Algebra I Honors Summer Assignment   Name_____

DUE: August 9, 2021

This assignment is for students who have completed Pre Algebra and are taking Algebra I Honors in the 2021-2022 school year.

Did you read the instructions? _____

What math are you taking in the 2021-2022 school year? _____

The expectation of the Math Department at Archbishop Hannan High School is that its students become Tenacious Problem Solvers! Thus, as you work on these problems be sure and document your strategies, your mathematical explanations, any drawings, tables or graphs that you use, and the best, complete answer you can find. We hope that you are challenged by these problems and enjoy them. We look forward to the discussion of these problems that we will have in the first weeks of school. Come prepared to defend your solution!

1. In an offshore pipeline, a cylindrical mechanism called a "pig" is run through the pipes periodically to clean them. These pigs travel at 2 feet per second. What is this speed expressed in miles per hour?

2. Let k represent some unknown non-integer number greater than 1. Mark your choice for k on a number line. Then locate each of the following:

   a. $-k$ b. $k+2$ c. $k-3$ d. $\sqrt{k}$ e. k^2

3. Add the following fractions by finding a common denominator:

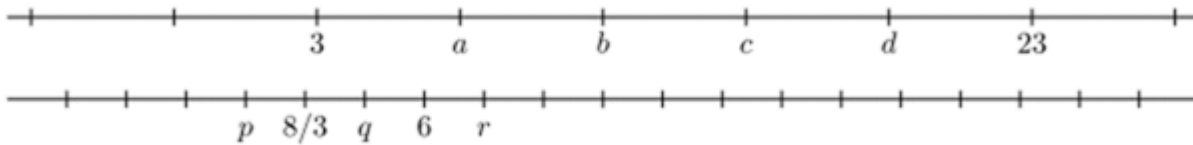   a. $\dfrac{27}{5}+\dfrac{3y}{4}$ b. $\dfrac{4m}{5}-\dfrac{2}{3}$ c. $2+\dfrac{x}{3}$ d. $\dfrac{x}{2}+\dfrac{2x}{3}-\dfrac{3x}{4}$

4. Without resorting to decimals, find equivalences amongst the following nine expressions:

$$\frac{2\cdot 3}{5} \qquad \left(\frac{3}{5}\right)\cdot 2 \qquad 3\cdot\left(\frac{2}{5}\right) \qquad \left(\frac{2}{5}\right)\left(\frac{3}{3}\right) \qquad \left(\frac{5}{3}\right)2 \qquad 2\div\frac{5}{3} \qquad \frac{2}{5} \qquad \frac{5}{3}\div\frac{1}{2} \qquad \frac{3}{5/2}$$

5. On each of the following number lines, all of the labeled points are evenly spaced. Find *coordinates* for the seven points designated by the letters:

6. Before you are able to take a bite of your new chocolate bar, a friend comes along and takes 1/4 of the bar. Then another friend comes along and you give this person 1/3 of what you have left. Make a diagram that shows the part of the bar left for you to eat.

7. Jess and Taylor go into the cookie-making business. The chart shows how many dozens of cookies were sold (at $3.50 per dozen) during the first six days of business.
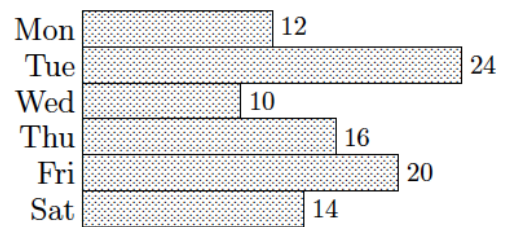
   a. What was their total income during those six days?

   b. Which had more income, the first three days or the last three days?

   c. What was the percentage decrease in sales from Tuesday to Wednesday? What was the percentage increase in sales from Wednesday to Thursday?

   d. Thursday's sales were what percent of the total sales?

   e. On average, how many dozens of cookies did Jess and Taylor sell each day?

