5b- Word Problems

January 11, 2019 9:18 AM

5b + ½ 6 today
Finish #6 + Review Tuesday
Unit Test Wednesday
Review/Retests > Thurs + Friday

5b) word problems part II

Word Problems (Day 2):

1. Ryan Kesler invested $2000, part of it at an annual interest rate of 8% and the rest at an annual interest rate of 10%. After one year, he earned $190 in interest. How much money did he have in each investment?

solve using substitution

Let x = $ invested at 8%. (0.08) => $500
y = $ invested at 10%. (0.10) => $1500

$$\begin{cases} ① \; x + y = 2000 \\ ② \; 0.08x + 0.10y = 190 \end{cases}$$

① $x + y = 2000$, $-x$, $y = 2000 - x$

sub-in (FWD) ② $0.08x + 0.10y = 190$

$0.08x + 0.10(2000 - x) = 190$
$0.08x + 200 - 0.10x = 190$
-200 -200
$-0.02x = -10$
-0.02 -0.02
$x = 500$ ✓

solve for y
$y = 2000 - x$
$= 2000 - 500$
$y = 1500$

2. A small airplane makes a 2400 km trip in 7.5 hours and makes the return trip in 6 hours. If the plane travels at a constant speed and the wind blows at a constant rate, find the airplanes speed and the speed of the wind.

FWD trip 2400 km in 7.5 hrs
RVS trip 2400 km in 6 hrs

Let x = airplane speed = 360 km/hr
y = wind speed. = 40 km/hr *

FWD: → plane +x, ← wind −y, opp. direc.
$x - y = \frac{2400\text{km}}{7.5\text{hrs}}$
① $x - y = 320$

RVS: → plane +x, → wind +y, same direc.
$x + y = \frac{2400\text{km}}{6\text{hrs}}$
② $x + y = 400$

Elimination

$$\begin{cases} x - y = 320 \\ x + y = 400 \end{cases}$$
$2x \; \emptyset = 720$
$\frac{2x}{2} = \frac{720}{2}$
$x = 360 \Rightarrow 360\frac{\text{km}}{\text{hr}}$

sub-in: $x + y = 400$
$(360) + y = 400$
-360 -360
$y = 40 \Rightarrow 40\frac{\text{km}}{\text{hr}}$

To save time, let's just set up the following systems of equations. ***DO NOT SOLVE.***

= Total = Total

3. The total money raised from 550 people attending a play was $9184. The tickets cost $20 for adults and $12 for students. Determine the number of adults and the number of students who attended the play.

Let x = # of adults
y = # of students
$y = 550 - x$

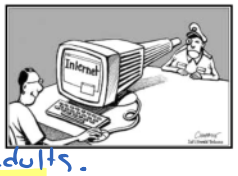
$$\begin{cases} x + y = 550 \\ \$20x + \$12y = \$9184 \end{cases} \Rightarrow$$

either substitution or elimination

3 1

= total = 45 ppl

4. Forty-five high school students and adults were surveyed about how they use the internet. Thirty-one people reported using the internet heavily. This was 80% high school students and 60% of the adults. How many students were included in this survey?



total = 31

80% stud. 60% adults.

Let x = # students
y = # adults

$$\begin{cases} x + y = 45 \\ 0.80x + 0.60y = 31 \end{cases}$$

5. A 50% acid solution is required in a chemistry lab. The instructor has a 20% stock solution and a 70% stock solution. He needs to make 20 litres of the 50% acid solution. How much of each stock solution should he use?

volume total = 20L
% solution total = (0.50)(20)

Total

Solve for the volume
Let x = vol. of 20% solution
y = vol. of 70% solution

System:

$$\begin{cases} x + y = 20 \\ 0.20x + 0.70y = (0.50)20 \end{cases}$$

Homework

ASSIGNMENT # 5b
pPages 21-24 Questions #104- 120
3's

Solving Problems with Systems of Equations. Use the method of your choice.

