

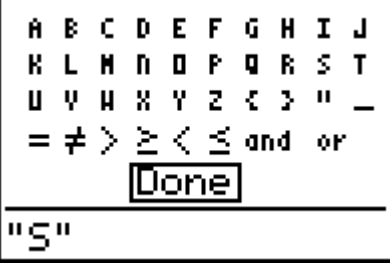
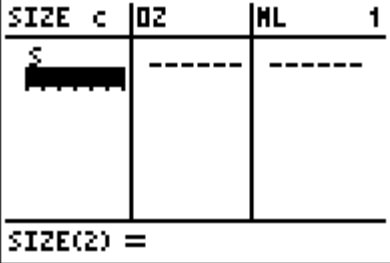
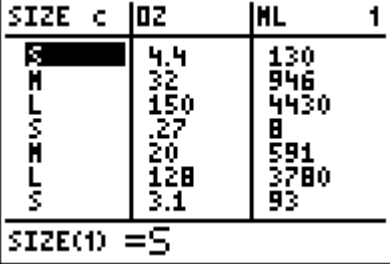
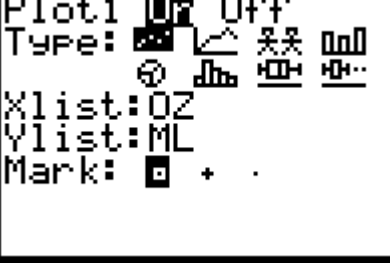



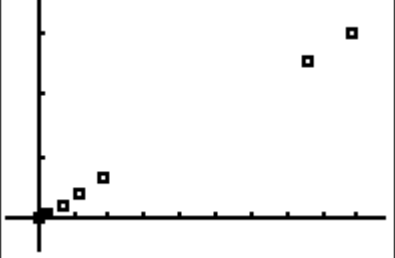
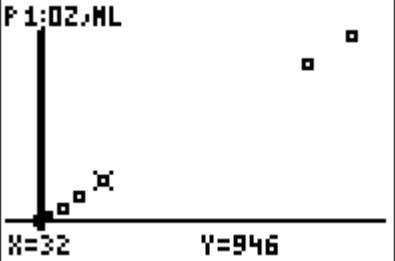
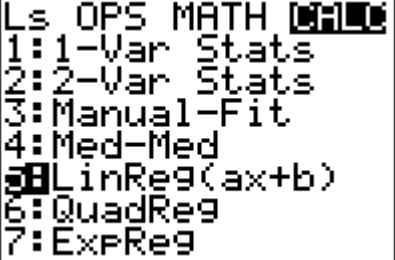
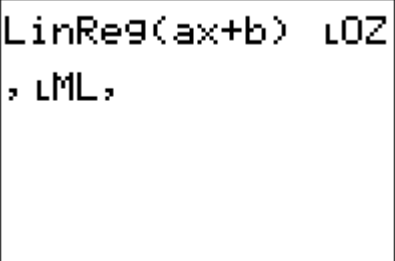
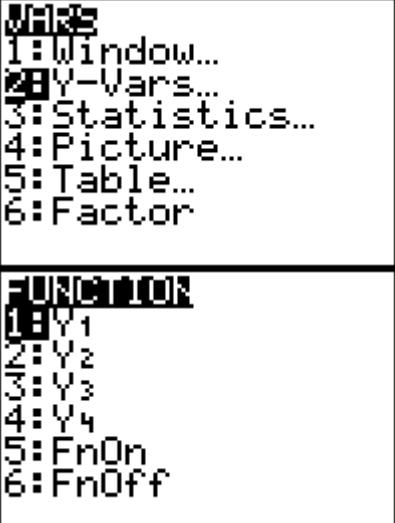
NSES Content Standards:

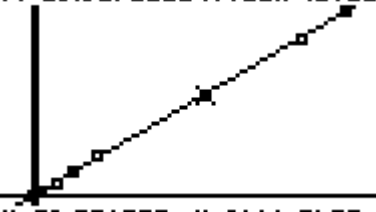
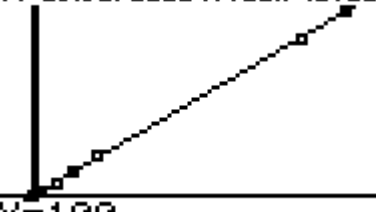

- Unifying concepts and processes in science.
- Science as inquiry.
- Physical science.
- Science and technology.
- Science in personal and social perspectives.
- History and nature of science.

