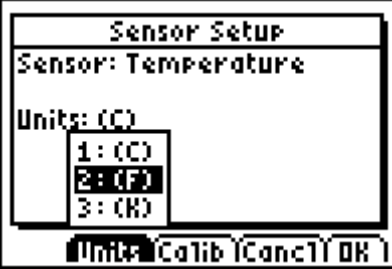
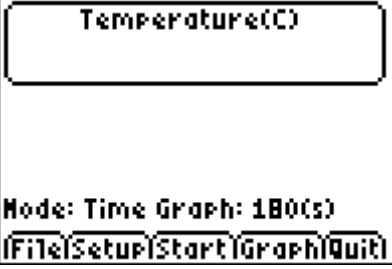
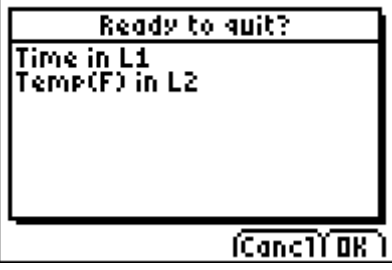
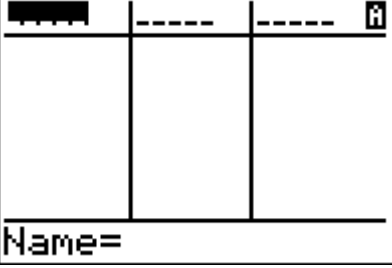
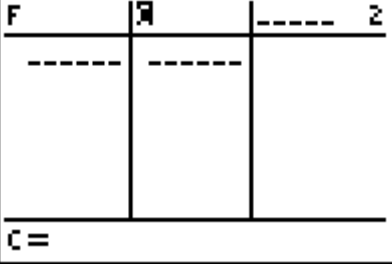
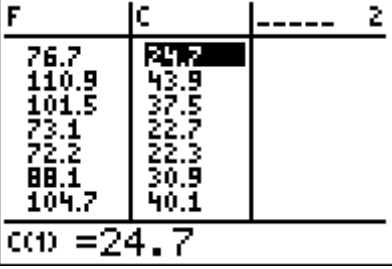
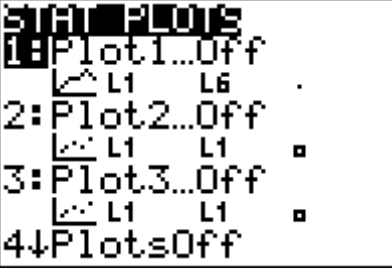
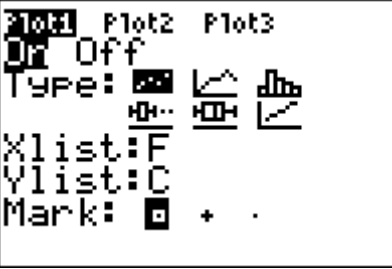
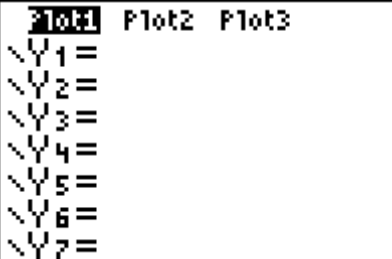


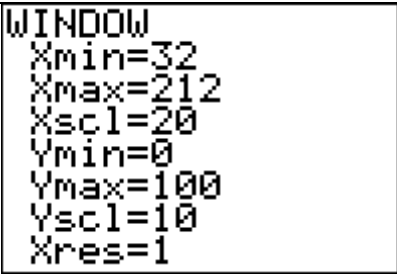
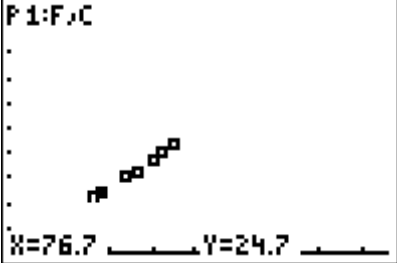

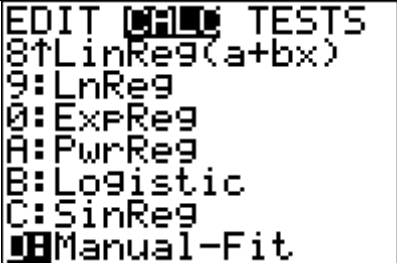
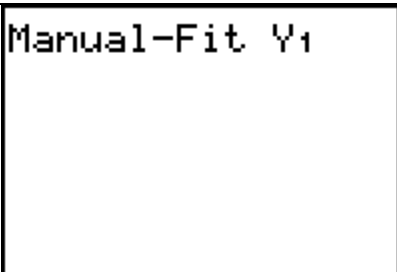
NSES Content Standards:

