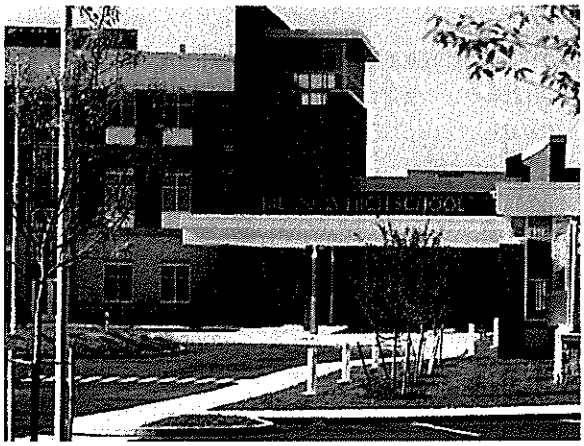
Killingly High School
Summer Math Packet:
Incoming CP Algebra I



Dear Student,

Happy summer vacation! We hope you will enjoy yourself during the long summer ahead. We also want you to be as prepared as you can be for the upcoming school year. **In order to maintain your current math level, it is extremely important for you to complete this packet over the summer.** We recommend you work on it a little at a time over the summer. Doing so will help you have a smooth transition to your College Prep Algebra I class in the fall.

It is your responsibility to finish the packet before the start of school. If you need additional paper to complete the work, please label which question your work is answering and attach the pages to your packet. Your signature at the bottom of page 2 signifies that you have completed all the work to the best of your ability. If you have trouble on some of the questions, look at the examples on the prior page and use the links to see video explanations of each problem type. You may also seek assistance from a parent/guardian, the websites below, or another adult who may be able to help you!

Best wishes and we will see you soon!

Sincerely,
Ms. Finkelman, Mrs. Bulmer, and the KHS Math Department

Dear Parent/Guardian,

We are looking forward to meeting your child this fall. To ensure a smooth transition to College Prep Algebra I, we are providing this practice work for your child to use to review previously taught skills. Our goal is for your child to increase retention of past learned mathematics that are prerequisite skills for studying Algebra I. The more time your child puts into this packet, the better prepared he or she will be for high school math.

Please encourage and monitor your child's completion of this work. Please make sure that ALL WORK IS SHOWN on each page or on an attached paper. Students should work on it consistently throughout the summer and not rush to finish it quickly, so they will better remember the material at the start of the school year. **Students are to submit their work to their math teachers within the first week of school.** The packet will count as their first homework grade.

Please sign and date the bottom of this document stating that your child has completed the summer math packet to the best of his/her ability.

A list of optional supplies is also included below.

Optional Math Supplies for a CP Algebra I Student:

- #2 pencils
- Extra erasers
- Folder or binder in which to save math work

Sincerely,

Ms. Finkelman, Mrs. Bulmer, and the KHS Math Department

Please fill in the following information when the summer math packet is complete.

Student Name (printed):	Student Signature:	Date:	Approximate Amount of Time Spent Completing the Packet:	# of Questions You Needed Adult Help to Complete: (Put an H next to any questions to identify you received help.

Parent/Guardian Signature:	Date:

Directions: Read this reference page, then do the related problems on the following page.

Evaluating Algebraic Expressions

1. Substitute the given values for the variables in the expression
2. Evaluate the expression using the order of operations
   - Parentheses/Brackets (inside to outside)
   - Exponents
   - Multiplication/Division (left to right)
   - Addition/Subtraction (left to right)

ex: $9x^2 - 4(y + 3z)$
for $x = -3, y = 2, z = 5$

$9(-3)^2 - 4(2 + 3 \cdot 5)$
$9(-3)^2 - 4(2 + 15)$
$9(-3)^2 - 4 \cdot 17$
$9 \cdot 9 - 4 \cdot 17$
$81 - 4 \cdot 17$
$81 - 68 = \boxed{13}$

https://tinyurl.com/2kh6rfrt link to Khan Academy on evaluating algebraic expressions.

The Distributive Property

1. Multiply the number outside the parentheses by each term in the parentheses.
2. Keep the addition/subtraction sign between each term.

ex: $5(8x - 3)$

$5(8x - 3)$
$5(8x) - 5(3)$
$\boxed{40x - 15}$

https://tinyurl.com/rz72s9aa link to Khan Academy on distributive property with variables.

