Algebra I
Summer Math Packet

This is _____'s summer math practice.

The purpose of the summer math packet is to maintain your math skills so you can "hit the ground running" at the start of high school.

When: The attached problems are due on the first day of school, September 2021. For best results, make a plan and spread out the work over the summer months.

Suggestion: Do one section every week.

Choice: Please complete Section 1 and at least 6 of the other sections.
So… complete a total of 7 or more sections, including the required Section 1.

SHOW ALL WORK: To earn credit for your summer math packet, you must show all work.
Why show work?

- To help you retain the skills in the Summer
- To help your teacher see how best to work with you in the Fall
- So you will earn credit for your summer work

Use a paper copy of this packet to show your work.
Use a digital copy of this packet to click on the links for online resources.

Resources: To help you complete the summer math packet, you may use the online resources shown throughout the packet. For some problems, you may need to search for other videos related to the ones you'll find at the links given in the packet.

Section 1: Using Equations and Expressions THIS SECTION IS REQUIRED
Section 2: Problem-solving: Saving Money
Section 3: Numbers and Operations
Section 4: Fractions/Decimals/Percents
Section 5: Graphing Lines
Section 6: Ratio and proportion
Section 7: Writing Equations and Expressions
Section 8: Recording Contract: Deal #1 or Deal #2?
Section 9: Data and probability
Section 10: Area and perimeter

Algebra I Summer Math Packet
Summer 2021

Section 1: Using Equations and Expressions

Web resources
Evaluate expressions
http://www.khanacademy.org/math/algebra/solving-linear-equations-and-inequalities/variable-and-expressions/v/variables-and-expressions-1
Solve equations
http://www.purplemath.com/modules/solvelin3.htm
Order of operations
http://www.khanacademy.org/math/arithmetic/multiplication-division/order_of_operations
Combine like terms
http://www.purplemath.com/modules/polydefs2.htm

Complete the following problems. SHOW ALL WORK ON THIS PAGE

1. If x = 5, then $\frac{x+7}{4} =$

2. If x = 3, then $x^2 =$

3. If $x = -3$, then $x^2 =$

4. Solve for x. Check your solution.

$$9x = 27$$

5. Solve for a. Check your solution.

$$3a + 4 = 22$$

6. Solve for n. Check your solution.

$$-5n - 7 = 18$$

7. Solve for y. Notice this is an inequality.

$$-3y > 12$$

Section 1: Using Equations and Expressions (continued)

On this page, the problems are NOT equations (notice there are no = signs).
The problems on this page are expressions.

Don't solve for x. Just simplify the expressions.
Be sure to use the correct order of operations (remember "PEMDAS").

SHOW ALL WORK ON THIS PAGE

8. $4 + 5 \cdot 4$

9. $6 \cdot 2t - 3t$

10. $6(2t - 3t)$

11. *Why does problem 9 have a different answer than problem 10?*

12. $-(3d - 5) + 3d$

13. $(3x^2 - 6x + 10) + (5x^2 + 6x - 2)$

Section 2: Problem-solving: Saving Money
SHOW ALL WORK

Resources:
https://www.khanacademy.org/math/algebra/linear-word-problems/modal/v/graphing-linear-functions-1

Suppose Eli gets a great job and saves $200 per week.
Before he got the job his bank account had $325 in it.

A. M= amount of money Eli has in the bank.
W = weeks since Eli started his new job
Write an equation for the amount of money in the bank (M), after W weeks.
Use slope-intercept form ($y = mx + b$)

Equation: M = _____ W + _____

Slope = _____ = **rate of change** (how fast the bank balance is changing)

y-intercept = _____ = **starting amount** (bank balance when weeks = 0)

B. Eli wants to save $3000.
After how many weeks will the bank balance be $3000 or more?

Use any method you like:

- You may use the equation you wrote in part A.
- Or you may make a table of the two variables money (M) and weeks (W).
- Or do you have another method?

Whichever method you choose, you must :

Show your work
AND
Explain in words how you know your answer is correct

On the next page, show your work and explain in words how you know your answer is correct>>>>>>

Use this page to show your work for Section 2.
Show your work and explain in words how you know your answer is correct.

