MATH 1314 – COLLEGE ALGEBRA
SECTION 2.3 MODELS AND APPLICATIONS

- Strategy for Solving Word problems

1. Read the problem. Identify what information is given and what you are looking for. Draw a picture if possible.
2. Choose a variable to represent the quantity you are looking for. Express all other quantities in terms of this variable.
3. Express the variable in 2 different ways. May use a formula from geometry or physics or finance.
4. Set-up an equation relating the expressions in number 3.
5. Solve the equation.
6. Answer the questions in the problem.

Ex: In Dan's College Algebra class, homework counts for 6% of the final grade; quizzes for 8%; labs for 6% 3 exams each for 15%; and the final exam for 20%. If Dan has an 85 homework average, 62 quiz average, 84 lab average, and scores of 75, 63 and 82 on his three exams, what does he need to make on the final exam to earn a 70 in the course?

Ex: A retired couple invests $\$25,000$, some in Bond A, which earns 4% and some in Bond B, which earns 6% annual interest. How much is invested at each rate if they earn \$1300 each year?

Ex: A small mower can mow a pasture in 3 hours, and a larger mower can mow the pasture in 2 hours. How long will it take to mow the pasture if both mowers are used?

NOTE: If there is a situation where one person or tool is working against the other, we subtract.

Ex: An empty pool can be filled in 10 hours. When full, the pool can be drained in 19 hours. How long will it take to fill the empty pool if the drain is left open?

- A solution is made up of a solute dissolved in a solvent.
  Volume of solution X Concentration of Solute = Volume of Solute

  Ex: A nurse has 300 mL of a solution that is 30% alcohol. How much pure water must she add to dilute the solution down to 18% concentration?

Solution 1		Solution 2		New Solution
(Volume)(Conc of solute)	+	(Volume)(Conc of solute)	=	(Volume)(Conc of solute)

SOLUTION: 200 mL

Ex: A nurse has 300 mL of a solution that is 30% alcohol. How much pure alcohol must she add to increase the concentration of the the solution to 38%?

Solution 1		Solution 2		New Solution
(Volume)(Conc of solute)	+	(Volume)(Conc of solute)	=	(Volume)(Conc of solute)

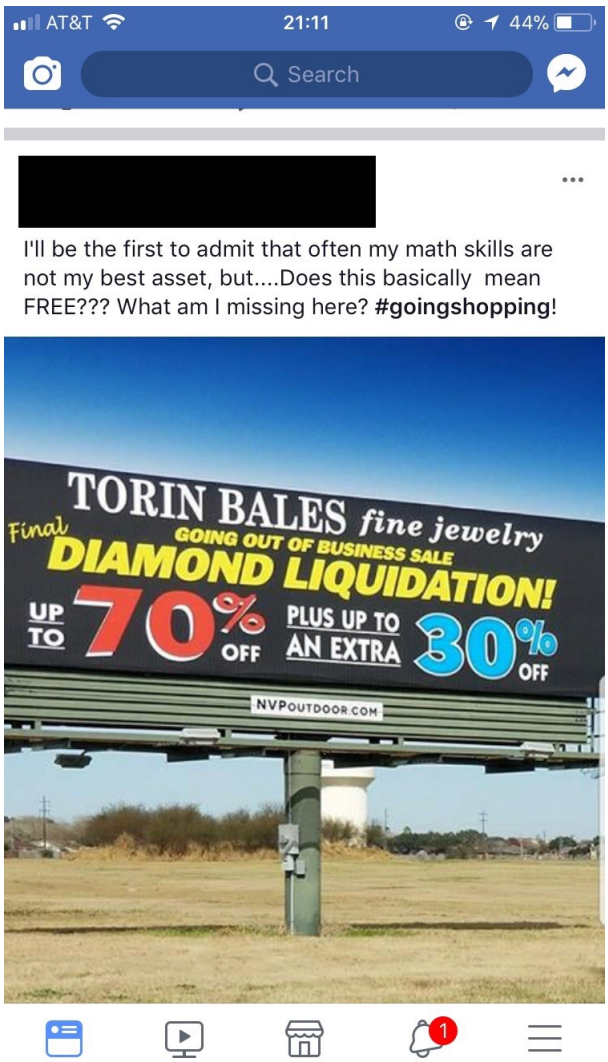
SOLUTION: ≈ 38.71 mL

Ex: How many gallons of a 24% salt solution and 18% salt solution must be mixed to get 25 gallons of a salt solution with concentration 20%?

Solution 1		Solution 2		New Solution
(Volume)(Conc of solute)	+	(Volume)(Conc of solute)	=	(Volume)(Conc of solute)

SOLUTION: ≈ 8.33 gallons

Ex: A man leaves home for a big work conference, driving at 70 mph. Ten minutes later, his wife realizes he left his briefcase, containing his cell phone and laptop, and follows him, traveling at 78 mph. How long will it take her to catch her husband?



For simplicity's sake, let's assume we purchase an item which is marked exactly 70% off, with an additional discount of exactly 30%.

Suppose we purchase an item that was originally \$100
Let's look at this in two steps:

1. Take 70% off. How much do we pay?
2. Now take 30% off of amount from Step 1. How much do we pay?

Let's try it again:
Suppose we purchase an item that was originally \$200

1. Take 70% off. How much do we pay?
2. Now take 30% off of amount from Step 1. How much do we pay?

SUMMARY: Suppose we purchase an item that was originally \$$x$

1. Take 70% off. How much do we pay?
2. Now take 30% off of amount from Step 1. How much do we pay?