Section 2.8 Mixture and Distance Problem Solving

**Before Class:**

- ☐ Read the objectives on page 147.
- ☐ Complete the exercises:
  1. What is the percent acid in a liquid that is pure acid?
  2. Write an expression for the amount of acid in $x$ liters of a 30% acid solution.
  3. If one car travels at a rate of $x$ miles per hour and a second car travels 10 miles per hour faster, write an expression for the rate of the second car.

**During Class:**

- ☐ Write your class notes. Neatly write down all examples shown as well as key terms or phrases with definitions. If not applicable or if you were absent, watch the Lecture Series (DVD) for this section and do the same (write down the examples shown as well as key terms or phrases). Insert more paper as needed.

<table>
<thead>
<tr>
<th>Class Notes/Examples</th>
<th>Your Notes</th>
</tr>
</thead>
</table>

**Answers:** 1) 100% 2) 0.30$x$ 3) $x + 10$
Review this example:

1. A chemist needs 12 liters of a 50% acid solution. The stockroom has only 40% and 70% solutions. How much of each solution should be mixed together to form 12 liters of a 50% solution?

**UNDERSTAND.** Read and reread the problem. Let \( x \) = number of liters of 40% solution; then \( 12 - x \) = number of liters of 70% solution.

**TRANSLATE.** The table summarizes the information given.

<table>
<thead>
<tr>
<th></th>
<th>Number of Liters</th>
<th>Acid Strength</th>
<th>Amount of Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>40% Solution</td>
<td>( x )</td>
<td>40%</td>
<td>0.40x</td>
</tr>
<tr>
<td>70% Solution</td>
<td>( 12 - x )</td>
<td>70%</td>
<td>0.70(12 - x)</td>
</tr>
<tr>
<td>50% Solution Needed</td>
<td>12</td>
<td>50%</td>
<td>0.50(12)</td>
</tr>
</tbody>
</table>

The amount of acid in the final solution is the sum of the amounts of acid in the two beginning solutions. 
\[
0.40x + 0.70(12 - x) = 0.50(12)
\]

**SOLVE.**
\[
0.40x + 0.70(12 - x) = 0.50(12)
\]
\[
0.4x + 8.4 - 0.7x = 6
\]
\[
-0.3x + 8.4 = 6
\]
\[
-0.3x = -2.4
\]
\[
x = 8
\]

**INTERPRET.**
Check: In 8 liters of a 40% acid solution there are \( 0.40(8) = 3.2 \) liters of acid. In \( 12 - 8 = 4 \) liters of a 70% acid solution there are \( 0.70(4) = 2.8 \) liters of acid. In 12 liters of 50% acid solution there are \( 0.50(12) = 6 \) liters of acid. \( 3.2 + 2.8 = 6 \), so the amounts are correct.

State: If 8 liters of the 40% solution are mixed with 4 liters of the 70% solution, the result is 12 liters of a 50% solution.

Your turn:

2. How much pure acid should be mixed with 2 gallons of a 40% acid solution in order to get a 70% acid solution?
**Section 2.8 Mixture and Distance Problem Solving**

**Review this example:**
3. Part of the proceeds from a local talent show was $2420 worth of $10 and $20 bills. If there were 37 more $20 bills than $10 bills, find the number of each denomination.

UNDERSTAND. Read and reread the problem. Let \( x \) = number of $10 bills and \( x + 37 \) = number of $20 bills.

**TRANSLATE.**

<table>
<thead>
<tr>
<th>Denomination</th>
<th>Number of Bills</th>
<th>Value of Bills (in dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10 bills</td>
<td>( x )</td>
<td>( 10x )</td>
</tr>
<tr>
<td>$20 bills</td>
<td>( x + 37 )</td>
<td>( 20(x + 37) )</td>
</tr>
</tbody>
</table>

Since the total value of these bills is $2420, \( 10x + 20(x + 37) = 2420 \)

SOLVE. \( 10x + 20(x + 37) = 2420 \)
\( 10x + 20x + 740 = 2420 \)
\( 30x + 740 = 2420 \)
\( 30x = 1680 \)
\( \frac{30x}{30} = \frac{1680}{30} \)
\( x = 56 \)

**INTERPRET.**
Check: Since \( x \) represents the number of $10 bills, we have 56 $10 bills and 56 + 37 = 93 $20 bills. The total amount is \( $10(56) + $20(93) = $2420 \), the correct total.

State: There are 56 $10 bills and 93 $20 bills.

**Your turn:**
4. Part of the proceeds from a garage sale was $280 worth of $5 and $10 bills. If there were 20 more $5 bills than $10 bills, find the number of each denomination.

<table>
<thead>
<tr>
<th>Number of Bills</th>
<th>Value of Bills</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5 bills</td>
<td></td>
</tr>
<tr>
<td>$10 bills</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Answer**

<table>
<thead>
<tr>
<th>Answer</th>
<th>Text Ref</th>
<th>Video Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 40% solution: 8 L; 70% solution: 4 L</td>
<td>Ex 1, p. 148</td>
<td>Sec 2.8, Ex 1</td>
</tr>
<tr>
<td>2 2 gal</td>
<td>Sec 2.8, Ex 13</td>
<td></td>
</tr>
</tbody>
</table>

Next, insert your homework. Make sure you attempt all exercises asked of you and show all work, as in the exercises above. Check your answers if possible. Clearly mark any exercises you were unable to correctly complete so that you may ask questions later. DO NOT ERASE YOUR INCORRECT WORK. THIS IS HOW WE UNDERSTAND AND EXPLAIN TO YOU YOUR ERRORS.
Preparing for the Chapter 2 Test

Start preparing for your Chapter 2 Test as soon as possible. Pay careful attention to any instructor discussion about this test, especially discussion on what sections you will be responsible for, etc.

☐ Work the Chapter 2 Vocabulary Check on page 163.

☐ Read your Class Notes/Examples for each section covered on your Chapter 2 Test. Look for any unresolved questions you may have.

☐ Complete as many of the Chapter 2 Review exercises as possible (page 163). Remember, the odd answers are in the back of your text.

☐ Most important: Place yourself in “test” conditions (see below) and work the Chapter 2 Test (page 166) as a practice test the day before your actual test. To honestly assess how you are doing, try the following:
  • Work on a few blank sheets of paper.
  • Give yourself the same amount of time you will be given for your actual test.
  • Complete this Chapter 2 Practice Test without using your notes or your text.
  • If you have any time left after completing this practice test, check your work and try to find any errors on your own.
  • Once done, use the back of your book to check ALL answers.
  • Try to correct any errors on your own.
  • Use the Chapter Test Prep Video (CTPV) to correct any errors you were unable to correct on your own. You can find these videos in the Interactive DVD Lecture Series, in MyMathLab, and on YouTube. Search Martin-Gay MyMathLab Algebra I and click “Channels.”

I wish you the best of luck….Elayn Martin-Gay