

NOTE: As with all intro computer lessons, this lesson looks quite long. As you read through it, you'll see that much of this is explanation for you, the teacher. The more questions you can answer for the students, the lower you'll be able to keep the frustration level as they experiment with this new application. Also, if you are new to spreadsheets, try to take a half hour or so to put into working through this on a computer before you actually teach it. You'll be a happier person.

TITLE OF LESSON

Algebra 1 Unit 1 Lesson 14 – Computers: Basic Spreadsheet Use
You Do Speak Math: Creation of the Individual

TIME ESTIMATE FOR THIS LESSON

One class period

ALIGNMENT WITH STANDARDS

California – Algebra 1:

4.0 Students simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x-5) + 4(x-2) = 12$.

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

6.0 Students graph a linear equation and compute the x - and y -intercepts (e.g., graph $2x + 6y = 4$). They are also able to sketch the region defined by linear inequality (e.g., they sketch the region defined by $2x + 6y < 4$).

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.

MATERIALS

Algu1less14_data – Student Page

Algu1less14_Spreadsheet – Student Page

Computer lab with Microsoft Excel or other spreadsheet program

LESSON OBJECTIVES

- To understand the computer as a tool for algebra
 - To feel comfortable with basic spreadsheet use
 - To manipulate equations using a computer
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EXPLANATION OF LESSON

In this lesson, students really dive in and get a hands-on chance to try, experiment, make mistakes, succeed, and have fun with a computer application many of them will never have used before. Although the spreadsheet is outside the free-time realm of most teenagers (still), they'll be thrilled with how easy it can make some of their work – once they learn how to speak its language.

Many people use spreadsheets as though they were tables in which to record or store data. The truth is that, once you get to know them, spreadsheets are amazing timesaving applications because they'll do your work for you. You just have to take the time to learn how to tell them what to do. Plus, you can buy off-the-shelf programs to calculate, project, etc., but with the basic spreadsheet, you can completely personalize it. It will do exactly and only what you want it to do. This is, obviously, as much for teachers new to spreadsheets as it is for students!

In this lesson, you're focusing on two things: 1. The math equations the students will be working with, and 2. Learning about spreadsheets. Try to keep coming back to explaining that now we're talking about how this application works, now we're talking about algebra.

This lesson is only an introduction to some of the easier functions you can accomplish with a spreadsheet. Still, if you're new to this, you'll probably be quite impressed with what you get through in one class period. Make sure students understand that it's okay to make mistakes. They may accidentally erase everything they've spent the whole period working on. It happens; and it has to be seen as a lesson learned. The first thing to teach them is where (it's easiest just to always save to the A drive on floppy disks) and how to save a new document on computers in your classroom or lab. Then teach them the shortcuts (CTRL + s for PCs and Apple + s on Macs) to save every few minutes. This is the best habit you can get into for computers. For the shortcuts, be sure to push the first key first, but also to hold both keys down together. On the Mac, it's the key that has the apple and the square with the loops at each corner.

(Quick aside: The button with the little blue arrow looping to the left in your toolbar up above may be the most important thing on your computer. It means *Undo*. Whenever you hear an "Aaaarrgghh," in your classroom, immediately tell that student to stop and not do anything else. Click that little button to go back a step. On newer versions of word processors and spreadsheets, you can go back much farther than one step, but they don't need to know that yet. Better to say if you make a mistake, STOP!)

Before class today, be sure to copy the spreadsheet information (titled **Alg1u1less14_data**) onto a disk. If you have time, it will save you class time if you install this data on the computers your students will be using. The easiest way to do that is to save it onto a disk, then either ask your lab tech person to install it on your lab network, or you can just copy it from the disk into your folder on each of the computers. If this is not an option, once you're in the lab and students have their computers booted up, open the disk on the computer you're using and have students copy the info into their spreadsheets. This will take more time, so it's really a good idea to try to install it before hand. Most lab techs won't have a problem installing one file onto the lab network – it'll take them a second. Just be sure to give them enough time. Also, print out and have copies of **Alg1u1less14_Spreadsheet**. You'll use this to explain the spreadsheet to them

FOCUS AND MOTIVATE STUDENTS

- 1) **Notetaking** – So much to do, so little time. Just have students choose a computer – or you can assign them – and ask them to take out their notebooks to take notes. There will be no **agenda** today because there just isn't enough time.
 - 2) **Computer Protocol** – Explain the rules you have established for the computer lab (you may want to get together with your technology person before class to decide what rules are appropriate for your students). Then explain the consequences for any misbehavior.
 - 3) **Power and Opening an Application** – Tell students to turn on their computers. Explain that they should take notes of the steps involved if they are not familiar with opening an application.
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ACTIVITIES – INDIVIDUAL AND GROUP

