You start a painting business by purchasing all the needed equipment for $15,750. Each job costs you $80 in paint and brushes. You plan to charge $600 per job.

How many jobs will it take for you to break-even?

j = # jobs

Break-Even Point: Income = Expenses

Income: $600j$ = Expenses: $15,750 + 80j$

$-80j \quad -80j$

$\frac{520j}{520} = \frac{15,750}{520}$

$j = 30.29$

Break-Even Point = 31 jobs

You want to start a business selling sporting goods. In order to do so you will buy a building for $400,000. Insurance and taxes cost you $2825 a month. Wages for your workers average $3500 a month. Utilities for your building average $840 a month. You predict that you can sell an average of $20,000 worth of merchandise each month.

How many months will it take you to break-even?

m = # months

Income: $20,000m$ = Expenses: $400,000 + 2825m + 3500m + 840m$

$20,000m = 400,000 + 7165m$

$-7165m \quad -7165m$

$\frac{12,835m}{12,835} = \frac{400,000}{12,835}$

$m = 31.16 \approx$ 32 months

While in college you plan on making money by typing papers for other students. To do this you need to buy a computer and a printer for $1235. It costs you $0.70 to type and print each page. You plan on charging $1.50 per page.

Write and solve a system of equations to find the number of pages you must type in order to break-even.

p = # pages

Income: $1.50p$ = Expenses: $1235 + .70p$

$-.70p \quad -.70p$

$\frac{.80p}{.80} = \frac{1235}{.80}$

$p = 1543.75 =$ 1544 pages

1. You can paddle a canoe 4 mph when the water is still, i.e. on a pond. You are camping along a river whose current is 2mph.

a) If you paddle downstream (traveling with the current) how fast will your canoe be able to go?

Boat speed + Current speed = 4 + 2 = 6mph

b) If you paddle downstream 9 miles to a new fishing spot how long will it take?

$d = rt$ $\quad \frac{9}{6} = \frac{6t}{6}$ $\quad t = 1.5$ hrs

c) If you paddle upstream (traveling against the current) how fast will your canoe be able to go?

Boat speed - Current speed = 4 - 2 = 2 mph

d) If you paddle upstream from the fishing spot back to your campsite, how long will it take?

d = rt $\quad \frac{9}{2} = \frac{2t}{2}$ $\quad 4.5 \text{ hrs} = t$

2. A plane can fly 210 mph if there is no wind. Today there is a 30mph wind

a) If you fly into the wind (headwind) how fast will the plane be able to travel?

Plane speed - Wind speed = 210 - 30 = 180 mph

b) If you fly for 4 hours into the wind how far will you be able to travel?

d = rt $\quad$ d = (180)(4) = 720 miles

c) If you fly with the wind (tailwind) how fast will the plane be able to travel?

Plane speed + Wind speed = 210 + 30 = 240 mph

d) If you fly for 3 hours with the wind how far will you be able to travel?

d = rt $\quad$ d = (240)(3) = 720 miles

3. There are two "sports" drinks in front of you: Powerhelp and Crocade.

a) Powerhelp contains 8% fructose by volume. How many ounces of fructose are there in a 24 ounce bottle of this drink?

(0.08)(24) = 1.92 ounces of fructose

b) Crocade contains 6% fructose by volume. How many ounces of fructose are there in a 20 ounce bottle of this drink?

(0.06)(20) = 1.2 ounces of fructose

c) You mixed these two bottles together:

i) How many total ounces of "sports drink" do you have?

24 + 20 = 44 total ounces of drink

ii) How many total ounces of fructose are there in this mixture?

1.92 + 1.2 = 3.12 ounces of fructose

iii) What percent of the total ounces of this mixture is fructose?

$\frac{3.12}{44}$ x 100 = 7.09% fructose

A plane can fly 220mph if there is no wind. However, there is a 20 mph wind today.

If the plane flys between two cities that are 180 miles apart but has to fly into the wind (headwind), how long will it take to complete the flight?

$220 - 20 = 200$

$d = rt$

$\frac{180}{200} = \frac{200}{200}t$ $t = .9$ hrs

How long will it take the plane to fly the return trip if it then flys with the wind (tailwind)?

$220 + 20 = 240$

$d = rt$

$\frac{180}{240} = \frac{240}{240}t$ $t = .75$