Kingwood High School

Algebra 1 Pre AP
Summer Assignment

This is a Pre-Advanced Placement course designed to prepare you for the Advanced Placement test to be taken in Calculus. To be successful in this course you must know how to learn and how to study. The answers to this assignment are given, so the intent is not only to get the right answer but to know the correct process.

In class you will utilize graphing calculators. The calculator is a tool and not a crutch. You will be expected to solve many problems without the use of a calculator. Furthermore, you will incur many exams at Kingwood High School that have a non-calculator portion, thus you must be fluent in your number skills.

Skills addressed:

Fractions: Adding and Subtracting

Do Not Use a Calculator

Example:	$3\frac{1}{9}-1\frac{5}{6}$
Step 1. Find the LCD (Least Common Denominator)	
Step 2. Change equivalent fractions.	$3\frac{2}{18}-1\frac{15}{18}$
Step 3. Rename (Borrow) if needed	$2\frac{20}{18}-1\frac{15}{18}$
Step 4. Add or Subtract	$1\frac{5}{18}$

1. $2\frac{3}{4}+5\frac{5}{6}$
2. $9-4\frac{2}{5}$
3. $6\frac{1}{3}+4\frac{3}{5}$
4. $8\frac{1}{9}-2\frac{5}{6}$
5. $9+1\frac{1}{7}$
6. $6\frac{1}{2}+2\frac{2}{3}$
7. $5\frac{1}{2}+1\frac{3}{5}$
8. $1\frac{3}{4}-\frac{1}{2}$
9. $\frac{1}{5}+1\frac{3}{4}$
10. $\frac{4}{5}-\frac{2}{3}$
11. $\frac{5}{7}+1\frac{4}{5}$
12. $3\frac{5}{8}-2\frac{1}{6}$

Fractions: Multiplying and Dividing

Do Not Use a Calculator

Multiplication Example: $2\frac{2}{3} \bullet 4\frac{1}{10}$	Division Example: $2\frac{3}{4} \div 3\frac{1}{2}$
Step 1. Change all mixed numbers to improper fractions $\frac{8}{3} \bullet \frac{41}{10}$	Step 1. Change all mixed numbers to improper fractions $\frac{11}{4} \div \frac{7}{2}$
Step 2. Multiply across (or simplify). $\frac{\cancel{8}}{3} \bullet \frac{41}{\cancel{10}} = \frac{4}{3} \bullet \frac{41}{5}$	Step 2. Multiply by the Reciprocal (Keep it, change it, flip it) $\frac{11}{4} \bullet \frac{2}{7}$
Step 3. Multiply Across. $\frac{164}{15}$ or $10\frac{14}{15}$	Step 3. Simplify & Multiply Across. $\frac{11}{4} \bullet \frac{2}{7} = \frac{11}{2} \bullet \frac{1}{7} = \frac{11}{14}$

1. $2\frac{3}{4} \bullet 1\frac{5}{11}$
2. $9 \bullet 4\frac{2}{3}$
3. $1\frac{1}{3} \bullet 4\frac{1}{6}$
4. $1\frac{1}{9} \bullet 2\frac{2}{5}$
5. $9 \bullet 1\frac{1}{3}$
6. $6\frac{1}{2} \bullet 2\frac{1}{13}$
7. $5\frac{1}{2} \div 1\frac{3}{4}$
8. $1\frac{3}{4} \div \frac{1}{2}$
9. $\frac{1}{5} \div 1\frac{3}{4}$
10. $\frac{4}{5} \div \frac{2}{3}$
11. $\frac{9}{20} \div 1\frac{4}{5}$
12. $3\frac{5}{8} \div 2\frac{1}{6}$

Order of Operations

Do Not Use a Calculator

In mathematics, to simplify expressions we must follow the same order when dealing with multiple operations. Step 1. Perform any operation with grouping symbols. (**P**arentheses, brackets, above or below the fraction bar) Step 2. Simplify any terms with **E**xponents. Step 3. **M**ultiply and **D**ivide in order from left to right. Step 4. **A**dd and **S**ubtract in order from left to right. The acronym PEMDAS can be used as a memory device, or Please, Excuse, My, Dear, Aunt Sally	Example 1: $2-3^2+(6+3\bullet 2)$ $2-3^2+(6+6)$ $2-3^2+(12)$ $2-9+12$ $-7+12$ 5 Example 2: $-7+4+(2^3-8\div -4)$ $-7+4+(8-8\div -4)$ $-7+4+(8--2)$ $-7+4+10$ $-3+10$ -7