8. A team has started its season badly, winning 1 game, losing 6 and tying none. The team will plan a total of 25 games this season. Round all answers to the nearest percent.
   a. What percentage of the seven games played so far have been wins?

   b. Starting with its current record of 1 win and 6 losses, what will the cumulative winning percentage be if the team wins the next 4 games in a row?

   c. Starting with its current record of 1 win and 6 losses, how many games in a row must the team win in order for its cumulative winning percentage to reach at least 60%?

   d. Suppose that the team wins ten of its remaining 18 games. What is its final winning percentage?

   e. How many of the remaining 18 games does the team need to win so that its final winning percentage is at least 60%? Is it possible for the team to have a final winning percentage of 80%? Explain.

9. It is customary in algebra to omit multiplication symbols whenever possible. For example, $11x$ means the same thing as $11 \cdot x$. If the multiplication dot were simply removed, which of the following expressions would continue to have the same meaning?

   a. $4 \cdot \dfrac{1}{3}$

   b. $1.08 \cdot p$

   c. $24 \cdot 52$

   d. $5 \cdot (2 + x)$

10. When describing the growth of a population, the passage of time is sometimes described in generations, a generation being about 30 years. One generation ago, you had two ancestors (your parents). Two generations ago, you had four ancestors (your grandparents). Ninety years ago, you had eight ancestors (your great-grandparents). How many ancestors did you have 300 years ago? 900 years ago? Do your answers make sense?

Essential Skills

The following problems represent the essential skills you need to be successful in Algebra 1 Honors.

11. Simplify each of the following:

    a. the sum of $6x + 2$ and $-8x + 5$

    b. the result of subtracting $5x - 17$ from $8x + 12$

    c. the product of $7x$ and $4x + 9$.

12. Simplify the expression $k - 2(k - (2 - k)) - 2$ as much as possible. Your final answer should not use parentheses.

13. Solve for x:

    a. $2(x - 3) = 4$ b. $-3(2x + 1) = 5$ d. $a(bx + c) = d$

14. Find the slope for the following ordered pairs:

    a. (−15, −8), (−16, −16)   b. (3, 6), (19, −16)   c. (12, 3), (7, 20)

    d. (8, 17), (4, 17)   e. (−3, 7), (−3, −15)

