SUMMER MATH PACKET

Students & Parents,

Enclosed you will find the summer math practice packet. The purpose of the summer math practice packet is to provide students with the opportunity to stay engaged in mathematics over the summer and reinforce the necessary skills for the upcoming school year. If you have any questions or concerns, please feel free to contact me at adavid@colemancarroll.org.

Directions: You do not have to complete the entire packet. Do only the odds or the evens.

– Summer Math Packet

Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Complete a function table with a given two operation rule.
Examples:

The solution of an equation with two variables consists of two numbers, one for each variable, that make the equation true. The solution is usually written as an ordered pair.

The cost to rent a bicycle at the beach includes a rental fee of 5 dollars plus 3 dollars for each hour. The equation for the cost of renting a bicycle is:

C = 3H + 5

C is the total cost and **H** is the number of hours.

Bicycle Rentals		
Hours	**3H + 5**	**Cost (dollars)**
1	3(1) + 5	8
2	3(2) + 5	11
3	3(3) + 5	14
4	3(4) + 5	17

Complete the following tables:

1.)

C = 3H + 4

H	3H + 4	C
2	3(2) + 4	
4		
6		
10		

2.)

Y = 5X + 2

X	5X + 2	Y
3		
6		
9		
12		

3.)

Y = 5X - 3

X	5X – 3	Y
1	5(1) - 3	2
2		
3		
4		

4.)

A = 4B - 3

B	4B – 3	A
3		
4		
5		
6		

5.)

Y = 2 + 10X

X	2 + 10X	Y
3	2 + 10(3)	32
4		
5		

6.)

6B – 1 = A

B	6B – 1	A
8	6(8) – 1	47
10		
12		

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Write an algebraic expression to represent unknown quantities with one unknown and 1 or 2 operations.
Examples:

The tables below show phrases written as mathematical expressions.

Phrases	Expression
9 more than a number the sum of 9 and a number a number plus 9 a number increased by 9 the total of *x* and 9	$X + 9$
Phrases	**Expression**
6 multiplied by *g* 6 times a number the product of *g* and 6	$6g$

Phrases	Expression
4 subtracted from a number a number minus 4 4 less than a number a number decreased by 4 the difference of *h* and 4	$h - 4$
Phrases	**Expression**
a number divided by 5 the quotient of *t* and 5 divide a number by 5	$\frac{t}{5}$

Write each phrase as an algebraic expression.

1.) 7 less than *m*

2.) The quotient of 3 and *y*

3.) 7 years younger than Jessica

4.) 3 times as many marbles as Bob has

5.) Let t = the number of tomatoes Tye planted last year. This year she planted 3 times as many. Write an algebraic expression to show how many tomatoes Tye planted this year.

6.) Last week Jason sold x number of hot dogs at the football game. This week he sold twice as many as last week, and then he sold 10 more. Write an expression to show how many hot dogs Jason sold this week.

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Evaluate an algebraic expression using one unknown and no more than 2 operations.

Example 1: Evaluate $6x - 7$ if $x = 8$.

$6x - 7$	$= 6(8) - 7$	Replace x with 8.
	$= 48 - 7$	Use order of operations.
	$= 41$	Subtract 7 from 48.

Example 2: Evaluate $5m - 15$ if $m = 6$.

$5m - 15$	$= 5(6) - 15$	Replace m with 6..
	$= 30 - 15$	Use order of operations.
	$= 15$	Subtract 15 from 30.

Example 3: Evaluate $\frac{7b}{3}$ if $b = 6$.

$\frac{7b}{3}$	$= \frac{(7)(6)}{3}$	Replace b with 6.
	$= \frac{42}{3}$	Multiply 6 by 7.
	$= 14$	Divide.

Example 4: Evaluate $x^3 + 4$ if $x = 3$.

$x^3 + 4$	$= 3^3 + 4$	Replace x with 3.
	$= 27 + 4$	Use order of operations.
	$= 31$	Add 27 and 4.

Evaluate the following expressions using the given values for a, b, and c. Show each step!

1.) Evaluate $6 + 3b$ if $b = 7$

2.) Evaluate $6a^2$ if $a = 4$

3.) Evaluate $5(6) - c$ if $c = 7$

4.) Evaluate $\frac{b^4}{4}$ if $b = 2$

5.) Evaluate $\frac{7.5m}{5}$ if $m = 2$

6.) Evaluate $\frac{(n)^2}{3}$ if $n = 9$

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Evaluate numeric expressions using order of operations with no more than 4 operations.

Use the order of operations to evaluate numerical expressions.
1. Do all operations within grouping symbols first.
2. Evaluate all powers before other operations.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

Example 1: Evaluate $14 + 3(7 – 2) – 2 \bullet 5$

$14 + 3(7 – 2) – 2 \bullet 5$
$= 14 + 3(5) – 2 \bullet 5$ **Subtract first since 7 – 2 is in parentheses**
$= 14 + 15 – 2 \bullet 5$ **Multiply left to right, 3 • 5 = 15**
$= 14 + 15 – 10$ **Multiply left to right, 2 • 5 = 10**
$= 29 – 10$ **Add left to right, 14 + 15 = 29**
$= 19$ **Subtract 10 from 29**

Example 2: $8 + (1 + 5)^2 \div 4$

$8 + (1 + 5)^2 \div 4$
$= 8 + (6)^2 \div 4$ **Add first since 1 + 5 is in parentheses**
$= 8 + 36 \div 4$ **Find the value of 6^2**
$= 8 + 9$ **Divide 36 by 4**
$= 17$ **Add 8 and 9**

Evaluate each of the following. Show each step!

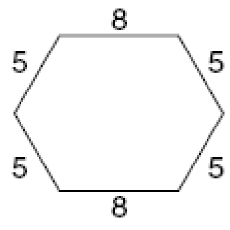
1.) $(2 + 10)^2 \div 4$

2.) $(6 + 5) \bullet (8 – 6)$

3.) $72 \div 3 – 5(2.8) + 9$

4.) $3 \bullet 14(10 – 8) – 60$

5.) The perimeter of a hexagon is found by adding the lengths of all six sides of the hexagon. For the hexagon below write a numerical expression to find the perimeter. Then evaluate the expression.



6.) Without parentheses, the expression $8 + 30 \div 2 + 4$ equals 27. Place parentheses in the expression so that it equals 13; then 23.

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Write **equations** and inequalities - **A**
Examples:

The table below shows sentences written as an equation.

Sentences	Equation
Sixty less than three times the amount is $59. Three times the amount less 60 is equal to 59. 59 is equal to 60 subtracted from three times a number. A number times three minus 60 equals 59.	$3n - 60 = 59$

Write an equation for each of the following:

1.) 4 less than 3 times a number is 14.

2.) There are 5 people in Johnny's rock band. They made x dollars playing at a dance hall. After dividing the money 5 ways, each person got $67.

3.) The Washington Monument is 555 feet tall. It is 75 feet shorter than the Gateway to the West Arch.

4.) The lifespan of a zebra is 15 years. The lifespan of a black bear is 3 years longer than the lifespan of a zebra. Write an addition equation that you could use to find the lifespan of a bear.

5.) A gardening expert recommends that flower bulbs be planted to a depth of three times their height. Suppose Jenna determines that a certain bulb should be planted at a depth of 4.5 inches. Write an equation to find the height of the bulb.

6.) The electric company charges $0.06 per kilowatt hour of electricity used. Write a multiplication equation to find the number of kilowatt hours of electricity for which the Estevez family was charged if their electric bill was $45.84.

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Write equations and **inequalities - B**

An **inequality** is a mathematical sentence that contains the symbols $\langle$, $\rangle$, $\leq$, or $\geq$.

Words	Symbols
m is greater than 7.	$m > 7$
r is less than −4.	$r < -4$
t is greater than or equal to 6.	$t \geq 6$
y is less than or equal to 1.	$y \leq 1$

Examples:

1) Two times a number is greater than 10 **$2x \rangle 10$**
2) Three less than a number is less than or equal to 7. **$x - 3 = 7$**
3) The sum of a number and 1 is at least 5. **$x + 1 \geq 5$**
4) Cody has $50 to spend. How many shirts can he buy at $16.50 each? **$16.50x \leq 50$**

Write an inequality for each of the following:

1.) Five times a number is greater than 25.	**2.)** The sum of a number and 6 is at least 15.
3.) 24 divided by some number is less than 7.	**4.)** Five dollars less than two times Chris' pay is at most $124.
5.) In Ohio, you can get your license when you turn 16. Write an inequality to show the age of all drivers in Ohio.	**6.)** Suppose a DVD costs $19 and a CD costs $14. Write an inequality to find how many CDs you can buy along with one DVD if you have $65 to spend.

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Determine the unknown in a linear equation with 1 or 2 operations

Remember, equations must always remain balanced.
- If you add or subtract the same number from each side of an equation, the two sides remain equal.
- If you multiply or divide the same number from each side of an equation, the two sides remain equal.

Example 1: Solve x + 5 = 11

x + 5 = 11	Write the equation	**Check**	**x + 5 = 11**	Write the equation
- 5 = - 5	Subtract 5 from both sides		**6 + 5 = 11**	Replace x with 6
x = 6	Simplify		**11 = 11**✓	The sentence is true

Example 2: Solve - 21 = - 3y

- 21 = - 3y	Write the equation	**Check**	**- 21 = - 3y**	Write the equation
- 3 = - 3	Divide each side by – 3		**- 21 = - 3(7)**	Replace the y with 7
7 = y	Simplify		**-21 = - 21?**	Multiply – is the sentence true?

Example 3: Solve 3x + 2 = 23

3x + 2 = 23	Write the equation	**Check**	**3x + 2 = 23**	Write the equation
- 2 = - 2	Subtract 2 from each side		**3(7) + 2 = 23?**	Replace x with 7
3x = 21	Simplify		**21 + 2 = 23?**	Multiply
$\frac{3x}{3} = \frac{21}{3}$	Divide each side by 3		**23 = 23?**	Add – is the sentence true?
x = 7	Simplify			

1.) Solve **x – 9 = -12**

2.) Solve **48 = - 6r**

3.) Solve **2t + 7 = -1**

4.) Solve **4t + 3.5 = 12.5**

5.) It costs $12 to attend a golf clinic with a local pro. Buckets of balls for practice during the clinic cost $3 each. How many buckets can you buy at the clinic if you have $30 to spend?

6.) An online retailer charges $6.99 plus $0.55 per pound to ship electronics purchases. How many pounds is a DVD player for which the shipping charge is $11.94?

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Solve for the unknown in an inequality with one variable.

An **inequality** is a mathematical sentence that contains the symbols 〈 , 〉, ≤, or ≥.

Words	Symbols
m is greater than 7.	$m > 7$
r is less than −4.	$r < -4$
t is greater than or equal to 6.	$t \geq 6$
y is less than or equal to 1.	$y \leq 1$

Example 1: Solve **v + 3** < **5**

v + 3 < **5** Write the inequality
- 3 - 3 Subtract 3 from each side
v < **2** Simplify

Check: Try 1, a number less than 2
v + 3 < **5** Write the inequality
1 + 3 < **5** Replace **v** with **1**
4 < **5?** Is this sentence true? **yes**

Example 2: Solve **2x + 8** < **24**

2x + 8 < **24** Write the inequality
- 8 - 8 Subtract 8 from each side
$\frac{2x}{2} < \frac{16}{2}$ Simplify, Divide each side by 2
x < **8** Simplify

Check: Try 7, a number less than 8
2x + 8 < **24** Write the inequality
2(7) + 8 < **24** Replace **x** with **7**
14 + 8 < **24** Multiply 7 by 2
22 < **24?** Is the sentence true? **yes**

1.) Solve **y + 5** ≤ **14**

2.) Solve **6u** ≥ **36**

3.) Solve **5y + 1** < **36**

4.) Solve **4x – 6** > **-10**

5.) The speed limit on highways in Florida is 70 miles per hour. Write and solve an inequality to find how long it will take you to travel the 105 miles from Orlando to St. Augustine if you travel at or below the speed limit.

6.) You have $80. Jeans cost $29 and shirts cost $12. Mom told you to buy one pair of jeans and use the rest of the money to buy shirts. Use this information to write and solve an inequality. How many shirts you can buy?

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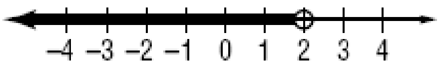
Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Identify or graph solutions of inequalities on a number line.

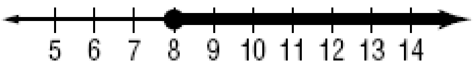
Examples: Graph each inequality on a number line.

x < 2



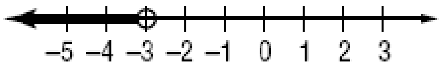
The open circle means that the number is **not** included in the solution.

y $\geq$ 8



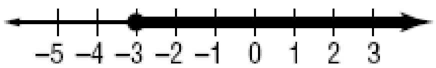
The closed circle means that the number **is** included in the solution.

m < - 3

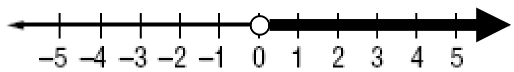


The solution is all numbers less than negative three.
-3 is **not** included in the solution.

1.) Write an inequality for the graph.

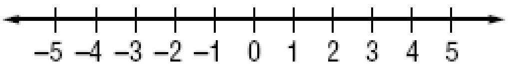


2.) Write an inequality for the graph.



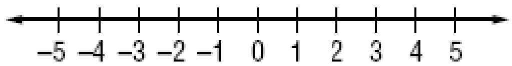
3.) Graph the inequality.

b $\geq$ - 1



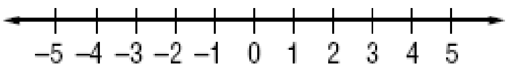
4.) Graph the inequality.

z < 3



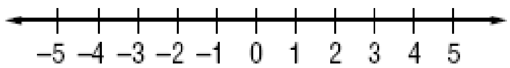
5.) Solve the inequality, then graph it on the number line.

y + 9 $\leq$ 13



6.) Solve the inequality, then graph it on the number line.

4x – 6 > -10



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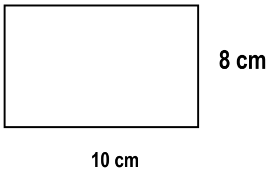
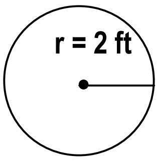
Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Apply given formulas to a problem-solving situation using formulas having no more than three variables.