"After how many weeks will the amount in the bank be $3000 or more?"

Section 3: Numbers and Operations
SHOW ALL WORK

Online resources:

Addition of Integers –

- http://www.mathgoodies.com/lessons/vol5/addition.html
- http://www.youtube.com/watch?v=204uFu0DRWE

Subtraction of Integers –

- http://www.mathgoodies.com/lessons/vol5/subtraction.html

Multiplication and division of integers

- http://www.mgccc.edu/learning_lab/math/multdiv.html

Absolute value –

- http://www.purplemath.com/modules/absolute.htm

Square root - $\sqrt{\#}$

- https://www.khanacademy.org/math/arithmetic/exponents-radicals/radical-radicals/v/understanding-square-roots

1) For each problem, add the two integers:

a) – 21 + 3 a) _____

b) 17 + (– 20) b) _____

c) – 12 + (– 5) c) _____

2) Complete the following subtraction problems:

a) 22 – (– 15) a) _____

b) – 15 – 7 b) _____

c) 12 – 18 c) _____

Section 3: Numbers and Operations (continued)

3) Complete the following problems:

a) Which of the following equal – 39? _____
(circle *all* correct answers; there may be more than one)

i. $-13 \cdot 3$

ii. $-13 \cdot (-3)$

iii. $13 \cdot (-3)$

iv. $-1 \cdot 39$

b) $\frac{24}{-3}$ = _____

4) Which expression has the larger value, $|-9|, |3|, or\ |2-5|$? How do you know?

5) Which expression has the larger value, $\sqrt{16}$ or 3^2? How do you know?

Section 4: Fractions/Decimals/Percents

SHOW ALL WORK

Web resources:

Vocabulary - information about underlined words in the problems below can be found at:

- http://www.mathwords.com/
- http://www.math.com/school/glossary/glossindex.html

Fractions and mixed numbers (add, subtract, multiply, divide) –

- https://www.khanacademy.org/math/arithmetic/fractions

Percent problems - http://www.mathgoodies.com/lessons/percent/sale_price.html

Equivalent fractions, decimals, percents –

- http://www.mathsisfun.com/decimal-fraction-percentage.html (scroll down to "conversions")

Remember to do the following problems *WITHOUT A CALCULATOR*.
You will need to do these types problems without a calculator on quizzes in high school.

1) Divide. Show your work. $-\frac{5}{6} \div \frac{15}{-6} =$ _____

2) Write – 2.75 as a ratio of two integers. Show your work. _____

3) Write the reciprocal of $-\frac{5}{9}$ _____

4) Multiply. Show your work. $\frac{15}{7} \cdot \frac{4}{5}$ _____

Section 4: Fractions/Decimals/Percents (continued)

5) Subtract. Show your work. $\frac{3}{4} - \frac{1}{2}$ _____

6) Add. Show your work. 5.01 + 0.431 + 40 _____

7) A jacket originally sold for $45. This week it is on sale for 20% off. What is the discount and what is the sale price? Show your work.

Discount_____

Sale price_____

8) A student answered 44 questions correctly on a test with 55 questions. What percent of the test was answered correctly? Show your work.

Percent correct _____

9) Write $\frac{12}{16}$ as a fraction in simplest form.

Then write the equivalent decimal and percent. Show your work.

Simplest form_____ Decimal _____ Percent_____

Section 5: Graphing Lines

Lets use the topic of evaluating expressions to graph lines.
For example if I have the equation of a line $y = 3x - 2$

I could make an X-Y table(like the one shown below) and substitute numbers in for x to get the y

