

Vocabulary

Constraints: The inequalities contained in the problem.

Continuous data: Data that has an infinite number of possible values within a selected range (measurable).

Discrete data: Data that has a finite or limited number of possible values (countable).

Domain: The set of x-coordinates of the set of points on a graph. The input value in a function or relation.

Feasible region: The solution to the set of constraints.

Function notation: An equation written using f(x) to mean the function whose input is x.

Literal equations: An equation that has more than one variable and where the values of the variables are known; can represent things like time, distance, and slope.

Modeling using mathematics: An algebraic or graphical representation of a real world situation involving data.

Range: The y-coordinates of the set of points on a graph. The output value in a function or relation.

Translate the following into mathematical equations or inequalities and then solve

1. The sum of a number and 8 is 28

$$\begin{array}{r} x+8=28 \\ -8 \quad -8 \\ \hline x=20 \end{array}$$

2. The difference of three times a number and 10 is 18.

$$\begin{array}{r} 3x-10=18 \\ +10 \quad +10 \\ \hline 3x=28 \\ \frac{3x}{3}=\frac{28}{3} \end{array} \quad x=9.3$$

3. Five more than the quotient of a number and 3 are at most 16.

$$\begin{array}{r} 5+\frac{x}{3} \leq 16 \\ -5 \quad -5 \\ \hline \frac{x}{3} \leq 11 \\ 3 \cdot \frac{x}{3} \leq 11 \cdot 3 \end{array} \quad x \leq 33$$

4. The product of 7 and a number plus 3 is 27

$$\begin{array}{r} 7n+3=27 \\ -3 \quad -3 \\ \hline 7n=24 \\ \frac{7n}{7}=\frac{24}{7} \end{array} \quad n=3.4$$

Solve the equations and inequalities

5. $\frac{1}{3}x - 6 = 10$

$$\begin{array}{r} +6 \quad +6 \\ \hline \frac{1}{3}x = 16 \\ \frac{1}{3} \quad \frac{1}{3} \\ \hline x = 48 \end{array}$$

6. $\frac{2x}{3} = 11 - 2x$

$$\begin{array}{r} 7=22x \\ 21=22x \\ \hline 0.3=x \end{array}$$

7. $-3x + 5 + 9x = 12 - 3x$

$$\begin{array}{r} 6x+5=12-3x \\ +3x \quad +3x \\ \hline 9x+5=12 \\ -5 \quad -5 \\ \hline 9x=7 \\ \frac{9x}{9}=\frac{7}{9} \end{array} \quad x=0.7$$

8. $4x + 7 = 19x - 3x$

$$\begin{array}{r} 4x+7=16x \\ -4x \quad -4x \\ \hline 7=12x \\ \frac{7}{12}=\frac{12x}{12} \\ \hline x=0.6 \end{array}$$

9. $2(x+1) = -3(4x+9)$

$$\begin{array}{r} 2x+2=-12x-27 \\ +12x \quad +12x \\ \hline 14x+2=-27 \\ \frac{14x}{14}=\frac{-29}{14} \end{array} \quad x=-2.1$$

10. $-2x + 9 < 1$

$$\begin{array}{r} -9 \quad -9 \\ \hline -2x < -8 \\ \frac{-2x}{-2} < \frac{-8}{-2} \\ \hline x > 4 \end{array}$$

**Always flip the inequality symbol when you mult. or div. by a negative #.*

11. $12x - 14 \leq 5x + 7$

$$\begin{array}{r} -7 \quad -7 \\ \hline 12x-21 \leq 5x \\ -12x \quad -12x \\ \hline -21 \leq -7x \\ \frac{-21}{-7} \leq \frac{-7x}{-7} \end{array} \quad 3 \geq x$$

12. $-12x - 10 > 50$

$$\begin{array}{r} +10 \quad +10 \\ \hline -12x > 60 \\ \frac{-12x}{-12} > \frac{60}{-12} \\ \hline x < -5 \end{array}$$

13. Write the equation of a line that has a slope of 3 and goes through the point (3, 2)

$$\begin{array}{r} 2=3(3)+b \\ 2=9+b \\ -9 \quad -9 \\ \hline -7=b \end{array} \quad y=mx+b \quad y=3x-7$$

