

TITLE OF LESSON

Algebra 1 Unit 1 Lesson 12 – Equivalent Sets, Union, Intersection, Adding and Subtracting Sets
You Do Speak Math: Creation of the Individual

TIME ESTIMATE FOR THIS LESSON

One class period

ALIGNMENT WITH STANDARDS

California – Algebra 1:

Preliminary lesson necessary for the development of:

5.0 Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification of each step.

7.0 Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations by using the point-slope formula.

8.0 Students understand the concepts of parallel lines and perpendicular lines and how those slopes are related. Students are able to find the equation of a line perpendicular to a given line that passes through a given point.

TARGET VOCABULARY

equivalent set

redundancy

union

intersection

∪

∩

(If you want to type these symbols yourself, you have two choices: 1) Select the symbol, copy, and paste it where you want to put it; or 2) Put the cursor where you want to insert the symbol in your document. Go to Insert on the top menu. Go down to Symbol, then, when the dialogue box opens, under Font: select Symbol and look for the appropriate symbol. Click it once. Hit the Insert button. Click Close. If you haven't ever inserted symbols before, you may want to take a look around this dialogue box. You can find a lot of symbols and other things here that you don't have on your keyboard.)

LESSON OBJECTIVES

- To give students knowledge of various set manipulations
-

EXPLANATION OF LESSON

The point of this lesson is to get students to start thinking about sets in terms and situations in which we really use them. One of the things we do with sets is to *union* them. When we union sets, we have to avoid any *redundancy* of elements. This is an easy idea to explain in today's economy: when two or more companies merge, the first thing that happens normally are the layoffs of employees to eliminate any redundancy of positions or tasks. Many students may have felt this through personal experience. The people doing the books are paid to look at the union of sets (the two companies) and to eliminate any redundancy, not to consider the human factor.

Just a quick review: Sets can be created from smaller sets through union or intersected with other sets to obtain common elements. Sets can also be added or subtracted from other sets. And, as we saw in Lesson 11, sets can be *equivalent*.

Before class, write the following questions on butcher paper or poster board;

1. Does your group have any two sets that are exactly the same?
2. Does your group have any sets that can be added together? Is there redundancy?
3. Does your group have any sets that have something in common? Can you create and intersection of the sets?
4. Does your group have any sets that can be subtracted from other sets?
5. Does your group have a set that has nothing in it?

Students will be focused and motivated if they see the discussion and mathematical manipulation of sets as something they already do and something that is relevant to their lives. It is important that we continually draw from the student's experiences and relate the results of the algebraic calculations back to them. The strongest deterrent from using math is usually the sense that it is irrelevant, abstract and meaningless. Anything we can do to counter these unfounded assertions will benefit the students. Students typically learn these ideas because math is presented to them in irrelevance abstract and meaningless manners. We want algebra to be seen as part of their lives.

FOCUS AND MOTIVATE STUDENTS

- 1) Homework Check – Stamp/initial complete homework assignments. Pass back graded work and have students place in their folders.
 - 2) [Agenda](#) – Have students copy the agenda you have posted.
-

ACTIVITIES – INDIVIDUAL AND GROUP

1. Set Notation – To introduce the set notation for this class, remind them that \cup (See note above about this symbol.) is the symbol to show the union of two sets: $\{A, B, C, D\} \cup \{B, D, E\} = \{A, B, C, D, E\}$. Notice that the redundancy is eliminated. Only one of each element shows up in the union. The *intersection* of these sets is $\{B, D\}$ or $\{A, B, C, D\} \cap \{B, D, E\} = \{B, D\}$. So those elements that are redundant become the members of the set of intersection.
2. Assign Groups – Explain to the class that they'll be working in groups to consider how we union – or merge – sets, how we find redundancy, and they'll be thinking about how to add and subtract sets. Once they understand, divide the class into groups of 3. Have students assign group roles (see *Group Roles* below).
3. Present in Groups – In their groups, have each student present one of the sets they came up with for homework.
4. [Notetaking](#) – On loose leaf paper, for their classroom folders, have each student record all other students' sets.
5. Group Answers – As they're presenting, post the questions you wrote on butcher paper or poster board before class. Once all groups have finished their presentations, ask the groups to discuss and answer each question. For each question to which they have a positive response (except #5), they should try to manipulate the sets accordingly.
6. Work and Present – Give them ten minutes or so to work through these. Once they have finished, have the groups present to the class.
7. Discuss – As you do the following discussion, have a student write the sets and equations on the board. Discuss, based on what they have just done, the concepts of comparing sets, equivalent sets, union and intersection and ask them for other examples. Elicit examples from different sources including video games (for example, the set of the favorite video games of one student + the set of the names of the favorite video games of another students = the set of both, minus any redundant video games), the work world, sports (for example, the set of the names of all point guards in the NFL \cap the set of the names of all members of the LA Lakers = the set of the names of all point guards on the LA Lakers}), computers, fashion, music, and so on. You're getting to know your students by now. What are their interests?

8. Rules – Did any of the groups add rules that described any of their sets? See what they came up with, or what they can come up with now. Elicit examples from the class. Always give examples using standard set notation.
 9. No Elements – Ask them what they thought of question 5 from the butcher paper/poster board. Did any groups have sets that contained no elements? What does that mean? Why would there be a set with no elements? Can they think of any questions to which they'd answer "No"? The set of all oceans within the US = { }, for example. Can they think of any time this might be useful? If not, they can come back to this one. It will come up again!
 10. Homework Review – Go over the homework assignment. Field questions. Make sure the sets are of varying sizes in order to segue into tomorrow's discussion of cardinality of sets.
-

HOMEWORK

Create 10 sets of varying sizes. These sets should be paired so that 5 can be added to or in some way combined with the other 5. Write down each set with set notation, and describe the rule for each set. Then add the sets together (or subtract or intersect) and add (or subtract or intersect) the rules.

GROUP ROLES

Students will be working in groups for most of this class. In their groups, students should have a recorder, a presenter, and facilitator.

DOCUMENTATION FOR PORTFOLIO

None