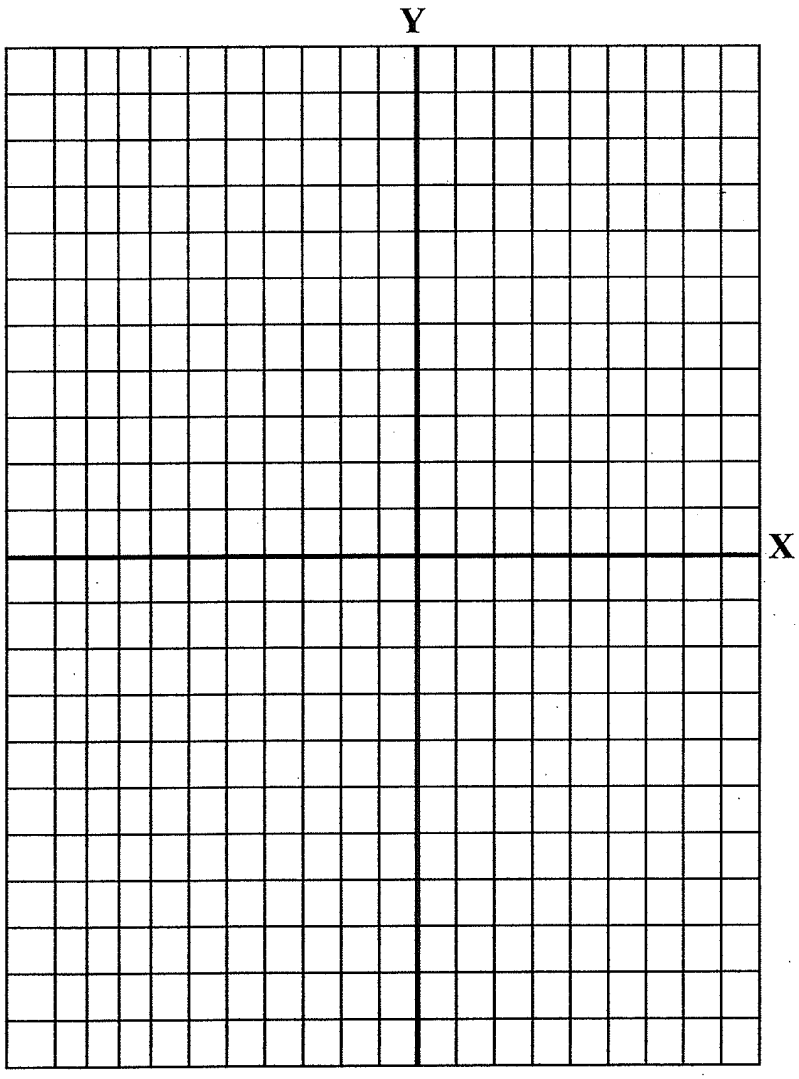
To make a table, substitute each x-value into the equation, and find y

so with an x value of **-3** => $y = 3(-3) - 2$

$y = -9 - 2 = -11$

To make the graph, plot the points from the table. Then connect the points using a straight edge. **If your line is not straight, something is wrong. Check your work.**

X	Y
-3	**-11**
-2	-8
-1	-5
0	**-2**
1	1
2	4
3	7
4	10



The y-intercept is the point where the line crosses the y-axis and it has an x value of 0.

For our graph the y-intercept is

(0 , -2)