2. $(-2)\bullet 3+5-7=$
3. $15\div 3\bullet 5-4=$
4. $29-3\bullet 9+4=$
5. $4\bullet 9-9+7=$
6. $50-(17+8)=$
7. $(12-4)\div 8=$
8. $\dfrac{5+\left[30-(8-1)^2\right]}{11-2^2}=$
10. $3(2+7)-9\bullet 7=$
11. $3+8\bullet 2^2-4=$
12. $16\div 2\bullet 5\bullet 3\div 6=$
13. $12\div 3-6\bullet 2-8\div 4=$
14. $10\bullet(3-6^2)+8\div 2=$
15. $6.9-3.2\bullet(10\div 5)=$
16. $\dfrac{3+\left[10-(27\div 9)\right]}{4-7}=$
18. $\dfrac{1}{4}(3\bullet 8)+2\bullet(-12)$
19. $12\bullet 5+6\div 6=$
20. $180\div\left[2+(12\div 3)\right]=$
21. $32\div\left[16\div(8\div 2)\right]=$
22. $162\div\left[6(7-4)^2\right]\div 3=$
23. $\left[8\bullet 2-(3+9)\right]+\left[8-2\bullet 3\right]=$
24. $5(14-39\div 3)+4\bullet\dfrac{1}{4}=$

Integer

Do Not Use a Calculator

Adding Integers

Like Signs Add the numbers & keep the same sign		Different Signs Subtract the numbers & keep the sign of the larger number	
(+) + (+) = +	(+3) + (+4) = +7	(+) + (-) = ?	(+3) + (-1) = 2
(-) + (-) = -	(-2) + (-3) = -5	(-) + (+) = ?	(-5) + (3) = -2

Subtracting Integers

Don't Subtract! Change the problem to **addition** and change the sign of the **second** number. The use the addition rules.	
(+9) - (+12) = (+9) + (-12) = -3	(+4) - (-3) = (+4) + (+3) = 7
(-5) – (+3) = (-5) + (-3) = -8	(-1) – (-5) = (-1) + (+5) = 4

Simplify.

1. $9+-4=$
2. $-8+7=$
3. $-14-6=$
4. $-30+-9=$
5. $14-20=$
6. $-2+11=$
7. $20--6=$
8. $7-10=$
9. $-6--7=$
10. $5-9=$
11. $-8-7=$
12. $1--12=$

Do Not Use a Calculator

Like Signs If the signs are the same, the answer is positive		Different Signs If the signs are the different, the answer is negative.	
(+) (+) = + (+) ÷ (+) = +	(+3)(+4) = 12 (12) ÷ (4) (+)(+) = 3	(+)(-) = - (-) ÷ (+) = -	(+3)(-4) = -12 (-12) ÷ (4) = -3

Simplify.

1. $(-5)(-3) =$
2. $\frac{-6}{2} =$
3. $(4)(2) =$
4. $\frac{-12}{-4} =$
5. $(-1)(-5) =$
6. $\frac{-16}{8} =$
7. $\frac{-7}{-1} =$
8. $(3)(-4) =$
9. $\frac{8}{-4} =$
10. $(-2)(7) =$
11. $\frac{-20}{-1} =$
12. $(2)(-5) =$

Step 1. Underline the place value in which you want to round. Step 2. Look at the digit to the right of the place value you want to round. Step 3. If the number to the right is less than 5, keep the underlined number the same and drop all the digits to the right. If the number to the right is 5 or more, add 1 to the underlined digit and drop all the digits to the right.	Round each of the following to the tenths place. Example 1: 23.1246 2 is less than 5 – so drop 246 23.<u>1</u>246 = 23.1 Example 2: 64.2685 6 is more than 5 – so add 1 to 2 & drop the 685 64.<u>2</u>685 = 64.3 Example 3: 83.9721 7 is more than 5 – so add 1 to 9 and drop the 721 83.<u>9</u>721 = 84.0

Round each of the following numbers to the tenths place.

1. 18.6321 _____
2. 25.0543 _____
3. 3.9215 _____
4. 36.9913 _____
5. 15.9199 _____
6. 0.2658 _____
7. 100.9158 _____
8. 19.9816 _____
9. 17.1083 _____
10. 0.6701 _____

Round each of the following numbers to the hundredths place.

