The Village School's Rising 8th Grade Summer Algebra Packet

The following pages contain optional activities for you to complete for the first day of school in August. This packet is optional and will not be graded.

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Name _____

Rising 8th Grade Algebra Summer 2020 Mathematics Packet

Welcome to 8th grade Algebra at The Village School. This packet consists of important concepts necessary for success in 8th grade Algebra.

Add, Subtract, Multiply and Divide Integers:

1. 4 + (-12) =
2. -17 + (-45) =
3. -62 + 80 =
4. 2/3 + (− 4/5) =
5. − 1/4 + (− 2/5) =
6. − 1/2 + 3/4 =
7. 15 - (-42) =
8. -8 - 12 =
9. -95 - (-48) =
10. − 4/5 − 1/2 =
11. − 9/10 − (− 2/5) =
12. 1/3 − (− 1/4) =
13. -10 x 8 =
14. 15 x (-3) =
15. -25 x (-6) =
16. 1/2 x (-7/8) =
17. -3/4 x (-6/7) =
18. -5/6 x 1/5 =
19. -24 ÷ (-6) =
20. 54 ÷ (-9) =
21. -13 ÷ 13 =
22. -4/5 ÷ 2/3 =
23. 7/8 ÷ (-1/2) =
24. -2/3 ÷ (-5/8) =

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Order of Operations:

1. $17 - 6 \cdot 10 \div 2 + 12$
2. $5 \times (8 + 7) + 7$
3. $(62 - 2) \div 6 + 4^2$
4. $5 \text{ x } (11\text{-}3) + 8^2$
5. $(62 - 2) \div 30 + 6$
6. $(85 - 5^2) \div (16 - 6)$

Solving One and Two-step Equations and Inequalities:

1. $x/4 = 250$
2. $y - 3 = -2$
3. $-3x = 36$
4. $4n + 12 = 4$
5. $6a - 11 = 13$
6. $9 + a/6 = 8$
7. $n + 6 \leq -3$
8. $-2x < -12$
9. $r - 4 > 1$
10. $-2x + 12 > -4$
11. $-7d + 8 > 20$
12. $r/-6 + 5 < 7$

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=Percent of Change:

1. 24 teachers to 30 teachers
2. $65 to $144
3. 95 trees to 145 trees
4. 20 miles to 11 miles
5. 126 ounces to 48 ounces
6. 248 workers to 200 workers

Proportions and Unit Rates:

1. $\frac{x}{5} = \frac{18}{30}$
2. $\frac{x}{12} = \frac{24}{36}$
3. $\frac{14}{15} = \frac{x}{75}$
4. $\frac{8}{x} = \frac{14}{7}$
5. $\frac{5}{6} = \frac{x}{15}$
6. $\frac{3}{8} = \frac{33}{x}$

7. On her way to visit her grandparents, Jennifer drives 265 miles in 5 hours. What is her average rate of speed in miles per hour?

8. Last week Alexander was paid $56 for 7 hours of work. How much money does Alexander's job pay per hour?

9. An above-ground swimming pool is leaking. After ½ hour the pool has leaked ⅞ of a gallon of water. How many gallons of water per hour is the swimming pool leaking?

10. After ¾ of a minute a sloth has moved just ⅜ of a foot. What is the sloth's speed in feet per minute?

Calculate Statistical Measures:

23, 29, 24, 19, 27, 16, 28, 20, 20, 21, 25

1. Mean: _____
2. Median: _____
3. Mode: _____
4. Range: _____

5. Draw a dot plot for the data

6. Draw a box plot for the data

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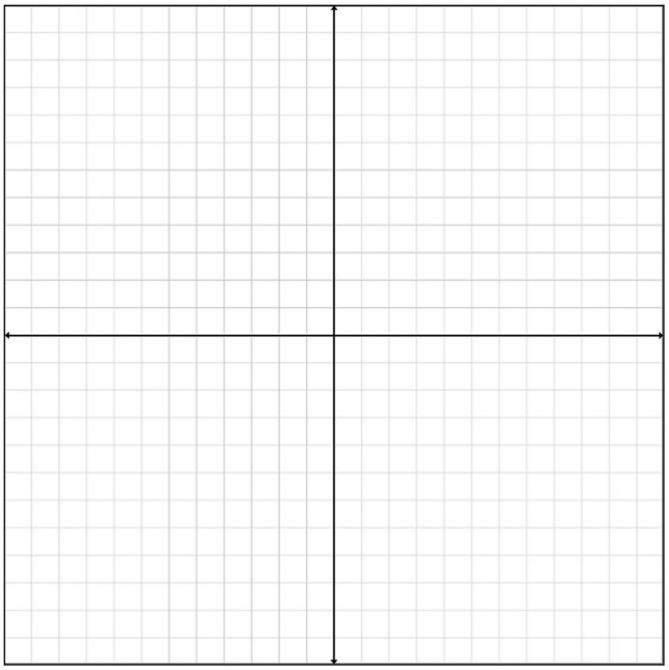
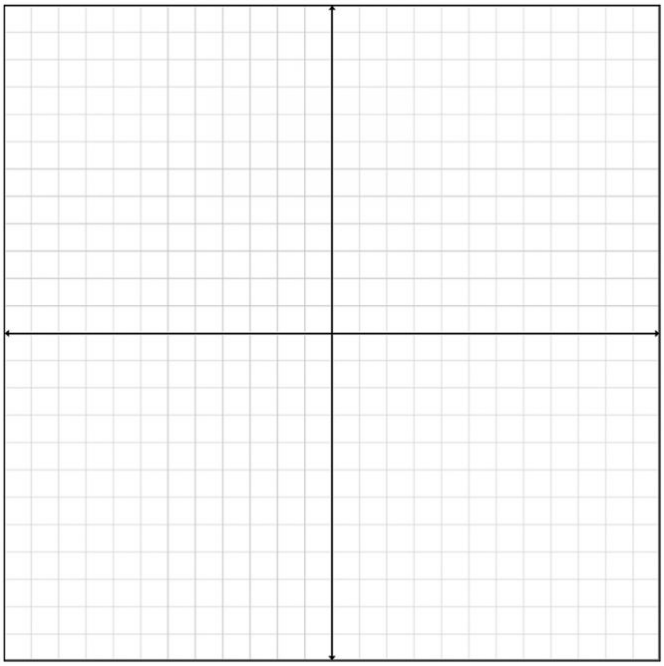
Graphing Linear Equations:

1. $y = \frac{1}{3}x + 5$



2. $y = -2x + 7$



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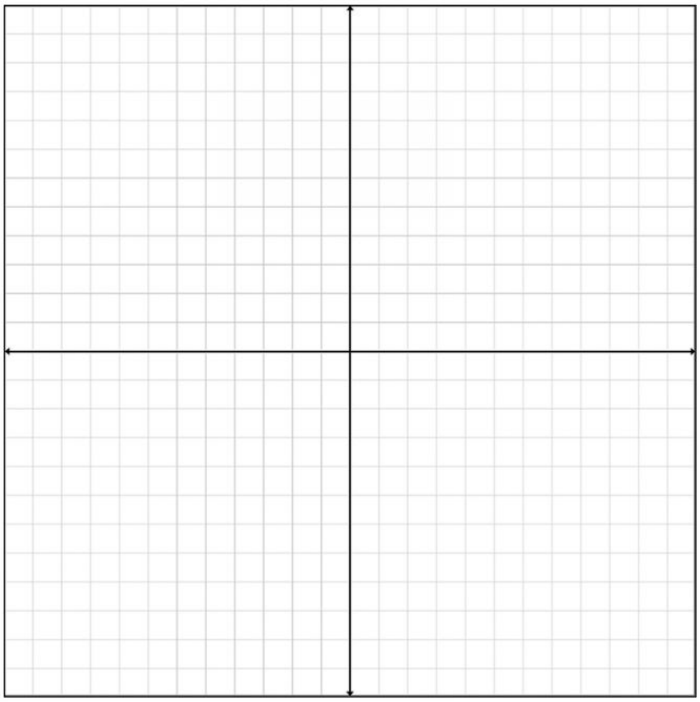
3. $y = \frac{3}{4}x + 2$



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Directions:

1. On the pages that follow you will find some STEAM activities to choose from. Like the packet itself, these activities are **optional and will not be graded**.

2. Follow the directions carefully for your chosen project and have fun with it!

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OPTION #1

Ancient Civilizations Solid Figure Project

In this project you will solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. You will solve real-world mathematical problems involving area, surface area, and volume.

1. Design a blueprint for an architectural accomplishment in an Ancient Civilization of your choice.
    a. The blueprint must be done on graph paper.
    b. You must include a scale (ex: 1in = 1ft) and dimensions on your blueprint.
    c. You must incorporate at least three different shapes/solids.
2. Create a solid figure representing your architectural accomplishment from the Ancient Civilization. You must build three different shapes/solids into your design. This can be made of any material of your choosing.
3. Create a tri-fold brochure that shares information about the Ancient Civilization and architectural accomplishment you chose to build.
4. Write a mathematical report that includes:
    a. The surface area of each solid used to construct your building.
    b. The surface area of the entire building.
    c. The volume of each solid used to construct your building.
    d. The volume of the entire building.

