+\frac{1}{3}\cdot\frac{5}{3}$

$\frac{2}{3}+\frac{5}{9}$

$\frac{6}{9}+\frac{5}{9}$

$\boxed{\frac{11}{9}}$

37. $\left(\frac{3}{12}-\frac{3}{4}\right)^2+\frac{1}{2}\cdot10$

$\left(\frac{3}{12}-\frac{9}{12}\right)^2+5$

$\left(\frac{-6}{12}\right)^2+5$

$\left(-\frac{1}{2}\right)^2+5$

$\frac{1}{4}+5=5\frac{1}{4}$

38. $\frac{\frac{1}{5}}{\frac{7}{10}}$

$=\frac{1}{5}\cdot\frac{10}{7}$

$=\boxed{\frac{2}{7}}$

39. $\frac{\frac{5}{6}+\frac{1}{3}}{3}$

$\frac{5}{6}+\frac{2}{6}$

$\frac{\frac{7}{6}}{\frac{3}{1}}$

$=\frac{7}{6}\cdot\frac{1}{3}$

$=\boxed{\frac{7}{18}}$

40. $\frac{\frac{1}{2}}{2-\frac{1}{3}}$

$\frac{\frac{1}{2}}{\frac{6}{3}-\frac{1}{3}}$

$=\frac{\frac{1}{2}}{\frac{5}{3}}$

$=\frac{1}{2}\cdot\frac{3}{5}$

$=\boxed{\frac{3}{10}}$

Unit 3

1. Write 4.786 in words.

four and seven hundred eighty-six thousandths.

2. Write 5.00671 in words.

five and six hundred seventy-one hundred-thousandths

3. Write the following as a number.

Three and four hundred twenty-one thousandths

3.421

4. Write the following as a number.

Seven hundred-thousandths

.00007

Find the absolute value of the following.

5. $|-0.251|$

0.251

6. $|7.123|$

7.123

7. $-|-0.235|$

-0.235

Order the following by placing < or > between the numbers.

8. 4.0256 > 4.025

9. 3.715 > 3.0715

10. -5.26 < -5.206

11. Write -5.47 as a fraction.

$-\frac{547}{100}$

12. Write 3.255 as a fraction.

$\frac{3255}{1000}=\boxed{\frac{651}{200}}$

13. Round -42.23715 to the nearest thousandth.

-42.237

14. Round -0.025467 to the nearest hundredth.

-0.03

15. Round 235.45678948 to the nearest ten-thousandth.

235.4568

16. Round to the nearest dollar : $ 25.86

$26

17. You calculate the cost of a single item bought in bulk as $ 3.2655478. How much would you pay for it?

$3.27

Perform the indicated operation

18. $-2.36+1.369$

-2.360

1.369

-0.991

$\boxed{-0.991}$

19. $-523.365+(-21.1)$

-544.465

$\boxed{-544.465}$

20. $-2.251-5.33$

-5.33

$\boxed{-7.581}$

21. $-2.4-5.232$

-5.232

$\boxed{-7.632}$

22. $43.52-6.4253$

43.8200

-6.4253

$\boxed{37.0947}$

23. $-35.1+234.34$

234.34

-35.1

$\boxed{199.24}$

24. Sue has$ 236 in an account and writes a check for $250. If the check clears, what is Sues account balance?

236

-250

-14

$-\$14$

overdrawn $14.

Perform the indicated operation.

25. $-23.45(-5.2)$

$23.45 \times 5.2 = 46690 + 117250 = 121.940$

121.94

26. $-4.34 \cdot 5.5$

$4.34 \times 5.5 = 2170 + 21700 = 23870$

-23.87

27. $(-3.7)(-7)$

$3.7 \times 7 = 25.9$

25.9

28. $-23.4556(100)$

-2345.56

29. $5.238(-10000)$

$-52380.$

30. $3.2234 \cdot 0.01$

$.032234$

31. Given the formula for circumference is $C = 2\pi r$ with $\pi \approx 3.14$, find the circumference of a circle whose radius, r, equal to 2in.