Example 1:
The perimeter of a rectangle is twice the length (L) plus twice the width (W). **P = 2L + 2W**
Use the given formula to find the perimeter of the rectangle.



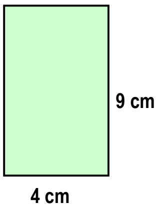
P = 2L + 2W	Write the equation
P = 2(10) + 2(8)	Replace L and W with the length and width
P = 20 + 16	Multiply
P = 36 cm	Simplify and add the correct label

Example 2:
The area *A* of a circle equals the product of pi **(π)** and the square of its radius **(r)**. **$A = \pi r^2$** **($\pi \approx 3.14$)**
Use the given formula to find the area of the circle.

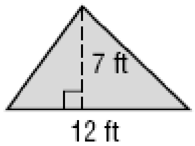


$A = \pi r^2$	Write the equation
$A = 3.14 \bullet (2)^2$	Replace **π** with 3.14 and **r** with 2
$A = 3.14 \bullet 4$	Square the 2
$A = 12.56$ ft^2	Simplify and add the correct label

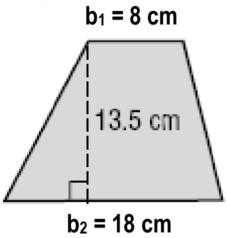
1.) The formula for finding the area of a rectangle is **$A = L \bullet W$**. Use this formula to find the area of the rectangle.



2.) The formula for finding the area of a triangle is **$A = \frac{1}{2}bh$**. Find the area of the triangle below.

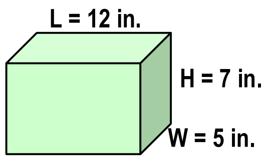


3.) A trapezoid has two bases (b_1 and b_2). The formula for finding the area of a trapezoid is: $A = \frac{1}{2}h(b_1 + b_2)$



Find the area of the trapezoid.

4.) The formula for finding the volume of a rectangular prism is **$V = L \bullet W \bullet H$**. Find the volume of the box.



5.) Margot planted a rectangular garden that was 18 feet long and 10 feet wide. How many feet of fencing will she need to go all the way around the garden? **P = 2L + 2W**

6.) Juan ran all the way around a circular track one time. The diameter (d) of the track is 60 meters. The formula for circumference of a circle is **$C = \pi d$**. Use this formula to find out how far Juan ran.

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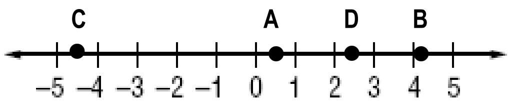
Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Graph rational numbers on a number line.

Rational Numbers are numbers that can be written as fractions.
Some examples of rational numbers are ½ , 5 ¾ , 0.8, and -1.4444…

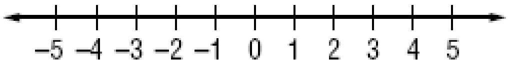
Example: Graph and label the following numbers on the number line:

A: $\frac{1}{2}$ **B:** $4\frac{1}{4}$ **C:** - 4.5 **D:** 2.5



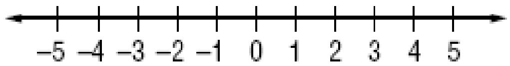
1.) Graph and label the following numbers on the number line.

A: –5 **B:** –1 **C:** 2 **D:** 5



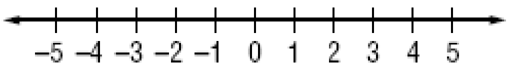
2.) Graph and label the following numbers on the number line.

A: 0 **B:** $-1\frac{1}{2}$ **C:** $\frac{5}{2}$ **D:** 4



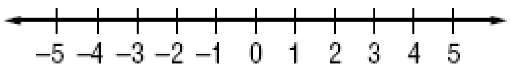
3.) Graph and label the following numbers on the number line.

A: 1.5 **B:** –0.5 **C:** –3.5 **D:** 3.5



4.) Graph and label the following numbers on the number line.

A: $-\frac{9}{3}$ **B:** $-\frac{3}{2}$ **C:** $\frac{9}{4}$ **D:** $\frac{12}{3}$



5.) Jonah recorded the temperature for 5 days on a chart. Draw a number line and graph the temperatures. Where do the numbers on the line need to begin and end? Label the points 1 to 5.

Day 1	Day 2	Day 3	Day 4	Day 5
45°	50°	53°	57°	60°

6.) Graphing numbers on a number line can help you put them in order from smallest to greatest. Draw a number line and graph the numbers in the chart below. Label the points. Which number is the smallest?

V	W	X	Y	Z
20	–10	–15	5	10

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Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Graph ordered pairs in a coordinate plane.

The **coordinate plane** is used to locate points. The horizontal number line is the ***x*-axis**. The vertical number line is the ***y*-axis**. Their intersection is the **origin**.
Points are located using **ordered pairs.** The first number in an ordered pair is the ***x*-coordinate**; the second number is the ***y*-coordinate**.
The coordinate plane is separated into four sections called **quadrants**.

Example 1: Name the ordered pair for point P. Then identify the quadrant in which P lies.

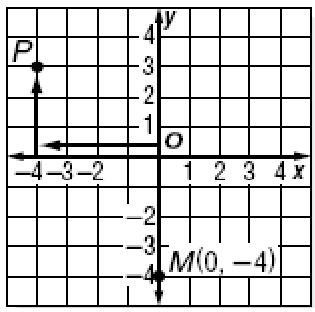
- Start at the origin.
- Move 4 units left along the *x*-axis.
- Move 3 units up on the *y*-axis.

The ordered pair for point P is (- 4, 3).
P is in the upper left quadrant or quadrant II.

Example 2: Graph and label the point M (0, - 4).

- Start at the origin.
- Move 0 units along the x-axis.
- Move 4 units down on the y-axis.
- Draw a dot and label it M(0, - 4).

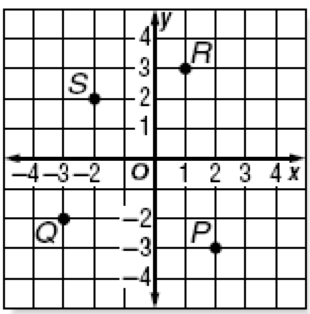
Quadrant 2 Quadrant 1



Quadrant 3 Quadrant 4

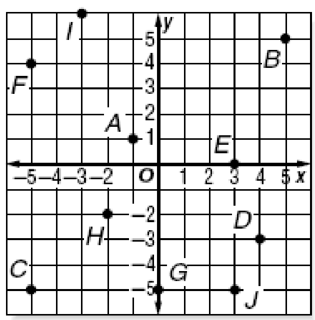
1.) Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.

	Coordinates	Quadrant
P	**(___, ___)**	____
Q	**(___, ___)**	____
R	**(___, ___)**	____
S	**(___, ___)**	____



2.) Find each of the points below on the coordinate plane. Then identify the quadrant in which each point lies.

	Coordinates	Quadrant
A	**(___, ___)**	____
J	**(___, ___)**	____
B	**(___, ___)**	____
H	**(___, ___)**	____



3.) Graph and label each point on the coordinate plane.

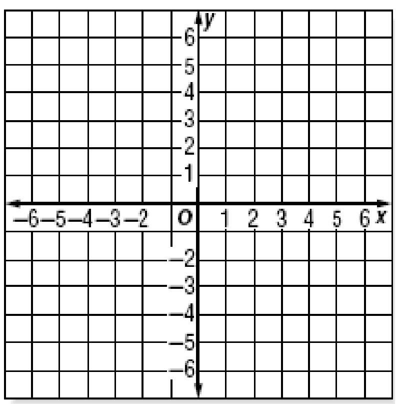
N (3, -1)

P (-2, 4)

Q (-3, -4)

R (0, 0)

S (-5, 0)



4.) Graph and label each point on the coordinate plane.

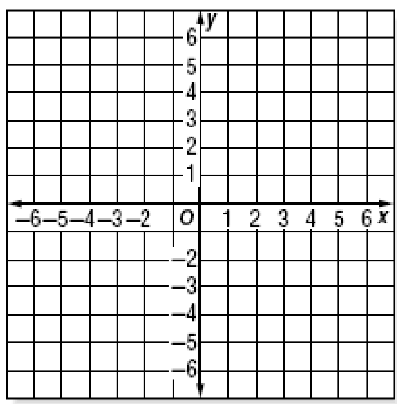
D (0, 4)

E (5, 5)

G (-3, 0)

H (-6, -2)

J (0, -2)



Unit: Knowledge of Algebra, Patterns, and Functions
Objective: Identify and describe the change represented in a table of values; identify increase, decrease, or no change.

Example: Look at the table below. How are Wages (y) affected by the number of Hours Worked (x)?
Identify the change as **increasing, decreasing**, or **no change.** Describe the changes in y-values.

Hours Worked (x)	Wages (y)
2	$14
4	$28
6	$42
8	$56

As the Hours Worked (x) increase, the wages (y) increase.
Wages increase by $14 dollars for every 2 hours worked (or $7 for every hour worked).

Identify the change in each table of values as **increasing, decreasing**, or **no change**. Describe the changes in y-values.

1.)

Homework Minutes (x)	Test Grades (y)
25	61
35	74
45	87
55	100

2.)

Time Hours (x)	Distance Miles (y)
1	50
2	100
3	150
4	200

3.)

Temperature (x)	Dewpoint (y)
68°	1.9°
76°	1.3°
91°	0.7°
104°	0.1°

4.)

Cell Phone Plan Minutes (x)	Cost (y)
625	$59.99
723	$59.99
829	$59.99
899	$59.99

5.)

Month (x)	Fee ($) (y)
1	22
2	44
3	66
4	88

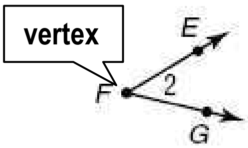
6.)

Oil changes per year (x)	Cost of Car Repairs $ (y)
0	1000
1	700
2	400
3	100

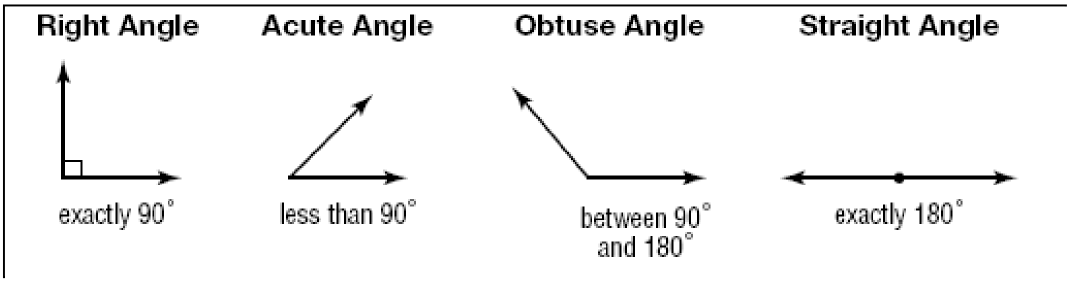
– Summer Math Packet

Unit: Knowledge of Geometry
Objective: Identify and describe angles formed by intersecting lines, rays, or line segments **- A**

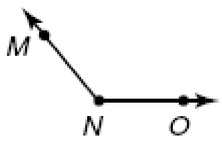
An **angle** is formed by two rays with a common vertex.
Angles are also formed by intersecting lines or line segments.
Angles are measured in **degrees**.
Angles are classified according to their measures.



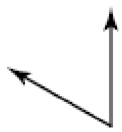
$\angle$**2** (also called $\angle$**EFG**) is formed by rays $\overrightarrow{\mathbf{FE}}$ and $\overrightarrow{\mathbf{FG}}$



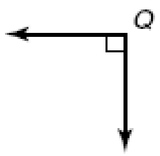
1.) Classify the angle as **acute, obtuse, right**, or **straight.**



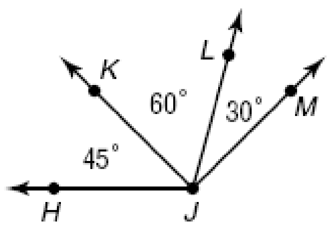
2.) Classify the angle as **acute, obtuse, right**, or **straight.**



3.) Classify the angle as **acute, obtuse, right**, or **straight.**

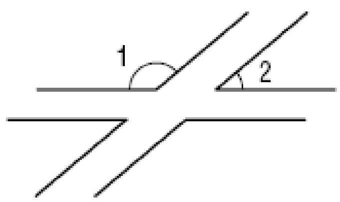


4.) Name all of the acute angles.



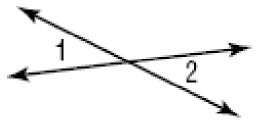
5.) The time shown on the clock is 11:05. Starting at this time, approximately what time will it be when the hands form an obtuse angle?

6.) The runways at a local airport are sketched in the figure. Classify $\angle 1$ and $\angle 2$ as acute, obtuse, right, or straight.

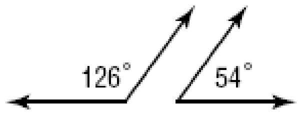


– Summer Math Packet

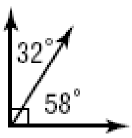
Unit: Knowledge of Geometry
Objective: Identify and describe angles formed by intersecting lines, rays, or line segments - **B**
Examples:



When two lines intersect, they form two pairs of opposite angles called **vertical angles**, which are always congruent.
Congruent angles have the same measure.
$\angle \mathbf{1} \cong \angle \mathbf{2}$ means that angle 1 is congruent to angle 2.

