Excel Temperature Graphs
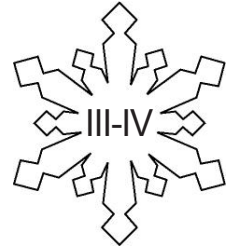
Overview:

In this lesson, students will download weather data from the ACMP website. Using Excel, students will find temperature averages, make a graph of the data, and add a trend line to the graph.

Objective:

The student will
- identify the formula bar, cells, rows and columns in Excel worksheets;
- use a formula in Excel to find averages from a set of data;
- use the charting capabilities in Excel to be able to make a graph of data;
- plot a trend line of data.

GLEs Addressed:

Science
[5-8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Math
[5] S&P-2   The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; drawing or justifying conclusions) by using information from a variety of displays (tables, bar graphs, line graphs, or Venn diagrams).
[6] S&P-2   The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; drawing or justifying conclusions) by using information from a variety of displays (tables, bar graphs, line graphs, circle graphs, or Venn diagrams).

Materials:

- Computer with Microsoft Excel
- Printer (Optional)
- STUDENT WORKSHEET: "Is Nome, Alaska Getting Warmer?"

IT Basics

Microsoft Excel is a spreadsheet application. It is a flexible program that can be used to perform calculations on numerical data, graph data, and as a simple database.

Activity Procedure

1. Review the basic components of an Excel worksheet (cells, rows, columns).
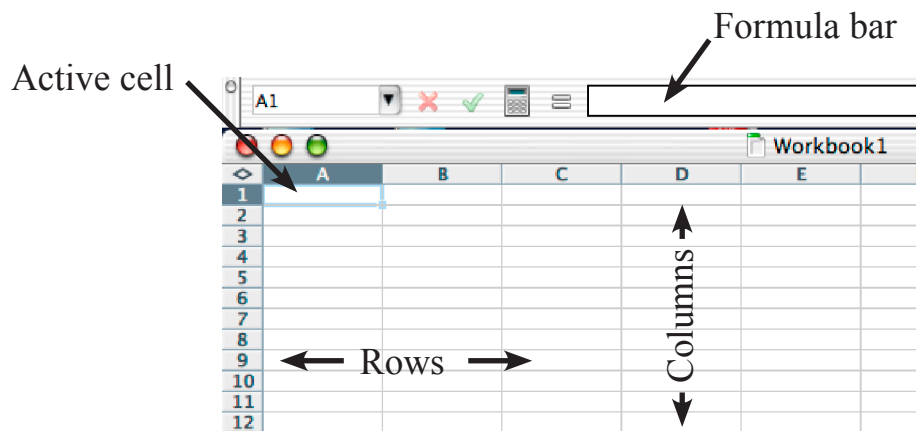
2. Direct students to the ACMP Web site and ask them to click on the file "Excel Nome Data" to download the file.


NOTE: The temperature data was obtained at the Western Regional Climate Center at http://www.wrcc.dri.edu/index.html.

If the file does not open automatically, ask students to open the file in Microsoft Excel.

3. Distribute the STUDENT WORKSHEET: "Is Nome, Alaska Getting Warmer?" Guide students through the worksheet.

4. At the end of the lesson, students will add a trend line to the graph. A trend line is a line of best fit through the data and will show the trend of the data. In this example, the trend line shows that the temperatures are increasing.
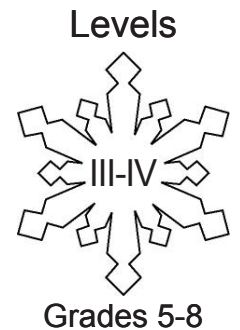
Answers:

The student's graph should resemble the one below. Students should state that Nome, Alaska is getting warmer.
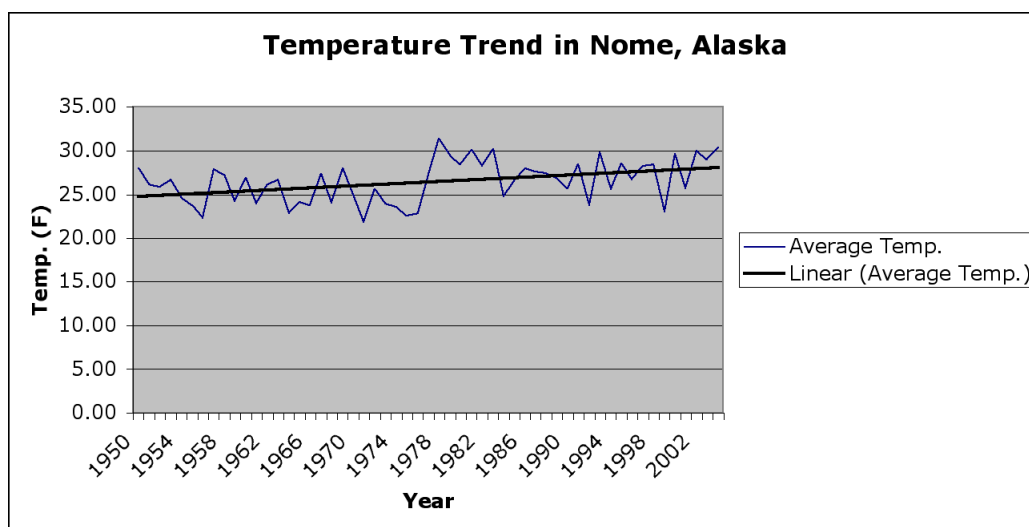
Name:_____

Is Nome, Alaska Getting Warmer?
Student Worksheet (1 of 7)

Background Information

Microsoft Excel is a spreadsheet application. It is a flexible program that can be used to perform calculations on numerical data, graph data and as a simple database. In this lesson the charting capabilities of Excel will be used to graph temperature trends in Nome, Alaska.

In order to find out if Nome is getting warmer it will be necessary to find the average temperature for each year. Next a line graph will be made of the annual average then a trend line will be added to the graph.
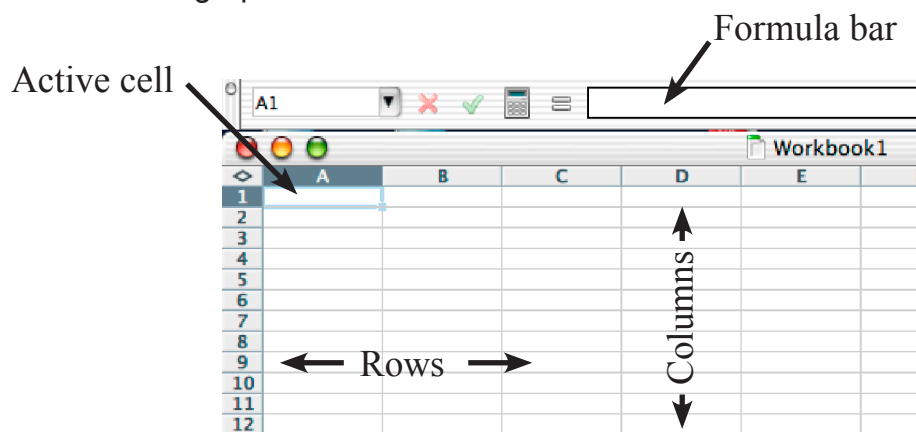
Directions:

Using a web browser, go to the ACMP Web site (www.ArcticClimateModeling.org) and download the file "Excel Nome Data." This file has monthly average temperatures taken at the Nome Airport from 1950 to 2004. The temperatures are listed in degrees Fahrenheit. If the file does not automatically launch Excel when it is downloaded, double click on the file to open it in Excel. Follow the steps below.

Part One: Finding Average Temperatures.

1. Place the cursor in cell N6.

	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
	41.42	52.37	51.71	44.21	34.26	22.63	9.58	
	49	48.95	47.19	42.77	29.56	21.78	8.73	
	46.53	50	50.34	41.32	31.87	25.12	9.95	
	45.95	51.11	49.82	43.57	27.94	20.2	6.15	
	47.43	47.94	49	41.95	32	20.05	-5.13	
	42	50.69	49.13	41.7	24.03	8.9	6.13	
	48.1	49.42	49.92	42.4	25.35	4.07	-3.37	
	50.65	47.95	49.95	40.81	31.74	22.37	-3.61	
	49.82	53.65	50.05	40.7	24.81	14.12	6.26	

Name:_____

Is Nome, Alaska Getting Warmer?
Student Worksheet (2 of 7)

Levels

III-IV

Grades 5-8
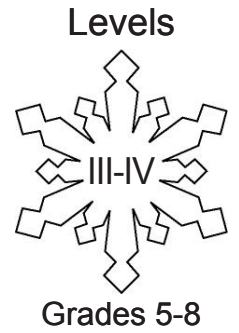
2. To find the average temperature for the year enter the formula "=AVERAGE (B6:M6)" in the formula bar and press return. This formula will average the temperature data from cells B6 to M6.