$C = 2 \cdot \pi \cdot r$

$C = 2 \cdot 3.14 \cdot 2$

$C = 6.28 \cdot 2$

12.56 in

32. $27.56 \div 13$

$13\overline{)27.56}$: 26, 15, -13, 26

2.12

33. $106.7 \div 5$

$5\overline{)106.70}$: -10, 07, -5, 17, -15, 20

21.34

34. $28 \div 3$

$3\overline{)28.00}$: -27, 10, -9, 10

$9.\overline{3}$

35. $12.588 \div 0.2$

$2\overline{)125.88}$: -12, 05, -4, 8, -8, 08

62.94

62.94

36. $7 \div 0.9$

$9\overline{)70.0}$: -63, 70

$7.\overline{7}$

7.7

37. $5.2756 \div 1.21$

$121\overline{)527.56}$: -484, 435, -363, 726, -726, 0

4.36

Round the following to the nearest Thousandth.

38. $423 \div 2.3$

$23\overline{)4230.0000}$: -23, 193, -184, 90, -69, 210, -207, 30, -23, 70, -69, 10

183.913

39. $20 \div 7$

$7\overline{)20.000}$: -14, 60, -56, 40, -35, 50, -49, 10

2.8571 = 2.857

40. $536 \div 0.7$

$7\overline{)5360.0000}$: 49, 46, -42, 40, -35, 50, -49, 10, -7, 30, -28, 20

765.714

41. Write $\frac{5}{9}$ as a decimal.

$9\overline{)5.00}$: -45, 50

$.\overline{5}$

42. Write $\frac{3}{8}$ as a decimal.

$8\overline{)3.000}$: -24, 60, -56, 40

.375

Order the following by placing a < or > in between the numbers

43. $0.67 > \frac{2}{3}$ (.66666...)