14. Write the equation of a line that has a slope of 7 and goes through the point (3, 5)

$$\begin{array}{r} 5=7(3)+b \\ 5=21+b \\ -21 \quad -21 \\ \hline -16=b \end{array} \quad y=mx+b \quad y=7x-16$$

15. Write the equation of a line that passes through the coordinates (1, 3) and (3, 7)

$$\begin{array}{r} \frac{7-3}{3-1}=\frac{4}{2}=2 \\ y=mx+b \\ 3=2(1)+b \\ 3=2+b \\ -2 \quad -2 \\ \hline 1=b \\ y=2x+1 \end{array}$$

16. Write the equation of a line that passes through the coordinates (1, 3) and (3, 7)

Word Problems: Solve and Graph

17. Lucy pays \$211 in advance on her account at the athletic club. Each time she uses the club, \$5 is deducted from the account.

a. Write a linear function that gives the value remaining in her account after x visits to the club.

$$y=211-5x$$

OR

$$y=-5x+211$$

b. Find the value remaining in the account after 10 visits.

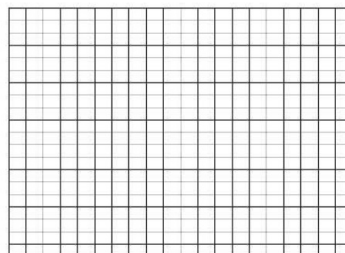
$$y=211-5(10)$$

$$y=211-50$$

$$y=161$$

c. After how many visits did she have \$96 remaining?

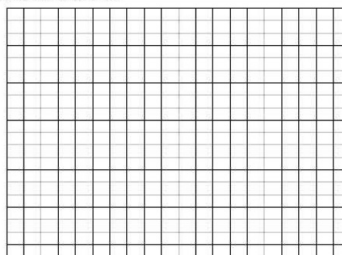
$$\begin{array}{r} -5x+211=96 \\ -211 \quad -211 \\ \hline -5x=-115 \\ \frac{-5x}{-5}=\frac{-115}{-5} \end{array} \quad x=23$$



18. Billy plans to paint baskets. The paint costs \$14.50. The baskets cost \$7.25 each.

- a. Write an equation that gives the total cost as a function of the number of baskets made.

$$y = 14.50 + 7.25x$$



- b. Determine the cost of four baskets.

$$y = 14.50 + 7.25(4)$$

$$y = 843.50$$

- c. If Billy spent \$112 how many baskets did he make.

$$112 = 14.50 + 7.25x$$

$$112 - 14.50 = 7.25x$$

$$97.50 = 7.25x$$

$$x = 13.4$$

(13)

Convert the following units

2.54cm = 1 inch 16 oz = 1 lb 5280 ft = 1 mile	2 cups = 1 pint 8 oz = 1 cup 454 grams = 1 lb
19. 432 ounces to pints <p style="text-align: center; font-size: 2em;">27</p>	20. 1152 cm to feet $1152 \div 2.54 = 453.54 \text{ in.}$ $453.54 \div 12 = 37.8$
21. 65 oz to grams $65 \div 16 = 4.0625$ $4.0625 \times 454 =$ 1844.375	22. 164 cups/feet to pints/ mile <p style="text-align: center; font-size: 2em;">X</p>

Exponential Growth and Decay

23. In 1985, there were 285 cell phone subscribers in the small town of Centerville. The number of subscribers increased by 75% per year after 1985. $A = P(1+r)^x$

- a. Complete the table

Year	0	1	2	3	4	5	6	7
# of Phone Users	285	498	872	1527	2,672	4,677	8,186	14,325

- b. Write an algebraic expression to model the situation

$$A = 285(1.75)^x$$

- c. How many cell phone subscribers were in Centerville in 1994?

$$285(1.75)^9 = 43,871$$

24. Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?

- a. Complete the table

Rounds	0	1	2	3
# of Players Left	128	64	32	16

- b. Write an algebraic expression to model the situation

$$A = 128(0.5)^x$$

- c. How many cell phone subscribers were in Centerville in 1994?