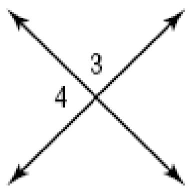


Two angle are **supplementary** if the sum of their measures is 180°.
126° + 54° = 180°

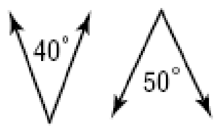


Two angles are **complementary** if the sum of their measures is 90°.
32° + 58° = 90°

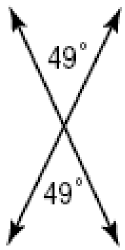
1.) Classify the angles as **complementary, supplementary,** or **neither.**



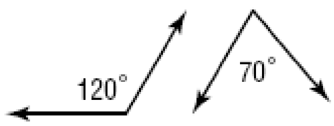
2.) Classify the angles as **complementary, supplementary,** or **neither.**



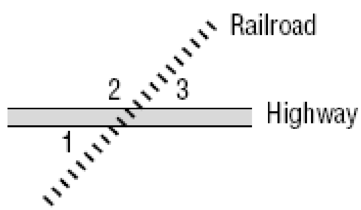
3.) Classify the angles as **complementary, supplementary,** or **neither.**



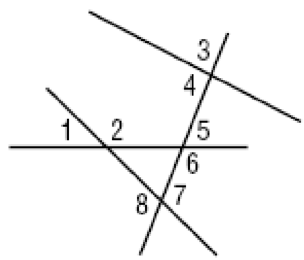
4.) Classify the angles as **complementary, supplementary,** or **neither.**



5.) A map shows a railroad crossing a highway, as shown below. Which of the numbered angles are vertical angles?



6.) In a game of pick-up-sticks, the last 4 sticks are shown below. Which of the numbered angles are vertical angles?

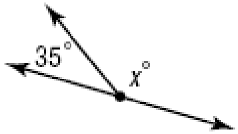


– Summer Math Packet

Unit: Knowledge of Geometry
Objective: Determine the measure of angles formed by intersecting lines, line segments, and rays.

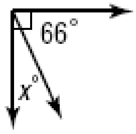
Example 1: Find the value of **x** in the figure.
The two angles are supplementary, so the sum of their measures is 180°.

$x + 35 = 180$	**Write the equation**
$-35 \quad -35$	**Subtract 35 from both sides**
$x = 145$	**Simplify**
	The angle is 145°

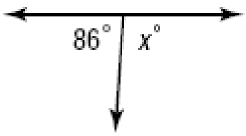


Example 2: Find the value of **x** in the figure.
The two angles are complementary, so the sum of their measures is 90°.

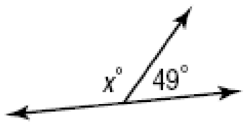
$x + 66 = 90$	**Write the equation**
$-66 \quad -66$	**Subtract 66 from both sides**
$x = 24$	**Simplify**
	The angle is 24°



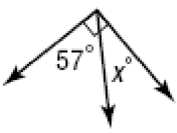
1.) Find the value of **x.**



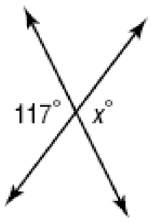
2.) Find the value of **x.**



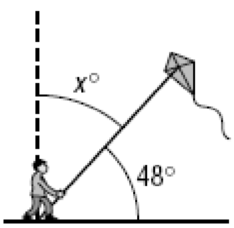
3.) Find the value of **x.**



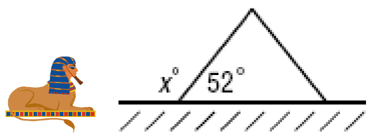
4.) Find the value of **x.**



5.) A kite string makes an angle of 48° with respect to the ground as shown below. The dashed line is vertical and the ground is horizontal. How are the 48° angle and the unknown angle related? What is the value of x ?



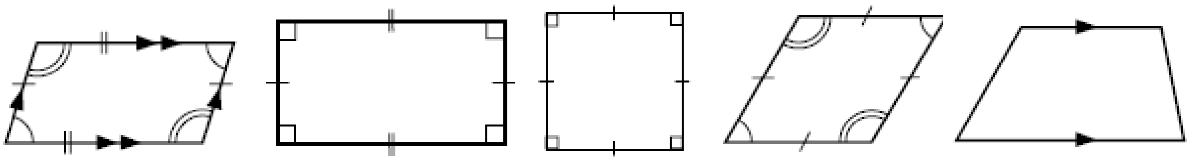
6.) A side view of the Great Pyramid at Giza is shown below. The sides of the pyramid make an angle of 52° with respect to the ground. What is the value of x?



– Summer Math Packet

Unit: Knowledge of Geometry
Objective: Determine a missing angle using the sum of the interior angles in a quadrilateral

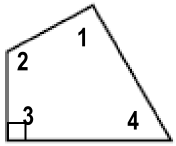
Examples of Quadrilaterals:



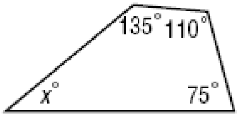
Parallelogram **Rectangle** **Square** **Rhombus** **Trapezoid**

The sum of the measures of the angles of a quadrilateral is 360°.

$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$



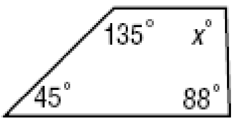
Example: Find the missing measure in the quadrilateral.



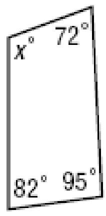
$135 + 110 + 75 + x = 360$	**The sum of the measures is 360°**
$320 + x = 360$	**Simplify**
$-320 \quad -320$	**Subtract 320 from each side**
$x = 40$	**The missing angle is 40°**

Find the missing measure in each of the following quadrilaterals.

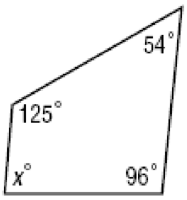
1.)



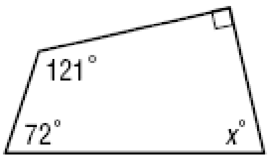
2.)



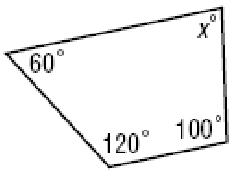
3.)



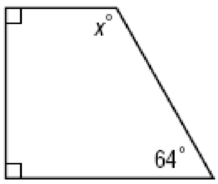
4.)



5.) The top of Mrs. Hartsock's coffee table is shown below. Find the measure of the missing angle.



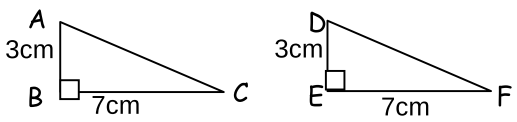
6.) Maria needs to cut a piece of carpet to fit the space drawn below. What should the measure of the missing angle be?



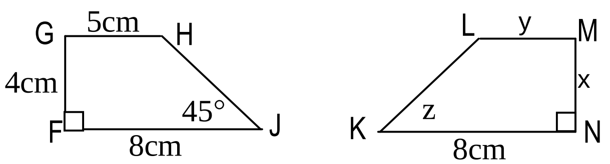
– Summer Math Packet

Unit: Knowledge of Geometry
Objective: Determine the congruent parts of polygons.

Congruent Polygons | **Non Congruent Polygons**

Congruent Polygons	Polygons that have exactly the same size and the same shape
Congruent Segments	Segments that have the same length
Congruent Angles	Angles that have the same measure
Corresponding Sides of a Polygon	Sides of a polygon that are matched up with sides of another congruent or similar polygon
Corresponding Angles of a Polygon	Angles of a polygon that match up with angles of another congruent or similar polygon
$\Delta ABC \cong \Delta DEF$ 	Corresponding sides and angles of congruent polygons are congruent: $\overline{AB} \cong \overline{DE}$ $\angle A \cong \angle D$ $\overline{BC} \cong \overline{EF}$ $\angle B \cong \angle E$ $\overline{AC} \cong \overline{DF}$ $\angle C \cong \angle F$

1.)



Polygon FGHJ ≅ polygon NMLK
Complete the following congruence statements.

$\overline{GH} \cong$ ______ $\overline{KL} \cong$ ______ $\overline{IJ} \cong$ ______

2.) Use the figures in problem #1 to complete the following congruence statements.

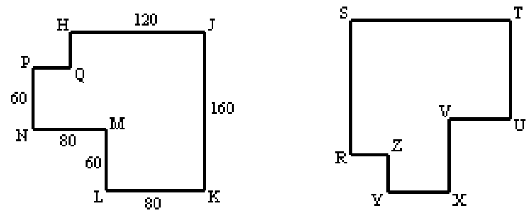
$\angle G \cong$ ______ $\angle K \cong$ ______

$\angle H \cong$ ______ $\angle F \cong$ ______

3.) Look at the figures in problem #1. Determine the measure of each segment or angle.

x = _______ y = _______ z = _______

4.) Polygon HJKLMNPQ is congruent to polygon RSTUVXYZ. What is the length, in units, of $\overline{RZ}$? (Note: Figures are not drawn to scale.)



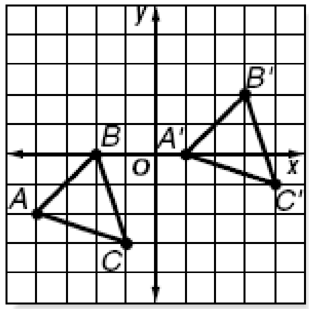
Unit: Knowledge of Geometry
Objective: Identify the result of one **translation**, reflection, or rotation **– A**

A **translation** is the movement of a geometric figure in some direction without turning the figure. When translating a figure, every point of the original figure is moved the same distance and in the same direction. To graph a translation of a figure, move each vertex of the figure in the given direction. Then connect the new vertices.

Example: Triangle **ABC** has vertices **A**(- 4, - 2), **B**(- 2, 0), and **C**(- 1, - 3). Find the vertices of triangle **A'B'C'** after a translation of 5 units right and 2 units up.

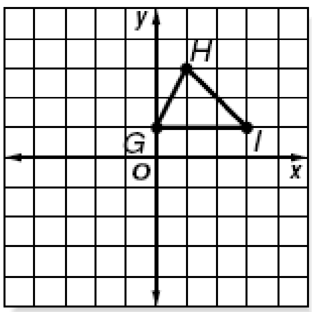
Add 5 to each x-coordinate   Add 2 to each y-coordinate

Vertices of $\triangle ABC$	$(x+5, y+2)$	Vertices of $\triangle A'B'C'$
$A(-4,-2)$	$(-4+5, -2+2)$	$A'(1,0)$
$B(-2,0)$	$(-2+5, 0+2)$	$B'(3,2)$
$C(-1,-3)$	$(-1+5, -3+2)$	$C'(4,-1)$

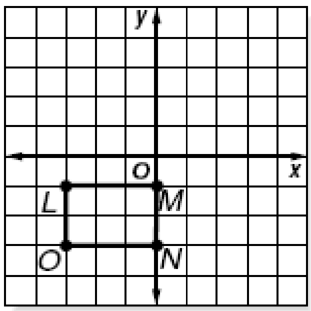


The coordinates of the vertices of $\triangle$ A'B'C' are A'(1, 0), B'(3, 2), and C'(4, - 1).

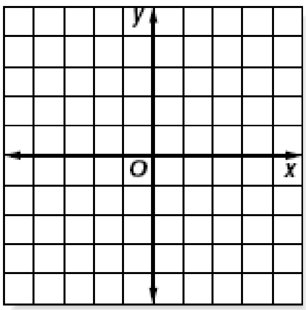
1.) Translate **ΔGHI** 1 unit left and 5 units down.



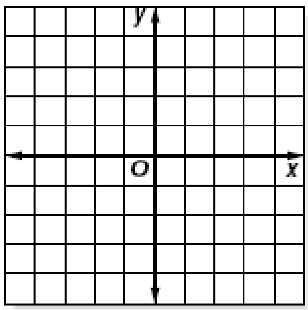
2.) Translate rectangle **LMNO** 3 units up and 4 units right.



3.) **ΔXYZ** has vertices **X**(- 4, 5), **Y**(- 1, 3), and **Z**(- 2, 0). Find the vertices of **ΔX'Y'Z** after a translation of 4 units right and 3 units down. Then graph the figure and its translated image.



4.) Parallelogram **RSTU** has vertices **R**(- 1, - 3), **S**(0, - 1), **T**(4, -1), and **U**(3, - 3). Find the vertices of **R'S'T'U'** after a translation of 3 units left and 3 units up. Then graph the figure and its translated image.



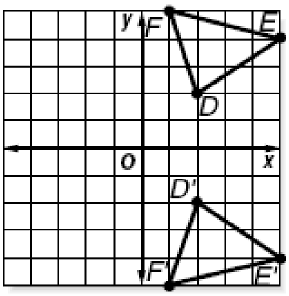
Unit: Knowledge of Geometry
Objective: Identify the result of one translation, **reflection**, or rotation **– B**

A type of transformation where a figure is flipped over a line of symmetry is a **reflection.** To draw the reflection of a polygon, find the distance from each vertex of the polygon to the line of symmetry. Plot the new vertices the same distance from the line of symmetry but on the other side of the line. Then connect the new vertices to complete the reflected image.

- **To reflect a point over the x-axis, use the same x-coordinate and multiply the y-coordinate by -1.**
- **To reflect a point over the y-axis, use the same y-coordinate and multiply the x-coordinate by -1.**

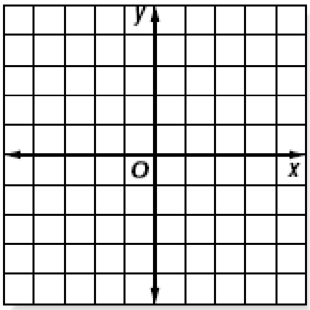
Example: Triangle **DEF** has vertices **D**(2, 2), **E**(5, 4), and **F**(1, 5). Find the coordinates of the vertices of **DEF** after a reflection over the x-axis. Then graph the figure and its reflected image.

Vertices of ΔDEF	Distance from x-axis	Vertices of $\Delta D'E'F'$
$D(2, 2)$	2	$D'(2, -2)$
$E(5, 4)$	4	$E'(5, -4)$
$F(1, 5)$	5	$F'(1, -5)$

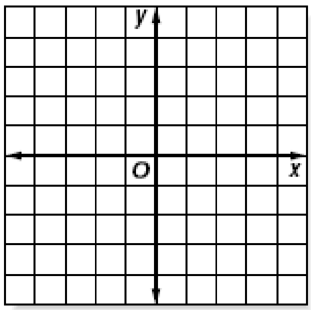


Plot the vertices and connect them to form **ΔDEF**. The x-axis is the line of symmetry. The distance from a point on **ΔDEF** to the line of symmetry is the same as the distance from the line of symmetry to the reflected image.

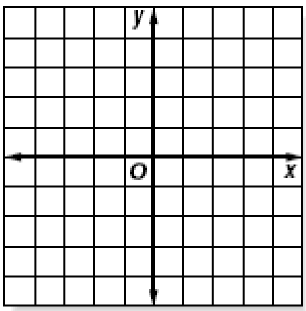
1.) **ΔABC** has vertices **A**(0, 4), **B**(2, 1), and **C**(4, 3). Find the coordinates of the vertices of **ABC** after a reflection over the **x**-axis. Then graph the figure and its reflected image.