11. 18.6321 _____
12. 25.0553 _____
13. 3.9215 _____
14. 36.9943 _____
15. 15.9199 _____
16. 0.2658 _____
17. 100.9958 _____
18. 19.9816 _____
19. 17.1083 _____
20. 0.6701 _____

Do Not Use a Calculator

Evaluating Expressions

Example:

Evaluate the following expression when $x = \frac{1}{2}$

a. 5x $(5)(\frac{1}{2}) = \frac{5}{2}$

b. -2x $(-2)(\frac{1}{2}) = -1$

c. x + 25 $25 + \frac{1}{2} = 25\frac{1}{2}$

d. 4x – 3 $4(\frac{1}{2}) - 3 = 2 - 3 = -1$

e. 3x + 4 $3(\frac{1}{2}) + 4 = \frac{3}{2} + \frac{8}{2} = \frac{11}{2}$

Evaluate the following expressions when $x = \frac{1}{2}$, $y = -4$, $z = 6$

1. $3x$
2. $2x^2$
3. $3x^2 + y$
4. $2(x + z) - y$
5. $5z - 6$
6. $2x + 3y - z$

Evaluate the following expressions when $x = -4$, $y = \frac{1}{3}$, $z = \frac{-1}{2}$

7. $5x - (y + 2z)$
8. $\frac{xy}{2}$
9. $x^2 + y^2 + z^2$
10. $2x(y + z)$
11. $4x - 2y - z$
12. $\frac{xy}{z}$

Combining Like Terms

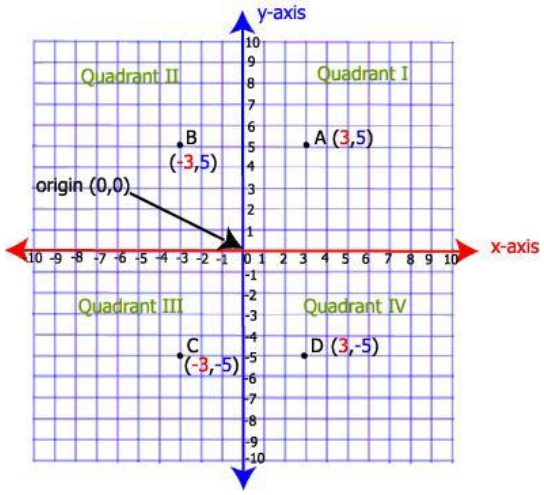
Do Not Use a Calculator

What is a **term**? The parts of an algebraic expression that are separated by an addition or subtraction sign are called terms. What are **like terms**? Terms with same variable factors are called like terms. For example 2n and 3n are like terms, but 3x and 4y are not like terms because x & y are different variables. To simplify an expression, you must combine like terms.	Example 1: 5x + 8x add the coefficients 5+8 =13x Example 2: 3y − 6y subtract coefficients 3-6 = -3y Example 3: 3x + 4 – 2x + 3 3x – 2x + 4 + 3 1x + 7 Example 4: 2b + 5c + 3b – 6c 2b + 3b + 5c – 6c 5b – 1c

Simplify each expression

1. $6n+5n$
2. $25b+15b$
3. $37z+4z$
4. $x-5x$
5. $3n+1-2n+8$
6. $4f+5f-6+8$
7. $7t+9-4t+3$
8. $2k+4-8k-1$
9. $8g+9h-4g-5h$
10. $2m+3n-4m+5n$
11. $4r+3r+6y-2y$
12. $a+5b-2a+9b$

Graphing

Points in a plane are named using two numbers, called a coordinate pair. The first number is the x-coordinate. The x-coordinate is positive when the point is to the right of the origin, and negative it is to the left of the origin. The second number is the y-coordinate. The y-coordinate is positive when the point is to the above of the origin, and negative it is below of the origin. Quadrant 1: positive x-coordinate & positive y-coordinate (+x, +y) Quadrant 2: negative x-coordinate & positive y-coordinate (-x, +y) Quadrant 3: negative x-coordinate & positive y-coordinate (-x, -y) Quadrant 4: positive x-coordinate & negative y-coordinate (+x, -y)	A is at the point (3,5). B (-3,5) C (-3,-5) D (3,-5) 

Plot each point on the graph below. Remember, coordinate pairs are labeled (x,y).

1. Label each point on the graph with the letter given.

A (3,4)

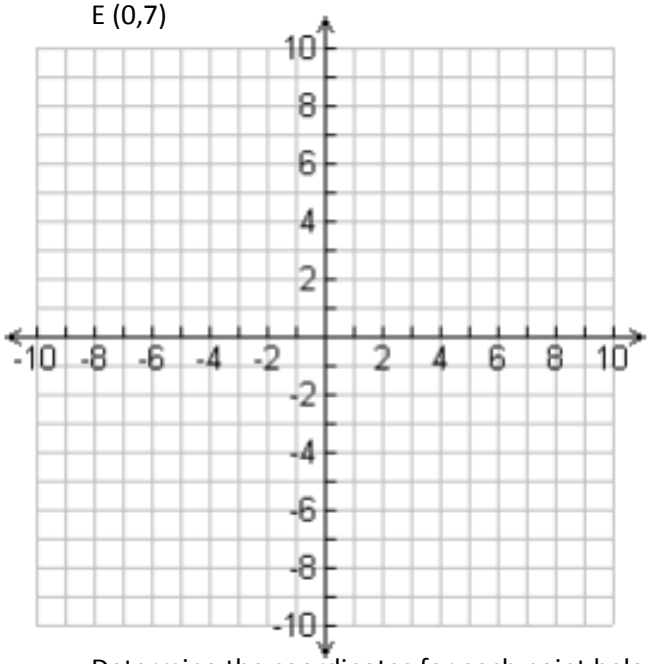
B (4,0)

