A carpenter is going to build and sell some tables. It costs him $12,000 to buy the equipment needed and $85 in materials and time to make each table.

If the carpenter sells each table for $275 find the number of tables he need to make and sell in order to break-even.

Income: $275T$ — Expenses: $12{,}000 + 85T$

T = # of tables made and sold.

$275T = 12{,}000 + 85T$

$-85T \quad -85T$

$190T = 12{,}000$

$190 \quad 190$

$T = 63.158$ → 64 Tables

Find the number of tables needed in order to make a $5000 profit.

Profit = Income - Expenses

$5000 = 275T - (12{,}000 + 85T)$

$5000 = 275T - 12{,}000 - 85T$

$5000 = 190T - 12{,}000$

$12{,}000 \qquad +12{,}000$

$17{,}000 = 190T$

$190 \quad 190$

$T = 89.47$ → 90 Tables

Suppose it takes you 6.4 hours to fly 2800 miles into a headwind from Miami to Seattle. The return trip takes only 5.6 hours because you are flying with a tailwind. Write and solve a system of equations to find the speed of the wind and the airspeed of the plane.

p = speed of the plane

w = speed of the wind

d = rt

EQ for MIA to SEA: $\frac{2800}{6.4} = \frac{(p-w)6.4\text{hrs}}{6.4}$

EQ for SEA to MIA: $\frac{2800}{5.6} = \frac{(p+w)5.6\text{ hrs}}{5.6}$

$437.5 = p - w$

$+\ 500 = p + w$

$937.5 = 2p$

$2 \quad 2$

$468.75 = p$

$500 = p + w$

$500 = 468.75 + w$

$31.25 = w$

Plane speed = 468.75 mph

Wind speed = 31.25 mph

On your small boat it takes 3 hours to travel downstream 45 miles to the next city. It takes you 5 hours to return upstream. Write and solve a system of equations to find the speed of your boat and the speed of the current.

d = rt

b = speed of the boat

c = speed of the current

Downstream EQ: $45\text{mi} = (b+c)3\text{hrs}$ → $15 = b + c$

Upstream EQ: $45\text{mi} = (b-c)5\text{hrs}$ → $+\ 9 = b - c$

$24 = 2b$

$12 = b$

$15 = b + c$

$15 = 12 + c$

$3 = c$

Speed of the boat = 12 mph

Current speed = 3 mph

On a canoe trip I paddled upstream (against the current) for 6 hours and traveled 15 miles. Later I paddled downstream (with the current) for 4 hours and traveled 34 miles. Write and solve a system of equations to find the speed of the current and the speed that I can paddle in still water.

d = rt

b = speed of the boat

c = speed of the current

Downstream EQ: $\frac{34}{4} = \frac{(b+c)4}{4}$

Upstream EQ: $\frac{15}{6} = \frac{(b-c)6}{6}$

$8.5 = b + c$

$+\ 2.5 = b - c$

$11 = 2b$

$b = 5.5$

$8.5 = b + c$

$8.5 = 5.5 + c$

$3 = c$

Speed of the boat = 5.5 mph

Current speed = 3 mph

It takes you 3 hours in your canoe to travel 12.6 miles downstream. The return trip upstream takes you 7 hours. Write and solve a system of equations to find the speed of the canoe and the speed of the current.

d = rt

b = speed of the boat

c = speed of the current

Downstream EQ: $\frac{12.6}{3} = \frac{(b+c)3}{3}$

Upstream EQ: $\frac{12.6}{7} = \frac{(b-c)7}{7}$

$4.2 = b+c$

$+\ 1.8 = b-c$

$6.0 = 2b$

$3 = b$

$4.2 = 3+c$

$-3 \quad -3$

$1.2 = c$

speed of canoe = 3 mph

speed of current = 1.2 mph

You mix togther two acid solutions to get a final solution that is 9% acid by volume. If there ends up being 15 liters of this new solution how many liters of pure acid do you have?

9% of 15 liters

$(.09)(15) = 1.35$ liters

There is a flask with an unknown amount of solution.
This solution is 6% acid by volume.
Write an expression that gives the amount of pure acid in the flask. x=Amount of solution

$0.06x$

You mix an unknown # of liters of a 9% acid solution with an unknown # of liters of a 15% acid solution. You end up with a total of 20 liters of solution.

x = # liters of 9% solution y = # liters of 15% solution

Write an equation which represents the above information.

$x + y = 20$ solution

You want to create 8 gallons of an acid solution that is 12% acid by volume. All you have on the shelf are solutions that are 15% acid and 10% acid by volume.

How many gallons of each should you mix together?

X = gallons of 15% solution **Y** = gallons of 10% solution

Gallons of Solution

$X + Y = 8$

Gallons of pure acid

$.15X + .10Y = .12(8)$

$.15x + .10y = .96$

I used elimination by multiplying the top equation by 0.10 and subtracting to solve for x.

$.10X + .10Y = .80$

$-\ .15X + .10Y = .96$

$\frac{-.05X}{-.05} = \frac{-.16}{-.05}$

$X = 3.2$

3.2 gal of 15% solution
4.8 gal of 10% solution

$X + Y = 8$
$3.2 + Y = 8$
$Y = 4.8$