44. $\frac{4}{5} < 0.81$

$.80$

Complete the following

45. $(-3.5)^2$

$(-3.5)(-3.5)$

$3.5 \times 3.5 = 175 + 1050 = 12.25$

12.25

46. -0.5^2

$-0.5 \cdot 0.5$

-0.25

47. $-(0.2)^3$

$-(0.2)(0.2)(0.2)$

-0.008

48. $3.1(0.2)^4$

$3.1 \cdot .0016$

$.0016 \times 3.1 = 16 + 4960 = .00496$

0.00496

49. $4(-0.3)^3$

$4(-.027)$

$-.027 \times 4 = .108$

$-.108$

50. $5.8 + 12.3(0.2)$

$5.8 + 2.46$

$12.3 \times .2 = 2.46$

8.26

51. $4.8 \div 0.3 \cdot 2.22$

$16 \cdot 2.22$

$3\overline{)48}$: -3, 18

$2.22 \times 16 = 1332 + 2220 = 35.52$

35.52

52. $2(0.3)^2 + 3.2(5.1)$

$2(.09) + 3.2(5.1)$

$.18 + 16.32$

16.50

$3.2 \times 5.1 = 32 + 1600 = 16.32$

16.32 .18 16.50

53. $4.25 \div 0.05 + 3.3 \cdot 4.123$

$85 + 13.6059$

98.6059

$5\overline{)425}$: -40, 25, -25, 0

$4.123 \times 3.3 = 123690 + 123690 = 13.6059$

54. Find the average of 87, 75, and 81.

$87 + 75 + 81 = 243$

$\frac{243}{3} = 81$

81

81%

55. $\sqrt{196}$

$= \sqrt{14 \cdot 14}$

$= 14$

56. $\sqrt{900}$

$= \sqrt{30 \cdot 30}$

$= 30$

57. $-\sqrt{36} = \sqrt{6 \cdot 6}$

-6

Review unit 4 - 6 NAME: Key

Unit 4

Evaluate the following

1. $x - 7$, *for* $x = -5$

$-5-7$

-12

2. $2b + 4$, *for* $b = -2$

$2\cdot -2+4$

$-4+4$

0

Simplify

3. $47x - 3x + 4x$

$44x+4x$

$48x$

4. $12x + 4y - 3y$

$12x+y$

5. $22k + j - 12k - j$

$10k$

6. $4x^2 + 3x - 12$

$4x^2+3x-12$

7. $3x^2y + xy + 8xy^2 - 5xy$

$3x^2y+8xy^2-4xy$

Distribute and simplify

8. $4(x - 3)$

$4x-12$

9. $8(x + 2)$

$8x+16$

10. $-5(x - 4)$

$-5x+20$

11. $-3(2x + 6)$

$-6x-18$

12. $2 + 5(x - 2)$

$2+5x-10$

$5x-8$

13. $3x - 6(x - 4)$

$3x-6x+24$

$-3x+24$

Solve

14. $x + 4 = -10$

$-4 \quad -4$

$x=-14$

15. $x - 5 = -14$

$+5 \quad +5$

$x=-9$

16. $-3 = x + 28$

$-28 \quad -28$

$-31=x$

Solve

17. $6x = -24$

$\frac{6x}{6}=\frac{-24}{6}$

$x=-4$

18. $-7x = -42$

$\frac{-7x}{-7}=\frac{-42}{-7}$

$x=6$

19. $-8x = 72$

$\frac{-8x}{-8}=\frac{72}{-8}$

$x=-9$

20. $-2x + 7x = 72 - (-3)$

$\frac{5x}{5}=\frac{75}{5}$

$x=15$

21. $8x + 10 - 7x = 4$

$x+10=4$

$-10 \quad -10$

$x=-6$

22. A number decreased by thirty is twenty-two. Find the number.

$n-30=22$

$n=52$

23. The product of a number and 4 is 32. Find the number.

$4x=32$

$x=8$

Solve

24. $-3x - 7 = 8$

$+7 \quad +7$

$\frac{-3x}{-3}=\frac{15}{-3}$

$x=-5$

25. $-2 - 3x = 31$

$+2 \quad +2$

$-3x=33$

$x=-11$

Solve

26. $2(x - 1) + 12 = -10$

$2x-2+12=-10$

$2x+10=-10$

$-10 \quad -10$

$2x=-20$

$x=-10$

27. $5 - 2(x + 1) = 12 - (-3)$

$5-2x-2=15$

$3-2x=15$

$-3 \quad -3$

$-2x=12$

$x=-6$

28. $8x - 5 = 2x + 13$

$-2x \quad -2x$

$6x-5=13$

$+5 \quad +5$

$\frac{6x}{6}=\frac{18}{6}$

$x=3$

29. $5x - 5 = 4(x + 7) - 3$

$5x-5=4x+28-3$

$5x-5=4x+25$

$x=30$

30. $\frac{1}{5}x = \frac{3}{7}$

$x=\frac{3}{7}\cdot\frac{5}{1}$

$x=\frac{15}{7}$

31. $x - \frac{1}{2} = \frac{2}{3}$

$x=\frac{1}{2}+\frac{2}{3}$

$x=\frac{3}{6}+\frac{4}{6}$

$x=\frac{7}{6}$

32. $\frac{2}{3}x - \frac{1}{3} = \frac{1}{6}$

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

$\frac{2}{3}x=\frac{3}{6}$

$\frac{3}{2}\cdot\frac{2}{3}x=\frac{1}{2}\cdot\frac{3}{2}$

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

33. $\frac{1}{2}x - 2 = \frac{3}{2}x - \frac{1}{2}$

$-\frac{1}{2}x \quad -\frac{1}{2}x$

$-2=x-\frac{1}{2}$

$+\frac{1}{2} \quad +\frac{1}{2}$

$\frac{-3}{2}=x$

$-2+\frac{1}{2}$

$-\frac{4}{2}+\frac{1}{2}$

34. $0.3x = 3.9$

$\frac{.3x}{.3}=\frac{3.9}{.3}$

$x=13$

35. $x + 1.3 = -2.23$

$-1.3 \quad -1.3$

$x=-3.53$

36. $0.25x - 3.2 = -2.55$

$+3.2 \quad +3.20$

$\frac{.25x}{.25}=\frac{.65}{.25}$

$x=2.6$

$25\overline{)65.0}$ 2.6

-50

150

Unit 5

1. If you spend 6 hours studying to every 2 hours in class, what is the ratio of hours in class to hours studying?

$\frac{2}{6}$ $\boxed{\frac{1}{3}}$

Write a ratio for the following in lowest terms.