Simplifying Algebraic Expressions

1. Clear any parentheses using the Distributive Property
2. Add or subtract like terms (use the sign in front of each term to determine whether to add or subtract)

ex: $2(3x - 4) - 12x + 9$

$2(3x - 4) - 12x + 9$
$6x - 8 - 12x + 9$
$\boxed{-6x + 1}$

https://www.youtube.com/watch?v=3NHSwiv_pSE link to Khan Academy on simplifying algebraic expressions.

Evaluate each expression for x = 9, y = -2, z = 7. Show your work.

1. $x - yz$	2. $2x + y^2$	3. $4z - (x - y)$	4. $\frac{x-y+z}{y}$

https://tinyurl.com/2kh6rfrt link to Khan Academy on evaluating algebraic expressions.

Simplify each expression using the Distributive Property.

5. $5(2x - 8)$	6. $7(x + 3)$	7. $-3(4x - 3)$	8. $(6x + 3)2$

https://tinyurl.com/rz72s9aa link to Khan Academy on distributive property with variables.

Simplify each expression, by **distributing and combining any like terms** showing all work.

9. $8(x + 1) - 12x$	10. $6x - 7 + 12x - 3y$
11. $9x - 8 + 3(2x - 11)$	12. $3(7x + 4y) - 2(2x + y)$

https://www.youtube.com/watch?v=3NHSwiv_pSE link to Khan Academy on simplifying algebraic expressions.

Solving One-Step Equations

1. Cancel out the number on the same side of the equal sign as the variable using inverse operations (addition/subtraction; multiplication/division)
2. Be sure to do the same thing to both sides of the equation!

ex: $-18 = 6j$

$\frac{-18}{6} = \frac{6j}{6}$

$-3 = j \rightarrow \boxed{j = -3}$

https://tinyurl.com/2crupbbn link to Khan Academy on solving one-step equations.

Solving Two-Step Equations

1. Undo operations one at a time with inverse operations, using the order of operations in reverse (i.e. undo addition/subtraction before multiplication/division)
2. Be sure to always do the same thing to both sides of the equation!

ex: $\frac{a}{7} - 12 = -9$

$\frac{a}{7} - 12 = -9$

$+12 \quad +12$

$\frac{a}{7} = 3 \times 7$

$\boxed{a = 21}$

https://www.youtube.com/watch?v=_y_Q3_B2Vh8 link to Khan Ac intro to two-step equations **and** https://tinyurl.com/2v23nkf8 link to Khan AC solving two-step equations.

Solving Multi-Step Equations

1. Clear any parentheses using the Distributive Property
2. Combine like terms on each side of the equal sign
3. Get the variable terms on the same side of the equation by adding/subtracting a variable term to/from both sides of the equation to cancel it out on one side
4. The equation is now a two-step equation, so finish solving it as described above

ex: $5(2x - 1) = 3x + 4x - 1$

$10x - 5 = 3x + 4x - 1$

$10x - 5 = 7x - 1$

$-7x \quad -7x$

$3x - 5 = -1$

$+5 \quad +5$

$\frac{3x}{3} = \frac{4}{3}$

$\boxed{x = \frac{4}{3}}$

https://www.youtube.com/watch?v=f15zA0PhSek link to Khan Academy on solving multi-step equations.

Solve the following equations. Show your work.

13. $x - 64 = -23$	14. $-7 = 2x$	15. $\frac{y}{-12} = -6$
16. $13 = x + 21$	17. $5x - 3 = -28$	18. $\frac{x+8}{-3} = -9$
19. $-8 + \frac{x}{4} = 13$	20. $22 = 6x + 7$	21. $8x - 4 = 3x + 1$
22. $-2(5x - 8) = 20$	23. $7x + 21 = 49x$	24. $-9x - 3 = -3(3x + 2)$

https://tinyurl.com/2v23nkf8 link to Khan Academy on solving multi-step equations

Scientific Notation

Standard Form to Scientific Notation: move the decimal after the first non-zero digit and eliminate any trailing zeros. Multiply by 10 to the power equal to the number of places you moved the decimal point. If the original number was greater than 1, the exponent is positive. If the number was less than 1, the exponent is negative.

ex: 0.000057 1

0.00005 7 1

Original number < 1, so negative exponent

$= \boxed{5.71 \times 10^{-5}}$

Scientific Notation to Standard Form: move the decimal point the number of places indicated by the exponent. If the exponent is positive, move the decimal right. If negative, move left.

ex: 3.5×10^3

Positive exponent, so move decimal right

3.500. = 3,500

https://www.youtube.com/watch?v=trdbaV4TaAo link to Khan Academy into to sci notation

https://www.youtube.com/watch?v=i6IfVUp5RW8 link to Khan Academy scientific notation examples