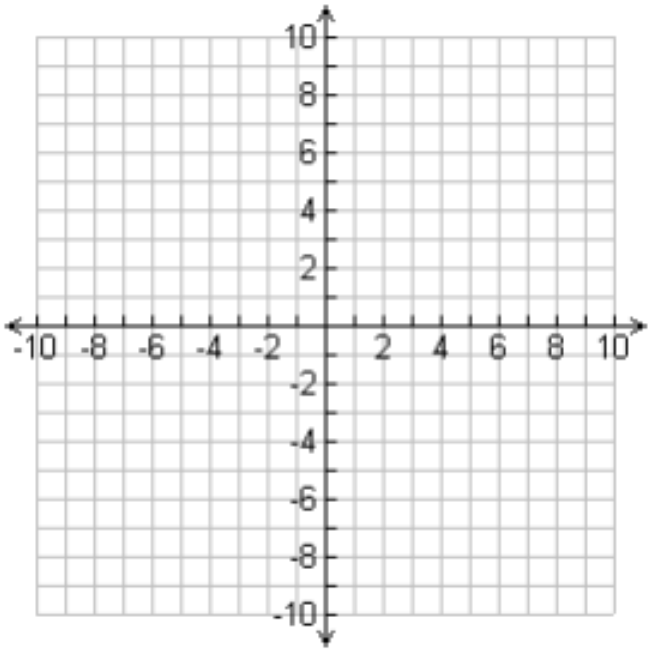
C (-4,2)

D (-3, -1)

E (0,7)

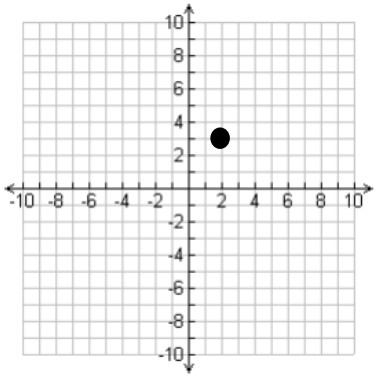
2. Label all the parts of the coordinate plane.
Origin, x-axis, y-axis, Quadrants I, II, III, IV



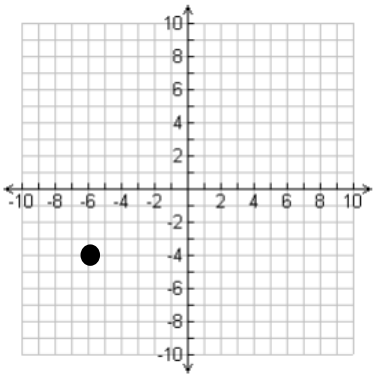


Determine the coordinates for each point below.

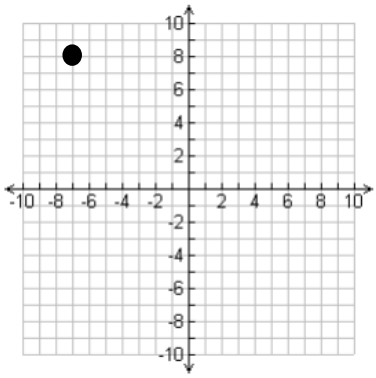
Example: (__2__ , __3__)



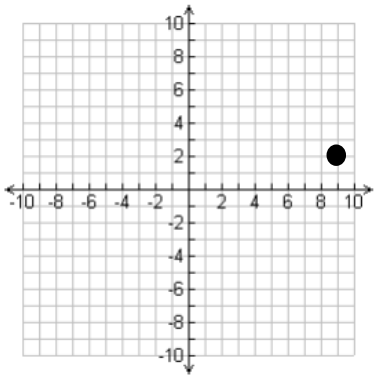
3. (_____ , _____)



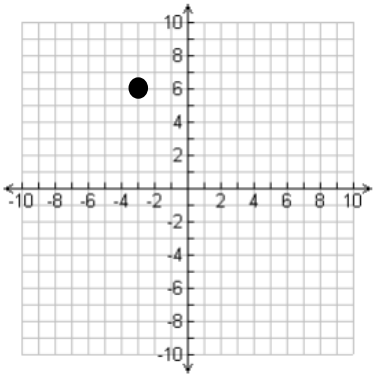
4. (_____ , _____)



