Rising Algebra/Algebra Honors Summer Packet

Mark Twain Middle School
## Summer 2019

Name:_____

All rising **Algebra or Algebra Honors students** must complete this packet over the summer. Students entering Algebra or Algebra Honors must have mastered the skills contained in this packet prior to the start of the 2019-2020 school year. There are videos available on our Google Video Lesson site for students who need assistance completing this assignment. Please use the QR code below to access the Video Lessons. The videos will be under the Summer Packet tab. You will need your FCPS email to access the videos.

> This assignment is due for
> **ALL** Mark Twain Middle School
> Algebra or Algebra Honors students on the first day of school:
> **August 26, 2019**
> **Students will be given a graded quiz during the first week of school. This quiz will assess their mastery of the prerequisite concepts reviewed in this packet.**

Scan the QR code to access the Summer Packet Video Lessons
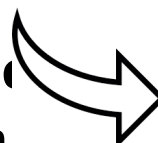
Converting and Ordering Fractions, Decimals, Percents, and Scientific Notation

Examples:

Fractions, Decimals, & Percents

Change a...	To a...	To a...
Fraction	**Decimal** Divide the numerator by the denominator. Example: ¼ would be $3 \div 4 = 0.75$	**Percent** Change the fraction to a decimal then multiply the decimal by 100. Example: ¾ = 0.75 Then 0.75 x 100 = 75%
Decimal	**Percent** Multiply the decimal by 100. Example: To change 0.382 to a percent just multiply by 100. 0.382 x 100 = 38.2%	**Fraction** If you can read the decimal properly you can write it as a fraction. Then simplify the fraction Example: 0.875 reads 875 thousandths – as a fraction that would be $\frac{875}{1000}$ - which reads exactly the same. Now simplify your answer and you are finished $\frac{875}{1000} = \frac{7}{8}$.
Percent	**Decimal** Divide the percent by 100. Example: 75% would be $75 \div 100 = 0.75$ So 75% = 0.75	**Fraction** Write the percent as a fraction over 100 then simplify the fraction. Example: 75% would be $\frac{75}{100}$. Simplified $\frac{75}{100} = ¾$

Scientific Notation

Example 1   Express each number in standard form.

a. 6.32×10^5

$6.32 \times 10^5 = 6.32 \times 100,000$ $10^5 = 100,000$

$= 632,000$ Move the decimal point 5 places to the right because it is a **POSITIVE** exponent.

b. 7.8×10^{-6}

$7.8 \times 10^{-6} = 7.8 \times 0.000001$ $10^{-6} = 0.000001$

$= 0.0000078$ Move the decimal point 6 places to the left because it is a **NEGATIVE** exponent.

Example 2   Express each number in scientific notation.

a. $62,000,000$

To write in scientific notation, place the decimal point after the first nonzero digit, then find the power of 10.

$62,000,000 = 6.2 \times 10,000,000$ The decimal point moves 7 places.

$= 6.2 \times 10^7$ The exponent is positive because the original number was **greater than or equal to 1.**

b. 0.00025

$0.00025 = 2.5 \times 0.0001$ The decimal point moves 4 places.

$= 2.5 \times 10^{-4}$ The exponent is negative because the original number was **less than 1.**

1. Write in the symbol that makes the statement true, < or >.

a) $0.09 \,\square\, \dfrac{7}{8}$ 　　　**b)** $6\% \,\square\, 0.09$ 　　　**c)** $\dfrac{7}{8} \,\square\, 8.0 \times 10^{-3}$ 　　　**d)** $8.0 \times 10^{-3} \,\square\, 6\%$

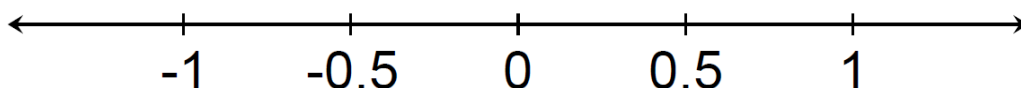**2.** Order the following numbers *in descending* order. Next, plot them on the number line below.