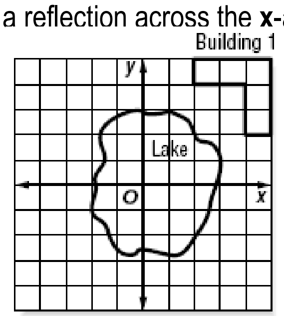
2.) Rectangle **MNOP** has vertices **M**(- 2, - 4), **N**(- 2, - 1), **O**(3, - 1), and **P**(3, - 4). Find the coordinates of the vertices of **MNOP** after a reflection over the **x**-axis. Then graph the figure and its reflected image.



3.) Trapezoid **WXYZ** has vertices **W**(-1, 3), **X**(-1, -4), **Y**(-5, -4), and **Z**(-3, 3).). Find the coordinates of the vertices of **WXYZ** after a reflection over the **y**-axis. Then graph the figure and its reflected image.



4.) A corporate plaza is to be built around a small lake. Building 1 has already been built. Suppose there are axes through the lake as shown. Show where Building 2 should be built if it will be a reflection of Building 1 across the **y**-axis followed by a reflection across the **x**-axis.



Unit: Knowledge of Geometry

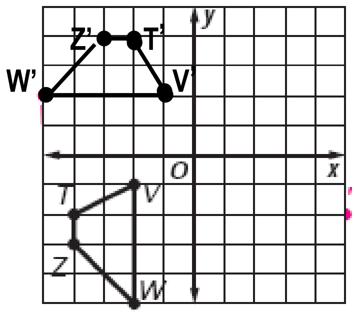
Objective: Identify the result of one translation, reflection, or **rotation – C**

A type of transformation where a figure is turned around a fixed point is called a **rotation**. The figure can be rotated 90° clockwise, 90° counterclockwise, or 180° about the origin.

- **To rotate a figure 90° clockwise, switch the coordinates of each point and multiply the new second coordinate by -1.**
- **To rotate a figure 90° counterclockwise, switch the coordinates of each point and multiply the new first coordinate by -1.**
- **To rotate a figure 180°, multiply both coordinates of each point by -1.**

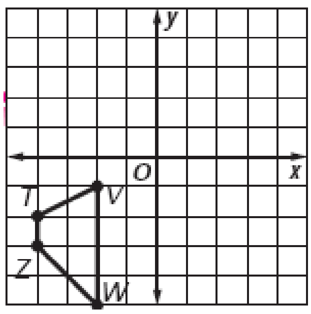
Example: Graph the image of the figure after a rotation of 90° clockwise.

T (- 4, - 2) → **T'**(- 2, 4)
V(- 2, - 1) → **V'**(- 1, 2)
W(- 2, - 5) → **W'**(- 5, 2)
Z(- 4, - 3) → **Z'**(- 3, 4)



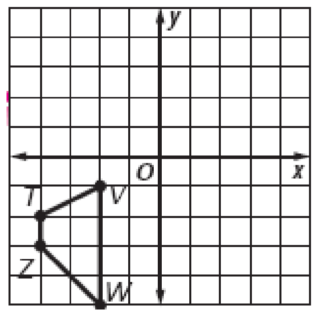
1.) Graph the image of the figure after a rotation of 90° counterclockwise.

T(- 4, - 2) **T'(___, ___)**
V(- 2, - 1) **V'(___, ___)**
W(- 2, - 5) **W'(___, ___)**
Z(- 4, - 3) **Z'(___, ___)**



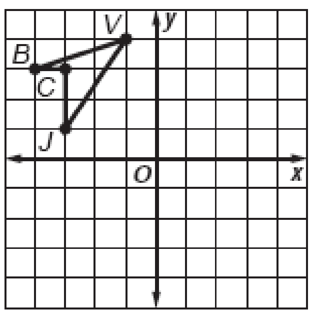
2.) Graph the image of the figure after a rotation of 180°.

T(- 4, - 2) **T'(___, ___)**
V(- 2, - 1) **V'(___, ___)**
W(- 2, - 5) **W'(___, ___)**
Z(- 4, - 3) **Z'(___, ___)**



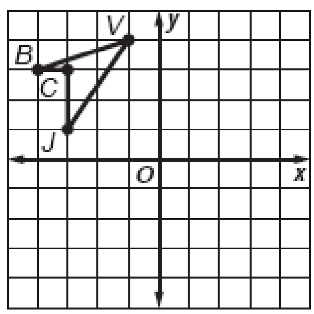
3.) Graph the image of the figure after a rotation of 90° clockwise.

B(___,___) **B'(___, ___)**
C(___,___) **C'(___, ___)**
J(___,___) **J'(___, ___)**
V(___,___) **V'(___, ___)**



4.) Graph the image of the figure after a rotation of 180°.

B(___,___) **B'(___, ___)**
C(___,___) **C'(___, ___)**
J(___,___) **J'(___, ___)**
V(___,___) **V'(___, ___)**

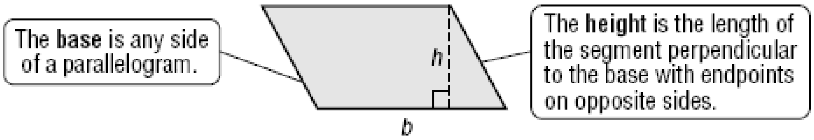


– Summer Math Packet

Unit: Knowledge of Measurement
Objective: Estimate and determine the area of quadrilaterals using **parallelograms** or trapezoids **– A**.

The area **A** of a parallelogram equals the product of its base **b** and its height **h**. Because rectangles, rhombuses, and squares are all parallelograms, the formula for finding the area of a parallelogram is also used to find the areas of each of these figures.

A = bh

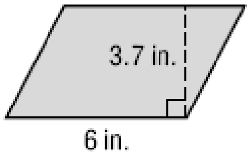


Example: Find the area of a parallelogram if the base is 6 inches and the height is 3.7 inches.

Estimate: A = 6 • 4 or 24 in^2

Calculate:

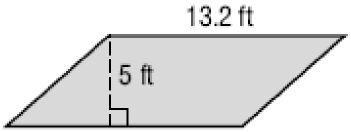
A =bh	Area of a parallelogram
A = 6 • 3.7	Replace **b** with 6 and **h** with 3.7
A = 22.2	Multiply



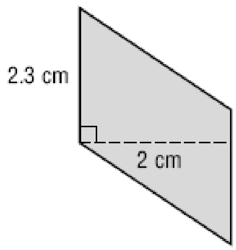
Check: The area of the parallelogram is 22.2 square inches. This is close to the estimate.

Find the area of each parallelogram. Round to the nearest tenth if necessary.

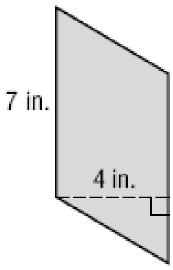
1.)



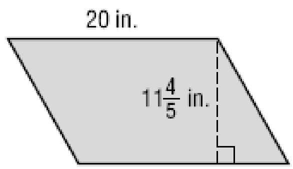
2.)



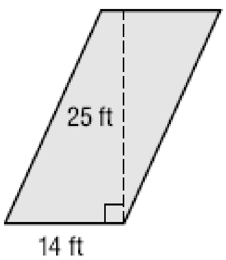
3.)



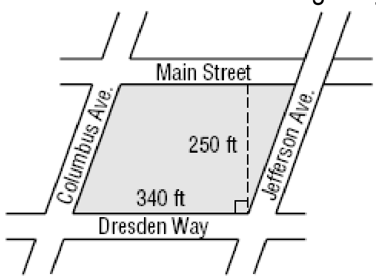
4.)



5.) Joyce wants to construct a sail with the dimensions shown. How much material will be used?



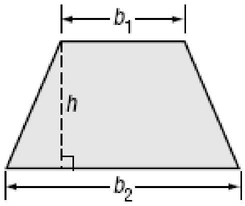
6.) Two parallel streets are cut across by two other parallel streets as shown in the figure. What is the area of the grassy area in the middle?



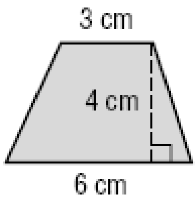
Unit: Knowledge of Measurement
Objective: Estimate and determine the area of quadrilaterals using parallelograms or **trapezoids – B**.

A trapezoid has two bases, $\mathbf{b_1}$ and $\mathbf{b_2}$. The height of a trapezoid is the distance between the two bases. The area **A** of a trapezoid equals half the product of the height **h** and the sum of the bases $\mathbf{b_1}$ and $\mathbf{b_2}$.

$$A = \frac{1}{2} h(b_1 + b_2)$$



Example: Find the area of the trapezoid.

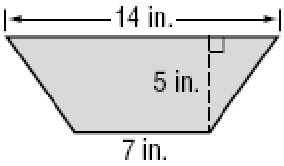


$\mathbf{A = 1/2\ h\ (b_1 + b_2)}$	Area of a trapezoid
$\mathbf{A = 1/2\ (4)\ (3 + 6)}$	Replace **h** with 4, $\mathbf{b_1}$ with 3, and $\mathbf{b_2}$ with 6.
$\mathbf{A = 18}$	

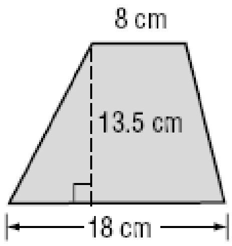
The area of the trapezoid is 18 square centimeters.

Find the area of each trapezoid. Round to the nearest tenth if necessary.

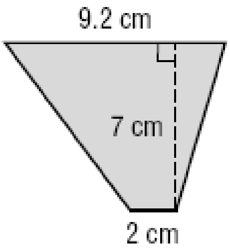
1.)



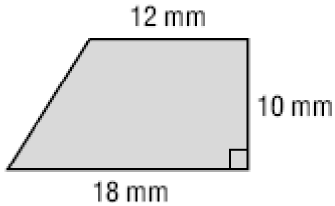
2.)



3.)

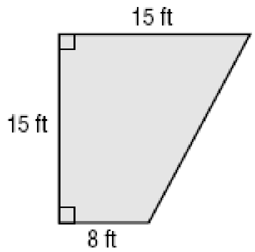


4.)



5.) Arkansas has a shape that is similar to a trapezoid with bases of about 182 miles and 267 miles and a height of about 254 miles. Estimate the area of the state.

6.) Greta is making a patio with the dimensions given in the figure. What is the area of the patio?

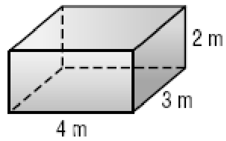


– Summer Math Packet

Unit: Knowledge of Measurement
Objective: Determine the surface area of geometric solids using rectangular prisms.

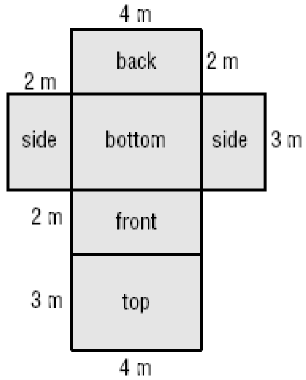
> The sum of the areas of all the surfaces, or faces, of a three-dimensional figure is the **surface area**. The surface area **S** of a rectangular prism with length ***l***, width ***w***, and height ***h*** is found using the following formula:
> **S = 2*lw* + 2*lh* + *2wh***

Example: Find the surface area of the rectangular prism.



You can use the net of the rectangular prism to find its surface area.
There are 3 pairs of congruent faces on a rectangular prism:

- top and bottom
- front and back
- two sides

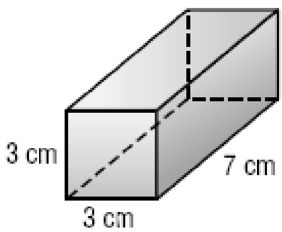


> **Faces Area**
> top and bottom (4 • 3) + (4 • 3) = 24
> front and back (4 • 2) _ (4 • 2) =16
> two sides (2 • 3) + (2 • 3) = 12
> Sum of the areas 24 + 16 + 12 = 52

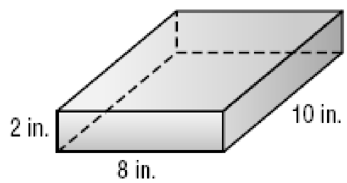
Alternatively, replace ***l*** with 4, ***w*** with 3, and ***h*** with 2 in the formula for surface area.
S* = 2*lw* + 2*lh* + 2*wh
S = 2 • 4 • 3 + 2 • 4 • 2 + 2 • 3 • 2 Follow order of operations.
S = 24 + 16 + 12
S = 52 So, the surface area of the rectangular prism is **52 square meters.**

Find the surface area of the rectangular prisms below. Round to the nearest tenth, if necessary.

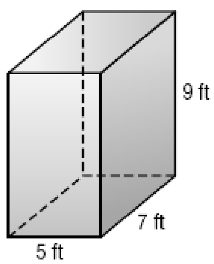
1.)



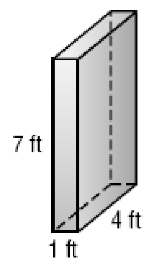
2.)



3.)

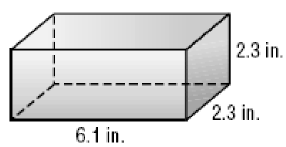


4.)



5.) A packaging company needs to know how much cardboard will be required to make boxes 18 inches long, 12 inches wide, and 10 inches high. How much cardboard will be needed for each box if there is no overlap in the construction?

6.) Oscar is making a play block for his baby sister by gluing fabric over the entire surface of a foam block. How much fabric will Oscar need?



– Summer Math Packet

Unit: Knowledge of Measurement
Objective: Determine the missing dimensions for a polygon.

A **scale drawing** represents something that is too large or too small to be drawn at actual size. Similarly, a **scale model** can be used to represent something that is too large or too small for an actual-size model. The **scale** gives the relationship between the drawing/model measure and the actual measure.

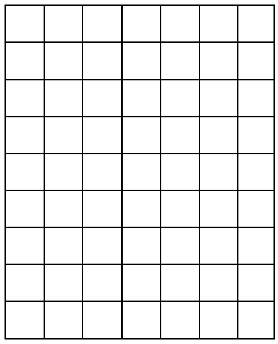
Example: On this drawing of a swimming pool, each square has a side length of ¼ inch. What is the actual width of the pool?