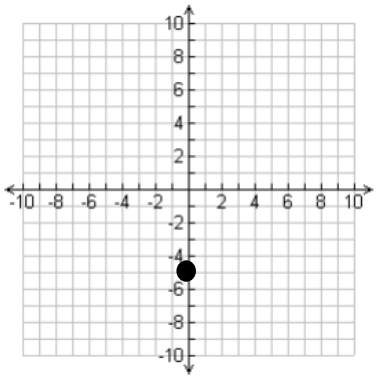
5. (_____ , _____)



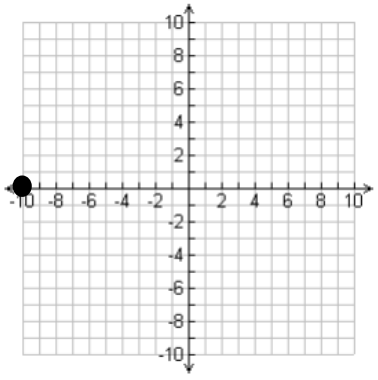
6. (_____ , _____)



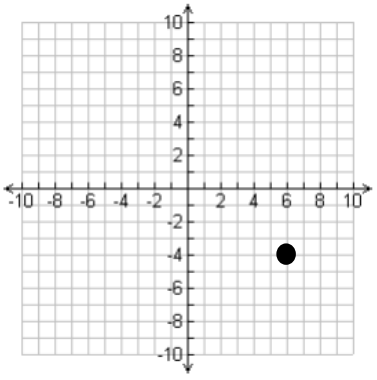
7. (_____ , _____)



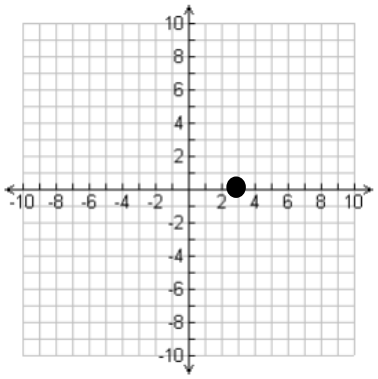
8.(_____ , _____)



9. (_____ , _____)

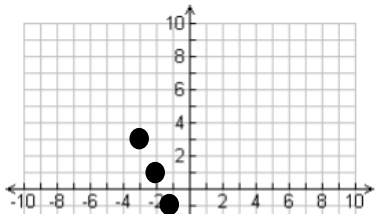


10. (_____ , _____)



Complete the tables, then graph the (x,y) data points on the graphs provided.

Example: $y = -2x - 3$ work: graph:



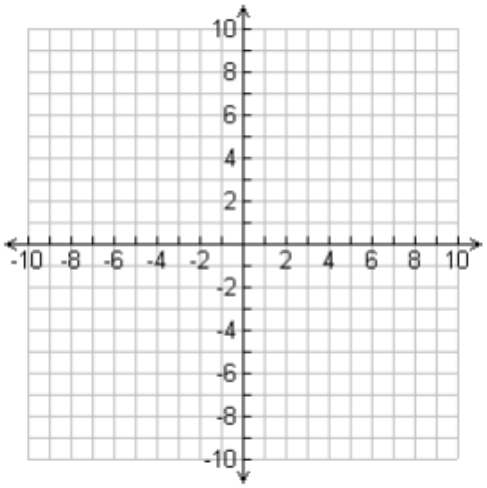
x	y
-3	3
-2	1
-1	-1
0	-3

x=-3 So plug that into the equation
y= -2(-3)-3, so y=3 →(-3,3)

x=-2 So plug that into the equation
y= -2(-2)-3, so y=1 →(-2,1)

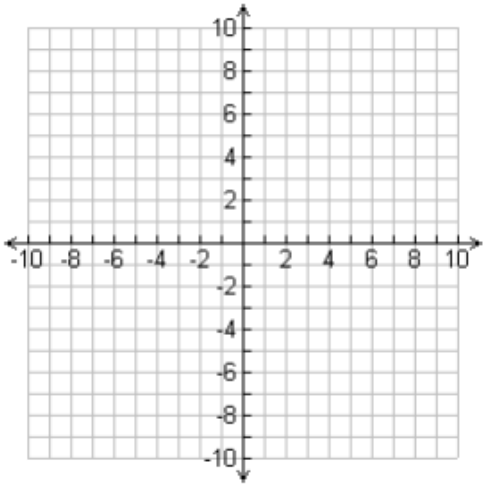
x=-1 So plug that into the equation
y= -2(-1)-3, so y=3 →(-1,-1)

x=0 So plug that into the equation
y= -2(0)-3, so y=3 →(0,-3)



