Summer Math Packet for Students Entering Algebra 2

1. **Percentages**

a. What is 15% of 250

b. 150 is what percent of 750?

c. Last week the stock market went down from 15,235 to 13,784. What was the percent decrease to the nearest whole percent?

d. 60% of what number is 20?

e. A local department store gives a customer an additional 15% off the price of a television if they use their department store credit card during the annual 10% savings sale. If the original price of the TV is $650, find the sale price for a customer who is using their department store credit card.

2. **Ratios & Proportions**

a. Twoc fifths of the automobiles entering the city every morning will be parked in city parking lots. These cars fill 5282 parking spaces. How many cars enter the city each morning?

b. The new City Council representative, Mr. Hughes, won by a ratio of 6 to 5, with 2343 total votes cast. How many votes did Mr. Hughes get?

c. Maria sketched plans for a rectangular garden on grid paper. The rectangle she drew if 2.5 squares wide and 4 squares long. If each side of each square on the grid paper represents 3.5 feet, find the length and width of the actual garden.

d. Sam's car used 5 gallons of gas to travel 142 miles. How much gas will Sam need to travel 317 miles?

e. The ratio of boys to girls in a school is approximately 3 to 5. There are 800 students in the school. How many boys are in the school? How many girls are in the school?

3. Operations with Real Numbers and Expressions

Simplify each of the following:

a) $\frac{1}{6}+5+\frac{1}{15}$

b) $\left(49^2-5\cdot 14\div 5+21\right)\cdot 7$

c) $-15-(-6)$

d) $-7\cdot 9$

e) $-15+6$

f) $35\div -7$

g) $\frac{3\left[2(6+1)-3^2\right]}{1+\left(2^2-1\right)+1}$

h) $\frac{4}{5}\cdot\frac{3}{7}$

2. Simplify each of the following:

a) $(23a^2 - 17b) - (3a^2 - b + 5)$

b) $-5a - 2b - a - 7b + 2$

c) $\dfrac{x+1}{2x^2-2}$

3. Multiply and Simplify.

a) $-5(2x - 4)$

b) $(a-3)^2$

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

Evaluating Expressions

a) $(x-y)^2+2(x+y)$ if $x=9$ and $y=-2$

b) $2a^2b-3ab^2$ if $a=-2$ and $b=3$

Exponents

Simplify each of the following:

a) $a^3 \cdot a^2 \cdot a$

b) $\left(b^3\right)^5$

c) $\frac{5m^7}{m^3}$

d) 293^0

e) $(-2x)(5x^5)$

f) $\frac{-30y^9}{6y^3}$

Probability & Statistics

a. What is the probability of drawing a king from a standard deck of 52 cards?

b. A bag contains 8 black marbles, 5 white marbles, and 1 red marble. What is the probability of selecting a red marble?

c. A bag contains 8 black marbles, 5 white marbles, and 1 red marble. What is the probability of selecting a red marble followed by a white marble if there is NO replacement?

d. A bag contains 8 black marbles, 5 white marbles, and 1 red marble. What is the probability of selecting a red marble followed by a white marble if there is replacement?

e. When spinning a spinner numbered 1 to 5, what is the probability of spinning a multiple of 2?

f. The probability of rain on Saturday is $\frac{1}{10}$ and the probability of rain on Sunday is $\frac{3}{10}$. What is the probability that it will rain on both Saturday and Sunday?

g. During 10 weeks of babysitting, Sam earned the following dollar amounts:

$30, $33, $35, $50, $50, $60, $65, $90, $50, $35

Find the mean to the nearest dollar

Find the median

Find the mode

Linear Equations & Inequalities

Solve each of the following:

a) $5x - 12 = 48$

b) $3b - 1 + 2b = 5b + 4 - 2b$

c) $\dfrac{x+1}{x-2} = \dfrac{3}{2}$

d) $\dfrac{3}{4}x + \dfrac{5}{8} = \dfrac{7}{12}$

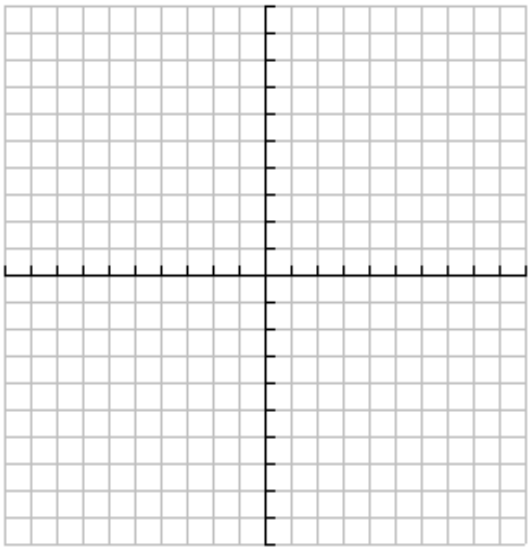
e) $x - 9 = -3x - 5$

f) $18 = 9(x + 3)$

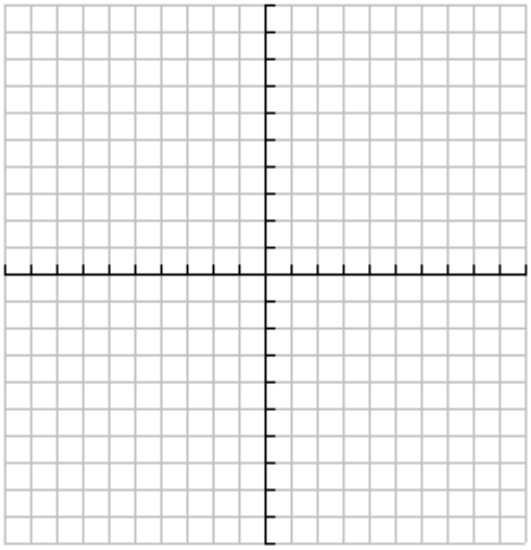
2. Graphing Linear Equations

Graph each of the following:

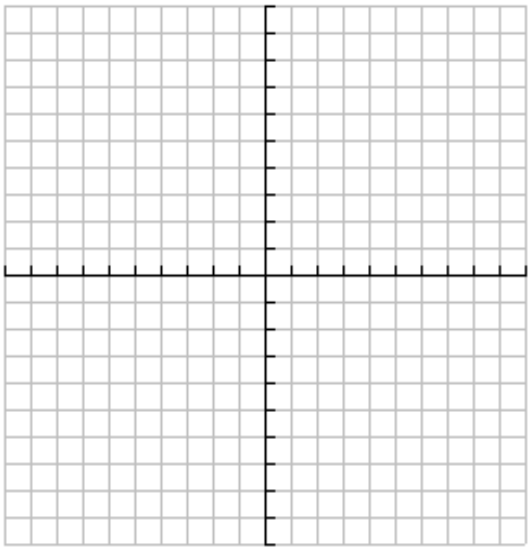
a) $y = \frac{1}{4}x + 3$



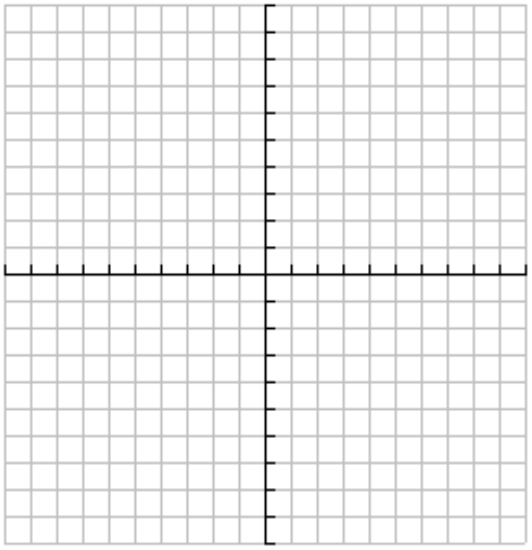
b) $y = -3x + 2$



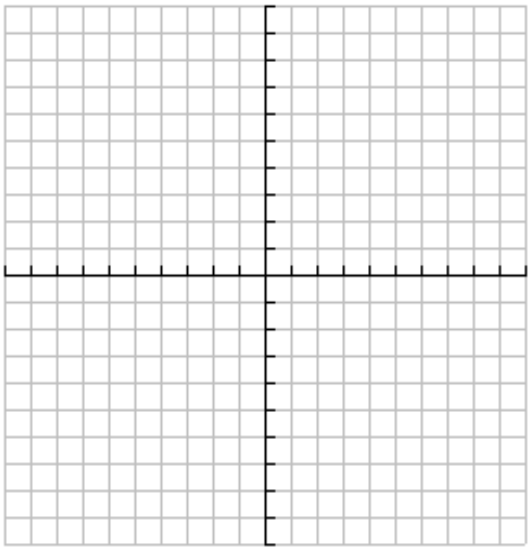
c) $x + y = 4$



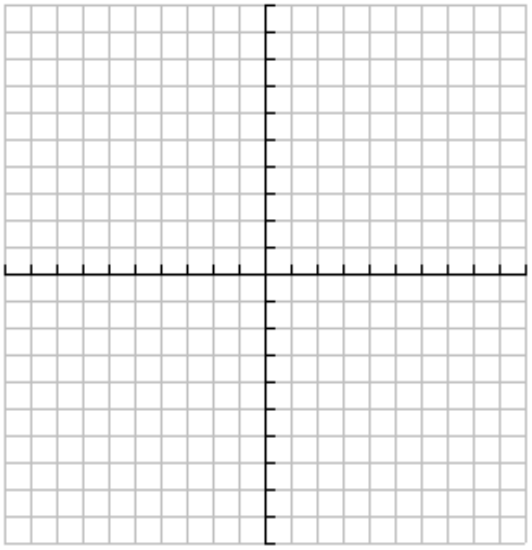
d) $2x - 3y = 12$



e) $y = 5$



f) $x = -3$

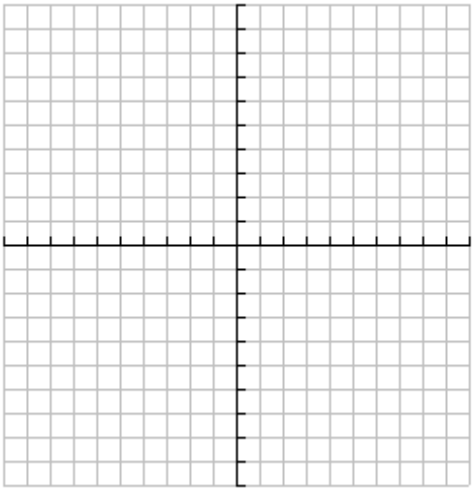


3. Solve and graph a one variable inequality.

Solve the inequality and graph the solution on a number line.
$-2x + 4 > 18$

4. Graphing Linear Inequalities

Graph the following linear inequality
$2x + y \geq -8$



Finding Slopes & y-Intercepts

Find the slope and the yc intercept for each of the following

lines:

a) $y = 8x - 5$

b) $5x - 10y = 250$

c) Find the x- and y-intercepts for the line $-3x + 7y = 42$

d) Find the slope of the line containing the points $(0,3)$ and $(-2,-10)$.

e) Miles works 18 hours and makes \$153. The following week, he works 26 hours and makes \$221.

1. Write 2 ordered pairs that represent the information given.

2. Determine the slope of the line through the two points.

3. Explain the meaning of the slope in the context of this problem.

Writing Equations of Lines

a) Write the equation of the line that contains the point (2,5) and is parallel to the x-axis.

b) Write the equation of the line that has x-intercept 5 and y-intercept -2.

c) Connie, the electrician, charges $45 for a house call and $34 per hour for each hour spent working on the wiring. If x = the number of hours Connie worked and y = total bill, write a linear equation that models this situation.

d) Write the equation of the line that has the same y-intercept as $x - 3y = 6$ and contains the point (5,-1).

