CHERRY HILL EAST

Algebra 1
Summer Review Packet

Welcome to Algebra 1! This summer review assignment is designed for all the students enrolled in Algebra 1 for the next school year. It is designed refresh your skills from previous math courses and prepare you for a successful year!

- **This packet is to be completed by the end of the 1st cycle.**
- **It will be collected and graded based upon completion and effort.**
- **These are not new skills or concepts and will be reviewed at a rapid pace during the beginning of the school year.**
- **A <u>formal assessment</u> will be given based on information reviewed in this packet during the first two weeks of school in September.**
- **When necessary, use the formulas and hints provided in this packet and the online sites to help refresh your memory!**
- **You MUST SHOW WORK on a separate sheet or printed version!**

See you in September!!
Mr. Mancinelli, Mrs. Melograna & Mrs. Burgess

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Enriched Algebra Summer Workshop

Part 1: Solving Multi-Step Equations

To solve an equation with the same variable on each side, write an equivalent equation that has the variable on just one side of the equation. Then solve.

Example **Solve $4(2a - 1) = -10(a - 5)$.**

$4(2a - 1) = -10(a - 5)$	Original equation
$8a - 4 = -10a + 50$	Distributive Property
$8a - 4 + 10a = -10a + 50 + 10a$	Add 10a to each side.
$18a - 4 = 50$	Simplify.
$18a - 4 + 4 = 50 + 4$	Add 4 to each side.
$18a = 54$	Simplify.
$\frac{18a}{18} = \frac{54}{18}$	Divide each side by 18.
$a = 3$	Simplify.

The solution is 3.

Practice Solving each equation

1. $14n - 8 = 34$	2. $8 + \frac{n}{12} = 13$	3. $\frac{3k-7}{5} = 16$
4. $5 + 3r = 5r - 19$	5. $6(-3m + 1) = 5(-2m - 2)$	6. $3(d - 8) - 5 = 9(d + 2) + 1$

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Part 2: Solving and Graphing Multi-Step Inequalities

- Use the equation rules from the previous page.
- When dividing by a negative, flip the inequality sign.
- Make sure the variable is on the left before graphing.
  - $>$ or $<$: open circle ○
  - $\geq$ or $\leq$: closed circle ●
  - $>$ or $\geq$: arrow to the right
  - $<$ or $\leq$: arrow to the left

Solve and Graph each solution on the number line

1. $5x - 3 > 12$ 	2. $\frac{2x-3}{5} \leq 7$ 
3. $6x - 7 \leq 6x - 10$ 	4. $9r + 15 \geq 24 + 10r$ 
5. $3(4m + 2) \leq 6(2m + 1)$ 	6. $4y + 2 < 8y - 2(3y - 5)$ 

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Part 3: Equation and Inequality Word Problems

Translate each word problem into an algebraic equation or inequality, using x for the unknown, and solve. Write a "let x =" for each unknown; write an equation or inequality; solve the equation or inequality; substitute the value of x into the let statement to answer the question.

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 fine? Let variables represent what you are asked to find.

How many nights can Kara stay in Maui?

Let x = The number of nights 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

$325 + 125x = 1200$

$-325 \qquad -325$

$125x = 875$

$x = 7$ Kara can spend 7 nights in Maui

1. An online video service charges a one-time membership fee of $12 plus $1.50 per rental fee. How many videos can Stewart rent if he spends $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 our new bicycle, how many days can it take Bicycle City to build the bike?
3. Kevin went to the mall and spent $41. He bought several t-shirts that each cost $12 and he bought 1 pair of socks that cost $5. How many t-shirts did Kevin buy?	4. Keith has $500 in a savings account at the beginning of the summer. He wants to have at least $200 in the account at the end of the summer. He withdraws $25 each week for food, clothing and movie tickets. How many weeks can Keith withdraw money from his account?
5. Skate land charges a $50 flat fee for birthday party rental and $10.50 per person. Maryann has no more than $200 to spend on the party, how many people can she invite?	6. Mark wants to order video games on Gamefly. Each game cost $19.99 and shipping is a fixed $9.99 for the whole order. Mark has no more than $140 to spend on video games, how many can be buy without exceeding his limit?