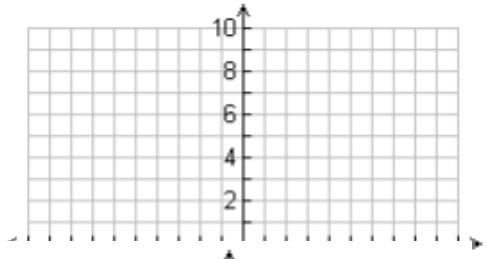
11. $y = x + 2$

x	y
-2	
-1	
0	
1	



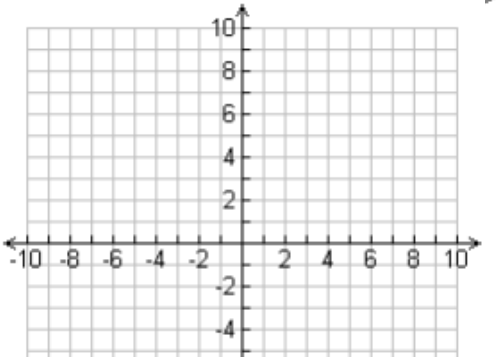
12. $y = 2x$

x	y
0	
1	
2	
3	



13. $y = -x$

x	y
-3	
-1	
1	
3	



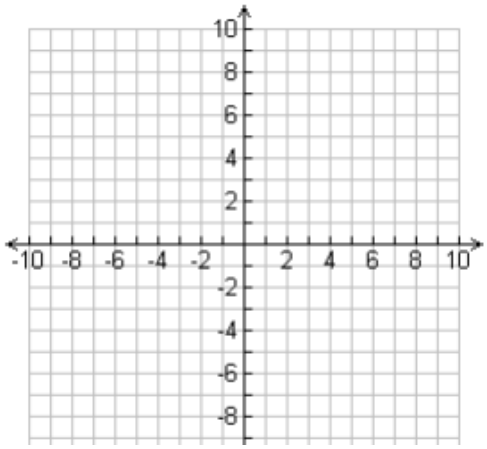
14. $y = 2x - 3$

x	y

-3	
-1	
1	
3	

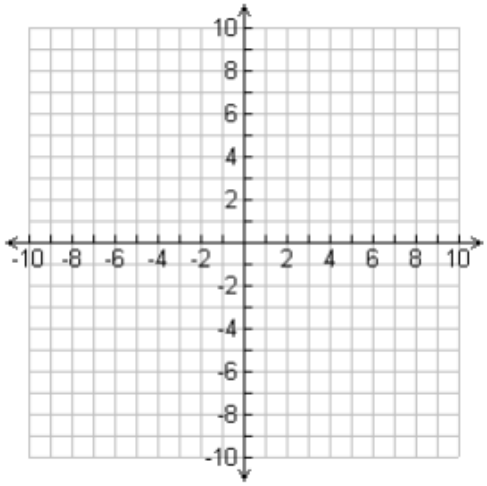
15. $y = \frac{1}{2}x + 1$

x	y
0	
2	
4	
6	



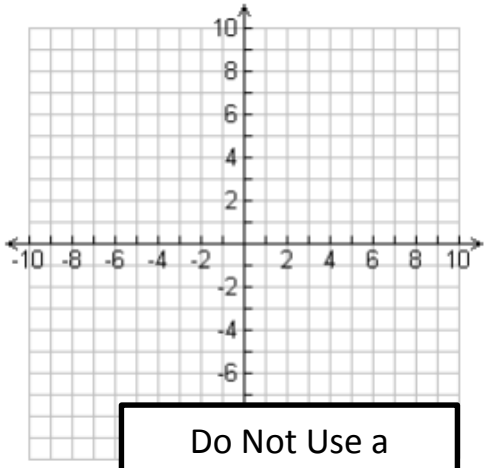
16. $y = \frac{3}{2}x - 1$

x	y
-4	
-2	
2	
4	



17. $y = -\frac{2}{3}x + 1$

x	y
-3	
-1	
1	
3	



Solving Equations

Do Not Use a Calculator

To solve an equation means to ***find the value*** of the variable. We solve equations by isolating the variable using opposite operations. An easy way to remember is to do the Order of Operations in reverse.

Opposite Operations:

Addition (+) & Subtraction (-)
Multiplication(x) & Division (÷)

Please remember:
Do the same operation on each side of the equation

Always check your work by substituting the answer back into the original problem.

Example: (PEMDAS backwards)

Solve.

$3x - 2 = 10$ Undo subtract (by adding 2 to both sides)

$+2 \quad +2$

$3x = 12$ Undo multiply (by dividing by 3 on both sides)

$\div 3 \quad \div 3$

$x = 4$ Check $3(4) - 2 = 10$

$12 - 2 = 10$ Is this equation true?

