2025 Summer Math Packet

8th Grade

This is the summer math packet for all students entering into the 8th grade. It was designed to give extra practice in the skills they will need for 8th grade math. It is recommended that a portion of the packet be completed each week. This is due by the 1st week of the 2025-26 school year.

I have listed websites below that can be used as resources or extra practice.

I hope everyone has a wonderful summer full of fun and rest!

Many Blessings,

Mrs. Wendi O'Brien

Websites:

www.khanacademy.org

www.studentguide.org

Multiplying Fractions

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. $2\frac{3}{4} = 4x2 + 3 = \frac{11}{4}$

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

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?

Ratios and Percents

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.

Rates

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.

Proportions

Examples:

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

$8 \times 15 = a \times 10$

$120 = 10a$

$120 \div 10 = 10a \div 10$

$12 = a$

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?

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

$n \times 750 = 600 \times 100$

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

$n = 80\%$

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: $68 \times 25 = 100x$

Solve $\frac{1700}{100} = \frac{100x}{100}$

$x = 17$

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?

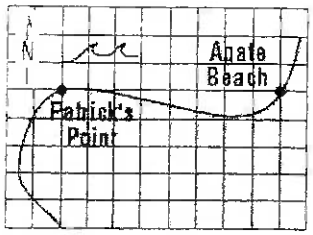
5.) Kristen and Melissa spent 35% of their $32.00 on movie tickets. How much money did they spend?

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?

Scale Factor

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.



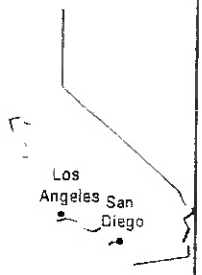
	Scale		Patrick's Point to Agate Beach	
map →	1 unit	=	8 units	← map
actual →	50 yards		x yards	← actual

$1 \cdot x = 50 \cdot 8$ cross multiply

$x = 400$ simplify

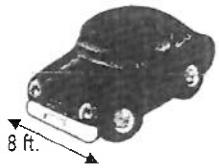
It is 400 yards from Patrick's Point to Agate Beach.

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?



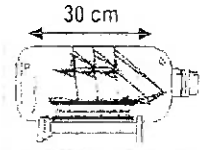
2.) Lexie is making a model of the Empire State Building. The scale of the model is 1 inch = 9 feet. The needle at the top is 31.5 feet tall. How big should the needle be on the model?

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?

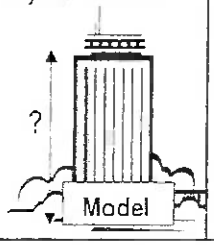


Actual car

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?

Plans

Percent Change

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

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

The amount of discount is $13.90 13.90 = n

- 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.

Percents

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 $I = 136 \cdot 0.075 \cdot 2$ 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)

Mean, Median, Mode

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

Equations

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
$-5 = -5$	Subtract 5 from both sides
$x = 6$	Simplify

⇨ Check

$x + 5 = 11$	Write the equation
$6 + 5 = 11$	Replace x with 6
$11 = 11$✓	The sentence is true

Example 2: Solve $-21 = -3y$

$\frac{-21}{-3} = \frac{-3y}{-3}$	Write the equation
$7 = y$	Divide each side by – 3 Simplify

⇨ Check

$-21 = -3y$	Write the equation
$-21 = -3(7)$	Replace the y with 7
$-21 = -21$?	Multiply – is the sentence true?

Example 3: Solve $3x + 2 = 23$

$3x + 2 = 23$	Write the equation
$-2 = -2$	Subtract 2 from each side
$\frac{3x}{3} = \frac{21}{3}$	Simplify
$x = 7$	Divide each side by 3 Simplify

⇨ Check

$3x + 2 = 23$	Write the equation
$3(7) + 2 = 23$?	Replace x with 7
$21 + 2 = 23$?	Multiply
$23 = 23$?	Add – is the sentence true?

1.) Solve $x - 9 = -12$

2.) Solve $48 = -6r$

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

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

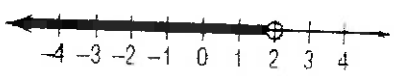
5.) It costs $12 to attend a golf clinic with a local pro. Buckets of balls for practice during the clinic cost $3 each. How many buckets can you buy at the clinic if you have $30 to spend?

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?

Inequalities

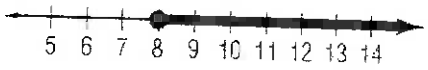
Examples: Graph each inequality on a number line.