Try these problems on your own

Use the equation $y = 2x + 1$

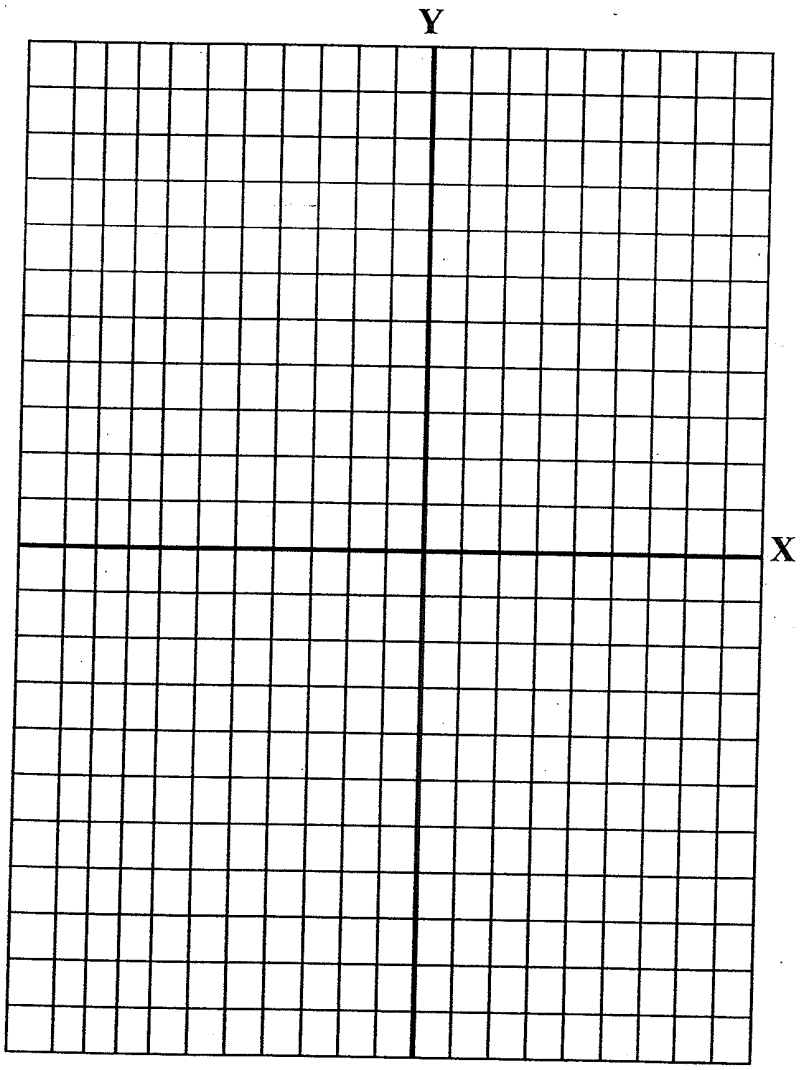
Make your table
To make a table, you make up the x values.
Be sure to use both negative and positive numbers for x.

Since you know the y-intercept has an x value of 0,
Use numbers on both sides of zero.

Then substitute each
x-value into the equation, and find y.

Now make the graph by plot the points from the table.
Connect the points using a straightedge.
If your line is not straight, something is wrong.
Check your work.

X	Y



Section 6: Ratio and proportion

SHOW ALL WORK

Web resources

http://www.khanacademy.org/math/arithmetic/rates-and-ratios/ratios_and_proportions

Complete the following problems. SHOW ALL WORK ON THIS PAGE

1. Reduce the fraction to lowest terms: $\frac{12}{15}$

2. A. Write the ratio of girls to boys in a class with 12 girls and 15 boys.
   Reduce the ratio to lowest terms.

   B. Use the information from Part A to estimate the number of girls in the school if there are a total of 1350 students in the whole school, and the class in Part A is representative of all classes in the school.

3. A. The equation below is called a _____ because it shows that two ratios are equal.

   B. Solve for *d*: $\frac{16}{d} = \frac{2}{3}$

Section 6: Ratio and proportion (continued)

4. Solve for g: $\frac{12}{27} = \frac{g}{1350}$ **SHOW ALL WORK**

5. A 3.5 pound package of hamburger costs $11.20.

   What is the cost of one pound of hamburger? **SHOW ALL WORK**

6. The scale on a map indicates 1 inch = 150 miles. The distance from Philadelphia to Miami is 1200 miles. On the map, how far apart are Philadelphia and Miami?

7. A recipe calls for 3 cups of sugar for every 4 pounds of fruit. How many cups of sugar are required for 10 pounds of fruit?

Section 7: Writing Equations and Expressions

Writing equations and expressions is when you take word problems and turn them into an equation with numbers in order to solve the problem.

Example 1: A number is 5 more than another number.

In order to solve we need to first set up our variables

So after reading this I know that there are two numbers. Whenever we have a number that we do not know the value of we use a variable instead.
That's why we have to set up our variables.

Let x = the first number
Let y = second number

Next establish which number will be five more than the other. Let's say that it is y.

Since y is 5 more than the other number, in order for us to find y we would have to add 5 to x. which is represented as $y = x + 5$ and we are done

Example 2: The sum of Bob and Frank's age is 25. Bob is 7 years younger than Frank, find their ages?