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Part 4: Literal Equations

Solve for Variables Sometimes you may want to solve an equation such as $V = \ell wh$ for one of its variables. For example, if you know the values of V, w, and h, then the equation $\ell = \frac{V}{wh}$ is more useful for finding the value of ℓ. If an equation that contains more than one variable is to be solved for a specific variable, use the properties of equality to isolate the specified variable on one side of the equation.

Example 1 Solve $2x - 4y = 8$ for y.

$$2x - 4y = 8$$
$$2x - 4y - 2x = 8 - 2x$$
$$-4y = 8 - 2x$$
$$\frac{-4y}{-4} = \frac{8 - 2x}{-4}$$
$$y = \frac{8 - 2x}{-4} \text{ or } \frac{2x - 8}{4}$$

The value of y is $\frac{2x - 8}{4}$.

Example 2 Solve $3m - n = km - 8$ for m.

$$3m - n = km - 8$$
$$3m - n - km = km - 8 - km$$
$$3m - n - km = -8$$
$$3m - n - km + n = -8 + n$$
$$3m - km = -8 + n$$
$$m(3 - k) = -8 + n$$
$$\frac{m(3 - k)}{3 - k} = \frac{-8 + n}{3 - k}$$
$$m = \frac{-8 + n}{3 - k}, \text{ or } \frac{n - 8}{3 - k}$$

The value of m is $\frac{n - 8}{3 - k}$. Since division by 0 is undefined, $3 - k \neq 0$, or $k \neq 3$.

Solve each equation or formula for the variable specified.

1. $15x + 1 = y \quad solve\ for\ x$	2. $7x + 3y = m \quad solve\ for\ y$	3. $x\,(4 - k) = p \quad solve\ for\ k$
4. $P = 2l + 2w \quad solve\ for\ w$	5. Given the surface area of a cone is represented by the following formula $S = \pi rl + B$, find the slant height, *l*, given the surface area, *S* is 141.4 in^2 and the radius, *r*, is 3 inches long and the base area, B is 28.3 in^2.	

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Part 5: Rate of Change and Slope

Find Slope

Slope of a Line	$m = \frac{\text{rise}}{\text{run}}$ or $m = \frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) and (x_2, y_2) are the coordinates of any two points on a nonvertical line

Example 1 **Find the slope of the line that passes through (−3, 5) and (4, −2).**

Let $(-3, 5) = (x_1, y_1)$ and $(4, -2) = (x_2, y_2)$.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Slope formula

$= \frac{-2 - 5}{4 - (-3)}$ $y_2 = -2, y_1 = 5, x_2 = 4, x_1 = -3$

$= \frac{-7}{7}$ Simplify.

$= -1$

Example 2 **Find the value of r so that the line through (10, r) and (3, 4) has a slope of $-\frac{2}{7}$.**

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Slope formula

$-\frac{2}{7} = \frac{4 - r}{3 - 10}$ $m = -\frac{2}{7}, y_2 = 4, y_1 = r, x_2 = 3, x_1 = 10$

$-\frac{2}{7} = \frac{4 - r}{-7}$ Simplify.

$-2(-7) = 7(4 - r)$ Cross multiply.

$14 = 28 - 7r$ Distributive Property

$-14 = -7r$ Subtract 28 from each side.

$2 = r$ Divide each side by −7.

Find the slope of the line through the given points, or the value of r for the given slope.

1. (4, 9), (1, -6)	2. (2, 5), (6, 2)	3. (4, 3.5), (-4, 3.5)
4. (1, -2), (-2, -5)	5. (6, 8) (r, -2) , $m = 1$	6. (10, r) (3, 4), $m = \frac{-2}{7}$

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Part 6: Graphing Linear Equations

Example: $y = -2x - 3$

X	Y
-3	3
-2	1
-1	-1
0	-3

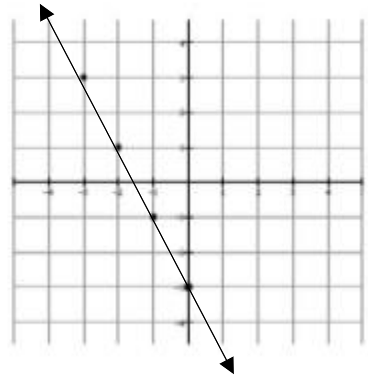
Work:

$x = -3$
$y = -2(-3) - 3 = 6 - 3 = 3$
Therefore $(x, y) = (-3, 3)$

$x = -2$
$y = -2(-2) - 3 = 4 - 3 = 1$
Therefore $(x, y) = (-2, 1)$

$x = -1$
$y = -2(-1) - 3 = 2 - 3 = -1$
Therefore $(x, y) = (-1, -1)$

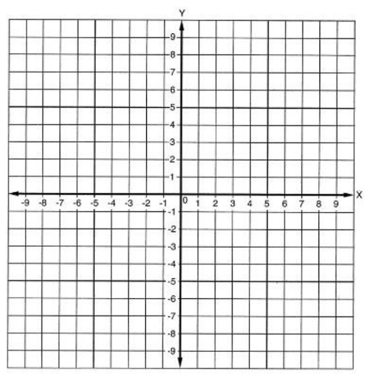
$x = 0$
$y = -2(0) - 3 = 0 - 3 = -3$
Therefore $(x, y) = (0, -3)$



Create a table of values and graph the line from the given equation.

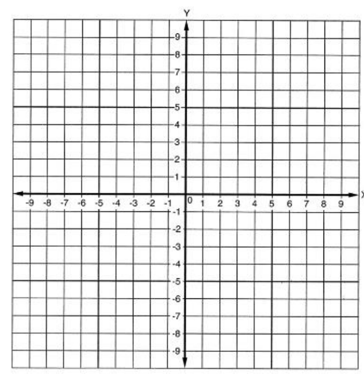
1. $y = 2x - 4$

x	y
-1	
0	
2	
3	
4	
6	



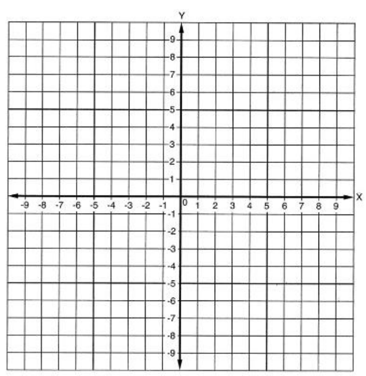
2. $y = -x - 3$

x	y
-7	
-4	
-1	
0	
2	
3	



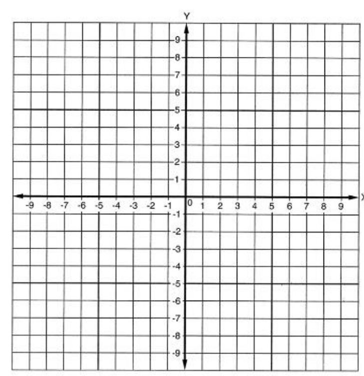
3. $y = \frac{1}{3}x + 1$

x	y
-6	
-3	
0	
3	
6	
9	



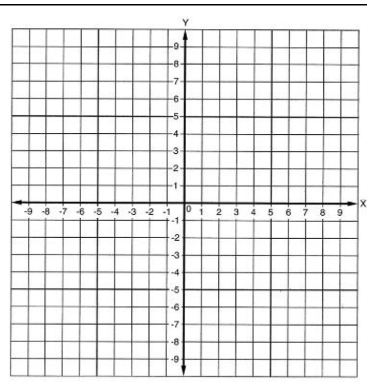
4. $x + 2y = 10$

x	y
-6	
-2	
0	
4	
8	
10	



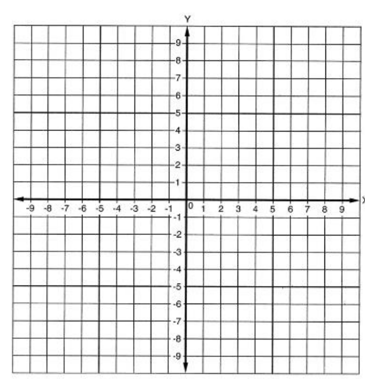
5. $x - y = -2$

x	y
-4	
-3	
0	
1	
4	
6	



6. $2x - 3y = 6$

x	y
-3	
-1	
0	
1	
2	
3	



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Part 7: Function Notation

Find the functional values f(-2), and f(3) for the function:
$f(x) = x^2 + 1$

This problem involves 2 steps because you are asked to find two values for the function. You must evaluate for f(-2) and f(3).