$x < 2$



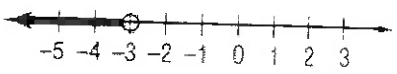
The open circle means that the number is **not** included in the solution.

$y \geq 8$



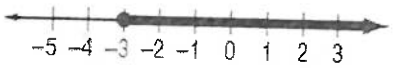
The closed circle means that the number **is** included in the solution.

$m < -3$

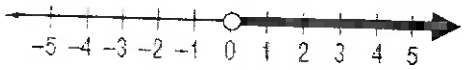


The solution is all numbers less than negative three.
-3 is **not** included in the solution.

1.) Write an inequality for the graph.

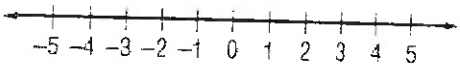


2.) Write an inequality for the graph.



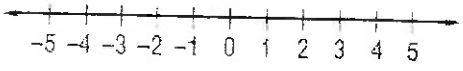
3.) Graph the inequality.

$b \geq -1$



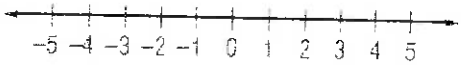
4.) Graph the inequality.

$z < 3$



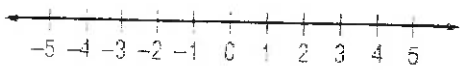
5.) Solve the inequality, then graph it on the number line.

$y + 9 \leq 13$



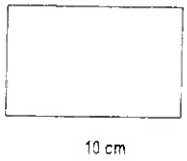
6.) Solve the inequality, then graph it on the number line.

$4x - 6 > -10$



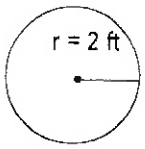
Area

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.



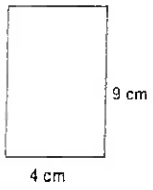
$P = 2L + 2W$	Write the equation
$P = 2(10) + 2(8)$	Replace L and W with the length and width
$P = 20 + 16$	Multiply
$P = 36$ cm	Simplify and add the correct label

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.

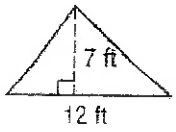


$A = \pi r^2$	Write the equation
$A = 3.14 \cdot (2)^2$	Replace π with 3.14 and r with 2
$A = 3.14 \cdot 4$	Square the 2
$A = 12.56$ ft^2	Simplify and add the correct label

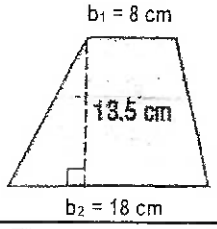
1.) The formula for finding the area of a rectangle is $A = L \cdot W$. Use this formula to find the area of the rectangle.



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

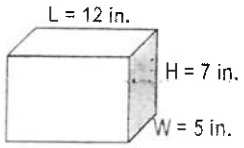


3.) A trapezoid has two bases (b_1 and b_2). The formula for finding the area of a trapezoid is. $A = \frac{1}{2}h(b_1 + b_2)$



Find the area of the trapezoid.

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



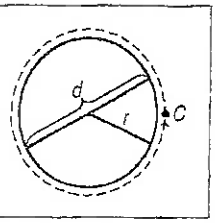
5.) Margot planted a rectangular garden that was 18 feet long and 10 feet wide. How many feet of fencing will she need to go all the way around the garden? $P = 2L + 2W$

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.

Circumference and Area of Circles

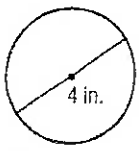
The **circumference** C of a circle is equal to its diameter d times π or 2 times the radius r times π, or $C = \pi d$ or $C = 2\pi r$.

The area A of a circle is equal to π times the square of the radius r, or $A = \pi r^2$.



EXAMPLES **Find the circumference of each circle.**

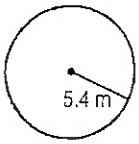
1



$C = \pi d$ Circumference of a circle
$C = \pi \cdot 4$ Replace d with 4.
$C \approx 12.6$ Use a calculator.

The circumference is about 12.6 inches.

2



$C = 2\pi r$ Circumference of a circle
$C = 2 \cdot \pi \cdot 5.4$ Replace r with 5.4.
$C \approx 33.9$ Use a calculator.

The circumference is about 33.9 meters.

