

Word problems activity
Total time 65 minutes
Instructor version

(Prep work) Make sure you have work sheets copied and ready to hand out. Also make sure you have multiple markers for students to use.

(10 mins) Put the students into groups of 3 or 4. For the first class, you should definitely use random groups. One good method for making random groups is to hand out appropriately prepared playing cards to the students, and have the aces form one group, the 2s the next group, and so on. You may need to adjust groups at the end to make sure there are no groups larger than 4 or smaller than 3; just tell people what to do, as it will be easier for them.

Also, have students introduce themselves in their groups; that way, each student will have talked to at least 2 or 3 other students in the class. But make sure you call the class to order and start the problem before this degenerates into socializing — keep everyone focused on business.

(15 mins) Note: Make sure you read and do all four problems before class. You have to know the problems well if you're going to supervise them.

Assign a different problem to each group: “You do 1, you do 2, etc.” Have everyone read the instructions before they begin; students will want to start plugging numbers in randomly, which is the complete opposite of what you want them to do. Then have them do the first item (“Name the variables”) and only the first item. Note that many students will have developed methods for “solving” word problems that get around reading the problem. Remember, your main goal in this whole activity is to get students to realize that they have to read the problem, and help them to learn to read it.

Circulate among the different groups and monitor their progress. Answer any questions, but answer them *quickly*; don't get stuck at any one table while other tables are lost. In fact, one point is that you don't want to get any particular group to the *end* of a problem; you just want to get them unstuck on the current point and on to the next one, after which you move to the next group. E.g.: “So what's one important quantity in this problem? OK, pick a name for that, anything is fine as long as you write it down. Great, now keep going. . . . (Or: Great, that's it! Can you go write that down on the board, please?)”

(5 mins) Next, have students figure out the goal of each problem (“Find out how much Francis makes”) and express that goal in terms of the variable names from the previous segment (“Solve for F ”). Again, have the fastest groups write their answers on the board.

(15 mins) Next, have students translate the words of each problem, sentence by sentence, into equations, using the variables chosen in the first segment. When groups get

stuck, ask them, “What does the first sentence say about the variables you listed at the beginning? OK, now do that for the second sentence.”

Common mistakes to watch for include:

- Student using numbers randomly, including extraneous numbers like the year.
- Students applying arithmetic operations before setting up the equations. Try hard to get them to start over and translate each sentence into an equation.
- Confusion about percentages and “percent of” versus “percent more”. If more than one group has this confusion, stop the entire class, get everyone’s attention, and give a 2 min explanation of the difference between “percent of” and “percent more”. (Prepare this beforehand; you will almost certainly have to do it; Problems 1 & 3)

(15 mins) Have students solve the problems and write their final answers on the board in a complete sentence (“Frank makes. . .”). This will not be easy for students, and you should expect to see the following problems:

- Students forgetting how to solve two equations in two variables, even though one of the equations is $x + y = C$. Remind them that they should try to eliminate one variable. (Problems 2 & 4)
- Problems with the distributive law. That is, students often have trouble recognizing that $x + 1.15x = 2.15x$, so remind them of the “invisible 1”: $x + 1.15x = 1x + 1.15x = 2.15x$.

(5 mins) Bring the activity to a close. (It’s important that every activity have some sense of closure, and does not just stop.) Go over the final answers. If teams don’t look like they will finish in a finite amount of time, do one or two yourself on the board; to be frank, students may not learn much from that, but they’ll feel better about the day’s activities.

Most importantly, finish by reviewing the main steps in solving a problem:

- **READ THE PROBLEM.** (Again, many students have “learned” their way around this step.)
- Name the important quantities in the problem.
- Translate words into math, sentence by sentence.
- Only **THEN** do you solve the problem.

Finally, collect written work from each group, signed by all members of the group. Teams will be graded by effort, not by correctness of answer, though you should make a point of giving 0s to non-participating teams.