104. A job offered to Mr. Xu will pay straight commission at a rate of 6% on all sales. A second job offer will pay a monthly salary of $400 and 2% commission. How much would Mr. Xu have to sell so that both jobs would pay him the same amount.

let:
x = sales
y = pay

$y = 0.06x$
$y = 400 + 0.02x$

When would the job paying straight commission be a better choice?

105. In his 2004-05 season, Steve Nash scored 524 total baskets (not including free throws). He scored 336 more two point baskets than three point baskets. Write and solve a system of linear equations that represents this problem.

Let x = 2pt
y = 3pt.

+336

$x + y = 524$
$x = y + 336$
$-y \quad -y$

$\begin{cases} x + y = 524 \\ x - y = 336 \end{cases}$

Interpret your solution:

106. Mr. J has a class with 30 students in it. 22 of those students own a cell phone. $\frac{4}{5}$ of the girls owned a cell phone and $\frac{3}{5}$ of the boys owned a cell phone. How many girls were in this class?

107. Daiki invested a total of $12 000 in two stocks in 2009. One stock earned 4% interest and the other earned 7% interest. Daiki earned a total of $615 in interest in 2009. How much did he invest in each stock?

For each of the following problems, write and solve a system of equations. Interpret solutions!

108. Breakers Volleyball sold 570 tickets to their home opener, some tickets cost $2 and some cost $5. The total revenue was $1950. How many of each type of ticket were sold?

109. Mr. J is doing routine maintenance on his old farm truck. This month he spent $26.50 on 6 litres of oil and 2 gaskets. Last month he spent $25.00 on 4 litres of oil and 4 gaskets. Find the price of each gasket and one litre of oil.

110. Anya makes a trip to the local grocery store to buy some bulk candy. She chooses two of her favourite candies, gummy frogs and gummy penguins. Gummy frogs sell for $1.10 per 100g and penguins sell for $1.75 per 100g. Anya buys a total of 500g of candy for $7.84 (no taxes). How much of each type did she buy?

111. For his Christmas party, Teems Prey is making a bowl of exotic punch for the kid's table. Imported lychee juice sells for $12.50 per litre and guava nectar sells for $18 per litre. He is making 8 litres and will need to pay $126.40 for the perfect blend. How much of each type does he use?

112. Jay Maholl swam 12 km downstream in Englishman River in two hours. The return trip upstream took 6 hours. Find the speed of the current in Englishman River.

113. (What assumption must you make?)

114. The Lucky-Lady dinghy travels 25 km upstream in five hours. The return trip takes only half an hour. Find the speed of the boat and the speed of the current.

115. A bumble bee travels 4.5 km into a headwind in 45 minutes. The return trip with the wind only takes 15 minutes. Assuming speeds are constant, find the speed of the bumble bee in still air.

116. A plane flew a distance of 650 km in 3.25 hours when travelling in a tailwind. The return trip took 6.5 hours against the same wind. Assume both speeds are constant. Find the speed of the plane and the wind speed.

117. A 50% acid solution is required for a chemistry lab. The instructor has a 20% stock solution and a 70% stock solution. She needs to make 20 litres of the 50% acid solution. How much of each stock solution should she use?

Let x = volume of 20% solution

Let y = volume of 70% solution.

$x + y = 20$

$0.2x + 0.7y = (0.5)(20)$

Solve the System:

118. A 65% acid solution is required for a chemistry lab. The instructor has a 20% stock solution and a 70% stock solution. She needs to make 20 litres of the 65% acid solution. How much of each stock solution should she use?

119. The karat (or carat) is a measure of the purity of gold in gold alloy. 18K gold is approximately 75% pure and 14K gold is approximately 58.5% pure. Using 18K and 14K stock, a goldsmith needs to produce 40g of gold alloy that is 70% pure. How much of each stock will he need to use? (round to nearest hundredth)

120. A goldsmith needs to make 50g of 14K gold (58.5%) from 18K (75%) and 10K (41.7%) stock alloys. How much of each does she need? (round to nearest hundredth)