Systems of Linear Equations

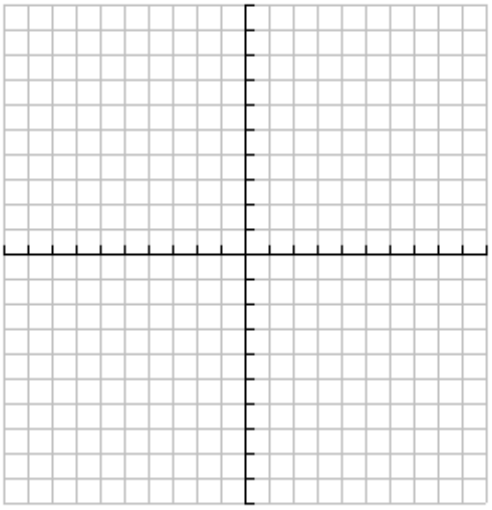
a. Is $(4,2)$ a solution to the system $\begin{matrix} x+y=6 \\ 2x-y=6 \end{matrix}$? Justify your answer.

b. Solve the following system using substitution: $\begin{matrix} y=x-10 \\ 5y+10x=10 \end{matrix}$

c. Solve the following system using elimination: $\begin{matrix} 2x-3y=12 \\ 4x+10y=16 \end{matrix}$

d. Solve the following system graphically:

$\begin{matrix} x+y=-2 \\ 2x-y=-7 \end{matrix}$



e. Write a system of equations that can be used to solve the following problem and then solve the problem.

Be sure to identify your variables and SHOW ALL WORK.

Jeremy, a farmer, paid 10 men and 8 boys $970 for 1 day's work. A week later he paid 12 men and 6 boys $1020 for a day's work. The men were paid one wage and the boys were paid at another wage. Find the daily wage that was paid to the men and the boys.

f. Stefano bought a total of 8 pounds of peanuts and cashews. Peanuts, p, cost $2 per pound and cashews, c, cost $5 per pound. The total amount Stefano spent on peanuts and cashews was $25. Which system of equations could be solved to find out how many pounds of peanuts and cashews Stefano bought?

a) $\begin{aligned} 2p + 5c &= 25 \\ p + c &= 8 \end{aligned}$

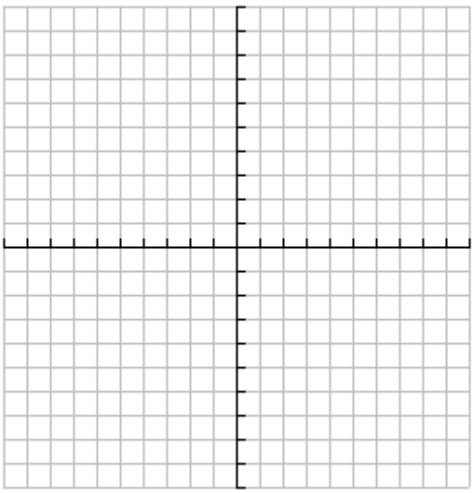
b) $\begin{aligned} 5p + 2c &= 25 \\ p + c &= 8 \end{aligned}$

c) $\begin{aligned} 2p + 5c &= 8 \\ p + c &= 25 \end{aligned}$

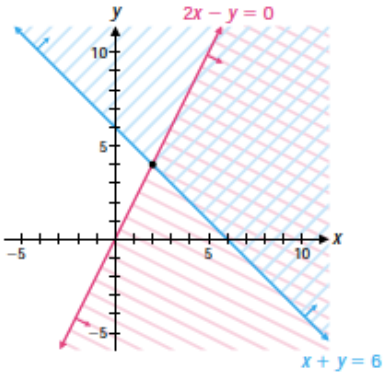
d) $\begin{aligned} 2p &= 8 \\ 5c &= 25 \end{aligned}$

Systems of Linear Inequalities

a. Graph the system of inequalities: $y \geq x+1$, $2x+y>-8$



b. Which of the following systems of inequalities is graphed below:



a. $2x - y \leq 0$, $x + y \geq 6$

b. $2x - y \geq 0$, $x + y \geq 6$

c. $2x - y > 0$, $x + y > 6$

c. Which of the following is a solution to the system: $\begin{matrix} 3x + y < 12 \\ x + y > 4 \end{matrix}$?

a. (3,1)
b. (4,3)
c. (2,6)
d. (6,0)

d. At an ice cream parlor, ice cream cones cost x dollars each and sundaes cost y dollars each. The total cost of 4 cones and 3 sundaes is more than $20. The total cost of 5 cones and one sundae is less than $16. Which system models this situation?

