

Linear Equation Word Problems

A linear equation can always be written in the form $y = mx + b$.

mx is the variable term: What is the rate of change? Is it $(+)$ increasing or $(-)$ decreasing? Multiply or divide by x .

b is the constant term: What is the starting point? Add or subtract it to the variable term.

x is the variable you solve for - What did I input? independent

y is after the equals sign - What is my output? dependent

Ex. 1 Sam has a Starbucks gift card worth \$15. He spends \$3 on every large cappuccino he buys.

a. Define x and y .

x : Cappuccinos

y : \$ on gift card

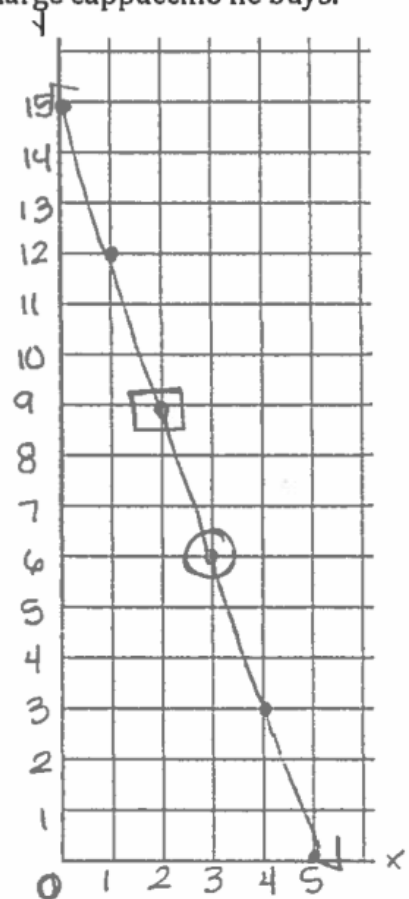
b. Write a linear equation for the scenario.

$$y = -3x + 15$$

c. Make a table for the scenario.

X: Cappuccinos	Y: \$
0	15
1	12
2	9
3	6
4	3
5	0

d. Make a graph.



e. SOLVE an equation for how many cappuccinos he must have bought if he only has \$6 left?

$$\begin{aligned}
 y &= -3x + 15 \\
 6 &= -3x + 15 \\
 -15 & \quad -15
 \end{aligned}
 \qquad
 \begin{aligned}
 -9 &= -3x \\
 \frac{-9}{3} &= \frac{-3x}{3} \\
 -3 &= -x \\
 3 &= x
 \end{aligned}
 \qquad
 \text{3 Cappuccinos}$$

f. How much money does he have on his gift card if he has bought 2 cappuccinos?

$$\begin{aligned}
 y & \\
 x & \quad y = -3x + 15 \\
 & \quad y = -3(2) + 15 = 9
 \end{aligned}$$

Ex. 2 Ciara earns \$8 per hour pet-sitting, but she owes her friend \$10.

a. Define x and y .

$$x = \text{hours}$$

$$y = \text{money}$$

b. Write a linear equation for the scenario.

$$y = mx + b$$

$$y = 8x - 10$$

b. If Ciara has \$22 after settling her debt, how many hours did she pet-sit?

$$y = 8x - 10$$

$$22 = 8x - 10$$

$$\begin{array}{r} +10 \\ \hline 32 \end{array}$$

$$\begin{array}{r} +10 \\ \hline 32 \end{array}$$

$$\frac{32}{8} = \frac{8x}{8}$$

$$4 = x$$

4 hours

c. How much money would Ciara have left if she pet-sit for 5 hours and settled her debt?

$$y = 8x - 10$$

$$y = 8(5) - 10$$

$$y = 40 - 10 = \$30$$

d. If Ciara has \$6 after settling her debt, how many hours did she pet-sit?

$$y = 8x - 10$$

$$6 = 8x - 10$$

$$\begin{array}{r} +10 \\ \hline 16 \end{array}$$

$$\begin{array}{r} +10 \\ \hline 16 \end{array}$$

$$\frac{16}{8} = \frac{8x}{8}$$

$$x = 2 \text{ hours}$$

e. How much money would Ciara have left if she pet-sit for 8 hours and settled her debt?

$$y = 8x - 10$$

$$y = 8(8) - 10$$

$$y = 64 - 10 = 54$$

Ex. 3 331 students went on a field trip. 6 buses were filled with students, and 7 students traveled in cars. How many students were in each bus?

One after the other (4, 5, 6)

Ex. 4 The sum of three consecutive numbers is 72. What is the smallest of these numbers?

$$\#1 + \#2 + \#3 = 72$$

$$x + (x+1) + (x+2) = 72$$

$$x + x + 1 + x + 2 = 72$$

$$\begin{array}{r} 3x + 3 = 72 \\ -3 \quad -3 \\ \hline 3x = 69 \end{array}$$

$$\frac{3x}{3} = \frac{69}{3}$$

$$x = 23$$

$$23 \quad 24 \quad 25$$

$$23 + 24 + 25 = 72$$