In this problem, the question is looking for a result, Bob and Frank's age. The sentence expresses Bob's age in terms of Franks age (Bob is 7 years younger than Frank). Therefore we need to choose one variable to represent Frank and one to represent Bob in terms of Frank. Let's try:

Let Frank's age = F
Let Bob's age = (F-7) (Bob is 7 years younger than Frank). Subtract seven from frank's age to get Bob's.

Now formulate an equation. We know the sum of their age's are 25. That means (Frank's age +(Bob's age) = 25). Or we can write an equation to solve mathematically like this. ↓ ↓

$F + (F - 7) = 25$ ← Now we follow the rules to combine like terms

$2F - 7 = 25$ ← Now we follow the steps to solve the equation

add 7 to both sides $+7 \quad +7$

Divide both sides by 2 $\frac{2F}{2} = \frac{32}{2}$

$F = 16$

Now that you have found Frank's age or F,
Plug in Frank's age into Bob's expression to find Bob's age.
Remember F=16

Frank's age = F	**F = 16**	**Frank's age**
Bob's age = (F-7)	**(16-7) = 9**	**Bob's age**

Don't forget to write your answer in a sentence!
Frank is 16 years old and Bob is 9 years old.

Try writing these equations on your own

Use these key words to help write your equations

Is: equals (=)
Sum: addition (+)
Difference: subtraction (-)
Product: Multiplication (*)
Quotient: Division (÷)

Problems 1-6: Just write the equation.

1. 4 divided by a number

2. The sum of p and 11

3. the product of a number and 5 is 7

4. 11 more than y is equal to 33

5. 8 more than a number is equal to 16

6. the product of a number and 5 is equal to 31

Problems 7 – 8: Write the equation and solve them

7. The sum of 2 numbers is 21. One number is twice the other number.

8. The difference between Molly and Chase's age is 35. If Molly is 3 times Chase's age plus an additional 10 years, how old are they?

Section 8:
Recording Contract: Deal #1 or Deal #2?

Nice work.
Your group was just offered two recording contracts.
Call them Deal #1 and Deal #2:

Deal #1: You earn $1.00 for each download,
plus you receive a $60,000 signing bonus.

Deal #2: You earn $3.00 for each download,
but your signing bonus is only $10,000.

1. Which deal would you accept? Why?

2. If you took Deal #2, how many downloads would you need to sell to earn *the same* income as you would earn with Deal #1?

_____downloads

How do you know?

TWO WAYS TO SHOW HOW YOU KNOW THE ANSWER

You could compare the two deals in a table like the one on the next page>>>

OR….

You could write an equation for Deal #1 and another equation for Deal #2.
Then you could solve the system of equations.

Show all work in the space below or on the next page>>>>

Section 8 (continued):
Recording Contract: Deal #1 or Deal #2?

If you took Deal #2, how many downloads would you need to sell to earn the ***same*** income as you would earn with Deal #1?

How do you know?

You may complete the table below to help answer the question:

x = number of downloads	$y_1 = income\ \ with\ Deal\ \#1$	$y_2 = income\ with\ \ Deal\ \#2$
0	$60,000	$10,000
10,000	$70,000	$40,000
100,000	$160,000	$310,000

Section 9: Data and probability
SHOW ALL WORK

Web resources

Median and mean (#1 below)
http://www.purplemath.com/modules/meanmode.htm

Box and whisker plots (#2 below)
https://www.khanacademy.org/math/engageny-alg-1/alg1-2#alg1-2a-box-plots

Scatterplots (#3 below)
http://www.mathgoodies.com/lessons/graphs/line.html
http://www.purplemath.com/modules/scattreg.htm

Probability (#4-6 below)
https://www.khanacademy.org/math/trigonometry/prob_comb/basic_prob_precalc/v/basic-probability

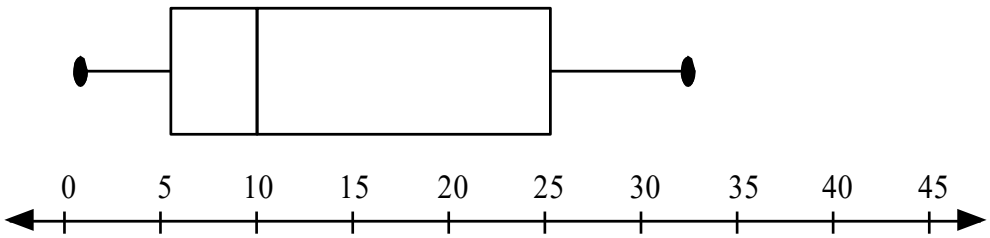
Complete the following problems. SHOW ALL WORK ON THIS PAGE

1. The students in a summer school math class took a 10 point quiz on Friday and received scores of 7, 8, 8, 9, 9, 9, 6, 5, 4, and 9.

