

TITLE OF LESSON

Algebra 1 Unit 1 Lesson 11 – Introduction to 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.

MATERIALS

Pens

Paper

Markers, colored pencils

Rulers

CD/tape player (Computer with CD drive)

LESSON OBJECTIVES

- To introduce the students to the concepts of set, member of a set, intention, and extension
 - To understand sets as a way we see the world and objects in it
 - To see sets as one way we organize thought
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EXPLANATION OF LESSON

This is the first of four classes on sets. We will introduce the idea of a set and show how we create and define sets. The students bring their own experiences of defining and using sets to the discussion. This introduction of sets is necessary foundation work for Algebra. As students begin to work with variables, they'll discover that in actual usage, variables frequently represent sets. Also, because we can state a rule to define or describe a set, students begin to learn how to state rules to describe sets. In this way, they will be consciously drawing connections and making associations between and among a variety of elements.

When we talk about transferable skills, students bring a basic understanding of sets with them to class. Describing them and seeing them in new ways is a transferable skill we're giving them. It's important for them that they see what they're learning and how it applies to situations and events outside the classroom. Our students will quickly see that they use sets every day. But, most incoming freshmen, and high school students in general, are accustomed to describing sets by their elements. Here, they are being forced to look at the elements and then create a rule to draw the limits. Although in their lives, they do this all the time, they are not normally aware that they are doing it. Part of these lessons, then, will be introducing new concepts; part will be making them aware of how our minds work.

Defining sets with a rule will be essential when they start to look at infinite sets. It is impossible to describe an infinite set by listing its elements: "Make a list: All the things I don't know." Students begin, in these next few

lessons, to look at connections within sets to determine the common quality, or *attribute*, among the items. From there, they state a rule that describes – for themselves and well as others – the elements of the set without actually having to list all elements.

Part of what students will learn here is that we, as human beings, already do this from the time we are born. We're thinking consciously here about how the mind works. We cannot, for example, talk about people in the United States by listing all of the elements of the set. (A computer could, so it is not an impossible task, but would, for us, be a meaningless one.) Instead, we make associations; we say "All the people in the US," or something along those lines.

This we learn from the moment we begin taking in the things around us in the world and as we begin to develop language. This is the abstraction we learn before we get into the symbolic representation of what's in the world. We look at the world; we simplify it by creating a rule to describe it; then we create a syntax, or a language, to describe those rules. Here, that language is algebra. When we move to function work and begin to look at functions that operate on a domain and are mapped to a range (This will be explained when you get to it, in case it doesn't make sense here.), students have to have the concept of set as second nature. This work on sets is part of the conscious formulation of this idea of association that our minds do naturally.

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.
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ACTIVITIES – INDIVIDUAL AND GROUP

1. Present Equations – Have each student present the equations they came up with. (Homework from Lesson 9).
2. Explain and Discuss – Today we're going to talk about *sets*. We will begin with sets that contain *elements* or *members* that are familiar objects and then move on to sets of letters and then sets of variables and numbers. Lead into the discussion with questions such as: Does anyone know what a set is? What is a set comprised of? Are the members of a set always the same? Do the members of a set always have something in common? What is it that they have in common? Is it possible to have a set in which the elements have nothing in common? We can have the set {a car, 3, blue} – but when or why might you ever have a set in which the elements had nothing in common? Can you have sets that are composed of two sets? Just get students thinking about sets here. They don't have to come up with anything truly insightful, but they might!
3. [Brainstorm](#) – Brainstorm about types of sets they are familiar with. We may get answers along the line of sets of dishes, sets of baseball cards, or members of a team etc. We can then broaden the discussion to include sets of days or months. Can they demonstrate sets of notes or sets of colors by playing an instrument or drawing a picture? If you have students who can play an instrument, they may mention that a set of notes is sometimes a chord. They can demonstrate if you have a guitar or other instrument in the classroom. Ask students about colors. Can they think of any sets of colors they're familiar with already? Some may mention flags (read, white, and blue; green, white, and red, etc.) Others may think of sports teams (blue and gold, red and white, silver and black). Sports teams' colors are a good point for asking if a single set can have a number of different descriptions. For example, the set {red, white} may mean be described as the Chicago Bulls' colors by some, but others may describe it as the Tampa Bay Buccaneers' colors. Using sports team colors or flags, or some other set the students come up with, bring out the idea that, for example, the set {red, white, blue} could be described as both the US flag and the French flag, although the French say blue, white, and red. The order of the elements does not matter, as long as all elements are present.
4. Explain Sets – They did this quite a while ago, so remind them of set notation including { }, which is set notation. Everything within the brackets is within the set. \in is the symbol that means "is a member of" or "belongs to" and \notin means "is not a member of" or "does not belong to." Define the ideas of *intention*, a rule that determines all the elements in the set and *extension*, is a list of the elements specifically. This is what they

will be working on over the next few days, and, in many ways, throughout the year. Describe how a set can be determined both by a rule (intention) and by its elements (extension). Give some examples (e.g. “the days of the week” – intention – or {Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday} – extension.

5. **Brainstorm** – Brainstorm some set examples. Be sure to represent as many sets as possible with numbers or variables.
 6. **Group Sets** – Divide the class into sets (groups). Ask them to assign group roles (see *Group Roles* below). Have each group come up with a definition of the set that describes their group. They don't have to determine the group by extension, only by intention. First, they should come up with a list of characteristics of each member of the group. What things do they have in common? How do these fit together? Have them do a Venn diagram (another graphic organizer) if it makes it easier for them. In what ways are they a group? Using that information, they should determine what it is about them as a group that makes them distinct from the other groups in the class?
 7. **Present** – Have groups present themselves to the class.
 8. **Homework Review** – Go over the homework assignment and field questions.
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HOMEWORK

Create five sets. Try to come up with 5 sets no one else in the class will have. Write down the sets in set notation and give a rule that describes each set's elements

GROUP ROLES

For the group activity, students should have a recorder to record the group's ideas, a facilitator to help the group stay focused, and a presenter to present to the class.

DOCUMENTATION FOR PORTFOLIO

None