　　0.25 　　　　　　2/5 　　　　　　2.5×10^{-3} 　　　　　　2.5%

　　　　Answer: _____

3. Order the following numbers in *ascending* order and mark on a number line.

　　4^0 　　　　0.57 　　　　6/7 　　　　1.23×10^{-2} 　　　　72%

　　　　Answer:_____
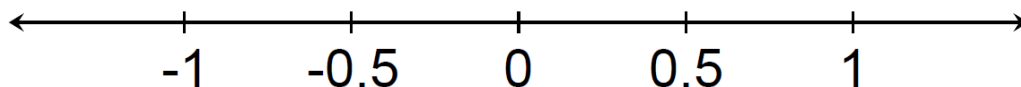
4. Which list is in *ascending* order?

A. $0.25, \dfrac{3}{8}, 30\%, 3.7 \times 10^{-2}$ 　　　　　**B.** $\dfrac{3}{8}, 30\%, 3.7 \times 10^{-2}, 0.25$

C. $3.7 \times 10^{-2}, 0.25, 30\%, \dfrac{3}{8}$ 　　　　　**D.** $30\%, 3.7 \times 10^{-2}, \dfrac{3}{8}, 0.25$

Translating Expressions and Equations

Translate the following to algebraic expressions:

5. 8 less than the product of 5 and a number.

6. The product of a number and five, subtracted from 8.

7. The difference of one third of a given number and nine

8. Twice the quantity of a number added to five.

Write an equation for the following:

9. The total cost of a taxi ride is a flat $3 plus $2 per mile.

10. Write a sentence that could be represented by the following equation:
$$y = 4x + 10$$

Simplifying Numerical Expressions

G First, solve the operations inside of **grouping symbols**.

E Second, solve the **exponents**.

MD Third, solve all **multiplication** and **division** from LEFT → RIGHT.

AS Fourth, solve all **addition** and **subtraction** from LEFT → RIGHT.

Example:

$8 - \boxed{4 \div 2} + 3 \bullet 5$

$8 - 2 + \boxed{3 \bullet 5}$

$\boxed{8 - 2} + 15$

$\boxed{6 + 15}$

(21)

Practice: Simplify the following expressions.

1. $12 \div 3 \bullet 5 - 4^2$

2. $\left[-28 \bullet (3 - 5) + -3^4 \right] \div (-5)^2$

3. $\dfrac{\left[8(3+4) - 2 \bullet 8 \right]}{5 - 3}$

4. $\left[131.625 - (6.4 + 5.1)^2 + 9/8 \right]^2$

5. $\dfrac{1}{4} \dfrac{5}{} + \left(\dfrac{3}{2} \right)^3$

Determine square roots

1. $\sqrt{49}$

2. $\sqrt{100}$

3. $\sqrt{169}$

4. $\sqrt{64}$

5. $\sqrt{196}$

6. $\sqrt{400}$

Evaluating Algebraic Expressions

Examples:

Evaluate the expression: $\dfrac{2x^2y}{x-y}$ when: $x = 5$ $y = 1$

$\dfrac{2x^2y}{x-y}$

$\dfrac{2(5)^2 \cdot 1}{5-1}$ Substitute the given values for each variable.

$\dfrac{2(25)(1)}{5-1}$ Evaluate the numerator first starting with the power (exponent.)

$\dfrac{50}{5-1}$ Finish the multiplication in the numerator.

$\dfrac{50}{4}$ Evaluate the denominator.

25/2 or 12.5   Simplify the fraction. This is the final answer.

Evaluate the following expression if a = 5, b = 3, and c = -2.

$2c + 3b^2 + 2(a-c)$

$2(-2) + 3(3)^2 + 2(5-(-2))$

$2(-2) + 3(9) + 2(5+2)$

$2(-2) + 3(9) + 2(7)$

$-4 + 27 + 14$

37

Practice:

1. Evaluate $\dfrac{3a + b^2}{2c}$ when a = 7, b = -3, and c = -5.

Evaluate if a = 1, b = 2, c = 3

2. ½ (a + b + c)

3. $|a - 6b|$

4. The formula to convert temperature from degrees Celsius to Fahrenheit is given by the formula $^oF = {}^oC \bullet \dfrac{9}{5} + 32$

If it is 17 degrees Celsius outside, what is the temperature in Fahrenheit?