Negative Exponents & Simplifying Monomials

Zero Exponent: Any number raised to the zero power equals 1

ex: $y^0 = 1$

Negative Exponent: Move the base to the opposite side of the fraction line and make the exponent positive

ex: $x^{-4} = \frac{1}{x^4}$

Monomial x Monomial: Multiply the coefficients and add the exponents of like bases

ex: $(4x^3)(2x^5) = 8x^8$

Monomial ÷ Monomial: Divide the coefficients and subtract the exponents of like bases

ex: $\frac{a}{a^6} = a^{-5} = \frac{1}{a^5}$

Power of a Monomial: Raise each base (including the coefficient) to that power. If a base already has an exponent, multiply the two exponents

ex: $(-2fg^5)^3 = -8f^3g^{15}$

Power of a Quotient: Raise each base (including the coefficient) to that power. If a base already has an exponent, multiply the two exponents

ex: $\left(\frac{5d^3}{c}\right)^2 = \frac{25d^6}{c^2}$

https://www.youtube.com/watch?v=klTJ6qH7jS0 link to Khan Academy exponent rules 1

https://www.youtube.com/watch?v=Zt2fdy3zrZU link to The Organic Chemistry Tutor Simplifying Exponents

https://www.youtube.com/watch?v=TKj8kEofbAw link to The Organic Chemistry Tutor negative exponents explained

Convert each number to Scientific Notation

25. $67,000,000,000$	26. 0.0009213

Convert each number to Standard Form

27. $5.92 * 10^{-5}$	28. $3.27 * 10^{2}$

https://www.youtube.com/watch?v=trdbaV4TaAo link to Khan Academy into to sci notation **and** https://www.youtube.com/watch?v=i6IfVUp5RW8 link to Khan Academy scientific notation examples

Simplify each expression. Write your answer using only positive exponents.

29. $x^3 \cdot x^2$	30. $x^4 \cdot x^{-2}$	31. x^0	32. $\frac{x^5}{x^2}$
33. $(x^2)^5$	34. $\frac{1}{x^{-5}}$	35. $\left(\frac{x^3}{2}\right)^2$	36. $\frac{8x^3}{2x^{-2}y}$

https://www.youtube.com/watch?v=Zt2fdy3zrZU link to The Organic Chemistry Tutor Simplifying Exponents **and** https://www.youtube.com/watch?v=TKj8kEofbAw link to The Organic Chemistry Tutor negative exponents explained

Slope & Rate of Change

Finding the Slope Given Two Points: Use the coordinates from the points in the slope formula:

$$\text{Slope } (m) = \frac{y_2 - y_1}{x_2 - x_1}$$

ex: $(4, -2), (-3, 8)$ (x_1, y_1; x_2, y_2)

$$m = \frac{8 - (-2)}{-3 - 4} = \frac{10}{-7} = \boxed{-\frac{10}{7}}$$

Finding the Rate of Change From a Table: Determine the amount the dependent variable (y) is changing and the amount the independent variable (x) is changing.

$$\text{Rate of Change} = \frac{\text{change in } y}{\text{change in } x}$$

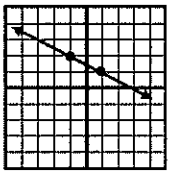
ex:

x	# months	3	5	7	9
y	Cost ($)	80	130	180	230

(+2, +2, +2 across the x row; +50, +50, +50 across the y row)

$$m = \frac{50}{2} = \boxed{25 \text{ dollars/month}}$$

Finding the Slope From a Graph: Choose 2 points on the graph. Find the vertical change (rise) and horizontal change (run) between the 2 points and write it as a fraction $\frac{\text{rise}}{\text{run}}$. (Up is positive, down is negative, right is positive, and left is negative).



rise = +1
run = -2

$$m = \frac{1}{-2} = \boxed{-\frac{1}{2}}$$

https://www.youtube.com/watch?v=lqws-qzyZwc&t=5s link to Khan Academy slope and rate of change

Graphing Linear Equations

Slope-Intercept Form: $y = mx + b$ (m: slope, b: y-intercept)

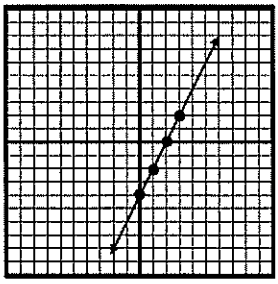
ex: $y = 2x - 4$

y-intercept: -4

slope: $2 = \frac{2}{1}$ ← rise / ← run

How To Graph:

1. Make a point on the y-axis at the y-intercept.
2. Use the slope to determine where to make the next point. The numerator tells you the rise (how far up/down) and the denominator tells you the run (how far right/left) to make the next point.
3. Repeat to make more points and then connect the points with a line.



https://www.youtube.com/watch?v=rgvysb9emcQ link to Khan Academy graphing linear equiations

Find the slope of the line that passes through the points. Sh(ow your work.