Yes!!! SO we solve correctly

Use line for organization.

Solve.

1. $x + 3 = 5$

2. $w - 4 = 10$

3. $c - 5 = -8$

4. $3p = 9$

5. $c - 15 = -8$

6. $5j - 3 = 12$

7. $\frac{h}{3} = 5$

8. $\frac{m}{8} = 7$

9. $\frac{4}{5}d = 12$

10. $\frac{3}{8}j = 6$

11. $2x - 5 = 11$

12. $4n + 1 = 9$

13. $40 = x + 6 - 28$

14. $2x + 11 = 9$

15. $-3x + 4 = -8$

16. $-10 = w - 32 + 6$

17. $\frac{f}{3} + 10 = 15$

18. $\frac{a}{7} - 4 = 2$

19. $\frac{b+4}{2} = 5$

20. $\frac{x-6}{5} = -3$

Use substitution to determine whether the solution is correct.

21. $4x - 5 = 7$ x = 3

22. $-2x + 5 = 13$ x = 4

23. $6 - x = 8$ x = 2

24. $1 - x = 9$ x = -8

Inequalities

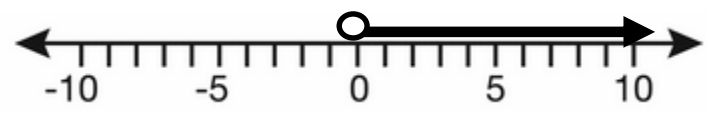
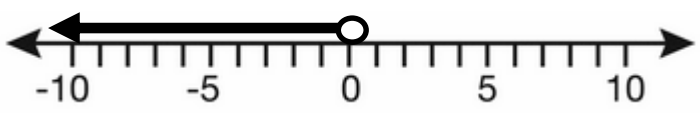
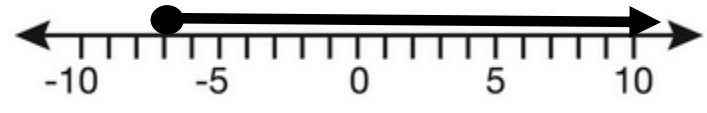
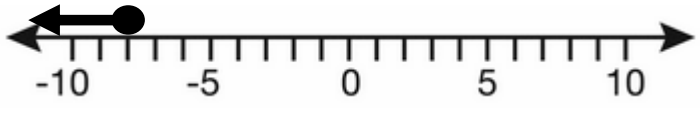
An inequality is a statement containing one of the following symbols:

<	>	≤	≥
Is less than	is greater than	Is less than or equal	is greater than or equal

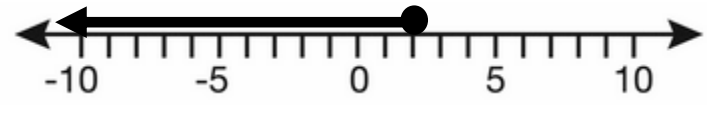
An inequality has many solutions, and we represent the solutions of an inequality by a set of numbers on a number line.

When graphing an inequality, $<$ and $>$ use an open circle ○ $\leq$ and $\geq$ use an closed circle ●

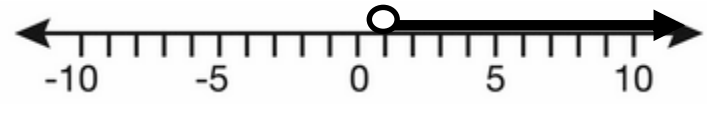
Examples:

$x > 0$ 	$x < 0$ 
$x \geq -8$ 	$x \leq -8$ 

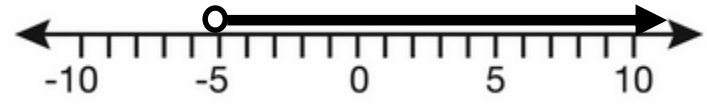
Practice: Write an inequality to represent the solution set that is shown on the graph.



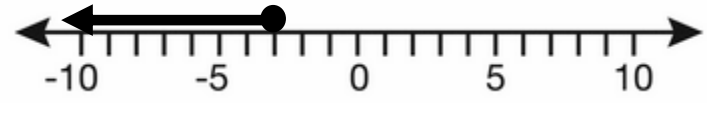
1. _____



2. _____



3. _____



4. _____

Graph each of the following inequalities on a number line.