5. Evaluate 7(3b – ac) when a = -2, b = 3 and c = 5.

6. Evaluate $-a + c^2 - b$ when a = 3, b = -5 and c = $\sqrt{4}$.

7. Evaluate $\dfrac{2a - 3b}{\sqrt{c}}$ when a = -6, b = 2 and c = 9.

8. What is the value of $2(c + 5) + 2c^2$ when c = -1.2?

Solving Equations

Examples:

$$-3(x-6)+4(x+1)=7x-10$$
$$-3x+18+4x+4=7x-10$$
$$x+22=7x-10$$
$$\underline{-7x\quad-22\quad-7x-22}$$
$$-6x\quad=-32$$
$$-6x=-32$$
$$x=\frac{-32}{-6}=\frac{16}{3}$$

$$4x+9 = 2x-6$$
$$\underline{-2x\qquad = -2x}$$
$$2x+9 = -6$$
$$\underline{\quad -9 = -9}$$
$$2x = -15$$
$$\frac{2x}{2} = \frac{-15}{2}$$
$$x=-\frac{15}{2}$$

Practice: Solve the equation

1. $x+7=-7$

2. $-\dfrac{3}{5}x = 18$

3. $2x-3=-23$

4. $6x+5=-43$

5. $-2(3y-7)=56$

6. $7x-2x+7=-13$

7. $9+\dfrac{4}{3}x-\dfrac{2}{3}x=11$

8. $10x-8=27-5x$

9. $6(1-4w)=-18$

Solving Inequalities

Solve the inequality and graph the result on a number line.

1. $-3x + 6 \leq -3$

0

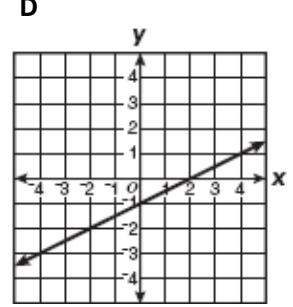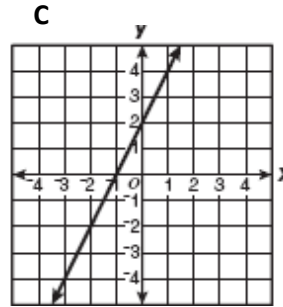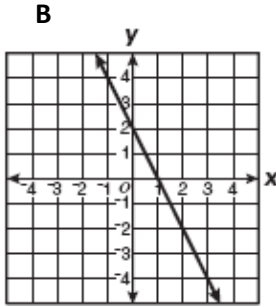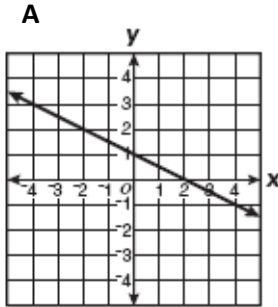2. $-5 + 8x > 59$

0

3. $3x + 2 > 17$

0
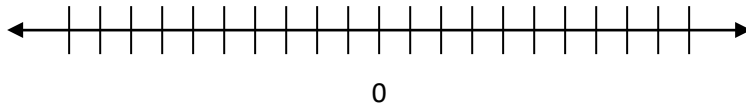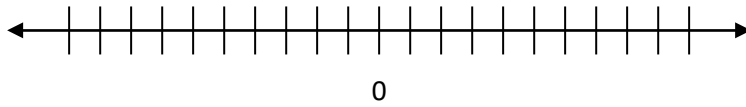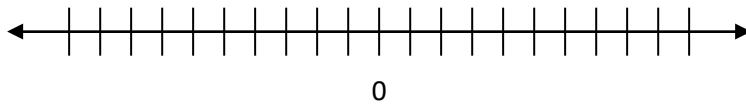
4. $-2x + 2 \leq 20$

0
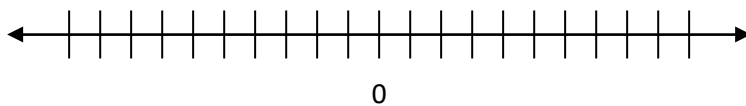
Representing Relationships with Tables, Graphs, Equations and Words