37. $(-5, 3), (2, 1)$	38. $(9, 3), (6, -1)$

https://tinyurl.com/58p45vfk link to Khan Academy worked example finding slope from two points

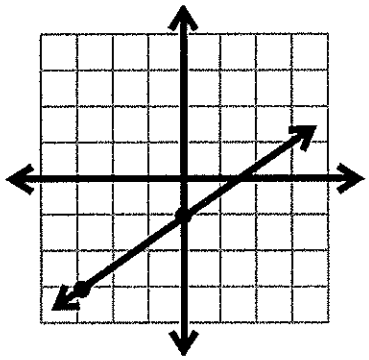
Find the rate of change from the following table. Show your work.
39.

Number of Hours	3	6	9	12
Distance (in miles)	135	270	405	540

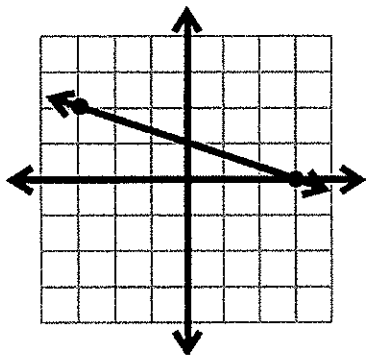
https://tinyurl.com/58b4asaj link to Khan Academy calculating slope from a tables

Find the slope of each line.

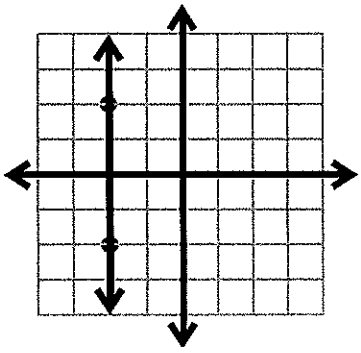
40.



41.



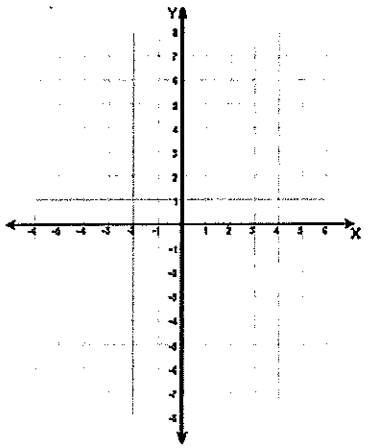
42.



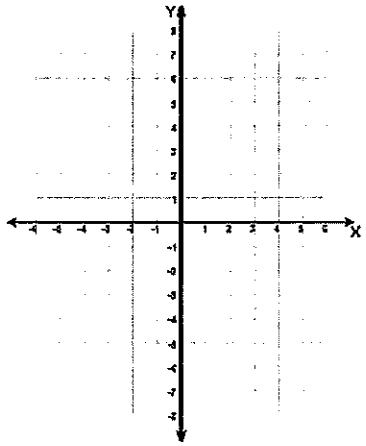
https://tinyurl.com/4c5rhush link to Khan Academy finding slope from a graph

Graph each line.

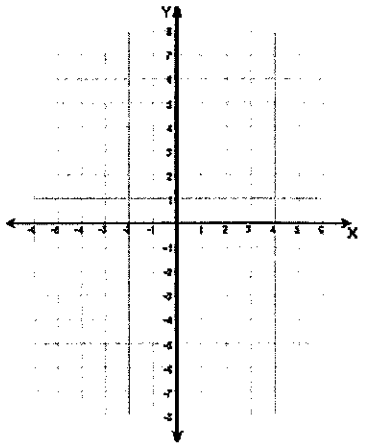
43. $y = \frac{1}{3}x + 2$



44. $y = 2x - 1$



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



https://tinyurl.com/y4tcvehs link to Khan Academy graphing linear equations

Statistics

Hints: Measures of Central Tendency		
Mean	**Median**	**Mode**
Sum of a set of numbers divided by the amount of numbers in the set	Middle number (when numbers are in order from least to greatest)	Number that appears most often

Measure of Variation
Range
highest number minus lowest number

https://tinyurl.com/vtfp4uy6 link to Khan Academy intro to statistics
https://tinyurl.com/3x7ke7uu link to Khan Academy mean, median, & mode examples

