

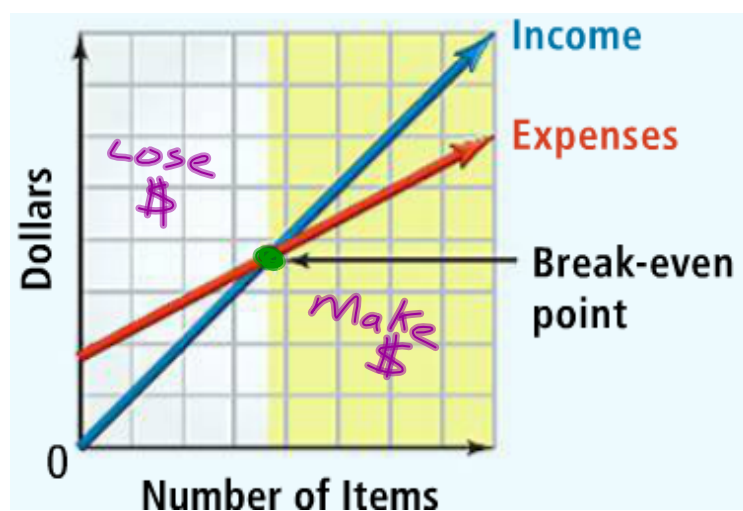
Algebra 1

Chapter 6

Section 6-4

Break-Even Point:

The break-even point occurs when income is equal to expenses.



Finding a Break-Even Point

A local used book store spends \$1050 per month on operating expenses. They pay \$1 for each book and sell each book for \$3.50.

* How many books will they have to sell in a month to break even?

$x \rightarrow$ # books
 $y \rightarrow$ \$

Income: $3.50x = y$
Expenses: $1050 + 1x = y$

$$\begin{array}{r} 420. \\ 2.5 \overline{)1050.0} \\ \underline{-100} \\ 50 \\ \underline{-50} \\ 0 \end{array}$$

$$\begin{array}{r} 1050 + 1x = 3.50x \\ -1x \quad -1x \\ \hline 1050 = 2.50x \\ \underline{2.50} \quad \underline{2.50} \end{array}$$

$$x = 420 \text{ books}$$

Finding a Break-Even Point

A bicycle store spends \$2000 per month on operating expenses. The average cost of each bike \$70 and the average sale price is \$120. The store also has a sponsorship from an athletic supply company that brings in \$100 per month. About how many bikes will the store need to sell to break even?

Exp: $2000 + 70x = y$
Inc: $120x + 100 = y$

$$\begin{array}{r} 2000 + 70x = 120x + 100 \\ -70x \quad -70x \\ \hline 2000 = 50x + 100 \\ -100 \quad -100 \end{array}$$

$$\frac{1900}{50} = \frac{50x}{50}$$

$$38 = x$$

$$38 \text{ bicycles}$$

A boat runs upriver (against the current) at a rate of 8mph. On the return trip the rate of the trip is 14mph. What is the rate of the boat in still water? What is the current of the river?




Diagram showing a boat moving upriver against a current. The boat's speed is labeled 'b' and the current's speed is labeled 'c'.

$$\begin{array}{r} b - c = 8 \\ b + c = 14 \\ \hline 2b = 22 \\ \frac{2b}{2} = \frac{22}{2} \\ b = 11 \text{ mph} \end{array}$$

$$\begin{array}{r} 11 + c = 14 \\ -11 \quad -11 \\ \hline c = 3 \text{ mph} \end{array}$$

A chemist has a solution that is 7% acid and another solution that is 16% acid. What she needs is 12 liters of a solution that is 10% acid. How much of each solution does she need?

$X \rightarrow$ L of 7% sol.
 $Y \rightarrow$ L of 16% sol.

$$\begin{array}{r} (x + y = 12) \cdot -7 \\ 100 \cdot (0.07x + 0.16y = 0.10(12)) \\ \hline 7x + 16y = 120 \\ -7x - 7y = -84 \\ \hline 9y = 36 \\ \frac{9y}{9} = \frac{36}{9} \\ y = 4 \end{array}$$

$$\begin{array}{r} x + 4 = 12 \\ -4 \quad -4 \\ \hline x = 8 \end{array}$$