Knowing what "percent" means will help a lot.

Elementary algebra
Class notes
Mixture and Uniform Motion Problem Solving (section B.2)

"Percent" means "per 100" or "part of 100"

For example, 20% means "20 parts out of every 100 parts". We could write 20% as $\frac{20}{100}$ or .20 (if we do that division).

Do you remember the shortcut for turning percents into decimals?

expl 1: What number is 16% of 70?

These problems can usually be directly translated.

Percent problems compare parts to the whole. Imagine you have a whole 70 dollars or meters or frogs or whatever. And, 16% of that 70 (or 11.2 dollars, meters, frogs, etc.) would be a **part of that whole**. The trick is to figure out what is the part and what is the whole in these problems.

$$percent = {}^{part}\!/_{whole}$$

or

$$percent \cdot whole = part$$

Alternatively,

$$\frac{percent\ number}{100} = \frac{part}{whole}$$

Mixture Problems:

Optional Worksheet: Mixture problems: Salt concentration:
We will first work with these problems on a visual level and try to understand what is really going on. This worksheet has a traditional mixture problem on the last page. Solutions are available online.

Some people swear by setting up a table for mixture problems. You may also find thinking about the physical situation and the verbal models below will help. I imagine the **pure substance** (pure antibiotics, in the example below) settling to the bottom of each bottle of solution. This is pure, 100% concentrate. Then I picture these amounts of pure substance combining when I pour the two solutions together. Here are the verbal models which later help form our equation.

amount of **pure substance** in first solution + amount of **pure substance** in second solution = amount of **pure substance** in **final** solution

amount of **pure substance** in a given solution = percent concentration (decimal form) * amount of **total solution**

expl 2: Solve. Complete the table to help with calculations.

How many cubic centimeters (cc) of a 25% antibiotic solution should be added to 10 cc of 60% solution in order to get a 30% antibiotic solution?

Let x be what you are asked to find.

	Number of cc *	Antibiotic Strength =	Amount of **Pure** Antibiotic
25% Solution			
60% Solution			
30% (Final) Solution			

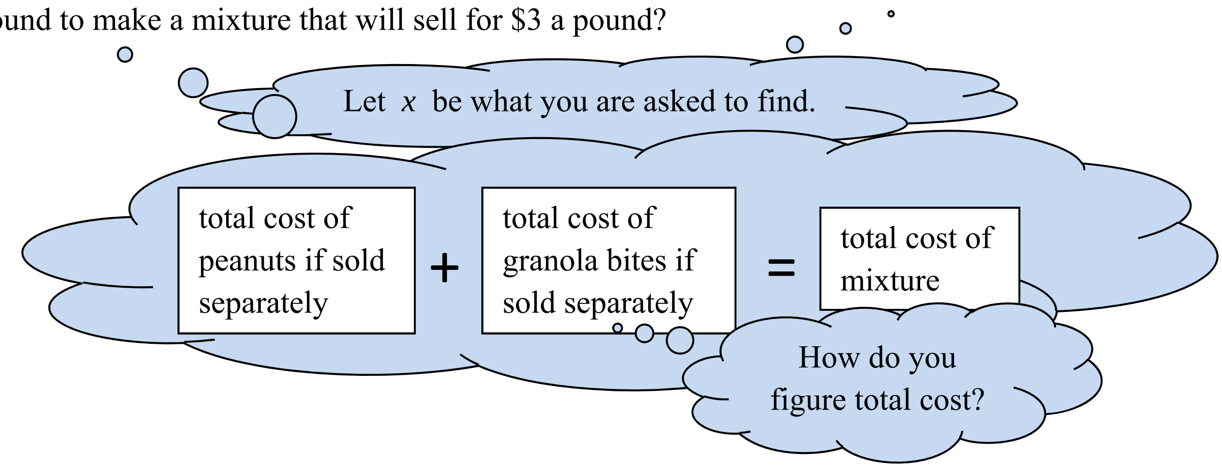
Always use decimal forms of percentages in calculations.

More room on next page…

expl 2 continued: Solve. Use the table we completed to make and solve an equation using the first verbal model from the previous page.

How many cubic centimeters (cc) of a 25% antibiotic solution should be added to 10 cc of 60% solution in order to get a 30% antibiotic solution?

expl 3: The owner of a chocolate shop wants to make a new trail mix. How many pounds of chocolate-covered peanuts worth $5 a pound should be mixed with 10 pounds of granola bites worth $2 a pound to make a mixture that will sell for $3 a pound?



Uniform Motion Problems:

expl 4: Solve.

A bus leaves a rest area at 12:00 traveling at 50 mph. A car leaves the rest area, following the bus, one hour later traveling at 70 mph. How long will it take the car to overtake the bus?

What two things are equal?

$d = r \cdot t$

Let x = number of hours the car drives.

expl 5: Two trains leave St. Louis at the same time, traveling in opposite directions. One train travels 10 miles per hour faster than the other train. In 2.5 hours, the trains are 205 miles apart. Find the speed of each train.

Draw a picture!

$d = r \cdot t$

Let x = rate of one of the trains

What is the rate of the other train? What are the units?

Money Denomination Problems (or what I call Piles o' Cash):

expl 6: The King is in his Counting House counting out $20 and $50 bills. There are six times as many $20 bills as $50 bills and the total of the money is $3910. How many of each denomination does the King have?

Let x = number of $50 bills.

What is the relationship between x and the number of $20 bills?

Picture it: stack of $20's plus stack of $50's equals $3910