Word Problems (Day 2):

1. Ryan Kesler invested $2000. He invested 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?

   \[ \begin{align*}
   x + y &= 2000 \\
   0.08x + 0.10y &= 190
   \end{align*} \]

   Solve using substitution.

   \[ \begin{align*}
   x &= 500 \\
   y &= 1500
   \end{align*} \]

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, \( y = \) wind speed.

   \[ \begin{align*}
   x - y &= \frac{2400}{7.5} \\
   x + y &= \frac{2400}{6}
   \end{align*} \]

   Solve using elimination.

   \[ \begin{align*}
   x - y &= 320 \\
   x + y &= 400
   \end{align*} \]

   \[ \begin{align*}
   x &= \frac{360}{2} = 180 \\
   y &= \frac{400 - 360}{2} = 20
   \end{align*} \]

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.

   \[ \begin{align*}
   x + y &= 550 \\
   20x + 12y &= 9184
   \end{align*} \]

   \[ \begin{align*}
   y &= 500 - x
   \end{align*} \]

   Either substitution or elimination.
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?

Let \( x \) = \# students
\( y \) = \# adults.
\[
\begin{align*}
x + y &= 45 \\
0.80x + 0.40y &= 31
\end{align*}
\]

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?

\[
\begin{align*}
\text{Volume total} &= 20L \\
\text{50\% solution total} &= (0.50)(20)
\end{align*}
\]

Solve for the volume

Let \( x \) = vol. of 20\% solution
\( y \) = vol. of 70\% solution
\[
\begin{align*}
x + y &= 20 \\
0.20x + 0.70y &= (0.50)(20)
\end{align*}
\]

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**Homework**

Assignment # 5b
Pages 21-24 Questions #104-120
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:\n\[ x = \text{sales} \]
\[ y = \text{pay} \]

\[ y = 0.06x \]
\[ y = 400 + 0.02x \]

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.

\[ x + y = 524 \]
\[ x = y + 336 \]

Interpret your solution:

x = y = 336

106. Mr. J has a class with 30 students in it. 22 of those students own a cell phone. \( \frac{3}{5} \) of the girls owned a cell phone and \( \frac{2}{7} \) 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!

<table>
<thead>
<tr>
<th>Problem</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>108.</td>
<td>Breakers Volleyball sold $70 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?</td>
</tr>
<tr>
<td>109.</td>
<td>Mr. J is doing routine maintenance on his old farm truck. This month he spent $26.59 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.</td>
</tr>
<tr>
<td>110.</td>
<td>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?</td>
</tr>
<tr>
<td>111.</td>
<td>For his Christmas party, Toemis 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?</td>
</tr>
</tbody>
</table>
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 50.5% 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)