    ****Your work/calculations must be present for all parts a-d above.*

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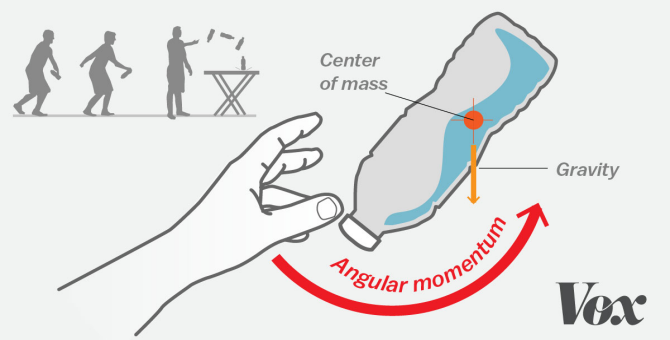
OPTION #2

The Bottle Toss Challenge

The ORIGINAL water bottle flip stem challenge and lab! Can water bottle flipping be educational? Absolutely! This STEAM challenge is inspired by the popular YouTube water bottle flipping challenge where you toss a water bottle and attempt to land it straight up. You will practice scientific method with some probability, fractions and data collection in the mix while having fun!



1. Select 4-8 different types of water bottles (different companies or brands) and determine which type of bottle works best for flipping.
    a. To determine this you will need to run a minimum of 30 trials with each water bottle. Use a tally format to collect your data.
    b. Create a bar graph to represent the success rates of each type of bottle.
    c. Calculate the mean for how many times the bottles successfully landed on their base.
2. Using the most successful water bottle from step 1, determine the best water level to fill the water bottle.
    a. To determine this run a minimum of 30 trials with the water bottle filled to different amounts. Use fractions to label how much water is in the bottle. (Ex: ⅕, ⅖, ⅗ … or ¼, $\frac{2}{4}$, ¾). Use a tally format to collect your data.
    b. Create a table or chart that tells me what <u>percentage</u> of the 30 trials were successful (ex: 7 out of 30 times would be 7 ÷ 30 = 0.2333 = 23%).
3. Using the best bottle and most successful water level, film a video (in slow motion!) of the bottle successfully landing on its base.
4. Create a poster explaining the physics behind bottle flipping. Be sure to use science vocabulary such as angular momentum, center of mass, gravity, and other terminology. Here are a few resources to get you started:
   https://www.scientificamerican.com/article/the-physics-of-bottle-flipping/
   https://www.livescience.com/63670-physics-of-water-bottle-flipping.html

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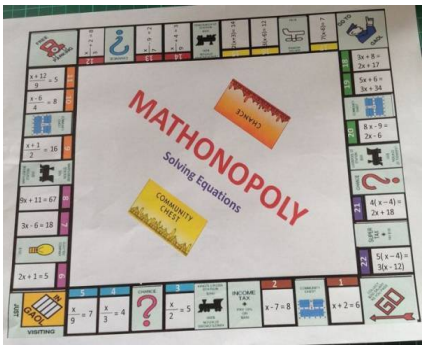
OPTION #3

Mathopoly Board Game: Solving Equations



For this project you will use what you learned in 7th grade about solving one and two-step equations to make a Monopoly board that also makes connections to your summer language arts book, "I Will Always Write Back." Although you will be required to include some of the most common and popular squares on your board, the rest is up to you!

1. Create your own Mathopoly board game using materials of your choice.
2. You must include the following Monopoly squares: GO, Go to Jail, Jail, Free Parking, Chance and Community Chest.
3. Language Arts Component: The other game board squares must make connections to *I Will Always Write Back.* You should include locations and important landmarks from both Caitlin's home in Pennsylvania and Martin's home country of Zimbabwe. Be sure to include the two colleges they choose to attend in the United States as well.
4. Math Component: You must include both one and two-step equations into the game board. They may be on the squares, in the Chance or Community Chest cards, or both. Part of success in the game must include being successful in solving a math problem.
5. Rules: You create the rules. Make sure they are typed and printed in a format that is easy for players to read and follow. Test the rules by having family members or friends play. You want to ensure that your classmates can play your game when we return to school.
6. Chance and Community Chest: You choose what are on these cards. They should have a connection to either the book or solving one and two-step equations.
7. Game Pieces: Create your game pieces/characters that move. They should somehow relate to the book. They can be characters or symbols that you feel are important. How your game pieces move is up to you (dice, spinner, etc…).