1. Which graph best represents the line defined by the table of ordered pairs?

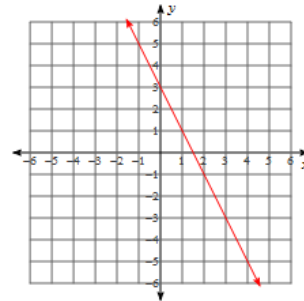| x	y
−1	4
0	2
1	0

A

B

C

D

2. Which equation matches the graph?

A. $y = 3x - 2$

B. $y = -2x + 3$

C. $y = -\dfrac{1}{2}x + 3$

D. $y = 2x + 3$

3. Which table of values is represented by this rule?

"Three and four- tenths times a number, _x_, plus two is _y_.

A.

X	y
3	10.2
5	17.0

B.

X	y
3	12.2
5	19.0

C.

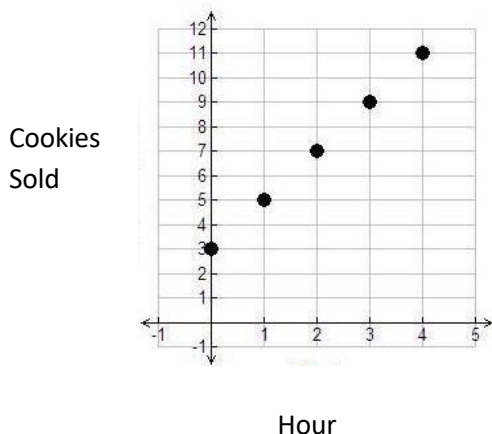| X	y
3	8.2
5	15.0

D.

X	y
3	11.12
5	17.2

4. Susie is selling cookies at a bake sale. The graph below shows how many cookies she sells after each hour has passed. Which word sentence matches the graph?

Cookies Sold

Hour

a. Susie started by selling 3 cookies and sold 1 additional cookie each hour

b. Susie started by selling 3 cookies and sold 2 additional cookies each hour

c. Susie started by selling 2 cookies and sold 2 additional cookies each hour

d. Susie started by selling 2 cookies and sold 3 additional cookies each hour

**5. The school store sells t-shirts and sweatshirts each Friday.**

- Sales totaled $565.00 last Friday
- Let t represent t-shirts, which sold for $10 each.
- Let w represent sweatshirts, which sold for $25 each.

Write an equation to represent the total sales last Friday.

6. Use the table to answer questions a, b, and c.

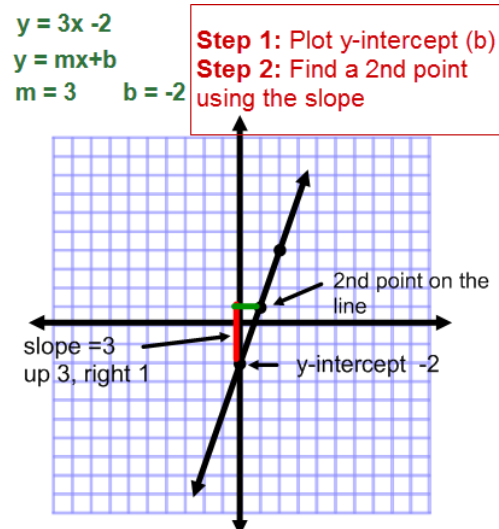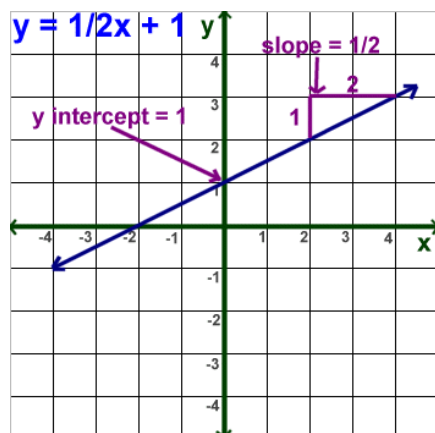| x	-2	0	1	3
y	-7	-3	-1	3