N6	▼ ✗ ✓ 🔢 ☰	=AVERAGE(B6:M6)

The number 27.96 will be entered in cell N6.

OCT	NOV	DEC	AVERAGE
34.26	22.63	9.58	27.96
29.56	21.78	8.73	
31.87	25.12	9.95	
27.94	20.2	6.15	
32	20.05	-5.13	

3. The formula could be entered for each row, however there is an easier way. With the cursor in cell N6 carefully move the mouse to the lower right corner until the cursor is a box with triangles at two corners.
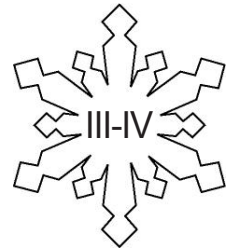
NOTE: In newer versions of Excel there will be a + sign which will change to a box with triangles when the mouse is moved.)

OCT	NOV	DEC	AVERAGE
34.26	22.63	9.58	27.96
29.56	21.78	8.73	
31.87	25.12	9.95	
27.94	20.2	6.15	
32	20.05	-5.13	

Name:_____

Is Nome, Alaska Getting Warmer?
Student Worksheet (3 of 7)

4. Drag from cell N6 to N60.

5. Release the mouse button at cell N60. All the cells should fill with the average for each row.

Excel Nome data.xls

	H	I	J	K	L	M	N
	JUL	AUG	SEP	OCT	NOV	DEC	Average Temp.
2	52.37	51.71	44.21	34.26	22.63	9.58	27.96
9	48.95	47.19	42.77	29.56	21.78	8.73	
3	50	50.34	41.32	31.87	25.12	9.95	
5	51.11	49.82	43.57	27.94	20.2	6.15	
3	47.94	49	41.95	32	20.05	-5.13	
2	50.69	49.13	41.7	24.03	8.9	6.13	
1	49.42	49.92	42.4	25.35	4.07	-3.37	
5	47.95	49.95	40.81	31.74	22.37	-3.61	
2	53.65	50.05	40.7	24.81	14.12	6.26	
7	45.24	51.03	41.82	28.82	18.82	-7.05	
5	54.26	50.44	38.37	27	13.4	19.98	
7	47.39	48.63	43.58	26.18	16.57	-5.47	
3	52.79	50.89	39.52	28.1	16.07	0.92	
3	47.97	46.06	43.92	25.53	4.73	14.98	
7	52.34	52.11	43.17	30.98	14.65	-2.42	
5	46.47	45.58	43.12	23.03	22.33	1.87	
3	49.19	49.77	42.47	25.58	17.12	1.94	
7	47.1	49.47	43.67	26.97	15.08	9.94	
4	54.08	51.97	39.45	28.06	14.43	-0.21	
7	50.15	45.15	46.47	33.48	8.68	14.35	
3	49.52	47.74	36.8	22.71	20.18	5.29	
4	50.97	48.52	41.52	27.97	15.55	7.98	
3	56.1	53.11	41.7	32.29	20.25	10.52	

Drag to
N60

Part Two: Graphing Average Temperatures.

6. Highlight column N from N5 to N60

7. From the menu select **Insert ☐ Chart** or choose the chart icon from the toolbar. This will bring up the Chart Wizard. There are 4 steps in the Chart Wizard.

NOTE: In some versions of Excel the Chart Wizard has a line graph for the icon.