2. $1\frac{1}{2}cm$ *to* $2cm$

$\frac{\frac{3}{2}}{\frac{2}{1}} = \frac{3}{2} \cdot \frac{1}{2}$ $\boxed{\frac{3}{4}}$

3. $4.2m$ *to* $3.22m$

$\frac{420}{322} = \frac{210}{161} = \frac{30}{23}$

4. 20 hours to 2 days

$\frac{20}{2 \cdot 24} = \frac{20}{48}$ $\boxed{\frac{5}{12}}$

5. If you drove 300miles on 25 gallons of gas, what is your miles per gallon?

$25\overline{)300}$ $\boxed{12 \text{ mpg}}$

6. You need to by a special seasoning for your holiday meal and have several options to choose from. What is the best deal?

4 oz for $10.21

4.5oz for $11.50

5oz for $12.00

The best deal

$4\overline{)10.21}$ $45\overline{)115.00}$ $5\overline{)12.0}$

7. $\frac{3}{5} = \frac{8}{x}$ $3x = 40$ $\boxed{x = \frac{40}{3}}$

8. $\frac{2.5}{7} = \frac{x}{1.4}$ $2.5 \times 1.4 = 3.50$ $3.5 = 7x$ $\boxed{.5 = x}$

9. $\frac{2\frac{1}{3}}{x} = \frac{4\frac{1}{2}}{6}$ $\frac{7}{3} \cdot 6 = \frac{9}{2} \cdot x$ $14 = \frac{9}{2}x$ $\frac{2}{9} \cdot 14 = x$ $\boxed{\frac{28}{9} = x}$

10. If it takes 2 cups of flour to make a recipe for 6 people, How much flour do you need to make enough for 8 people?

$\frac{2}{6} = \frac{x}{8}$ $\frac{16}{6} = \frac{6x}{6}$ $8/3 = x$ $\boxed{2\frac{2}{3} \text{ cups}}$

11. A study showed that 3 out of every 5 people voted in an election, how many people out of 1250 can you assume voted?

$\frac{3}{5} = \frac{x}{1250}$ $1250 \times 3 = 3750$ $\frac{3750}{5} = \frac{5x}{5}$ $750 = x$ $\boxed{750 \text{ people}}$

12. You were able to drive 400 miles on $18\frac{1}{2}$ *gallons* . How many gallons would you need to drive 800 miles?

$\frac{400}{18.5} = \frac{800}{x}$ $400x = 800 \cdot 18.5$ $x = 2.16.5$ $x = 37$ $18.5 \times 2 = 37.0$ $\boxed{37 \text{ gallons}}$

Write the following a s a decimal

13. 36% $\boxed{.36}$

14. 25.42% $\boxed{.2542}$

15. 0.0008% $\boxed{.000008}$

Write each of the following as a percent

16. 3.10 $\boxed{310\%}$

17. 0.46 $\boxed{46\%}$

18. 0.5 $\boxed{50\%}$

Write each of the following as a fraction

19. 96% $\frac{96}{100} = \boxed{\frac{24}{25}}$

20. 21.5% $\frac{215}{1000} = \boxed{\frac{43}{200}}$

21. $15\frac{1}{2}\%$ $\frac{31}{2} \cdot \frac{1}{100}$ $\boxed{\frac{31}{200}}$

22. Write $\frac{5}{6}$ as a percent.

$\frac{5}{6} \cdot \frac{100\%}{1} = \frac{250}{3}\% = \boxed{83\frac{1}{3}\%}$

23. What is 50% of 150?

$.5 \cdot 150$ $\boxed{75}$

24. What is 100% of 300? $\boxed{300}$

25. What is 10% of 28?

$.1 \cdot 28$ $\boxed{2.8}$

26. What is 4% of 30?

$.04 \cdot 30$ $\boxed{1.2}$

27. 33 is 60 % of what number?

$33 = .6 \cdot x$ $\frac{33}{.6} = \frac{.6x}{.6}$ $\boxed{x = 55}$

28. 90 is 150% of what number?

$90 = 1.5x$ $\frac{90}{1.5} = \frac{1.5x}{1.5}$ $\boxed{x = 60}$

29. 15 is what percent of 180?

$15 = x \cdot 180$ $\frac{15}{180} = x$ $83.\overline{3}\%$

30. 560 is what percent of 56?

$560 = x \cdot 56$ $\frac{560}{56} = \frac{x \cdot 56}{56}$ $10 = \frac{x}{100\%}$

31. You currently pay $700 for rent and were just told by your manager to expect a 5% increase next month. How much will the increase be?