   A. What is the median of the scores?

   B. What is the mean ("average") score?

2. The box-and whisker plot below represents the number of home runs hit by 20 major league baseball players.

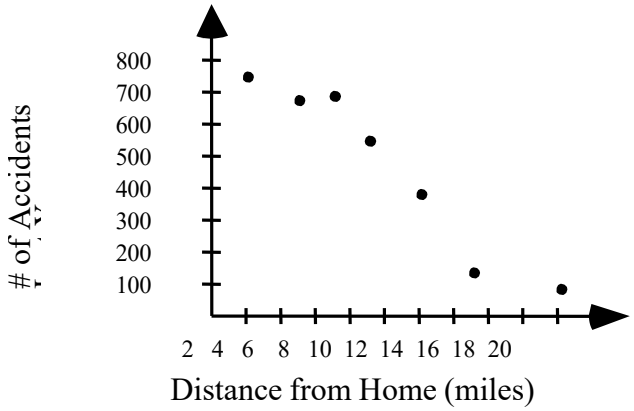


A. What is the median number of home runs hit by the 20 players?

B. Approximately how many of the players hit more than 25 home runs?

Section 9: Data and probability (continued)

3. The graph below describes the relationship between the distance from home and the number of accidents.



A. As the distance from home increases, the number of accidents _____.

B. Approximately _____ accidents occurred more than 20 miles from home.

4. A. If you flip a coin once, what is the probability of the coin landing on "heads"?

B. If you flip a coin 3 times, what is the probability of the coin landing on "heads" all 3 times?

5. If you roll a 6-sided die with the numbers 1, 2, 3, 4, 5, and 6 on it, what is the probability of the die landing on an odd number?

6. Name an event which has a probability of "one."

Section 10: Area and perimeter

SHOW ALL WORK

Web resources

Area of rectangles
http://www.mathgoodies.com/lessons/vol1/area_rectangle.html

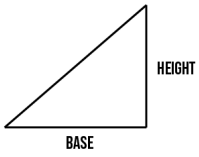
Area of triangles
http://www.mathgoodies.com/lessons/vol1/area_triangle.html

Perimeter
http://www.mathgoodies.com/lessons/vol1/perimeter.html

Complete the following problems. SHOW ALL WORK ON THIS PAGE

1. The first floor of a one-story house is in the shape of a rectangle. The house is 25 feet wide and 60 feet from front to back. What is the area of the first floor of the house?

2. A triangle has a base of 10 inches and a height of 25 inches. What is the area of the triangle?



3. A patio is a rectangle 12 feet wide and 16 feet long. The patio is completely surrounded by a fence.

   A. How long is the fence?

   B. The length of the fence is called the _____of the rectangle.

Section 10: Area and perimeter (continued)

4. A square has an area of 64 square feet.

   A. What is the length of each side of the square?

   B. What is the perimeter of the square?

5. The length of a rectangle is 6 greater than the width.

   A. Write the algebraic expression for length of the rectangle, using *w*: _____

   B. If the perimeter of the rectangle is 52, write the equation for perimeter, using *w*:

   52 = _____ + _____

6. Imagine you are building a rectangular playground in a township park and it needs to be 1000 square feet in area. You have the job of deciding the length and width of the playground and ordering the fence to enclose the playground.

   A. Choose the length and the width. There is more than one correct answer, but the playground must be a rectangle and the area must be 1000 square feet.

   Length = _____

   Width = _____

   Show your work to verify the area is 1000 square feet.

   B. What is the perimeter of the rectangle you chose?
   (In other words, how much fence do you need to order?)