EXAMPLE 3 **Find the area of the circle.**

$A = \pi r^2$ Area of a circle
$A = \pi(1.5)^2$ Replace r with half of 3 or 1.5.
$A \approx 7.1$ Use a calculator.

The area is about 7.1 square feet.

EXERCISES

Find the circumference and area of each circle. Round to the nearest tenth.

1.

2.

3.

4. The diameter is 9.3 meters.

5. The radius is 6.9 millimeter.

6. The diameter is 15.7 inches.

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**

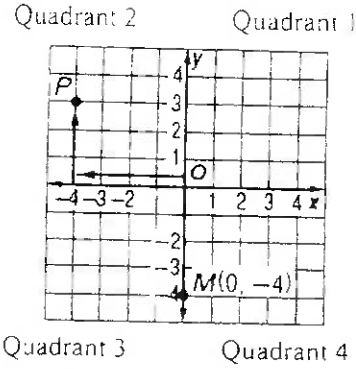
Example 1: Name the ordered pair for point P. Then identify the quadrant in which P lies.

- 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.

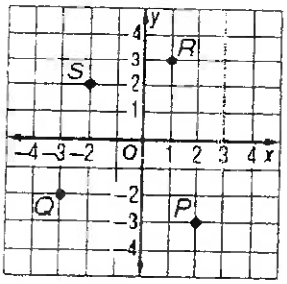
Example 2: Graph and label the point M (0, - 4).

- 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).



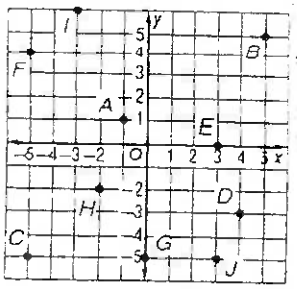
1.) Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.

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



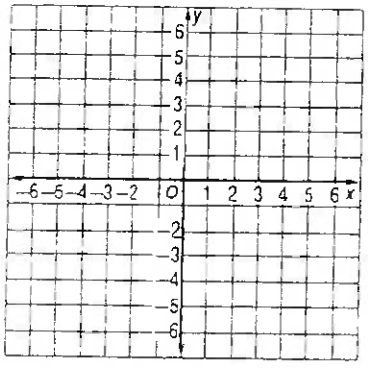
2.) Find each of the points below on the coordinate plane. Then identify the quadrant in which each point lies.

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



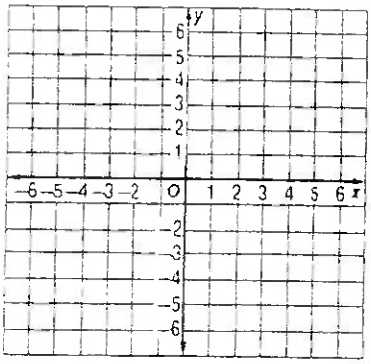
3.) Graph and label each point on the coordinate plane.

N (3, -1)
P (-2, 4)
Q (-3, -4)
R (0, 0)
S (-5, 0)