$700 \cdot .05$ $\boxed{\$35.00}$

32. The parks and recreation department just announced they will only have 75% of the budget they had last year. If they had a budget of $400,000 last year, how much will they have this year?

$.75 \cdot 400000 =$ $\boxed{\$300,000}$

33. A certain class has 26 females out of 42 students. What percent females are there?

$\frac{26}{42} = \frac{X}{100}$

$2600 = 42X$

$61.90 = X$

61.90% female

34. If Bob had $ 320 in his account at the end of the month and that was only 25% of what he had last month, how much did he have last month?

$\frac{320}{.25} = \frac{.25 \cdot X}{.25}$

$1280 = X$

he had $1280 last month.

35. If the school raised its tuition from $32 to $40 what would the percent increase be?

$\frac{8}{32} = \frac{X}{100}$ $\quad X = 25$

$800 = 32X$

25% increase

36. If you paid your credit card down to $250 from $450, what is the percent decrease?

$450 - 250 = 200$

$\frac{200}{450} = \frac{X}{100}$

$\frac{20000}{450} = \frac{450X}{450}$

$44.\overline{4} = X$

$44.\overline{4}\%$ decrease

If you went to a restaurant and had a bill for $58.63 , how much would you leave for a tip if you want to leave:

37. 10% tip? $5.86

38. 15% tip?

$5.86 + 2.93 = \$8.79$

39. 20% tip?

$5.86 + 2 = \$11.72$

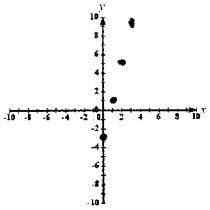
Unit 6

1. Complete the chart below by evaluating

y = 4x - 3 Then plot the points on the graph.

x	y
0	-3
1	1
2	5
3	9

4-3
8-3
12-3



2. Find the area of a rectangle whose base is 15 cm and hieght is 4cm.

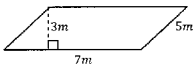
$A = bh$

$A = 15 \cdot 4$

$A = 60cm^2$

3. Find the Perimeter of a parallelogram below

$P = 2l + 2w$



$P = 7 + 2 \cdot 5$

$14 + 10 = 24m$

4. Find the area of a circle with a radius of 3 feet.

$A = \pi r^2$

$A = 3.14 \cdot 3^2$

$3.14 \cdot 9 = 28.26ft^2$

5. If the Perimeter of a recantgle is 36ft, and the base is 5ft, find the width.

$P = 2l + 2w$

$36 = 2 \cdot 5 + 2 \cdot w$

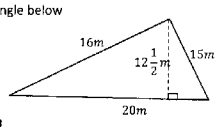
$36 = 10 + 2w$

$26 = 2w$

$13 = w$

13ft = width

6. Find the area of the triangle below

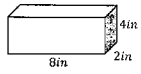


$A = \frac{1}{2} \cdot 20 \cdot 12\frac{1}{2}$

$A = \frac{1}{2} \cdot 20 \cdot \frac{25}{2}$

$A = 125\ m^2$

7. Find the volume of the rectangular prism below.



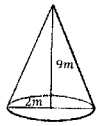
$V = 8 \cdot 2 \cdot 4$

$V = 16 \cdot 4$

$V = 64$

$64in^3$

8. Find the Volume of the cone below



$V = \frac{1}{3}\pi r^2 \cdot H$

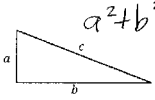
$= \frac{1}{3} \cdot 3.14(2)^2 \cdot 9$

$= 3.14 \cdot 12$

$37.68m^3$

3.14 × 12 = 628 + 3140 = 37.68

For problems 9 and 10 consider the rectangle



$a^2 + b^2 = c^2$

9. If $a = 5ft$ and $b = 12ft$, find c

$5^2 + 12^2 = c^2$

$25 + 144 = c^2$

$169 = c^2$

$c = \pm 13$

$c = 13ft$

10. If $c = 5ft$ and $b = 3ft$, find a

$5^2 = a^2 + 3^2$

$25 = a^2 + 9$

$-9 \quad -9$

$16 = a^2$

$a = \pm 4$

$a = 4ft$