

Strath Haven High School
Math Assignment for Rising 9th graders

NAME _____

Overview: This summer assignment is for students enrolled in Advanced Algebra I for the upcoming school year and is designed to provide students the opportunity to practice the prerequisite skills from prior courses. The packet is divided up in two sections, skills and open ended problem solving. These skills are necessary for success in Algebra I, and for courses that follow. The open ended problems are fun and especially enjoyable to do with friends and family.

Grading: This summer assignment is **OPTIONAL** but highly recommended and will not be collected or graded at the start of the school year.

Submitting Work: If it is completed, and a student would like feedback, please bring it to class in the days at the start of the semester. If you have difficulty with any of the problems in the packet, refer back to your classroom notes from the school year and use the website links provided in each section of the packet. Circle the problems about which you still have questions.

Thank you in advance for completing this packet. We look forward to working with you when we see you, either in September or January.

Yours in mathematics,
The Teachers of Advanced Algebra 1

Strath Haven High School Summer Math Packet
Incoming Algebra 1 Students

Numbers and Operations

Web 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>

Remember to do the following without a calculator.

1) For each problem, perform the indicated operation.

- | | | | |
|-----------------|----------|--------------------|----------|
| a) $-21 + 3$ | a) _____ | b) $17 + (-20)$ | b) _____ |
| c) $-12 + (-5)$ | c) _____ | d) $22 - (-15)$ | d) _____ |
| e) $-15 - 7$ | e) _____ | f) $\frac{24}{-3}$ | f) _____ |

2) 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. $-1 \cdot 39$

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

4) Simplify. Be sure to use the correct order of operations.

- | | |
|--------------------------------|----------------------|
| a. $4 + 5 \cdot 4 - 15 \div 3$ | b. $6 \cdot 2t - 3t$ |
| c. $6(2t - 3t)$ | d. $-(3d - 5) + 3d$ |

Why is problem 4C different from problem 4B?

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Fractions

Web resources:

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

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

Fractions and mixed numbers –

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

Bar Models multiplying fractions

- <https://www.educreations.com/lesson/view/multiplying-fractions-using-bar-model/16274323/>

Remember to do the following problems without a calculator. Please draw a bar model whenever you can't solve a problem without it.

1. What is $\frac{1}{4}$ of 10?

What then do you suppose is $\frac{3}{4}$ of 10

Perform the indicated operation

2. $5 \cdot \frac{3}{10}$

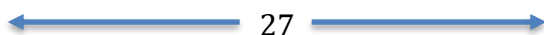
3. $\frac{8}{3} \cdot \frac{15}{2}$

4. $\frac{3}{4} - \frac{1}{2}$

5. $\frac{5}{12} + \frac{3}{2}$

6. If $\frac{1}{3}$ of 27 is 9, then what is $\frac{2}{3}$ of 27?

7. If $\frac{1}{7}$ of ☺ is 3, then what is $\frac{4}{7}$ of ☺?



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The “Language” of Algebra

Web resources:

- <http://www.mathgoodies.com/lessons/vol7/equations.html>
- <http://www.purplemath.com/modules/translat2.htm>

1. Shea’s sister has *twice as much money as Shea*.

a. If Shea has \$10, how much does Shea’s sister have? _____

b. If Shea has \$42, how much money does Shea’s sister have? _____

c. If Shea’s sister has \$100, how much money does Shea have? _____

d. Let d represent the amount of money Shea has. Write an algebraic expression for how much money Shea’s sister has.

2. Shea’s friend has *\$9 less than Shea*.

a. If Shea has \$20, how much does Shea’s friend have? _____

b. If Shea has \$88, how much money does Shea’s friend have? _____

c. If Shea’s friend has \$30, how much money does Shea have? _____

d. Let d represent the amount of money Shea has. Write an algebraic expression for how much money Shea’s friend has.

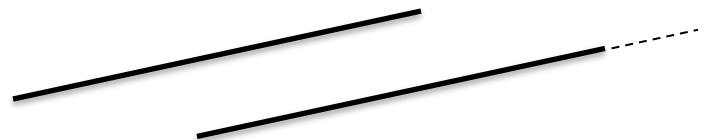
3) Amazon sells marbles in boxes.

a. If there are 30 marbles in a box, how many marbles are there in 200 boxes? _____

b. If there are 99 marbles in a box, how many marbles are there in 200 boxes? _____

c. If there are x marbles in a box, write an expression for how many marbles there are in 200 boxes. _____

4) The given segment has a length of ten units.



a.) The given segment is lengthened by two units. (see dotted segment which represents the additional length) How long is the entire segment now?

b.) What if the dotted segment measured five units. How long would the entire segment be then?

c.) What if the dotted segment measured 2.7 units. How long would the entire segment be then?

d.) What if the dotted segment measured an unknown length, say L units. How long would the entire segment be then?

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Algebraic Expressions and Equations

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/solvein3.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.