Step 1: $f(x) = x^2 + 1$	**find f(-2)**	**Original Problem**
$f(-2) = (-2)^2 + 1$	Substitute (-2) for x in the original function	
$f(-2) = 4+1$	Evaluate!	
$f(-2) = 5$	**This is your answer to part 1.**	

Step 2: $f(x) = x^2 + 1$	**find f(3)**	**Original Problem**
$f(3) = 3^2 + 1$	Substitute 3 for x in the original function.	
$f(3) = 9+1$	Evaluate!	
$f(3) = 10$	**This is your answer to part 2.**	

Our final solution to the function, $f(x) = x^2 + 1$ is:

$f(-2) = 5$ & $f(3) = 10$

This means:

If we substitute -2 for x
We get an answer of 5

If we substitute 3 for x
We get an answer of 10

Evaluate each function

1. $g(x) = 4x - 1;\ find\ g(-6)$	2. $p(t) = -3\lvert t+1\rvert;\ find\ p(2)$	3. $f(n) = 2n^2 + 5n;\ find\ f(-3)$
4. $h(t) = t^3 - 5t^2;\ find\ h(5)$	5. $g(a) = 2a + 3\ and\ h(a) = 2a + 1$ $find\ g(-7) - h(-7)$	6. $g(t) = 2t + 1\ and\ h(t) = 3t + 3$ $find\ g(5) \bullet h(5)$

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Part 8: Domain and Range of Functions

Let n be the number of the hours Lakeshia worked and let E represent the money she earned.

a. Write an algebraic equation for the amount earned, E, in terms of n.

$E = 6n + 10$

b. The algebraic equation for E in terms of n describes E as a function of n. There is specific notation that is often used for functions. The expression $E(n)$ is read "the function E of n." This notation means that $E(n)$ would be the amount of money Lakeshia earned for n hours. Rewrite your algebraic equation from part (a) using this notation.

$E(n) = 6n + 10$

c. $E(7)$ means to replace n with 7 and calculate the value of the function. What is the value of $E(7)$? Of $E(11)$?

$E(7) = 6 \cdot 7 + 10$ $E(7) = 52$ $E(11) = 6 \cdot 11 + 10$ $E(11) = 76$

d. The information in the table in question 2 shows E was 34 when n was 4. Write this information using function notation.

$E(4) = 34$

e. How much would Lakeshia earn if she works 14 hours for Ms. Alvarez? Show the work that leads to the answer using function notation.

$E(14) = 6 \cdot 14 + 10$ $E(14) = \$94$

f. If Lakeshia does not work any hours, how much does the model say she will earn? Can she work a million hours? Do these amounts make sense in the situation? Justify your statements.

$E(0) = 6 \cdot 0 + 10$ $E(0) = 10$

1. A company has developed a new video game console. After completing cost analysis and demand forecasts, the company has determined that the profit function for the new console is $f(g) = -250g^2 + 70{,}000g - 4{,}570{,}000$ where g is the number of consoles sold. What is the domain of the profit function?

- A. all integers
- B. all rational numbers
- C. all integers greater than or equal to 0
- D. all rational numbers greater than or equal to 0

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2.

Jamie has a plan to save money for a trip. Today, she puts 5 pennies in a jar. Tomorrow, she will put the initial amount in plus another 5 pennies. Each day she will put 5 pennies more than she put into the jar the day before, as shown in the table.

Day	0	1	2	3
Deposit (pennies)	5	10	15	20

Part A

Let $f(d)$ represent the amount of pennies she puts into the jar on day d. What does $f(10) = 55$ mean?

