Using Microsoft Excel 2007 to Create Scatter-Plots

Math Task: A student is asked to use a dual-scale thermometer to record twelve different readings. The student recorded the following Fahrenheit (F) and Celsius (C) temperatures as shown in the table:

<table>
<thead>
<tr>
<th>F</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
<th>130</th>
<th>140</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>4</td>
<td>10</td>
<td>16</td>
<td>21</td>
<td>27</td>
<td>32</td>
<td>38</td>
<td>43</td>
<td>49</td>
<td>54</td>
<td>60</td>
<td>66</td>
</tr>
</tbody>
</table>

The student needs to determine what type of function this data generates and to write a possible equation for the "line of best fit". (S)He decides to have Excel 2007 graph the data and supply a trend line (that will display its equation).

How to enter information into Excel 2007:
A computer spreadsheet is a series of small blocks (cells) where the columns are labeled with capital letters and the rows are labeled with numbers. To enter data into Microsoft Excel, simply type each entry into its own small block (cell). Pressing ENTER after each entry will usually make the cursor go down to the next cell. (See the note below.)

For this partial spreadsheet, each data item was typed in its own cell:
- "F" was typed in cell A1
- "C" was typed in cell B1
- "40" was typed in cell A2
- "4" was typed in cell B2
- "50" was typed in cell A3
- "10" was typed in cell B3
- "60" was typed in cell A4
- "16" was typed in cell B4
- "70" was typed in cell A5
- "21" was typed in cell B5
- "80" was typed in cell A6
- "27" was typed in cell B6
- "90" was typed in cell A7
- "32" was typed in cell B7
- and so on . . .

NOTE: The default direction is down, but you can change the direction in which the cursor moves in through the EXCEL OPTIONS dialog box – just follow this path:

MICROSOFT OFFICE BUTTON → EXCEL OPTIONS → ADVANCED → UNDER EDITING OPTIONS

How to create a scatter-plot in Excel 2007:

1. Highlight all of the entered data.
2. Click on the INSERT tab on the top of the Excel screen.
3. Choose the scatter option in the charts menu.
4. To create an unconnected scatter-plot, choose the first sub-type, a scatter with only markers.

The scatter-plot of the data will now appear within the Excel worksheet. You may click and drag the graph to whatever location you wish. (I suggest that you move it closer to the data.)

If you like the graph that was generated by Excel 2007, you don’t need to do anything more. However, if you want to change the appearance of the display, you will need to access some of the formatting options available through Excel 2007.
The graph on the left is the result of the first few steps that were completed. The graph on the right has been formatted. Notice that the legend, the title above the graph, and the horizontal gridlines have been removed. To do this, just left-click on the object and press the DELETE key on the keyboard – OR – right-click on the object and choose the delete option.

If you wish to format the chart area, right-click anywhere near the outer edge of the graph. You can format the font type and size at this point by using the font menu that appears. (I suggest a font size of 8.)

You can also select the format chart area option in the short-cut menu. When this choice is made, a format chart area dialog box will appear. Through this option, you can change the appearance of the chart area by selecting whatever desired effect you wish. (Experiment with the options to see if you have any special preferences. If not, just accept the default choices.)

If you wish to format either of the axes, right-click the numbers (labels) that appear near the axis that you want to change. If you haven’t already formatted the the font type and size, you can complete that task now.

You can also select the format axis option in the short-cut menu. When this choice is made, a format axis dialog box will appear. Through this option:

- You can change the scale on the axis by clicking the dot before the word “fixed” and then typing in whatever value you would like to use on the chart. (If you like what scale was offered by Excel 2007, you don’t need to do any changes.)
- You can decide what to do about the tick marks on the axis. (I chose to have them cross the axis.)
- You can decide where to display the axis labels.
- You can decide where the two axes will intersect.
If you wish to change the appearance of the data markers, right-click any of the markers. Choose the **format data series** option on the short-cut menu. A **format data series dialog box** will appear. Through any of these options, you can change the appearance of the markers. (I decided to change the shape of the markers from a square to a circle using the **marker options dialog box**. I also wanted the data markers to be red. This was accomplished through the **marker fill dialog box**. Experiment with the various changes that can be done to see what your personal preferences are.)

**How to add a trend line to a scatter-plot in Excel 2007:**

1. Right-click any of the data markers.

2. Select the **add trendline** option on the short-cut menu. A **format trend line dialog box** will appear.

3. Select **trend line options**. Here you will need to decide the **trend or regression type** for the data. (Are the markers "lining up"? Then, choose the "linear" option. Are the markers forming a parabolic curve? Then, choose the "polynomial" option with an order of 2. Are the markers forming a cubic curve? Then, choose the "polynomial" option with an order of 3. Are the markers forming an exponential growth or decay? Then, choose the "exponential" option.)

4. If you want the computer to generate an equation for the trend line, select the **display equation on chart** option toward the bottom of the **format trend line dialog box**.

Excel 2007 will display the “line of best fit” (trend line) for the data and an equation for the suggested line. In our example, the equation is: \( y = 0.556x - 17.88 \).

You can also make other changes (color, style) to the trend line. Experiment with the given options to see what you prefer.