<p>Activity 4: An Ounce of Prevention</p>	
<p>In this activity we will:</p> <ul style="list-style-type: none"> • Collect measures off of containers for the volume in both milliliters and ounces. • Combine your data with the others in your class. • Enter the data into your handheld and explore it. • Set up a plot to determine the relationship between the two measures. • Give this relationship a name. • Predict values for volumes in one unit, given the other. • Check your relationship with the Truth. 	
<p>As homework, find 3 containers – one large, one medium, and one small. Read the label and record the number of ounces and milliliters.</p>	
<p>Send your data to your teacher and then collect the data from the rest of the class.</p>	
<p>Enter the data into your handheld. Start by using the Setup Editor. From the Home Screen – press <code>[2nd][MODE][CLEAR]</code>.</p>	
<p>To get the command you need to go to the CATALOG by pressing <code>[2nd][CATALOG]</code>.</p>	<pre>CATALOG ▶Ab/c ▶Ab/c↔d/e abs(and Ans augment(Autosimp</pre>

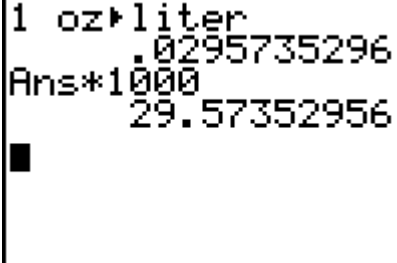
<p>Then using the alphabet select S to get to that part of the catalog. Press [2nd][TEXT] to get the alphabet.</p>	<pre> A B C D E F G H I J K L M N O P Q R S T U V W X Y Z </pre>												
<p>Now go down the list and select SetUpEditor. Highlight it and press [ENTER].</p>	<pre> CATALOG Select(Send(seq(SetConst(SetMenu(►SetUpEditor Shade(</pre> <hr/> <pre> SetUpEditor ■ </pre>												
<p>Now we will name the two lists we plan to use to hold the measures we collected and a list for the size. Press [2nd][TEXT] to get to the alphabet and key in the three list names: SIZE, OZ, and ML. Don't forget to highlight Done and press [ENTER][ENTER] to set up the three lists.</p>	<pre> A B C D E F G H I J K L M N O P Q R S T U V W X Y Z < > " _ = ≠ > ≥ < ≤ and or Done </pre> <hr/> <pre> SIZE, OZ, ML </pre> <hr/> <pre> SetUpEditor SIZE , OZ, ML Done ■ </pre>												
<p>Now look at the List Editor by pressing [LIST].</p>	<table border="1"> <thead> <tr> <th>SIZE</th> <th>OZ</th> <th>ML</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>■■■■■</td> <td>-----</td> <td>-----</td> <td></td> </tr> <tr> <td colspan="4">SIZE(1) =</td> </tr> </tbody> </table>	SIZE	OZ	ML	1	■■■■■	-----	-----		SIZE(1) =			
SIZE	OZ	ML	1										
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SIZE(1) =													

<p>Enter the data for size using S for small, M for medium and L for large. With the cursor in the 1st position on the SIZE list, go to the alphabet by pressing $\boxed{2nd}\boxed{[TEXT]}$. To put in letters – categorical data – you must start with a quote for the 1st data point. Assuming your first point is small, key in “S” and then highlight Done and press $\boxed{ENTER}\boxed{ENTER}$.</p>	 <p>A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [] " _ = ≠ > ≥ < ≤ and or Done</p> <p>"S"</p>																																								
<p>Now you can enter more sizes or fill in across with the ounces and then milliliters. Key in all of the data. Notice the C in the top of the SIZE list. This means that all the data in that list will be treated as words.</p>	 <table border="1"> <thead> <tr> <th>SIZE</th> <th>c</th> <th>OZ</th> <th>ML</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>S</td> <td></td> <td>-----</td> <td>-----</td> <td></td> </tr> </tbody> </table> <p>SIZE(2) =</p>	SIZE	c	OZ	ML	1	S		-----	-----																															
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<p>Double check your data for accuracy.</p>	 <table border="1"> <thead> <tr> <th>SIZE</th> <th>c</th> <th>OZ</th> <th>ML</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>S</td> <td></td> <td>4.4</td> <td>130</td> <td></td> </tr> <tr> <td>M</td> <td></td> <td>32</td> <td>946</td> <td></td> </tr> <tr> <td>L</td> <td></td> <td>150</td> <td>4430</td> <td></td> </tr> <tr> <td>S</td> <td></td> <td>.27</td> <td>8</td> <td></td> </tr> <tr> <td>M</td> <td></td> <td>20</td> <td>591</td> <td></td> </tr> <tr> <td>L</td> <td></td> <td>128</td> <td>3780</td> <td></td> </tr> <tr> <td>S</td> <td></td> <td>3.1</td> <td>93</td> <td></td> </tr> </tbody> </table> <p>SIZE(1) = S</p>	SIZE	c	OZ	ML	1	S		4.4	130		M		32	946		L		150	4430		S		.27	8		M		20	591		L		128	3780		S		3.1	93	
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<p>Can you guess a number and operation that you could use to change the ounces to milliliters, such as add 7 or divide by 2? Test out a few data pairs. How well did your class do picking small, medium, and large containers?</p>																																									
<p>Set up the plot by pressing $\boxed{2nd}\boxed{[PLOT]}\boxed{1}$. Don't forget to get the list names from the list of list at $\boxed{2nd}\boxed{[STAT]}$.</p>	 <p>Plot1 \boxed{OFF} Off Type: $\boxed{[]}$ $\boxed{[]}$ $\boxed{[]}$ $\boxed{[]}$ $\boxed{[]}$ Xlist: OZ Ylist: ML Mark: $\boxed{[]}$ + .</p>																																								
<p>Look at the Y= editor and make sure you have only plot turned on and that all the equations are gone or turned off as well. Press $\boxed{Y=}$.</p>	 <p>$\boxed{2nd}\boxed{[Y=]}$ Plot2 Plot3 ✓Y1= ✓Y2=$\boxed{[]}$ ✓Y3= ✓Y4=</p>																																								