1. If $x = 1$ and $y = 7$, evaluate $\frac{x+y}{4}$

2. If $x = 3$, which is larger, x^2 or $5x$? How do you know?

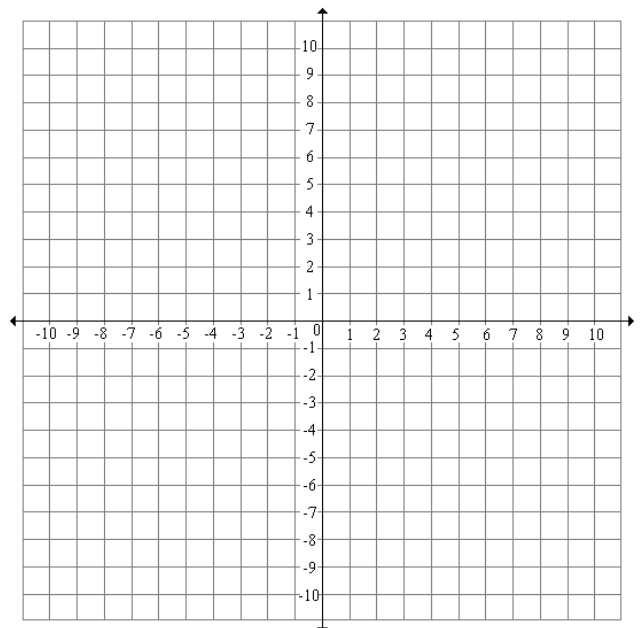
3. If $x = -3$, which is larger, x^2 or $5x$? How do you know?

4. Use the equation $y = 3x - 4$ to do the following:

a. Complete this table of values, choosing five different x values.

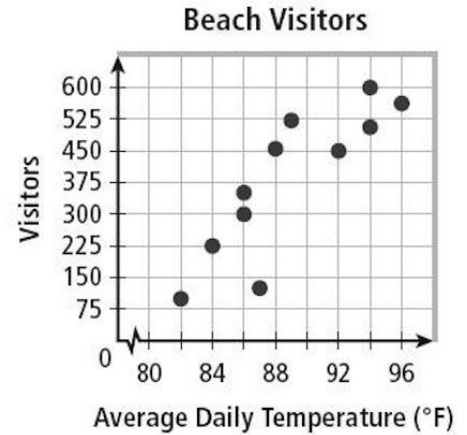
x	y

b. Graph the line $y = 3x - 4$ on the coordinate plane below.



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5. Which statement describes the relationship shown by the data in the scatterplot below? Circle the letter of the correct response.



- A. As the average daily temperature decreases, the number of visitors increases.
- B. The number of visitors decreases as the average daily temperature increases.
- C. The number of visitors increases as the average daily temperature increases.
- D. There is no relationship between the average daily temperature and the number of visitors.

6. Gerry starts the summer with \$300, saves her money from work, and after 10 weeks has \$1,500.

a. How much work money did she save per week?

NO IDEA? How much money did he save from the start of the summer until the 10th week?
 HINT: the answer is not \$1500. Now try 6a again.

b. How much did Gerry have at the end of week 1? Week 11?

7. What is the slope of a line that goes through the points (0,300) and (10, 1500)?

8. Consider 6a and 7 from above. What do you notice? Why?

9. The equation from (#4) $y = 3x - 4$ is a linear equation. Any ordered pair (x,y) in the table of values given in (#4) is a solution to the linear equation as it results in a true statement.

Provide a linear equation that passes through the point (3,4)

Provide another linear equation that passes through the point (3,4)

How many linear equations pass through the point (3,4)? *Find them all! Just kidding, summer is short. Go read a book or jump in a lake...but only if you can swim.*

10. *Extension Problem:* \$120 per week is a perfectly acceptable answer to 6a.) but it is not the ONLY acceptable answer. How so? Here is a hint...since Gerry started with \$300 and ended with \$1500 how many times larger is the money at the end of the 10th week as compared to the start of summer? What would that mean then for how much is saved per week? Toughie...

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Interesting problems:

These problems are about thinking and reasoning. There is no one way to attack the problem. Do what you think and explain your reasoning. Please attempt to complete two of the three.

NOTE: They are fun so you will probably complete all three and that's o.k.! ☺

Border Varieties

Leslie is planning an ornamental garden. She wanted the garden to be a square, 10 feet on each side, and she wanted part of this area to be used for a border of tiles. The tiles she wanted were each 1 foot by 1 foot square. Leslie had to figure out how many tiles she needed.

Your challenge is to figure out how many tiles Leslie needed without counting the tiles individually. Write down as many ways as you can for doing this, giving specific arithmetic involved. For each method that you find, draw a diagram that indicates how the method works.

The Haybaler Problem:

The situation:

You have five bales of hay. For some reason, instead of being weighted individually, they were weighted in all possible combinations of two: bales 1 and 2, bales 1 and 3, bales 1 and 4, bales 1 and 5, bales 2 and 3, and so on.

The weights of each of these combinations were written down and arranged in numerical order, without keeping track of which weight matched which pair of bales. The weights are in kilograms were 80, 82, 83, 84, 85, 86, 87, 88, 90, 91.

Your task:

Your initial task is to find out how much each bale weighs. You should determine if there is more than one possible set of weights, and explain how you know.

The Canoe

Three adults and two kids want to cross a river using a small canoe. The canoe can carry two kids or one adult. How many times must the canoe cross the river to get everyone to the other side? Show your work and thought process.

Problems adapted from *The Interactive Mathematics Program* and the textbook *Crossing the River with Dogs*.