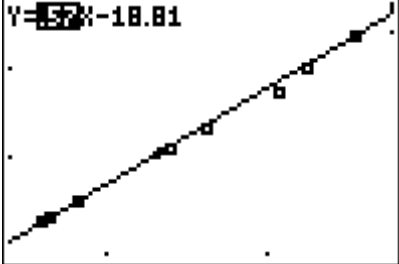
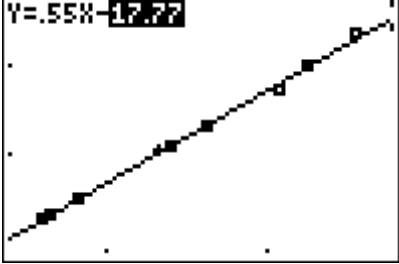
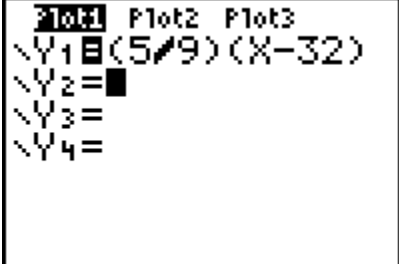

- Unifying concepts and processes in science
- Science as inquiry
- Physical science
- Science and technology
- Science in personal and social perspectives
- History and nature of science

<p>Activity 1: Coming to Know F and C</p>	
<p>In this activity we will:</p> <ul style="list-style-type: none"> • Collect 14 temperatures from two temperature probes (one reading Fahrenheit and one reading Celsius) covering the range of temperatures from 0 to 100 degrees Celsius as best we can. • Examine the Plot of the data and determine the Rule that relates Fahrenheit and Celsius units. • Check our answers with Truth. • Explore the pattern between the units to help come to know the two measures. 	
<p>Measurement is in the eye of the beholder. We can understand measures better if we have some jump points. For example:</p> <ul style="list-style-type: none"> • A nickel has a mass of 5 grams. • A yard stick is just short of a meter 	

<p>In EasyData to finish the setup, press [ENTER] to select 1:Temp and then to select Units press [WINDOW]. Change to 2:(F) by highlighting the choice and pressing [ENTER] or just pressing [2]. Then select OK by pressing [GRAPH]. Remember to do this on only one of the two calculators. Leave the other to record in degrees Celsius.</p>	
<p>Now you are ready to collect the data. Just read the display and report the two temperature measures at the same instant. Try to cover the range of values from 0 to 100 degrees Celsius.</p>	
<p>Now that we have the data recorded on our paper we want to enter it in our calculators. To exit the APP select by pressing [GRAPH] to get the Quit option and then [GRAPH] again for OK.</p>	
<p>We need to remove the lists to do this move your cursor up to the Header of the list and make sure you are in the first column (the number in the upper right is a 1). Now [Trust me here], press delete until all of the list left for use are out of our face. To do this just press [DEL][DEL][DEL][DEL][DEL][DEL][DEL][DEL] until you get tired. If you don't get the screen to the right it is probably because you did not have your cursor in the header, above the line in the Lists Editor or you just got tired too soon. Check with another student who had success and ask her how she did it.</p>	
<p>Now we need to name these lists. Since we use the symbol F for Fahrenheit and C for Celsius... The calculator is ready for you to Name them, so find your alphabet and key in F and then [ENTER]. Then move to the second column, next door [▶] and select C and [ENTER]. Since you are in the Alpha Mode, see the A in the upper right corner you just need to press</p>	

<p>COS for F and PRGM for C. Don't forget to move over to the second column before you name the Celsius list.</p>	
<p>Move down into the lists and enter the 14 data pairs. Double check your numbers to make sure you have the correct data. You can link and send the data to your partners or split up the work and send the list either from unit to unit or to the teacher through the TI-Navigator and then have the teacher send the list to your team members. In the sample to the right see that this team got 20s, 30s and 40s only. Maybe they did better on the second set of seven.</p>	
<p>Looking at the data you might see the relationships. For example If I was anywhere else in the World and they said the temperature was 25 degrees I could see that this was about 77 degrees in my house, so I would know if I needed socks on or just have my naked feet in my sandals. This is of course not exact, but maybe close enough so I can avoid any errors in translation from their language to mine. Can you find a hotter jumping over point? A colder one?</p>	
<p>Another way to examine the data is to see a plot. Let's set up a plot of the data looking at C vs. F. Press 2nd[STAT PLOT] □. Notice if you have any lists turned On. If so, make sure you turn them off (see 4:PlotsOff) before you try the plot you are about to set up and turn on.</p>	
<p>Press 1 to set up the first plot option. Set it up as shown. You can name the list needed by just using the alphabet or you can find all of the lists names on your calculator by pressing 2nd[LIST] Make sure you are on the Xlist or Ylist lines when you do this.</p>	
<p>Two things to do before we plot this data. Let's look at the Y= screen to see if we have any lines set up to graph and double check to make sure just our Plot1 is turned on. Place your cursor on stuff you want to turn off/on and press ENTER or if you want to remove a function you can get on that line you can just choose CLEAR.</p>	