5. $x > 4$

6. $k \leq -6$

7. $5 > y$

8. $j \leq -\frac{1}{2}$

9. $-2 \leq t$

10. $w \leq 15$

Key Words for Translations:

Add	Subtract	Multiply	Divide	Inequalities	Variable	=
Plus	Decreased	Per	One-third	< is less than	A number	Same as
Sum	Smaller	For every	Quotient	> is greater than	Some number	Equals
Longer than	Less than	For each	Divided by	≤ is less than	Quantity	Is
Greater than	Difference	Double	Each part	or equal to		Totals
Together	Reduced	Triple	Half as much	≥ is greater than		Was
Total	Differ	Multiplied	Split equally	or equal to		Results
Increased	Fewer	Of				Outcome
More than	Shorter than	Times				Answer
In all	Minus	Twice				
And	Diminished					

Examples:

A) Translate the expression: 3 less than 5 times some number

3 **less than**	5 **times**	**some number**
to subtract from	multiply	use a variable

Translation: $5n-3$

B) Translate the expression: 3 less than 5 times some number is 22

3 **less than**	5 **times**	**some number**	**is** 22
to subtract from	multiply	use a variable	=

Translation: $5n-3=22$

C) Translate the expression: the quotient of a number and -4, less 8 is -42

the **quotient** of a **number** and -4	**less** 8	**is** -42
Divide a variable and a number	subtract	=

Translation: $\frac{n}{-4}-8=-42$

D) Translate the expression: four plus three times a number is less than or equal to 18

four **plus**	three **times**	a **number**	**is less than or equal to** 18
Add	multiply	use a variable	≤

Translation: $4+3n\le 18$

Practice: Translate each phrase into a mathematical statement

1. Seven plus five times a number is greater than or equal to -9

2. Eight times a number increased by 6 is 62

3. One half of a number is equal to 14

4. 6 less than 8 times some number

5. a number divided by 9

6. p deceased by 5

7. twice a number decreased by 15 is equal to -27

8. 9 less than7 times some number is -6

9. the sum of number and eight is less than 2

10. eleven increased by a number is -12

Matching. Put the letter of the algebraic expression that estimates the phrase.

_____ 1.	Two more than a number	a.	2x
_____ 2.	Two less than a number	b.	x + 2
_____ 3.	Half of a number	c.	2 – x
_____ 4.	Twice a number	d.	x – 2
_____ 5.	Two decreased by a number	e.	$\frac{x}{2}$

Pay attention to subtraction. The order makes a difference.
Translate to an algebraic expression, then reread to check.

Word Problems

Translate each word problem into an algebraic equation, using x for the unknown, and solve.

1. Write a "let x =" for each unknown
2. Write an equation
3. Solve the equation
4. Rewrite the "let x=" statement using the answer

For example:

Kara is going to Maui on vacation. She paid $325 for her plane ticket and is spending $125 each night for the hotel. How many nights can she stay in Maui if she has $1200?

Step 1: What are you asked to find? Let the variables represent what you are asked to find.
How many nights can Kara stay in Maui?
Let x = The number of nights that Kara can stay in Maui

Step 2: Write an equation to represent the relationship in the problem.

$$325+125x=1200$$

Step 3: Solve the equation for the unknown

$$325+125x=1200$$

$$-325 \qquad -325$$

$$125x=875$$

$$\div 125 \quad \div 125$$

$$x=7$$

check your answer: $325+125(7)=1200$

$$325+125(7)=1200$$

$$325+875=1200$$

$$1200=1200$$

√

Step 4: Kara can stay in Maui 7 nights

Solve.

1. A video store charges a one-time membership fee of $12.00 plus $1.50 per video rental. How many videos did Stewart rent if he spent $21?

2. Bicycle City makes custom bicycles. They charge $160 plus $80 for each day that it takes to build the bicycle. If you have $480 to spend on your new bicycle, how many days can it take Bicycle City to build your bike?

3. Darrel went to the mall and spent $41. He bought several t-shirts that each costs $12 and he bought one pair of socks for $5. How many t-shirts did Darrell buy?

4. Janet weighs 20 pounds more than Anna. If the sum of their weights is 250 pounds. How much does each of the girls weigh?

5. Three-fourths of the student body attended the pep rally. If there were 1230 students at the pep rally, how many students are there in all?

6. Two-thirds of the Ms. Smith's students voted on the assignment. If 60 students voted, how many students does she have in all?

7. The current price of a school t-shirt is $10.58. Next year the cost of the t-shirt will be $15.35. How much is the price increase of next year's t-shirt?

8. The school lunch prices are changing next year. The cost of a hot lunch will increase $0.45 from the current price. IF next year's price will be $2.60. What did a hot lunch cost this year?

9. Next year the cost of gasoline will increase $1.25 from the current price. If the cost of a gallon of gasoline next year will be $4.50. What is the current price of gasoline?

10. Sarah drove 3 hours more than Michael on their trip to Texas. If the trip took 37 hours, how long did Sarah and Michael each drive?