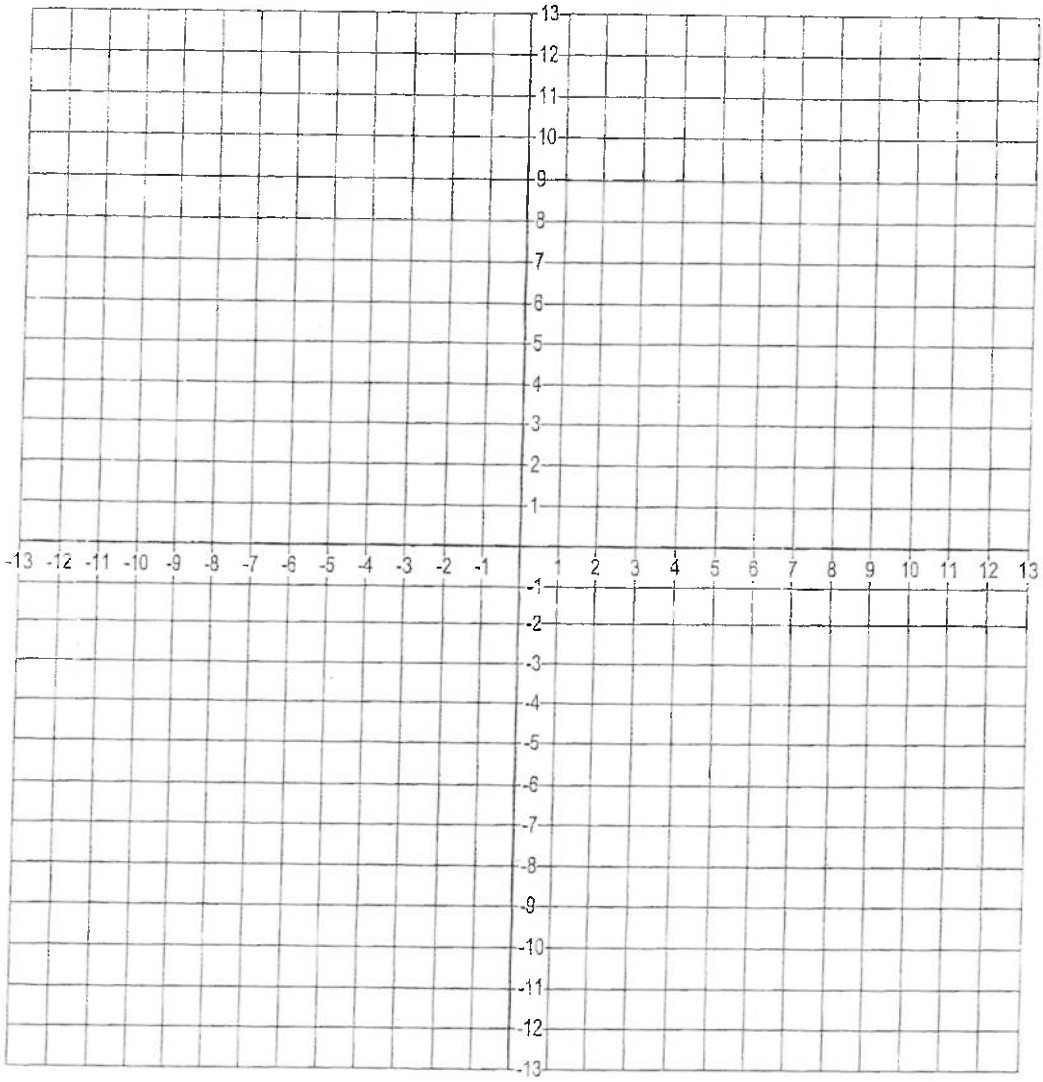
4.) Graph and label each point on the coordinate plane.

D (0, 4)
E (5, 5)
G (-3, 0)
H (-6, -2)
J (0, -2)



Plotting a Hidden Message

Connect each series of points to reveal a hidden message.



(-12,4)(-12,0) (6,-5)(4,-5)(4,-1)(6,-1) (-3,0)(-5,0)(-5,4)(-3,4) (-6,5)(-8,5)(-8,9)(-6,9) (10,2)(12,2) (3,-8)(5,-8) (4,-3)(5,-3) (0,-6)(2,-6) (-2,4)(0,4) (4,0)(4,4) (-2,0)(0,0) (-6,-10)(-6,-6)(-5,-9)(-4,-6)(-4,-10) (-6,-1)(-8,-2)(-8,-4)(-6,-5)(-6,-3)(-7,-3) (7,7)(8,7) (-5,-5)(-5,-1)(-3,-1)(-3,-3)(-5,-3) (-11,9)(-11,5)(-10,7)(-9,5)(-9,9) (9,5)(7,5)(7,9)(9,9) (1,5)(1,9)(3,9)(3,5)(1,5) (3,4)(1,3)(1,1)(3,0)(3,2)(2,2) (4,5)(4,9)(5,6)(6,9)(6,5) (-8,7)(-7,7) (-5,9)(-5,5)(-3,5) (1,-6)(1,-10) (-3,-8)(-1,-8) (-4,-3)(-3,-5) (-2,-3)(0,-3) (-13,4)(-11,4) (1,-5)(1,-1)(2,-1)(3,-3)(2,-5)(1,-5) (-3,-10)(-3,-8)(-2,-6)(-1,-8)(-1,-10) (5,-10)(5,-6) (12,0)(12,4) (10,0)(10,4) (-1,0)(-1,4) (3,-10)(3,-6) (-5,2)(-4,2) (-2,-5)(-2,-3)(-1,-1)(0,-3)(0,-5) (0,5)(-2,5)(-2,9)(0,9) (-10,0)(-10,4)(-8,4)(-8,0)(-10,0) (8,4)(8,0) (4,2)(6,2) (7,4)(9,4) (6,0)(6,4)