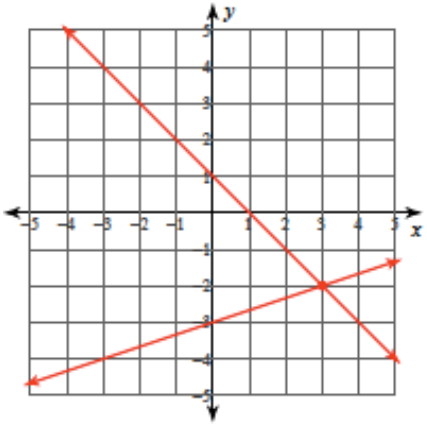
e. $\begin{matrix} 4x + 3y < 20 \\ 5x + y > 16 \end{matrix}$

f. $\begin{matrix} 4x + 3y > 20 \\ 5x + y < 16 \end{matrix}$

g. $\begin{matrix} 4x + 3y \geq 20 \\ 5x + y \leq 16 \end{matrix}$

e. The graph below shows the boundary lines of the system of inequalities: $y > \frac{1}{3}x - 3$, $y \leq -x + 1$

Shade the graph appropriately to determine the feasible region.



Radicals

Simplify each of the following:

a) $\sqrt{25}$

b) $\sqrt{48}$

c) $\sqrt{3}\cdot\sqrt{6}$

d) $\dfrac{\sqrt{60}}{\sqrt{6}}$

e) $5\sqrt{a}-7\sqrt{a}$

f) $\sqrt{12a^6b^3}$

g) Determine 3 values of x that will make $\sqrt{x-7}$ a real number.

Factoring

Completely factor each of the following:

a) $y^2 + 2y - 35$

b) $x^2 - 4x - 12$

c) $b^2 - 6b + 9$

d) $3x^2 - 75$

e) $30x^5 + 21x^2 - 36x^4$

f) $2x^2 - 3x - 20$

Quadratics

a. Solve: $y^2 - 25 = 0$

b. Solve: $2x^2 = 20$

c. Solve: $x(x-4) = 0$

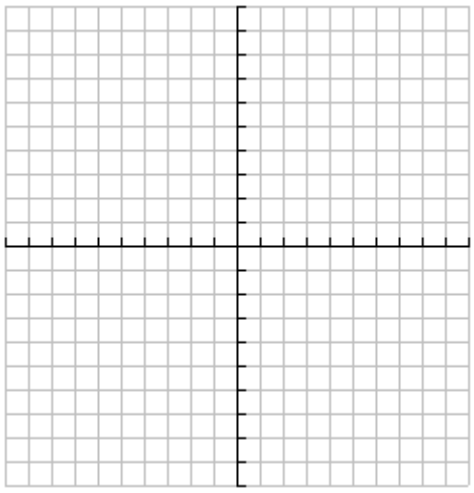
d. Solve: $-3x - 2 + 5x^2 = 0$

e. Solve: $3x^2 - 21x + 36 = 0$

f. Solve using the quadratic formula: $5x^2 + 11x = 3$

g. A 26-foot ladder is leaning against a building. The bottom of the ladder is 10 feet from the base of the building. How high is the top of the ladder from the ground?

h. Graph $y = x^2$



i. Marty leaves his house and walks 2 miles due west. He stops at the library and then walks 3 miles due north to his friends house. How far is Marty from his house? Round your answer to the nearest tenth of a mile.

j. A number squared is equal to 12 times the number minus 36. Find the number.

k. The area of a rectangle is $108cm^2$. The length is $3cm$ greater than the width. Find the length and width of the rectangle.