	Scale		**Width of Pool**	
drawing →	¼ inch	=	1 ¾ inches	← **drawing**
actual →	2 feet		**w** feet	← **actual**

$\frac{1}{4} \cdot w = \frac{14}{4}$ **cross multiply**

$w = 14$ **simplify - multiply each side by 4**

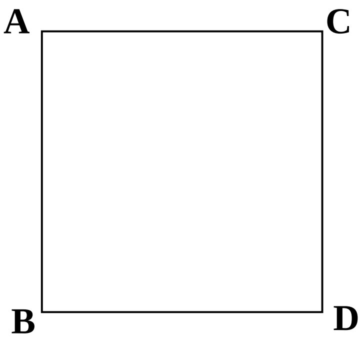
Scale
1/4 inch = 2 ft.



The width of the pool is 14 feet.

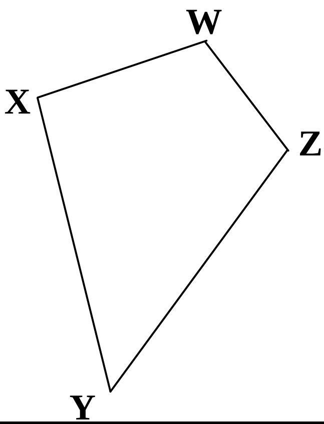
Use a ruler to complete the following.

1.) Measure $\overline{AB}$ and determine the actual length in feet using the scale.



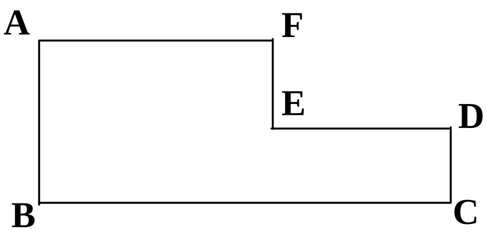
Scale 1 in = 3 ft

2.) Measure $\overline{XY}$ and determine the actual length in meters using the scale.

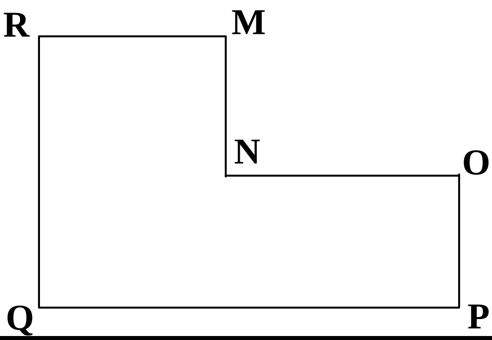


Scale 1 cm = 2.5 m

3.) Sherry is designing a garden. She drew the following scale drawing for the garden with a scale of **.**25 cm = 3 m. Use a ruler to determine the actual width $\overline{AB}$ of the garden.



4.) The Roberts made a drawing of their deck with a scale of ¼ inch = 2 feet. Use a ruler to determine the actual length of side $\overline{MN}$ of the deck.



– Summer Math Packet

Unit: Knowledge of Measurement
Objective: Determine the distance between 2 points using a drawing and a scale.

A **scale drawing** represents something that is too large or too small to be drawn at actual size. Similarly, a **scale model** can be used to represent something that is too large or too small for an actual-size model. The **scale** gives the relationship between the drawing/model measure and the actual measure.

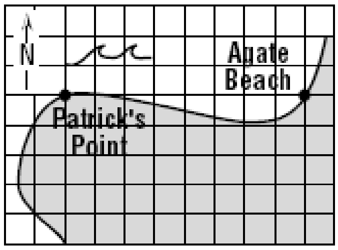
Example: On this map, each grid unit represents 50 yards. Find the distance from Patrick's Point to Agate Beach.

Scale | **Patrick's Point to Agate Beach**

$$\begin{array}{rcl} \textbf{map} \rightarrow & \dfrac{1 \text{ unit}}{50 \text{ yards}} = \dfrac{8 \text{ units}}{\mathbf{x} \text{ yards}} & \leftarrow \textbf{map} \\ \textbf{actual} \rightarrow & & \leftarrow \textbf{actual} \end{array}$$

$1 \bullet \mathbf{x} = 50 \bullet 8$ **cross multiply**

$\mathbf{x} = 400$ **simplify**

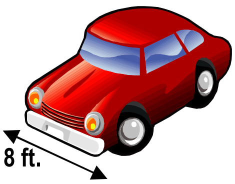


It is 400 yards from Patrick's Point to Agate Beach.

1.) On a map, the distance from Los Angeles to San Diego is 6.35 cm. The scale is 1 cm = 20 miles. What is the actual distance?

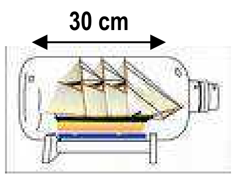
2.) Lexie is making a model of the Empire State Building. The scale of the model is 1 inch = 9 feet. The needle at the top is 31.5 feet tall. How big should the needle be on the model?

3.) A scale drawing of an automobile has a scale of 1 inch = ½ foot. The actual width of the car is 8 feet. What is the width on the scale drawing?

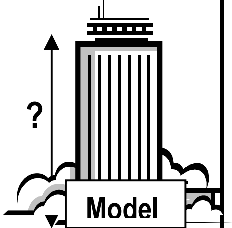


Actual car

4.) A model ship is built to a scale of 1 cm **:** 5 meters. The length of the model is 30 centimeters. What is the length of the actual ship?



5.) Jose wants to build a model of a 180-meter tall building. He will be using a scale of 1.5 centimeters = 3.5 meters. How tall will the model be? Round your answer to the nearest tenth.



6.) A pond is being dug according to plans that have a scale of 1 inch = 6.5 feet. The maximum distance across the pond is 9.75 inches on the plans. What will be the actual maximum distance across the pond?

– Summer Math Packet

Unit: Knowledge of Statistics
Objective: Organize & Display data use back-to-back stem & leaf plots
Examples:

- **In a stem & leaf plot, the data are organized from least to greatest. The digits of the least place value (ones) usually form the leaves, and the next place value digits (tens) form the stems.**
- **A back-to-back stem & leaf is two stem & leaf plots using the same stem, and is used to compare to sets of data.**

Steps for creating a back-to-back stem and leaf plot:

Step 1:.Order each set of data from least to greatest. Decide which digits will be the stems and which will be the leaves.
Step 2: List the stems in order from least to greatest, being sure to list stems that will include both sets of data.
Step 3: Using one set of data, write the leaves for each stem from the center to the **right**, ordering it from least to greatest.
Step 4: Using the other set of data, write the leaves for each stem from the center to the **left**, ordering it from least to greatest.
Step 5: Write a key that explains how to read both sides of the plot.

Example:

Test Scores

Loveless		Weaver
5 4 4 3 2 1 0 0	7	0 1 3 5 6
4 3 2 1	8	
6 6 6 5 5 4 3	9	0 0 0 1 3 3 5 5 5 5 7 9
2 2 0	10	0 1 1 2

Key
72% = 2 | 7 | 3 = 73%

1.) Listed below are the heights of 18 students in a 7th grade gym class, recorded in inches:
Boys: 60, 62, 57, 49, 53, 57, 61, 62, 63, 55
Girls: 63, 54, 57, 70, 54, 56, 64, 62

2.) Listed below are the number of points made during the last 10 basketball games:

Game	Jaguars	Lions
1	68	56
2	74	74
3	56	66
4	62	93
5	98	58
6	102	52
7	84	62
8	82	78
9	38	78
10	54	90

3.) Listed below are the test scores for Ms. Robert's period 2 and period 3 classes:
Pd 2: 54, 78, 85, 94, 70, 64, 100, 76, 38, 89
Pd 3: 67, 79, 83, 90, 91, 91, 74, 87, 100, 100

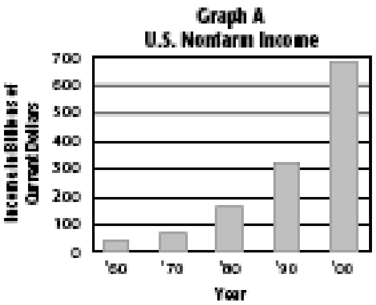
4.) Listed below are the number of hours that Shawn and Taylor study each week:

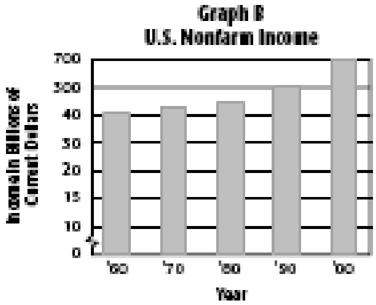
Week	1	2	3	4	5	6	7	8	9
Shawn	0	2	8	3	11	14	10	9	21
Taylor	8	16	9	17	15	20	22	18	15

– Summer Math Packet

Unit: Knowledge of Statistics
Objective: Analyze data and recognize the misuses of data
Examples:

- **Graphs can be misleading for many reasons: No title; the scale does not include 0; there are no labels on either axis; the intervals on a scale are not equal; or the size of the graphics misrepresents the data.**

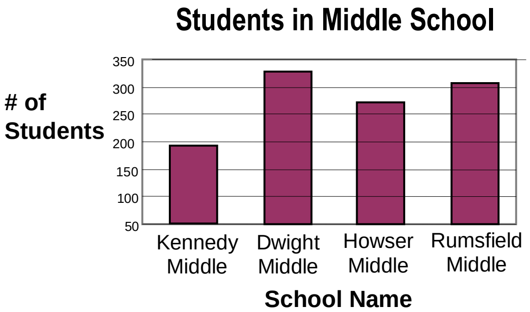




The bar graphs above show the total US National Income (nonfarm). Which graph is misleading? Explain.

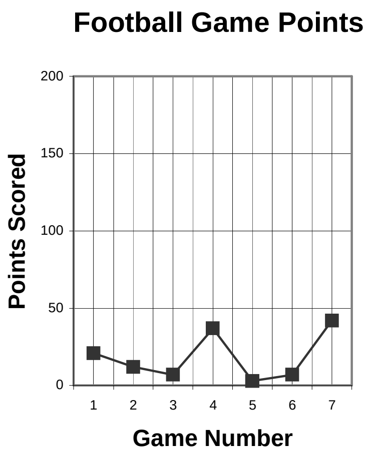
- **Graph B is misleading because the scale on the vertical axis does not have equal intervals. It makes the income appear to be slower.**

1.)



The following bar graph represents the number of students in four different middle schools. Determine why this graph may be considered misleading.

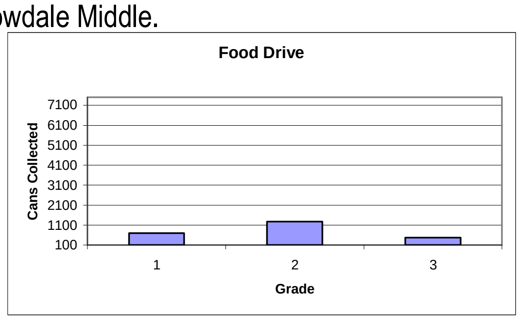
2.) The graph represents points scored by the Baltimore Ravens during the 2003-2004 football season. What makes this graph misleading? Explain.



3.) List 4 different situations that make a graph misleading.

4.) Look at #2, what would you change to make this graph not misleading?

The graph below represents cans collected for a food drive at Willowdale Middle.



Use the graph to the left to answer questions 5 & 6.

5.) Determine what makes this graph misleading.

6.) Using the Canned Food Drive Graph, how would you change the graph to better show the data and not be misleading?

– Summer Math Packet

Unit: Knowledge of Statistics
Objective: Determine the best choice of a data display for a given data set.
Examples:

- **Different types of graphs are better suited for certain types of data.**

Bar Graph – Use when comparing data (Ex. Football teams and # of wins)

Line Graph – Use when data is over time (Ex. Rainfall each month for 1 year)

Circle Graph (Pie Graph) – Use when data is dealing with $ or % (Ex. Allowance – how you spend it)

Stem & Leaf Plot – Use to show individual data (Ex. Class test scores)

Back-to-Back Stem & Leaf Plot – Use when comparing 2 large sets of data & showing individual data scores

Directions: Look at the following situations and tell what type of graph would be the best choice to display the data. Choose BAR, LINE, CIRCLE, or STEM & LEAF.

1.) How the Federal Government spends each part of your tax dollar

2.) You are keeping track of your little sister's/brother's height from age 3 months to 5 years old

3.) Lengths of the 5 largest rivers in the world

4.) Number of points scored in each game during the 99-00 Season
Redskins: 35 50 27 38 24 20 21 26 21 48 17 28 23 20 17 28

Ravens: 10 20 17 19 11 8 10 41 3 34 23 41 31 31 22 3

5.)

Students who ride a bus	
YEAR	**STUDENTS**
2000	333
2001	297
2002	360
2003	365

6.)

# of Species at the Zoo	
ZOO	**SPECIES**
Los Angeles	350
Lincoln Park	290
Cincinnati	700
Bronx	530
Oklahoma City	600

– Summer Math Packet

Unit: Knowledge of Statistics
Objective: Compare the measures of central tendency (mean, median, mode) to determine which is most appropriate.
Examples:

	MEAN	MEDIAN	MODE
What is it?	Average	Middle #	# shown the MOST often
How to find it?	Sum of Data (+) / # of Data Points (÷)	Order data from least to greatest, then find the middle # 2 middle #s - Average	Look at data & Find the # that appears the most. 2 modes – Bimodal
Most Useful when:	-- Data has no outliers Outliers are REALLY low & high #s	-- Data has outliers -- There are no large gaps in the middle of the data	-- Data has many identical (same) #s

Use the table at the right.

Find the mean, median, & mode of the data.
Mean: 488.3
Median: 150
Mode: None

Caribbean Islands			
Island	**Area (Sq Mi)**	**Island**	**Area (Sq Mi)**
Antiqua	**108**	**Martinique**	**425**
Aruba	**75**	**Puerto Rico**	**3,339**
Barbados	**166**	**Tobago**	**116**
Curacao	**171**	**Virgin Islands, UL**	**59**
Dominica	**290**	**Virgin Islands, US**	**134**

Which measure of central tendency would be misleading in describing the size of the islands? Explain.
The mean could be misleading since the areas of all but one of the islands are less than that value.
Which measure would most accurately describe the data? Median

Use the table that shows the miles of shoreline for five states to answer questions 1 – 3.