15. Solve each system.

a.
$$y = -2x$$
$$-x - y = 3$$

b.
$$y = 5$$
$$-7x + 2y = 24$$

c.
$$4x + 7y = 18$$
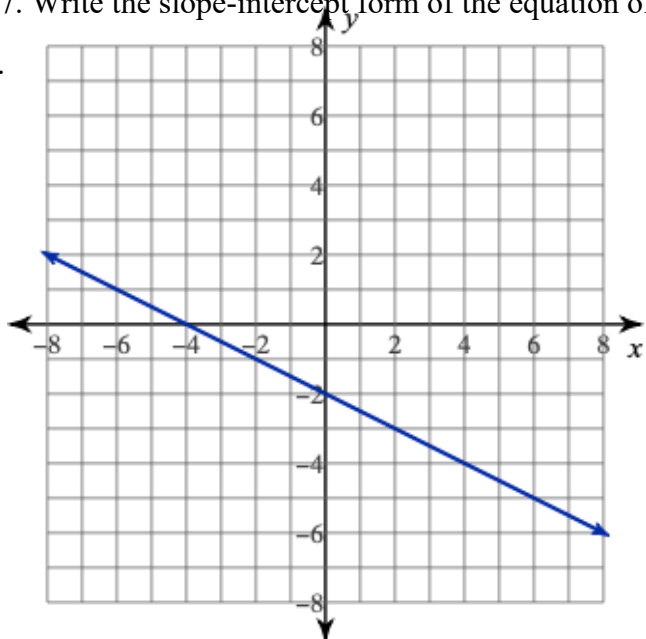$$y = 6$$

d.
$$5x + 3y = 7$$
$$y = 2x + 4$$

16. Write the slope-intercept form of the given equations with the slope and y- intercept given.
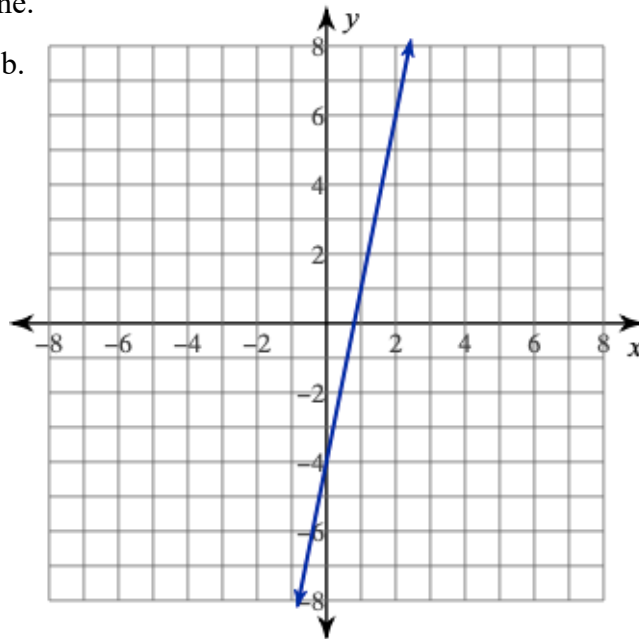
a. Slope = –5 y-intercept = 1

b. Slope $= -\dfrac{1}{2}$ y-intercept $= -1$

17. Write the slope-intercept form of the equation of each line.
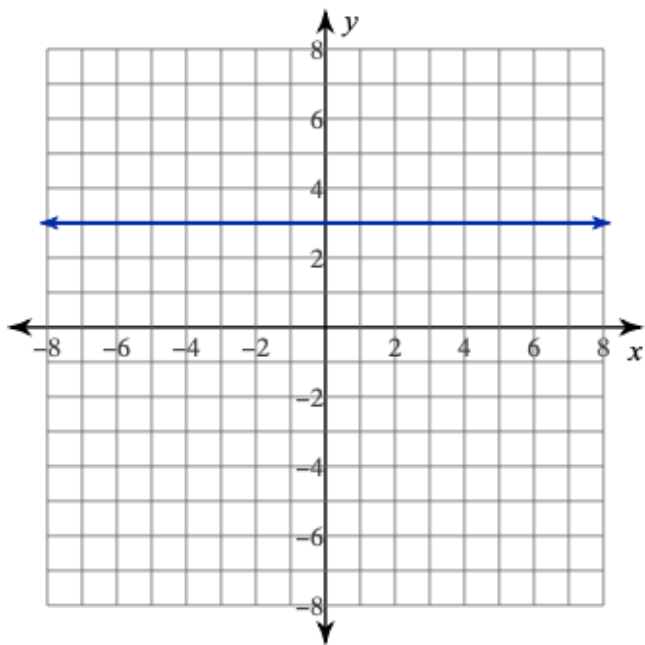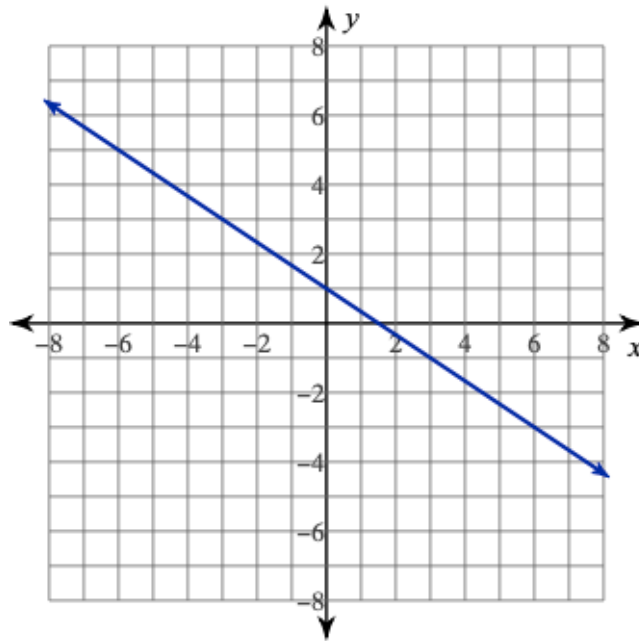
a.

b.

c.

d.

18. Simplify each expression. Your answer should contain only positive exponents.

a. $(x^2 y^7)(x^3 y^5)$

b. $\dfrac{24x^7}{8x^3}$

c. $(2x^4 y)^3$