NOTE: In this lesson, I'll talk about the *Excel icon*, etc. for simplicity's sake. The lesson though works equally well with Excel for Macintosh and for Apple's own spreadsheet, which is part of the AppleWorks program. Also, don't define *spreadsheet*; just use it regularly. If, after a half hour or so, one of the students asks what it is, ask the class to determine, based on what they've been doing, what they think a spreadsheet is. That's all they have to know about it for now, how they think it works, what it does, etc.

1. **Open Excel Data** – Depending on your computers, you may have an Excel icon on the desktop. If so, great, just have the students click on that, then open the data you've copied onto the computers. If you don't have an icon on the desktop, have the students go to the Start button, go up to Programs, then find Microsoft Excel and click that. This whole period, as with all classes in the lab, spend as much time as you can circulating among the students; this helps to keep them in the program they're supposed to be working on.

2. Visual Aid – Once the students have the data open, hand out **Alg1u1less14_Spreadsheet**. Ask them to take notes right on the handout. For now, you'll only be introducing a few items. They should keep this handout though, because they'll be learning more and more as the year goes on.
3. **Vocabulary** – First, have them label five parts:

Cells: The blank white rectangles that take up most of the page are called *cells*. These are the places you place and work with information and data. You'll see that, on this sample page, only the cells from A1 to C12 are filled. The box next to these, the graph, is placed on top of the cells, and is not actually part of the cells. They'll get to make a graph like this in Lesson 24, so they'll see how this happens. When a cell is outlined, like C5 is, it is selected. It's just like when you highlight a word in the word processor. We'll find out more about this in a minute.

Buttons: The gray buttons labeled 1, 2, 3, ... and A, B, C, ... are, in fact buttons. These label the cells and tell you where you're working. Notice that, since C5 is selected, both C and 5 look as though they've been pressed, just like with actual buttons.

Formula Bar: The fourth bar down from the top, which has "C5" in the first box, is called the *Formula Bar*. This is a very important part of a spreadsheet because this is where you'll do much of your work. Unlike word processing, with spreadsheets, you type into the cells, but you make changes in the formula bar. Also, this is where you see what's actually typed into the cell. If you look across this bar, you'll see that it says that $C5 = A5 * B5$, yet if you look in the cell C5, the one that's highlighted, you see \$36.00. This means that there's a formula in cell C5. With spreadsheets, you type formulas and the spreadsheet does the calculations for you. Thus, $A5 * B5$ means just that: $A5 (\$6) * B5 (6 \text{ hours}) = \36.00 . What you'll find is that, if you change the number in B5, the total in C5 will change automatically!

Tabs: If you look at the bottom of this sheet, you'll see two tabs that look like file tabs. That's what they're supposed to be. In our virtual office (called the computer) these pages are files from our filing cabinet. And these *tabs* tell us which file we're using right now. This one is called "Pay for \$6 per hour." You can see there's another file in this folder called "Total Pay." To get to that one, you just click on that tab. (You can't do that with this image. You have to go to the actual file. It is possible to place a spreadsheet page in a document and be able to go from page to page, but that's for the next lesson!)

Standard Toolbar: The final thing to review before you start is the *Standard Toolbar*. If you don't see this when you open Excel, go to View, then Toolbars, and select Standard. You'll need this one. Much of this toolbar already looks familiar, but some of those strange looking shapes over to the right are new. The only ones to worry about right now are: Σ which is the sum button; the one that looks like fx which applies a function to cells. (Don't worry if you don't understand that yet. You will.); and the Chart Wizard button that looks like a colorful little graph. You won't be working with this until Lesson 24, but you may as well look at it today.