Miles of Shoreline	
State	**Length of Shoreline (mi)**
Virginia	3,315
Maryland	3,190
Washington	3,026
North Carolina	3,375
Pennsylvania	89

1.) Determine the mean, median, and mode of the data.

2.) Which measure of central tendency is misleading in describing the miles of shoreline for the states? Explain.

3.) Which measure of central tendency most accurately describes the data? Explain.

Book Sales: Use the table below that shows the number of books sold each day for 20 days to answer questions 3 – 5.

Book Sales Per Day			
23	18	23	15
24	16	0	11
19	10	13	17
12	23	11	16
36	24	12	27

4.) Determine the mean, median, & mode of the data.

5.) Which measure of central tendency would be misleading in describing the book sales & which measure most accurately describes the data? Explain.

6.) Michael & Melissa both claim to be earning a C average, 70% to 79%, in their Latin Class. Use the table below to explain their reasoning and determine which student is earning a C average.

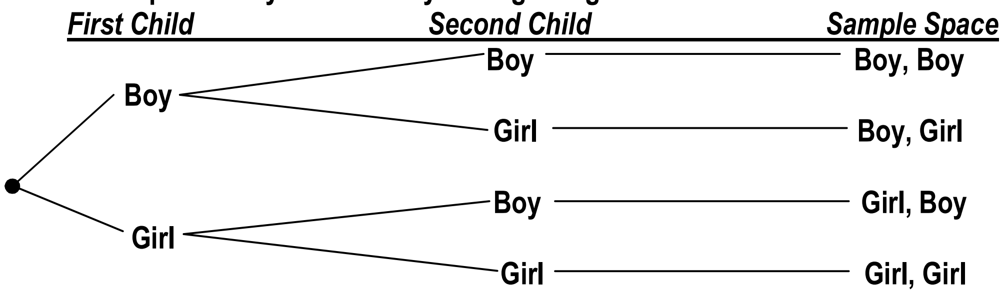
GRADES (%)							
	Test 1	**Test 2**	**Test 3**	**Test 4**	**Test 5**	**Test 6**	**Test 7**
Michael	**80**	**76**	**73**	**70**	**40**	**25**	**10**
Melissa	**88**	**83**	**75**	**70**	**60**	**65**	**62**

– Summer Math Packet

Unit: Knowledge of Probability
Objective: Identify a sample space and determine the number of outcomes using no more than 3 independent events.
Examples:

- **Sample Space is a listing of all the possible outcomes in a probability experiment. One way to determine sample space is to draw a tree diagram.**

A family has two children. Draw a tree diagram to show the sample space of the children's genders. Then determine the probability of the family having two girls.



Probability (Girl, Girl) = $\frac{1}{4}$

- **FUNDAMENTAL COUNTING PRINCIPLE is used to quickly determine the total number of possible outcomes. Multiply the number of possibilities for each event together.**

An ice cream sundae at the Ice Cream Shoppe is made from one flavor of ice cream and one topping. For ice cream flavors, you can choose from chocolate, vanilla, and strawberry. For toppings, you can have hot fudge, butterscotch, caramel, and marshmallow. Determine the number of different sundaes that are possible.

# of ice cream flavors	x	# of toppings
(Chocolate, Vanilla, Strawberry)		(Hot Fudge, Butterscotch, Caramel, Marshmallow)
3	x	4

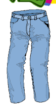
12 total possible outcomes

1.) A certain type of kickboard scooter comes in silver, red, or purple with wheel sizes of 125 millimeters or 180 millimeters. Determine the total number of color-wheel size combinations.

2.) Draw a tree diagram of the situation in #1 to show the sample space.

3.) Charlene packed 4 shirts and 3 pairs of pants for her trip to the beach. Make a tree diagram to show all of Charlene's possible outfits.

Blue, Yellow, Green, Purple



Jeans, Khaki, White

4.) The table below shows the shirts, shorts, and shoes in George's wardrobe. How many possible outfits can he choose consisting of one shirt, one pair of shorts, and one pair of shoes?

SHIRTS	SHORTS	SHOES
Red	Beige	Black
Blue	Green	Brown
White	Blue	
Yellow		

5.) Craig stops at a gas station to fill his tank. He must choose between full-service or self-service and between regular, midgrade, and premium gasoline. Draw a tree diagram showing the possible combinations of service and gasoline type. How many possible combinations are there?

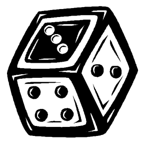
6.) Determine the total number of outcomes by choosing a vowel from the word COMPUTER and a consonant from the word BOOK.

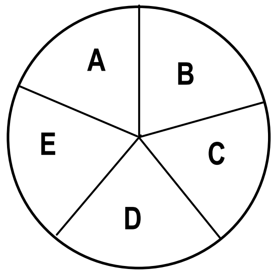
– Summer Math Packet

Unit: Knowledge of Probability
Objective: Determine the probability of an event comprised of 2 independent events.
Examples:

- **INDEPENDENT EVENTS: the outcome of one event does NOT affect the outcome of the 2nd event.**
- **The probability of two independent events can be found by multiplying the probability of the first event by the probability of the second event.**
- **P(A and B) = P (A) • P (B)**

A number cube is rolled, and the spinner at the right is spun.
Determine the probability of rolling a 2 and spinning a vowel.





P (2 and vowel) = P (2) x P (vowel)

$$\frac{1}{6} \times \frac{2}{5} = \frac{2}{30} = \frac{1}{15}$$

A coin is tossed and a number cube is rolled. Find the probability of tossing tails and rolling a 5.

P (tails, 5) = P (tails) x P (5)

$$\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$$

1.) A coin is tossed, and a number cube is rolled. What is the probability of tossing heads, and rolling a 3 or a 5?

2.) A red and a blue number cube are rolled. Determine the probability that an odd number is rolled on the red cube and a number greater than 1 is rolled on the blue cube.

3.) One letter is randomly selected from the word PRIME and one letter is randomly selected from the word MATH. What is the probability that both letters selected are vowels?

4.) What is the probability of spinning a number greater than 5 on a spinner numbered 1 to 8 and tossing a tail on a coin?

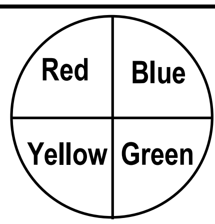
5.)

Kid's Carnival Meals
Choose 1 from each column

Chicken Nuggets	French Fries
Hamburger	Apple slices
Cheeseburger	
Pizza	

What is the probability that Joey will choose a hamburger and apple slices?

6.)



For his probability experiment, Ryan is going to spin a spinner and roll a six-sided number cube. What is the probability of spinning "Red" and rolling a "2"?

– Summer Math Packet

Unit: Knowledge of Probability

Objective: Make predictions and express probability of the results of a survey or simulation as a fraction, decimal, or percent. - **A**

Examples: Experimental probability can also be based on past performances and can be used to make predictions on future events.

SIDE DISH	# of People
Potato Salad	55
Green Salad Or vegetables	25
Macaroni salad	12
Coleslaw	8

In a survey, 100 people were asked to name their favorite Independence Day side dishes. What is the experimental probability of macaroni salad being someone's favorite dish?

There were 100 people surveyed and 12 chose macaroni salad, SO the experimental probability is $\frac{12}{100} = \frac{3}{25}$.

Suppose 250 people attend the city's Independence Day barbecue. How many can be expected to choose macaroni salad as their favorite side dish?

Write a proposition. $\frac{3}{25} = \frac{x}{250}$ (Use the experimental probability in the proportion.)

Solve by using cross products. $25x = 3(250)$

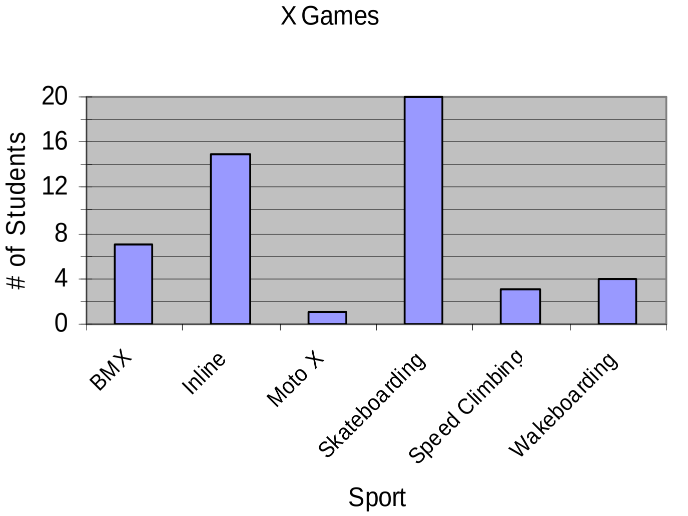
About 30 will choose macaroni salad. $x = 30$

1.) Using the table in the example, what is the experimental probability of potato salad being someone's favorite dish?

2.) Using the information in the example and question 1, about how many people can be expected to choose potato salad as their favorite dish if 400 attend the barbecue?

3.) In a survey, 50 people were asked to pick which movie they would see this weekend. Twenty chose *Horror Story*, 15 chose *The Ink Well*, 10 chose *The Monkey House*, and 5 chose *Little Rabbit.* What is the experimental probability of someone wanting to see *The Monkey House*?

4.) Using the information from question # 3, suppose 300 people are expected to attend a movie theater this weekend to see one of the four movies listed. How many can be expected to see *The Monkey House*?



For questions 5 & 6, use the graph shown at the left. The graph shows the results of a survey in which 50 students were asked to name their favorite X Game sport.

5.) Suppose 500 people attend the X Games. How many can be expected to choose Inline as their favorite sport?

6.) Suppose 500 people attend the X Games. How many can be expected to choose speed climbing as their favor sport?

– Summer Math Packet

Unit: Knowledge of Probability
Objective: Make predictions and **express probability of the results of a survey or simulation as a fraction, decimal, or percent**. **- B**
Examples:
Probability is a way to measure the chance that an event will occur. You can use this formula to determine the probability, P, of an event.

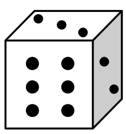
$$\mathbf{P} = \frac{\textbf{number of favorable outcomes}}{\textbf{number of possible outcomes}}$$

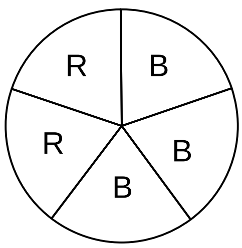
Probability can be expressed as a FRACTION, DECIMAL, or PERCENT.

A jar contains 10 purple, 3 orange, and 12 blue marbles. A marble is drawn at random.
Determine the probability that you will pick a purple marble. Express your answer in a fraction, decimal, and %.

Step 1 – Determine the total # of marbles. 10 + 3 + 12 = 25
Step 2 – Determine the probability of picking a purple marble. P(purple) = $\frac{\textbf{number of purple}}{\textbf{Total marbles}} = \frac{10 \div 5}{25 \div 5} = \frac{2}{5}$
Step 3 – Simplify the fraction.
Step 4 – Convert Fraction to a Decimal – Divide. **2 ÷ 5 = 0.4**
Step 5 – Convert Decimal to a % - Move decimal 2 places to the right. **0.4 = 40%**

1.) A six-sided number cube is rolled, and the spinner below is spun. Determine the probability of rolling a 3 and spinning blue. (B=blue, R=red) Express your answer as a fraction, a decimal, and a %.





2.) When Monica rolled her number cube 100 times, she had these results:

Number on cube	Frequency
1	12
2	18
3	21
4	16
5	17
6	16

What is the experimental probability of rolling a number less than 3? Express your answer as a fraction, a decimal, and a percent.

3.) A jar contains 15 orange, 14 white, 10 pink, 2 green, and 9 blue marbles. A marble is drawn at random. Determine the probability for the following situation. Express your answer in Fraction, Decimal, and % forms.

P (not blue) =

4.) A jar contains 15 orange, 14 white, 10 pink, 2 green, and 9 blue marbles. A marble is drawn at random. Determine the probability for the following situation. Express your answer in Fraction, Decimal, and % forms.

P (pink or orange) =

5.) A six-sided die is rolled 20 times and the results are recorded as follows: 3 ones, 4 twos, 5 threes, 2 fours, 4 fives, 2 sixes. What is the experimental probability of rolling a number greater than four? Express your answer in Fraction, Decimal, and % forms.

6.) A six-sided die is rolled 25 times and the results are recorded as follows: 4 ones, 5 twos, 5 threes, 3 fours, 4 fives, 4 sixes. What is the experimental probability of rolling a number greater than four? Express your answer in fraction, decimal, and % forms.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Read, write, and represent whole numbers using exponential notation.
Examples:

Exponent

Base $\rightarrow 3^4 = \underbrace{3 \cdot 3 \cdot 3 \cdot 3}_{\text{Common factors}} = 81$

Write 6^3 as a product of the same factor. Base = 6, so the exponent 3 means that 6 is used as a factor 3 times.
ANSWER: $6^3 = 6 \cdot 6 \cdot 6$

Evaluate 5^4. Evaluate means to solve. $5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$

Write $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$ in exponential form. Base = 4. It is used as a factor 5 times so the exponent is 5.
ANSWER: $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5$

1.) Write 15^4 as a product of the same factor.	**2.)** Write 2^7 as a product of the same factor.
3.) Evaluate 7^3.	**4.)** Evaluate 8^4.
5.) Write $9 \cdot 9 \cdot 9 \cdot 9 \cdot 9$ in exponential form.	**6.)** Write $12 \cdot 12 \cdot 12$ in exponential form.

Unit: Knowledge of Number Relationships & Computation
Objective: Express decimals using expanded form.
Examples:
You can write decimals in EXPANDED NOTATION using place value and decimals or their fraction equivalents as shown.

Decimal	0.1	0.01	0.001	0.0001
Fraction	$\frac{1}{10}$	$\frac{1}{10^2}$	$\frac{1}{10^3}$	$\frac{1}{10^4}$

Write 2.814 in expanded notation using decimals and using fractions.

Write the product of each digit and its place value.

2.814 = (2 x 1) + (8 x 0.1) + (1 x 0.01) + (4 x 0.001)

$2.814 = (2 \times 1) + (8 \times \frac{1}{10}) + (1 \times \frac{1}{10^2}) + (4 \times \frac{1}{10^3})$

1.) Write 6.79 in expanded notation using decimals.