46. Determine the mean, median, mode(s), and range for the following data.
4, 5, 7, 7, 7, 8, 10, 11, 11, 13, 13, 14

mean	median	mode	range

47. Put the following numbers in numerical order, then find the mean, median, mode, and range.
66, 46, 50, 42, 39, 64, 45, 54, 54
Numbers in order: _____

mean	median	mode	range

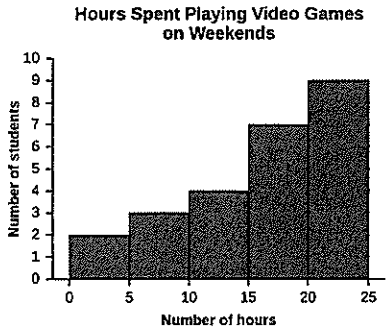
https://tinyurl.com/vtfp4uy6 link to Khan Academy intro to statistics
https://tinyurl.com/3x7ke7uu link to Khan Academy mean, median, & mode example

48. Determine whether the questions below are statistical questions. Explain.
a. What is the capital of Connecticut?

b. How many students attend your school?

https://tinyurl.com/y9wa62dw link to Khan Academy on statistical and non-statistical questions.

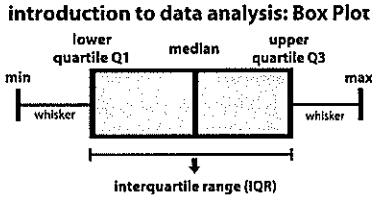
Use the following graph to answer the questions below.



https://tinyurl.com/yc7z3nns link to Khan Academy – understanding histograms
49. Which interval contains the most data?

50. How many students were surveyed?

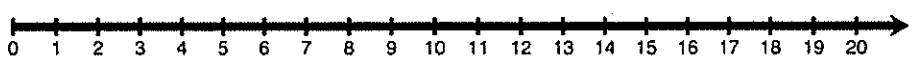
51. Determine the percent of students that spend less than 15 hours playing video games on the weekend.



https://tinyurl.com/5ehamjp8 link to Khan Academy on interpreting box plots
https://www.youtube.com/watch?v=fJZv9YeQ-qQ link to Mashup Math box & whisker plots

52. Identify the min, Q1, median, Q3, and max of the following data set and draw a box plot representing this data.
2, 3, 5, 9, 9, 12, 16, 20, 21 Draw your box plot below:

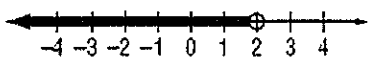
Min: _____
Q1: _____
Median: _____
Q3: _____
Max: _____



Solving and Graphing Inequalities

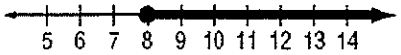
Examples: Graph each inequality on a number line.

x < 2



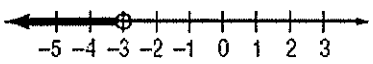
The open circle means that the number is **not** included in the solution.

y ≥ 8



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

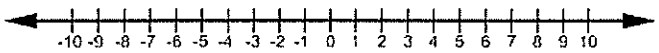
m < -3



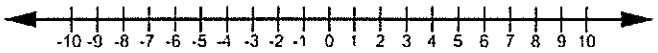
The solution is all numbers less than negative three.
-3 is **not** included in the solution.

53. Graph the following inequalities.

a. $y < 2$

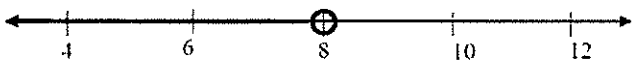


b. $y \geq -5$

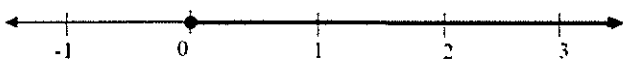


54. Write the inequality represented by the following graphs.

a.



b.



https://www.youtube.com/watch?v=n02r9ZKAi0I link to Math w Mr. J graphing inequalities
https://www.youtube.com/watch?v=LQhhGqk7C88 link to Math w Mr. J writing inequalities
https://www.youtube.com/watch?v=7WpAMZTZC0A link to Anywhere Math solving inequalities

Important: Be sure to bring this packet to school daily for the first weeks of school!

1. Which sections of this packet were easiest and most challenging for you?
2. Do you feel confident in your math skills? Why or why not?
3. What is something your math teacher should know about you?
4. List all help you had from another person to complete this packet. (Parent/guardian/other adult/websites)

Congratulations! You finished the summer packet!