- A. Jamie will put 10 pennies in the jar on day 55.
- B. Jamie will put 55 pennies in the jar on day 10.
- C. Jamie will have 10 pennies in the jar on day 55.
- D. Jamie will have 55 pennies in the jar on day 10.

Part B

Let $f(d)$ represent the amount of pennies that Jamie puts into the jar on day d. Today is day 0.

Select the statement that is true.

- A. $f(d+1) = f(d)$
- B. $f(d+1) = 5(f(d))$
- C. $f(d+1) = f(d) + 1$
- D. $f(d+1) = f(d) + 5$

3.

The value, V, of an investment is given by the function $V(t)$, where t is the number of years since 1995 and V is measured in thousands of dollars. Which equation indicates that the investment had a value of $8,000 in 2005?

- A. $V(8) = 10$
- B. $V(10) = 8$
- C. $V(8{,}000) = 2005$
- D. $V(2005) = 8{,}000$

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4\.

The cost to manufacture x pairs of sunglasses can be represented by a function, $C(x)$. If it costs $398 to manufacture 4 pairs of sunglasses, which of the following is true?

Select the correct equation.

A. $C(4) = 99.50$

B. $C(398) = 4$

C. $C(4) = 398$

D. $C(99.50) = 1$

5\.

Jerome is constructing a table of values that satisfies the definition of a function.

Input	−13	20	0	−4	11	−1	17	
Output	−15	−11	−9	−2	−1	5	5	13

Which number(s) can be placed in the empty cell so that the table of values satisfies the definition of a function?

Select **all** that apply.

A. −5

B. −1

C. 0

D. 2

E. 11

F. 17

6\.

Matthew has a job where his daily pay P, in dollars, is given by the function $P(h) = 15h$, where h represents the number of hours worked that day. Last week, he worked 2 hours more on Tuesday than he did on Wednesday. If he worked c hours on Tuesday, which statements are true?

Select **all** that apply.

- ☐ A. $P(c)$ represents Matthew's pay, in dollars, on Tuesday.
- ☐ B. $15c$ represents Matthew's pay, in dollars, on Tuesday.
- ☐ C. $P(c-2)$ represents Matthew's pay, in dollars, on Wednesday.
- ☐ D. $15c-2$ represents Matthew's pay, in dollars, on Wednesday.
- ☐ E. $P(c)-P(c-2)$ represents how much more Matthew's pay was on Tuesday than on Wednesday.

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Part 9: Evaluating Algebraic Expressions

P – Parenthesis first
E – Exponent next
M > Division and Multiplication
D > from left to right
A > Addition and Subtraction
S > from left to right

Start with:	$20 \times 2 - (1/2) \times 9.8 \times 2^2$
Parentheses first:	$20 \times 2 - 0.5 \times 9.8 \times 2^2$
Then Exponents ($2^2=4$):	$20 \times 2 - 0.5 \times 9.8 \times 4$
Then the Multiplies:	$40 - 19.6$
Subtract and DONE !	**20.4**

Find the value for each variable expression when $a = -4$ and $b = 2$.

Substituting $a = -4$ and $b = 2$, then finding the value of X:

$X = 3ab - 4b^2$	given expression
$= 3(-4)(2) - 4(2)^2$	substituting for variables
$= 3(-4)(2) - 4(4)$	computing the exponent
$= -24 - 16$	multiplying
$= -24 + (-16)$	converting to addition
$= -40$	adding

Evaluate each expression

1. $250 \div [5(3 \cdot 7 + 4)]$	2. $\dfrac{5^2 \cdot 4 - 5 \cdot 4^2}{5(4)}$	3. $\dfrac{1}{2} \cdot 26 - 3^2$
4. $8^2 \div (2 \cdot 8) + 2$	5. $5 + [30 - (6-1)^2]$	6. $\dfrac{2 \cdot 4^2 - 8 \div 2}{(5+2) \cdot 2}$
7. $5x^2 - y$ *when* $x = 4$ *and* $y = 24$	8. $\dfrac{3xy - 4}{7x}$ *when* $x = 2$ *and* $y = 3$	9. $(z \div x)^2 + \dfrac{4}{5}x$ *when* $x = 2$ *and* $z = 4$