2.) Write 6.79 in expanded notation using fractions.

3.) Write 0.0072 in expanded notation using decimals.

4.) Write 0.625 in expanded notation using fractions.

5.) Last week 3.9157 million people watched American Idol. Write the viewer number in expanded notation using decimals.

6.) The northern blossom bat is one of the world's smallest bats. It weighs just 0.53 ounce. Write its weight in expanded notation using fractions.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Determine equivalent forms of rational numbers expressed as **fractions, decimals**, percents, and ratios. **- A**
Examples:

To write a decimal as a fraction, divide the numerator of the fraction by the denominator.
Use a power of ten in the denominator to change a decimal to a fraction.

Write $\frac{5}{9}$ **as a decimal.** $\quad \begin{array}{r} 0.555 \\ 9\overline{)5.000} \end{array}$ **=** $0.\overline{5}$ **because 5 repeats forever.**

- 45
50
- 45
50
- 45

Write 0.32 as a fraction in simplest form. **0.32 =** $\frac{32}{100}$ **=** $\frac{\div 4}{\div 4} = \frac{8}{25}$

1.) Write 0.735353535… using bar notation to represent the repeating decimal.

2.) Write $\frac{3}{5}$ as a decimal.

3.) Write $4\frac{5}{8}$ as a decimal.

4.) Write 0.94 as a fraction in simplest form.

5.) Write 0.48 as a fraction in simplest form.

6.) There were 6 girls and 18 boys in Mrs. Johnson's math class. Write a ratio of the # of girls to the # of boys in fraction form. Then write the fraction as a repeating decimal.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Determine equivalent forms of rational numbers expressed as **fractions,** decimals, **percents, and ratios**.- **B**
Examples:

A RATIO is a comparison of two numbers by division. When a ratio compares a number to 100, it can be written as a PERCENT. To write a ratio or fraction as a percent, find an equivalent fraction with a denominator of 100. You can also use the meaning of percent to change percents to fractions.

Write $\frac{19}{20}$ **as a percent.**

$$\frac{19}{20}\,\frac{\bullet 5}{\bullet 5}=\frac{95}{100}=95\%$$ **Since 100 ÷ 20 = 5, multiply the numerator and denominator by 5.**

Write 92% as a fraction in simplest form.

$$\frac{92}{100}=\frac{\div 4}{\div 4}=\frac{23}{25}$$

Write 92% as a decimal. **Move decimal two places to the left. Add zeros if needed.** **92.0% = 0.92**

Write 0.4 as a percent. **Move decimal two places to the right. Add zeros if needed.** **0.4 = 40%**

1.) Write $\frac{7}{25}$ as a percent and decimal.	**2.)** Write 19% as a decimal and fraction in simplest form.
3.) Write $\frac{9}{50}$ as a percent and decimal.	**4.)** Write 75% as a decimal and fraction in simplest form.
5.) Ms. Crest surveyed her class and found that 15 out of 30 students brushed their teeth more than twice a day. Write this ratio as a fraction in simplest form, then write it as a % and a decimal.	**6.)** A local retail store was having a sale and offered all their merchandise as a 25% discount. Write this percent as a fraction in simplest form, then write it as a decimal.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Compare, order, and describe rational numbers.
Examples:

- **RATIONAL numbers include fractions, decimal, and percents. To COMPARE or ORDER rational numbers, they must be in the same form (all fraction or all decimals, or all %s)**

Example: Order 0.6, 48%, and $\frac{1}{2}$ from least to greatest.

Step 1 – Change all to decimals. **0.6** **48% = 0.48** **$\frac{1}{2}$ = 0.5**

Step 2 – Compare decimals & Order. **0.48, 0.5, 0.6**

Step 3 – Write using original form. **48%, $\frac{1}{2}$, 0.6**

1.) Order from least to greatest.

22%, 0.3, $\frac{1}{5}$

2.) Order from least to greatest.

0.74, $\frac{3}{4}$, 70%

3.) Replace ◯ with <, > , or =.

$\frac{7}{12}$ ◯ 58%

4.) Which is the largest?

$1\frac{3}{8}$ $1\frac{3}{10}$ $1\frac{4}{9}$

5.) According to the Pet Food Manufacturer's Association, 11 out of 25 people own large dogs and 13 out of 50 medium dogs. Do more people own large or medium dogs?

6.) Your PE teacher asked you to run for specific time period. You ran 0.6 of the time. Two of your friends ran $\frac{7}{10}$ and 72% of the time. Order the amount of time you and your friends ran from least to greatest.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Add, subtract, multiply and divide integers. - **A**
Examples:
ADDITION INTEGER RULES:
For integers with the same sign:

- **The sum of two positive integers is POSITIVE.**
- **The sum of two negative integers is NEGATIVE.**

For integers with different signs, subtract their absolute value. The sum is:

- **Positive IF the positive integer has the greater absolute value.**
- **Negative IF the negative integers has the greater absolute value.**

Examples:
- 6 + (- 3) = add keep the sign = - 9 **- 34 + (- 21) = add keep the sign = - 55**

8 + (- 7) = subtract keep the sign of the higher = 1 **- 5 + 4 = subtract keep the sign of the higher = - 1**

SUBTRACTION INTEGER RULES:

- **Keep the first number the same**
- **Switch the subtraction sign to ADDITION**
- **Change the second number to it's opposite. Opposite: - 6 to 6**
- **Follow Addition rules above.**

Examples:
6 – 9 = 6 + (- 9) = -3 **- 10 – (- 12) = - 10 + 12 = 2**

- 3 – 7 = - 3 + (- 7) = - 10 **1 – (- 2) = 1 + 2 = 3**

1.) Add: 2 + (- 7)	**2.)** Subtract: - 13 - 8
3.) Evaluate a – b if a = - 2 and b = - 7	**4.)** Evaluate x + y + z if x = 3, y = - 5, and z = - 2
5.) In Mongolia the temperature can dip down to – 45° C in January. The temperature in July may reach 40° C. What is the temperature range in Mongolia?	**6.)** Write an addition expression to describe skateboarding situation. Then determine the sum. Hank starts at the bottom of a half pipe 6 feet below street level. He rises 14 feet at the top of his kickturn.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Add, subtract, **multiply and divide** integers. - **B**
Examples:

MULTIPLYING & DIVIDING INTEGER RULES:

- **Two integers with DIFFERENT signs the answer is NEGATIVE.**
- **Two integers with SAME signs the answer is POSITIVE.**

Examples:

5 (- 2) = 5 times – 2, the signs are different so the answer will be negative = - 10

(- 6) • (- 9) = the signs are the same so the answer will be positive = 54

30 ÷ (- 5) = the signs are different so the answer will be negative = - 6

- 100 ÷ (- 5) = the signs are the same so the answer will be positive = 20

1.) Mulitply: - 14 (- 7)	**2.)** Divide: 350 ÷ (- 25)
3.) Evaluate if a = - 3 and c = 5 - 3ac	**4.)** Evaluate if d = - 24, e = - 4, and f = 8 $\frac{de}{f}$
5.) A computer stock decreased 2 points each hour for 6 hours. Determine the total change in the stock value over the 6 hours.	**6.)** A submarine descends at a rate of 60 feet each minute. How long will it take it to descend to a depth of 660 feet below the surface?

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Add, subtract, and multiply positive fractions and mixed numbers. **- A**
Examples:

- **To add unlike fractions (fractions with different denominators), rename the fractions so there is a common denominator.**

Add: $\frac{1}{6}+\frac{2}{5}=$ $\quad \frac{1}{6}=\frac{1x5}{6x5}=\frac{5}{30}$ $\quad \frac{2}{5}=\frac{2x6}{5x6}=\frac{12}{30}$ $\quad \frac{5}{30}+\frac{12}{30}=\frac{17}{30}$

Add: $12\frac{1}{2}+8\frac{2}{3}=$ $\quad 12\frac{1}{2}=12\frac{1x3}{2x3}=12\frac{3}{6}$ $\quad 8\frac{2}{3}=8\frac{2x2}{3x2}=8\frac{4}{6}$

$12\frac{3}{6}+8\frac{4}{6}=20\frac{7}{6}$ $\quad \frac{7}{6}$ is improper so we must change it to proper. 7 divided by 6 = $1\frac{1}{6}$

20 + $1\frac{1}{6}=21\frac{1}{6}$

1.) Add: $\frac{1}{3}+\frac{1}{9}$	**2.)** Add: $7\frac{4}{9}+10\frac{2}{9}$
3.) Add: $1\frac{5}{9}+4\frac{1}{6}$	**4.)** Add: $2\frac{1}{2}+2\frac{2}{3}$
5.) A quiche recipe calls for $2\frac{3}{4}$ cups of grated cheese. A recipe for quesadillas requires $1\frac{1}{3}$ cups of grated cheese. What is the total amount of grated cheese needed for both recipes?	**6.)** You want to make a scarf and matching hat. The pattern calls for $1\frac{7}{8}$ yards of fabric for the scarf and $2\frac{1}{2}$ yards of fabric for the hat. How much fabric do you need in all?

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Add, **subtract**, and multiply positive fractions and mixed numbers. - **B**
Examples:

- **To subtract unlike fractions (fractions with different denominators), rename the fractions so there is a common denominator.**

Subtract: $\frac{7}{8}-\frac{1}{2}=$ $\quad \frac{7}{8}=\frac{7x1}{8x1}=\frac{7}{8}$ $\quad \frac{1}{2}=\frac{1x4}{2x4}=\frac{4}{8}$ $\quad \frac{7}{8}-\frac{4}{8}=\frac{3}{8}$

Subtract: $5\frac{3}{4}-2\frac{1}{3}=$ $\quad 5\frac{3}{4}=5\frac{3x3}{4x3}=5\frac{9}{12}$ $\quad 2\frac{1}{3}=2\frac{1x4}{3x4}=2\frac{4}{12}$

$5\frac{9}{12}-2\frac{4}{12}=3\frac{5}{12}$

**Note: If you have to borrow from the whole number change to improper fractions, find a common denominator, subtract, and then change back to proper fractions.

1.) Subtract: $\frac{9}{10}-\frac{1}{10}$

2.) Subtract: $\frac{2}{3}-\frac{1}{6}$

3.) Subtract: $9\frac{7}{10}-4\frac{3}{5}$

4.) Subtract: $5\frac{3}{8}-4\frac{11}{12}$

*Hint: Change to improper fractions first!

5.) Melanie had $4\frac{2}{3}$ pounds of chopped walnuts. She used $1\frac{1}{4}$ pounds in a recipe. How many pounds of chopped walnuts did she have left?

6.) Lois has $3\frac{1}{3}$ pounds of butter. She uses $\frac{3}{4}$ pound in a recipe. How much does she have left? *Hint: Change to improper fractions first.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Add, subtract, and **multiply** positive fractions and mixed numbers. - **C**
Examples:

- **To multiply fractions – Multiply the numerators & denominators.**
- **Be sure to change mixed numbers to improper fractions before multiplying.**

$$\frac{1}{3} x \frac{5}{8} = \frac{5}{24}$$

$$1\frac{1}{3} x 3\frac{2}{5} = \frac{4}{3} x \frac{17}{5} = \frac{68}{15} = 4\frac{8}{15}$$

**Remember: Changing mixed numbers to improper fractions. $2\frac{3}{4} = 4x2 + 3 = \frac{11}{4}$

$$1\frac{1}{3} x 21 \quad = \quad \frac{4}{3} x \frac{21}{1} \quad = \quad \frac{4x21}{3x1} = \frac{84}{3} = 28$$

1.) $\frac{2}{3} x \frac{4}{5} =$	**2.)** $\frac{7}{3} \times 4\frac{1}{2} =$
3.) $2\frac{1}{2} \times 2\frac{1}{3} =$	**4.)** $3 \times 5\frac{2}{9} =$
5.) Anna wants to make 4 sets of curtains. Each set requires $5\frac{1}{8}$ yards of fabric. How much fabric does she need?	**6.)** One sixth of the students at a local college are seniors. The number of freshmen students is $2\frac{1}{2}$ times that amount. What fraction of the students are freshmen?

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Unit: Knowledge of Number Relationships & Computation
Objective: Calculate powers of integers and square roots of perfect square whole numbers.
Examples: **Powers of Integers**

Evaluate 5^4. **Evaluate means to solve.** **$5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$**
Evaluate 2^3. **$2^3 = 2 \cdot 2 \cdot 2 = 8$**
Evaluate $(-5)^2$. **$(-5)^2 = -5 \cdot -5 = 25$** **Remember to follow integer rules!**

Square Roots

- **A Perfect Square is the square of a whole number.**
- **A square root of a number is one of two equal factors of the number.**
- **Every positive number has a positive square root and a negative square root.**
- **The square root of a negative number such as -25, is not real because the square of a number is never negative.**

A.) $\sqrt{144}$ **Since $12^2 = 144$, then $\sqrt{144} = 12$**
B.) $-\sqrt{49}$ **Since $7^2 = 49$, then $\sqrt{49} = -7$**
C.) $\pm\sqrt{4}$ **Since $2^2 = 4$, then $\pm\sqrt{4} = \pm 2$**

1.) Evaluate: $13^2 =$	**2.)** Evaluate: $\sqrt{81} =$
3.) Evaluate: $(-4)^3 =$	**4.)** Evaluate: $\sqrt{100} =$
5.) Evaluate: $(-2)^2 =$	**6.)** Evaluate: $\sqrt{36}$

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Unit: Knowledge of Number Relationships & Computation
Objective: Use the laws of exponents to simplify expressions by using the rules of exponents.
Examples:

Sometimes an algebraic expression or number sentence contains terms with the same base but different exponents. We can simplify these expressions by using the *Laws of Exponents*.