<p>Set the window with the ZoomStat option. Press ZOOM 7.</p>	
<p>Look at the pattern in the plot. How well did we do with the distribution of small, medium, and large? Press TRACE and the ▶ ◀ to explore. Notice the gap in the sample to the right.</p>	
<p>Let us have the computer name the line that represents the relationship shown between ounces and milliliters. Press 2nd STAT ◀ 5 to get the linear regression option.</p>	
<p>Now we need to get the list names for the x and y values. These are located in the list of lists. Press 2nd STAT. Don't forget the comma to separate.</p>	
<p>You will need to place the regression equation in the Y= editor, so press 2nd VARS 2 1</p>	

<p>Press [ENTER] to make it happen.</p>	<pre>LinReg(ax+b) LOZ , LML, Y1</pre>
<p>How does this expression relate to your guess on how to change from ounces to milliliter? Why would you expect b to be zero? Is it zero? Why?</p>	<pre>LinReg y=ax+b a=29.52788624 b=.6068656789</pre> <p>■</p>
<p>Press [TRACE] [↓] [→] [↓] to explore the function.</p>	<pre>Y1=29.527886240011X+.606</pre>  <pre>X=82.780787 Y=2444.9485</pre>
<p>Use your rule to predict values. Key in a number of ounces and press [ENTER].</p>	<pre>Y1=29.527886240011X+.606</pre>  <pre>X=100</pre> <pre>Y1=29.527886240011X+.606</pre>  <pre>X=100 Y=2953.3955</pre>
<p>Now let's see the True relationship between ounces and milliliters. Press [2nd][QUIT][CLEAR] to get back to Home Screen and cleaned up.</p>	<p>■</p>

<p>We want to know what 1 ounce is in milliliters so we key in 1 and then go to the CONVERT Menu. Press $\boxed{2nd}\boxed{[CONVERT]}$ and select the volume option $\boxed{3}$.</p>	<pre> 1 ----- CONVERSIONS 1:Length... 2:Area... 3:Volume... 4:Time... 5:TEMP... 6:Mass/Weight... 7:Speed... </pre>
<p>We have ounces so highlight oz and press \boxed{ENTER}.</p>	<pre> CONVERSIONS 1:liter 2:gal 3:qt 4:pt 5:oz 6:cm³ 7:in³ ----- CONVERSIONS oz▶ 1:liter 2:gal 3:qt 4:pt 5:oz 6:cm³ 7:in³ </pre>
<p>Now we have a problem. There is no choice for milliliter. We could choose liter and then multiply by 1000 though. Pick option 1 and press $\boxed{ENTER}\boxed{ENTER}$.</p>	<pre> CONVERSIONS oz▶ 1:liter 2:gal 3:qt 4:pt 5:oz 6:cm³ 7:in³ ----- 1 oz▶liter .0295735296 </pre>

<p>Multiply by 1000 and see how well you did.</p>	
<p>Repeat the process going the other way. Let ML be the x-value and OZ be the y-value.</p>	
<p>What other units could you do this with? How about slugs and kilograms?</p>	