<p>Second we need to set up the graph paper to make sure we can see the data. Press WINDOW and let's edit the choices. Since the X values were Fahrenheit and the Y values were Celsius we know we wanted values from 32 to 212 degrees F and 0 to 100 degrees C. A Scale of 10 for Celsius would be good and maybe 20 for Fahrenheit might work. You could also go to 0 degrees for the X values (Fahrenheit) if you like.</p>	
<p>Now look at the plot by pressing TRACE and moving along your data with ▶ and then back with ◀. You can see that this team did not cover the range from 0 to 100 degrees Celcius very well. Just for fun try ZOOM9. You can return to your original window by using ZOOM and then going over to Memory and selecting the Previous Zoom. Decide what window you like best setting it manually or relying on the computer.</p>	
<p>Go to the Home Screen by pressing 2nd[QUIT][CLEAR]. Set your Mode to show your relationship to the nearest hundredth of a degree/ Press MODE and highlight the 2. Press ENTER to make it your choice and then to return to the Home Screen press 2nd[QUIT][CLEAR].</p>	
<p>Now from the Home Screen we will select Manual-Fit to have the computer name the line that represents the relationship between the two units of measure of temperature. Press STAT▶▲ENTER to select 0:Manual-Fit from the CALC screen. [Note: If you cannot find the Manual-Fit option on your TI-84 you will need to upgrade the OS. See the TI website, TI Connect or call 1-800-TI-CARES.]</p>	
<p>We need to tell the computer where to put this rule. To do this we go to the place the variable names are stored. Press VAR▶11 to select Y₁ from the FUNCTION Menu</p>	

<p>Press ENTER to get to the graph and then move your cursor to get in line with one some of the points on the cool end of the graph. When you think you have it, press ENTER and then with the arrow keys drag a line that marks out the majority of the points. Press ENTER again to lay down the line.</p>	
<p>Now we can adjust this line by keying in alternative values for the slope (the number in front of the x) and the y-intercept (the number at the end). Use your arrow to move to the two choices and press ENTER to accept the revisions. Note in this example the y-intercept is negative. You must tell the computer you want negative using the (-). Press 2nd[QUIT] to dump the formula in Y₁.</p> <p>[Note: To adjust your line, use your ←→↓↑ arrows to change the tilt of the line and the location that it crosses the y-axis. Press ENTER when you finish. If you can't get close enough you may need to start over from the Home Screen after getting more digits in the Mode.]</p>	
<p>If you press TRACE and then the ↑↓ arrows you will see your formulas. Do you recognize any of the numbers? Have your teacher explain to you how the two units were created and then give you the True conversion formula. Use the fraction values to avoid rounding. Replace your Y₁ with the Truth. How well doe this line fit the data? What is 5/9 as a decimal? What is 5/9 times 32? Why 5/9? Why 32? Test out this Truth with what you know. If x = 32, we should get y = 0 for x being degrees Fahrenheit and y being degrees Celsius.</p>	
<p>Now let us visit the Table. Before we go to the Table we should set it. Press 2nd[TBLSET] and adjust it like this for the Y₁ formula. The Ask option requires you to key in a value and press ENTER to get the values.</p>	

<p>Now go to the TABLE and key in values for x (the Fahrenheit). Our goal is to find “nice” values. Ones that will result in no decimals, like 32 degrees F is 0 degrees C. You only get 7 so you can delete [DEL] or just key over for more guesses. Keep guessing until you have found 7 nice pairs. Show your teacher.</p> <p>[Note: You might want to change your [MODE] back to Float.]</p>	<table border="1"> <thead> <tr> <th>X</th> <th>Y1</th> <th></th> </tr> </thead> <tbody> <tr> <td>32</td> <td>0</td> <td></td> </tr> <tr> <td>212</td> <td>100</td> <td></td> </tr> <tr> <td>77</td> <td>25</td> <td></td> </tr> </tbody> </table> <p>X=</p>	X	Y1		32	0		212	100		77	25													
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<p>Do you see the pattern? Change the Table Setup like shown. Press [2nd][TBLSET]. This will start at the nice value of 77 and change by 1 degree Fahrenheit and you move up or down the X column when you press [2nd][TABLE] to return to the Table. Do you see the pattern now? Can you predict the next value? Learn a few and then the conversions between the two units will be easy!</p>	<table border="1"> <thead> <tr> <th>X</th> <th>Y1</th> <th></th> </tr> </thead> <tbody> <tr> <td>77</td> <td>25</td> <td></td> </tr> <tr> <td>78</td> <td>25.556</td> <td></td> </tr> <tr> <td>79</td> <td>26.111</td> <td></td> </tr> <tr> <td>80</td> <td>26.667</td> <td></td> </tr> <tr> <td>81</td> <td>27.222</td> <td></td> </tr> <tr> <td>82</td> <td>27.778</td> <td></td> </tr> <tr> <td>83</td> <td>28.333</td> <td></td> </tr> </tbody> </table> <p>X=77</p>	X	Y1		77	25		78	25.556		79	26.111		80	26.667		81	27.222		82	27.778		83	28.333	
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<p>You may repeat this process with Celsius as the X value and Fahrenheit as the Y values.</p>	<p>[2nd][MODE] Plot2 Plot3</p> <p>$\sqrt{Y1} = (9/5)X + 32$</p> <p>$\sqrt{Y2} =$</p> <p>$\sqrt{Y3} =$</p> <p>$\sqrt{Y4} =$</p>																								