Multiplying with the same base: To multiply two terms with the same base, ADD the exponents

Symbols	Example
$X^a \bullet x^b = x^{a+b}$	$2^2 \bullet 2^4 = 2^{2+4} = 2^6$

Therefore $2^2 \bullet 2^4 = 2^6$ **Why does this work?** $2^2 \bullet 2^4 = 2\bullet2\bullet2\bullet2\bullet2\bullet2 = 2^6$

Dividing with the same base: To divide two terms with the same base, SUBTRACT the exponents

Symbols	Example
$\frac{x^a}{x^b} = x^{a-b}$	$\frac{3^4}{3^2} = 3^{4-2}$ **Therefore** $\frac{3^4}{3^2} = 3^2$

Why does this work? $\frac{3^4}{3^2} = \frac{3 \bullet 3 \bullet \cancel{3} \bullet \cancel{3}}{\cancel{3} \bullet \cancel{3}} = 3\bullet3 = 3^2$ **OR** $\frac{3^4}{3^2} = \frac{3 \bullet 3 \bullet 3 \bullet 3}{3 \bullet 3} = \frac{81}{9} = 9 = 3^2$

Simplify each expression using the laws of exponents

1.) $5^6 \bullet 5^3$	**2.)** $\frac{7^{10}}{7^3}$
3.) $9^4 \bullet 9^4 \bullet 9^4$	**4.)** $\frac{2^3 \bullet 2^4 \bullet 2^2}{2^6}$
5.) $a^5 \bullet a^6 \bullet a^2$	**6.)** $x^a \div x^b$

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Unit: Knowledge of Number Relationships & Computation
Objective: Identify and use the properties of addition and multiplication to simplify expressions using the commutative property.
Examples:

PROPERTY	ARITHMETIC	ALGEBRA
Distributive Property	**5(3+4) = 5(3) + 5(4)**	**a (b + c) = a (b) + a (c)**
Commutative Property of Addition	**5 + 3 = 3 + 5**	**a + b = b + a**
Commutative Property of Multiplication	**5 x 3 = 3 x 5**	**a x b = b x a**
Associative Property of Addition	**(2 + 3) + 4 = 2 + (3 + 4)**	**(a + b) + c = a + (b + c)**
Associative Property of Multiplication	**(4 x 5) x 6 = 4 x (5 x 6)**	**(a x b) x c = a x (b x c)**
Identity Property of Addition	**5 + 0 = 5**	**a + 0 = a**
Identity Property of Multiplication	**5 x 1 = 5**	**a x 1 = a**

1.) Use the distributive property to write the expression s an equivalent expression. Then evaluate the expression.

3(5 + 1) =

2.) Name the property shown:

6 + (1 + 4) = (6 + 1) + 4

3.) Name the property shown:

y x 3 = 3 x y

4.) Name the property shown:

b + 0 = b

5.) Mr. Brooks was working on addition using dominoes with a group of 1st graders. When picking the domino with 3 dots on one end and 5 dots on the other, some students read. "3 plus 5 equals 8" while other read it as "5 plus 3 equals 8." What property were these students using? Explain.

6.) Students in Mr. River's class were practicing their multiplication skills by rolling three 6-sided number cubes. Bailey rolled a 2, a 3, and a 5 on her roll. He multiplied the three numbers as follows using the order of operations: (2 x 3) x 5 = 30. Write another way Bailey could have performed the multiplication without changing the order of the numbers. State the property you used.

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Unit: Knowledge of Number Relationships & Computation
Objective: Estimate to determine approximate sums, differences, products, and quotients.
Examples:

Estimate by rounding to the nearest whole numbers.

GOAL: to make the problem simpler – estimate before computing.

Decimals:

23.485 – 9.757 = 23 – 10 = 13

6.43 + 2.17 + 9.1 + 4.87 = 6 + 2 + 9 + 5 = 22

43.9 x 37.5 = 40 x 40 = 1600

432.87 ÷ 8.9 = 450 ÷ 9 = 50

Fractions:

$3\frac{2}{3} + 5\frac{1}{6} =$ **4 + 5 = 9**

$6\frac{2}{5} \times 1\frac{7}{8} =$ **6 x 2 = 12**

$8\frac{7}{9} \div 2\frac{3}{4} =$ **9 ÷ 3 = 3**

Estimate by rounding:

1.) 34.84 – 17.69 + 8.4	**2.)** $2\frac{1}{5} + 3\frac{1}{2} =$
3.) 26.3 x 9.7	**4.)** $4\frac{3}{8} \times 5\frac{1}{4} =$
5.) 41.79 ÷ 6.8	**6.)** $15\frac{8}{9} \div 3\frac{3}{5} =$

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Unit: Knowledge of Number Relationships & Computation
Objective: Determine equivalent ratios.
Examples:

- **Any ratio can be written as a fraction. To write a ratio comparing measurements, such as units of length or units of time, both quantities must have the SAME unit of measure.**
- **Two ratios that have the same value are EQUIVALENT RATIOS.**

Write the ratio 15 to 9 as a fraction in simplest form. **15 to 9 =** $\frac{15}{9} = \frac{\div 3}{\div 3} = \frac{5}{3}$

Write 40 centimeters to 2 meters as a fraction in simplest form.

$$\frac{40\text{ centimeters}}{2\text{ meters}} = \frac{40\text{ centimeters}}{200\text{ centimeters}} = \frac{\div 40}{\div 40} = \frac{1\text{ centimeter}}{5\text{ centimeters}} = \frac{1}{5}$$

- **A PROPORTION is an equation stating that 2 ratios are equivalent. Since rates are types of ratios, they can also form proportions. In a proportion, a CROSS PRODUCT is the product of the numerator of one ratio and the denominator of the other ratio.**

Determine whether $\frac{2}{3}$ **and** $\frac{10}{15}$ **form a proportion (are equivalent ratios).** $\frac{2}{3} \stackrel{?}{=} \frac{10}{15}$

$$2 \times 15 \stackrel{?}{=} 3 \times 10$$

The cross products are equal, so the ratios are equivalent and form a proportion. $30 = 30$

1.) Write the ratio as a fraction in simplest form. *Remember: ratios must have the SAME measurement. 12 feet : 10 yards	**2.)** Determine whether the pair of ratios is equivalent and forms a proportion. $\frac{6}{14} \stackrel{?}{=} \frac{9}{21}$
3.) Determine whether the ratios are equivalent. Explain. 12:17 and 10:15	**4.)** Determine whether the pair of ratios is equivalent and forms a proportion. $\frac{\$2.48}{4\text{ oz}} \stackrel{?}{=} \frac{\$3.72}{6\text{ oz}}$
5.) In baseball, David has 10 hits out of 14 at bats. Adam has 15 hits out of 21 at bats. For each player, write a ratio that represents his total number of hits out of times at bat. Are these ratios equivalent?	**6.)** Sarah can drive 198 miles on 11 gallons of gasoline. On 6 gallons of gasoline, Rachel can travel 138 miles. Write a ratio that compares miles traveled per gallon of gasoline for each car. Do the cars get the same mileage?

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Unit: Knowledge of Number Relationships & Computation
Objective: Determine or use **ratios, unit rates**, and percents in the context of the problem. **- A**
Examples:

- A RATE is a fixed ratio between two quantities of different units, such as miles and hours, dollars and hours, points and games. If the second number of a rate is 1 then the rate is called a UNIT RATE.
- UNIT RATE examples: 60 miles per hour and $15 per hour

Last week Mike worked 30 hours and earned $240. What was his rate of pay?

STRATEGY: Divide the total earned by the number of hours.
Step 1: How much money did Mike earn? $240
Step 2: How many hours did he work? 30 hours
Step 3: Determine the rate of pay. Divide the amount of money earned by the number of hours.

$$\frac{\text{amount of \$}}{\text{\# of hours worked}} = \frac{240}{30} = \$8 \text{ per hour}$$

The unit price of a can of tuna fish at the GHK Supermarket is $2.43. How much will 7 cans cost?

STRATEGY: Use the definition of unit price.
Step 1: Unit price means the price of one unit or the price of one can of tuna fish. $2.43
Step 2: Multiply. 2.43 x 7 = $17.01
SOLUTION: Seven cans of tuna fish cost $17.01

1.) You earned 20 points on a test out of 50. What was your percent on the test?	**2.)** Chad purchased 6 Fierce Grape Gatorades for $12.00. If Chad wanted to go back and buy one Tropical Punch Gatorade at the same price, how much would it cost?
3.) Your family was headed to the beach for summer vacation. You drove 560 miles in 8 hours. Determine how many miles you drove per hour.	**4.)** Pam typed 325 words in 25 minutes. How many words did she type per minute?
5.) There are 1000 students in a middle school for 4 lunch shifts. Determine how many students will eat on each lunch shift.	**6.)** Giant Eagle was having a big 4th of July sale on sodas. Giant Eagle was selling Coke Fridge Packs at $3.00 for 12 sodas. Determine the cost of one soda.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Determine or use ratios, unit rates, and **percents** in the context of the problem. **- B**
Examples:

Solving Proportions: Solve $\frac{8}{a} = \frac{10}{15}$

8 x 15 = a x 10
120 = 10a
120 ÷ 10 = 10 a ÷ 10
12 = a

PERCENT PROPORTION / EQUATION

$$\frac{\%}{100} = \frac{\text{part (is)}}{\text{total (of)}}$$

Sometimes Proportions involve Percents. In this case, we use the PERCENT PROPORTION.

600 is what percent of 750?

$$\frac{n}{100} = \frac{600}{750}$$

n x 750 = 600 x 100

$$\frac{750\,n}{750} = \frac{60000}{750}$$

n = 80%

Chad's football team played 25 games. They won 68% of them. How many games did the team win?

Use the percent proportion: $\frac{68\%}{100} = \frac{x}{25}$

Cross multiply: **68 x 25 = 100 x**
Solve $\frac{1700}{100} = \frac{100\,x}{100}$

x = 17

Answer: Chad's football team won 17 out of 25 games.

1.) It is recommended that for every 8 square feet of surface, a pond should have 2 fish. A pond that has a surface of 72 square feet should contain how many fish?

2.) An 8-ounce glass of Orange juice contains 72 milligrams of vitamin C. How much juice contains 36 milligrams of vitamin C?

3.) 9 is what percent of 30?

4.) What percent of 56 is 14?

5.) Kristen and Melissa spent 35% of their $32.00 on movie tickets. How much money did they spend?

6.) Jake's club has 35 members. Its rules require that 60% of them must be present for any vote. At least how many members must be present to have a vote?

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Determine **rate of increase and decrease, discounts**, simple interest, commission, sales tax. - **A**
Examples:

- **A percent of change is a ratio that compares the change in quantity to the original amount. If the original quantity is increased, it is a PERCENT OF INCREASE. If the original quantity is decreased, it is a PERCENT OF DECREASE.**

Last year 2,376 people attended the rodeo. This year, attendance was 2,950. What was the percent of change in attendance to the nearest whole percent?

- **Since this year's attendance is greater than last year's attendance, this is a percent of INCREASE.**
- **The amount of increase is 2,950 – 2,376 = 574. (Percent of DECREASE: original – new.)**
- **Use the proportion:** $\frac{\%}{100} = \frac{\text{amount of change}}{\text{original amount}}$ $\frac{n}{100} = \frac{574}{2{,}376}$ **n = 0.24 or 24%**
- **The rodeo attendance increased by about 24%.**

DISCOUNT
Determine the price of a $69.50 tennis racket that is on sale for 20% off.

- **Use the percent proportion to determine the amount of discount.** $\frac{20}{100} = \frac{n}{69.50}$ **20 x 69.50 = 100n**

$$\frac{1390}{100} = \frac{100n}{100}$$

13.90 = n

The amount of discount is $13.90

- **Subtract the amount of discount from the price. 69.50 – 13.90 = $55.60**
  The sale price of the tennis racket is $55.60.

1.) Determine the percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an INCREASE or DECREASE. Original: 250 New: 100	**2.)** Determine the sale price to the nearest cent. $39.00 jeans 40% off
3.) Determine the percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an INCREASE or DECREASE. Original: $84 New: $100	**4.)** Justin is buying a cell phone that has a regular price of $149. The cell phone is on sale for 15% off the regular price. What will be the sale price?
5.) Alicia planted 45 tulip bulbs last year. This year she plans to plant 65 bulbs. Determine the percent of increase in the number of tulip bulbs to the nearest tenth.	****6.)** You want to buy a new sweater. The regular price was $48 dollars. The sale price was $34. What was the percent of discount to the nearest percent.

– Summer Math Packet

Unit: Knowledge of Number Relationships & Computation
Objective: Determine rate of increase and decrease, discounts, **simple interest, commission, sales tax. - B**
Examples:

- **SALES TAX is a percent of the purchase price and is an amount paid in addition to the purchase price.**

Determine the total price of a $17.55 soccer ball if the sales tax is 6%.
Determine the sales tax by changing % to a decimal and multiply. 17.55 x 0.06 = 1.07 (TAX)
Add price and tax to determine the total price. 17.55 + 1.07 = 18.82

- **COMMISSION is the amount a salesman/woman makes for selling items. To determine the amount of commission, change the % to a decimal and multiply by the total amount sold.**

Determine the commission for a RV salesman, whose sales for the month of March totaled $149,000. The salesman earns a 4% commission.
Change 4% to a decimal. 4% = 0.04 Multiply decimal and total sold. 0.04 x 149,000 = 5960
The RV salesman/woman will make a total commission of $5,960 for the month of March.

- **SIMPLE INTEREST the amount of money paid or earned for the use of money. To determine simple interest I, use the formula I = prt. Principal p is the amount of money deposited or invested. Rate r is the annual interest rate written as a decimal. Time t is the amount of time the money is invested in years.**

Determine the simple interest earned in a savings account where $136 is deposited for 2 years if the interest rate is 7.5% per year.
I = prt I = 136 • 0.075 • 2 I = 20.40 The simple interest earned is $20.40

1.) Jeremy wants to buy a skateboard but does not know if he has enough money. The price of the skateboard is $85 and the sales tax is 6%. What will be the total cost of the skateboard?	**2.)** Blake bought two magazines for $4.95 each. If the sales tax was 6.75%, what was the total amount that he paid for the magazines?
3.) How much interest will Hannah earn in 4 years if she deposits $630 in a savings account at 6.5% simple interest?	**4.)** You are a real estate agent. For every house you sell you earn 3.8% commission. This month you sold 2 houses that had a combined total of $560,950. How much commission will you earn?
5.) When Melissa was born, her parents put $8,000 into a college fund account that earned 9% simple interest. Determine the total amount in the account after 18 years.	**6.)** A car salesman earns 7% commission on his total sales this month. If he sells 2 cars at $15,670 each, and a truck at $25,995, how much commission will he earn? (hint: You need to find the total amount of sales first)