4. Identify Data – Once you've introduced these and talked about this a bit, it's time to look at the actual data, so turn back to Excel and the computer. Make sure the selected tab is "Pay for \$6 per hour." Have the students look at the data. Ask what they think this information is. Someone will say that it has something to do with a pay schedule. Get them to the point that they see clearly that, if you make \$6/hour, this page tells you how much you'll make depending on the number of hours you work. This should only take a minute for them to see.
5. Equation – Now, ask them for the equation used to determine how much they would make a day if they made \$6/hour. As they come up with it, you write it on the board or on your computer (if the students can see your work). They should understand that if they make \$6 an hour and work 4 hours, the equation has to be $6 (\text{dollars}) * (\text{times}) 4 (\text{hours}) = \text{One day's pay}$. Or $6 * 4 = \text{Total}$. Have them type this into cell A15. Explain that the asterisk (Shift + 8), or the third button to the right in the top row of number keys, is the multiplication sign on computers.
6. Formula Bar – One important thing to know is that any changes you make, once you have left a cell, have to be made in the formula bar. If a student is entering $6 * 4 = \text{Total}$ and accidentally enters $6 8 4 = \text{Total}$, he or she

cannot just use the arrow keys to go back to change the 8 to an *. If he/she realizes it immediately, he can use the *Backspace* key. Otherwise, he has to move from the cell to the formula bar. This is why you told them that much of their work on spreadsheets will be done in the formula bar. If a student has typed $4 \ 8 \ 6 = \text{Total}$, he should move his cursor up to the formula bar, where he sees what he has been typing. On the spreadsheet handout, it's the white box to the right of the =, in where the text says $A3*B3$. As long as cell A15 is still selected, the student should just use the mouse to place the cursor in the formula bar; then he can use the arrow keys or the *Backspace* and *Delete* keys. This will take some getting used to, but they'll have some practice below. If you want to replace the information completely, though, for example you want the cell to say 14 instead of 16, all you have to do is select the cell and type. The spreadsheet will automatically replace the data in the cell with new data.

7. Variables – Since not everyone makes the same amount and some days you work more hours than others, can they come up with variables for the pay and the hours worked? Let them come up with something. An easy way would be P or R = pay rate, and H = Hours worked. So the new equation could be $P * H = T$ (for Total pay).
8. Performing a Function – Now let's look at the information in the sheet already. Select cell A3. It says \$6.00, but if you look in the Formula Bar, it says 6. That's cell formatting. We'll do that in Lesson 24. For now, what we're concerned about is applying a function to a cell. That means asking a cell to do something for us. We're going to ask a cell to perform our equation for us, but first we have to figure out how to tell it to do that. So, select cell B3. It says 2 and the Formula Bar also says 2. This one's easy.
9. Identify Formulas – Now select cell C3. Hmm. It says \$12.00, but the formula bar says $A3*B3$ (This is a formula, basically another word for an equation). By now, $A3*B3$ shouldn't sound so odd. All it means is that the data in cell A3 has to be multiplied (*) by the data in cell B3. Remember that in formulas in spreadsheets, you *never* use spaces, so it's $A3*B3$, or $A3*B3=C3$. Hey! That's just like our equation, but here they used different variables! So, $P * H = T$, in this spreadsheet (and we know this because of the column headings), is $A3*B3=C3$. P (Rate of Pay, or column A) * H (Hours Worked, or column B) = T (Total Pay, or column C), but this has to be applied to this specific row, row 3. Looking at it like that, it's pretty easy, nothing new.
10. Test Formula – Now ask them to test the formula, by changing the data in some of the cells in columns A and B (Remember, here they have to use the formula bar to make the changes.). Suppose you made \$100/hour?! Or suppose you worked 24 hours/day? What if you only worked ½ hour/day? (Try .5, but let them try to figure that out. If someone says 30, for 30 minutes, remind them that the rate is in HOURS, so they'll be saying 30 hours. If the rate is in hours and $1 = 1$ hour, what would be ½ of 1?) As they're doing this, have them test the different ways of changing and replacing data in cells.
11. Shortcuts – After they've had some fun with this, tell them that in Lesson 24, they'll learn how to *apply the function*, which means tell the cell (in this case column C) that you want it to multiply data from other cells and place the answer in that specific cell. They can type in the formula every time, but that would take a lot of time and they have to know the language of the formulas. For this one, multiplying, it's pretty easy, but some are more difficult. In the next computer lesson, they'll learn the shortcuts. Unfortunately, although shortcuts save lots of time, they sometimes take a long time to learn the first time.
12. Clean Up – That's all you have time for in one lesson, but you'll come back to this and work on it more in two more lessons this quarter. Then, you get to actually use the spreadsheets! That's in Unit 2, though. Have students shut down their computers, clean up their workstations, and push in their chairs.

HOMEWORK
None

GROUP ROLES
Students will be working individually for this session.

DOCUMENTATION FOR PORTFOLIO
None