    a. Plot the ordered pairs in the table on the coordinate plane below.
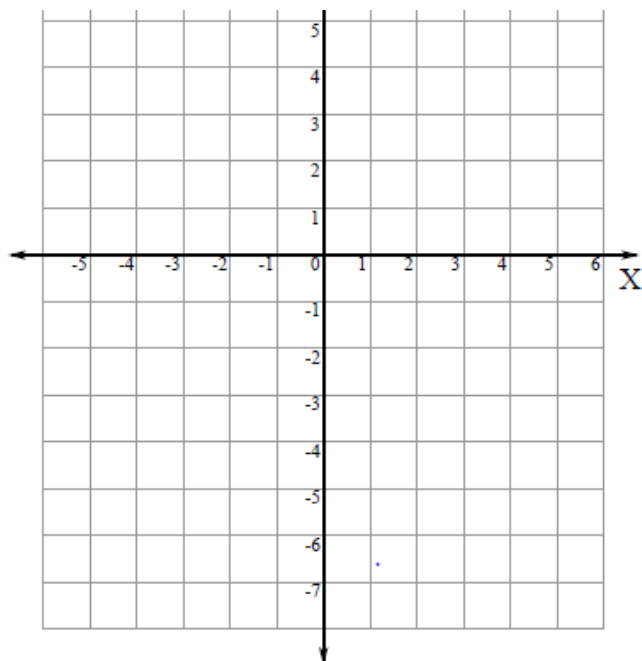
    b. Use words to describe the relationship found in the table.

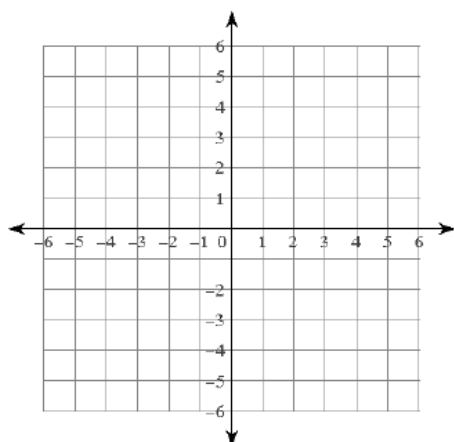   c. Write an equation for the relation that includes the ordered pairs in the table.
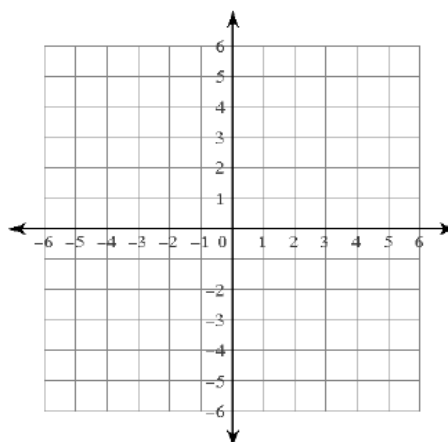
Graphing a Linear Equation

Examples:

$y = 1/2x + 1$

slope = 1/2

y intercept = 1

$y = 3x\ \text{-}2$

$y = mx+b$

$m = 3 \qquad b = \text{-}2$

Step 1: Plot y-intercept (b)
Step 2: Find a 2nd point using the slope

2nd point on the line

slope =3
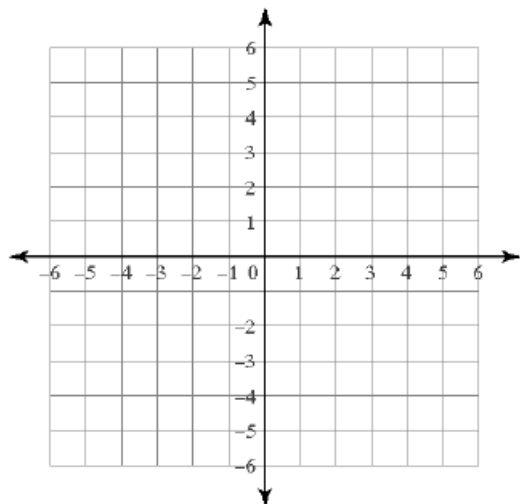up 3, right 1

y-intercept -2

Practice:

1) $y = -\dfrac{2}{5}x + 1$

2) $y = \dfrac{3}{5}x + 2$

3) $y = -3x - 1$

4) $y = -x$