Notes for 1.2 Applications and Modeling of Linear Equations (pp. 92 – 100)

Name:
Date:
Instructor:

Topics: General Problem Solving, Geometry, Applications and Modeling of Linear Information

I. Solving Applied Problems (pp.92 – 93)

General Steps for Solving Applications:

1. ______________ and reread the problem carefully and slowly until you understand _____________ and ____.
2. _________________________ to represent the unknown value. Use diagrams or tables to organize the information. Express other unknowns in terms of the variable.
3. ________________________ using the variable expressions.
4. _____________ the equation.
5. _____________________________________ to the problem. Does it seem reasonable?
6. _________________________ in the words of the original problem.

*7. Write the answer to the question in a complete sentence, being careful to use the correct units required.

II. Geometry Problems (p. 93)

Example 1, page 93:

* Use two figures to represent the old square and the new square. Label each completely.
* Recall that the perimeter of a square is the sum of all 4 sides, or 4*s*.
* Read the problem and look for key math words that can be used later to make an equation.
* Find the **verb** of the key math sentence FIRST. That will anchor the entire equation.
* Put the left phrase of the sentence on the left side of the equals sign, and the right phrase of the sentence on the right side of the equals sign. Don't scramble the order of the words of the problem.

Example, Problem #13, page 101:

* Remember that operation phrases like "less **than**" and "fewer **than**" (and even "more than" must be translated in reverse order of the English statement. Ex. "5 *less **than*** a number" = x – 5
* Recall that perimeter is the sum of all the sides.

III. Motion Problems (pp. 94 – 95)

Example, Problem #21, page 103:

* Use a chart to organize the information.
* Units of time must be consistent from one entry to the other, and also be consistent with the context of the problem. Miles per hour dictates what the units of time in problem must be written as.
* Use the calculator to help with the fractions—MATH #1 and MATH #2 will go back and forth from fraction to decimal forms.

IV. Rate of work (pp. 95 – 96)

Example 3, page 95:
I teach this type of problem as the following:
1. Set up the problem using the pattern:

$$\frac{time\ together}{time\ alone}+\frac{time\ together}{time\ alone}=1\,(whole\ \ job\ done)$$

Let x = first computer and $2x$ = second computer. (The slower computer must be multiplied by 2, since the *other* one is twice as fast.)
So this problem becomes:

$$\frac{2}{x}+\frac{2}{2x}=1$$

$$\frac{2}{x}+\frac{1}{x}=1 \quad \text{LCD} = x$$

Multiplying each term by the LCD of x,
then $2+1=x$
$3=x$
and $2x = 6$.
So, the faster computer takes 3 hours and the slower computer takes 6 hours to do the job alone.
*This pattern will work every time, even though it doesn't look like the text's solution at all…

V. PerCent Mixture Problems (pp. 96 – 98)

Example #35, page 104 (chemical mixture)
Example 6, page 99 (money mixture)

* Let each percentage have its own line of your chart.
* Keep in mind what is really happening-- you are mixing two things (accounts, chemicals, etc) together and getting a result.
* All percents can be written as decimals by moving the decimal 2 places to the **left**.
* When you only know the total amount (of money or chemical), split the total by using subtraction. Ex. When the total is $4000, then the amount in the two accounts is x and $4000 - x$. When the total is 50 pounds of chemical, then the amount of the two chemicals to be mixed is x and $50 - x$.

VI. Modeling with Linear Equations
* Read the problem completely, paying particular attention to what the (possibly unfamiliar) variables represent, and what units are associated with each one.
* Substitute the values given for the appropriate variable. Double check this to make sure that you've put the right number in the right spot.
* Watch for a restatement of the calendar years. Often, it's more convenient to use 0 as the first calendar year, 1 for the next year, 2 for the next, etc. Ex. The problem concerns action that happened between 1994 and 2000, where $x = 0$ corresponds to 1994, $x = 1$ corresponds to 1995, etc. That makes the x values become 0, 1, 2, 3, 4, and 5 for the problem.

Assignments:
Text: pp. 100 – 107 #1 – 7 odd, 8, 9, 11, 13, 47, 51abcd

"A Review of Algebra": pp. 58 - 59 #9, 11, 17, 18, 19