Chart Wizard icon

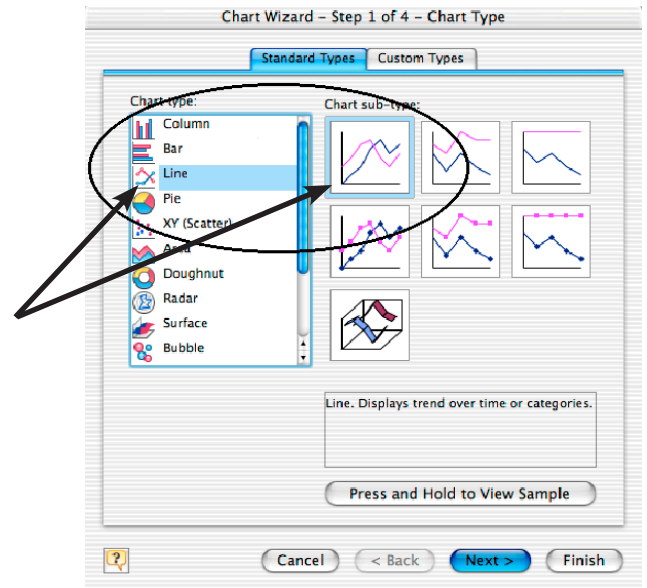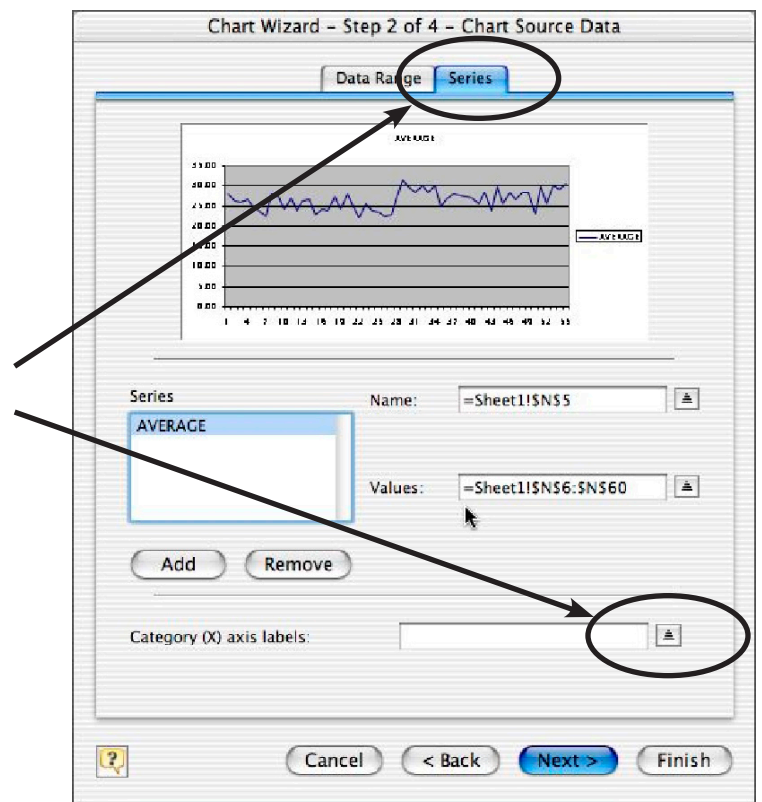# Is Nome, Alaska Getting Warmer?
Student Worksheet (4 of 7)

Screen 1 of 4 - Chart Type:

8. Select a line chart. Click the upper left line graph in the chart sub-type part of the screen.

9. Click **Next** to continue.
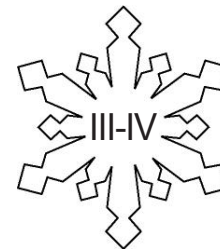

Screen 2 of 4 - Chart Source Data:

10. There are several steps to this screen.

   a) Click on **Series** at the top.

   b) Click the arrow next to Category (X) axis labels. The screen will pull up to show more of the Excel worksheet.

Name:_____

Is Nome, Alaska Getting Warmer?
Student Worksheet (5 of 7)

Levels

III-IV

Grades 5-8

c) Click and drag to highlight cells A6 through A60. The cells will have a dashed line around them. The dashed line is often called "marching ants."

d) Press **Return**.

e) Click **Next** when finished.

Screen 3 of 4 - Chart Options:

11. Add labels to the chart by entering the following:

a) On the chart title:

"Temperature Trend in Nome, Alaska."

b) For the x axis type "Year."

c) For the y axis type "Temp. (F)."

d) Click **Next**.
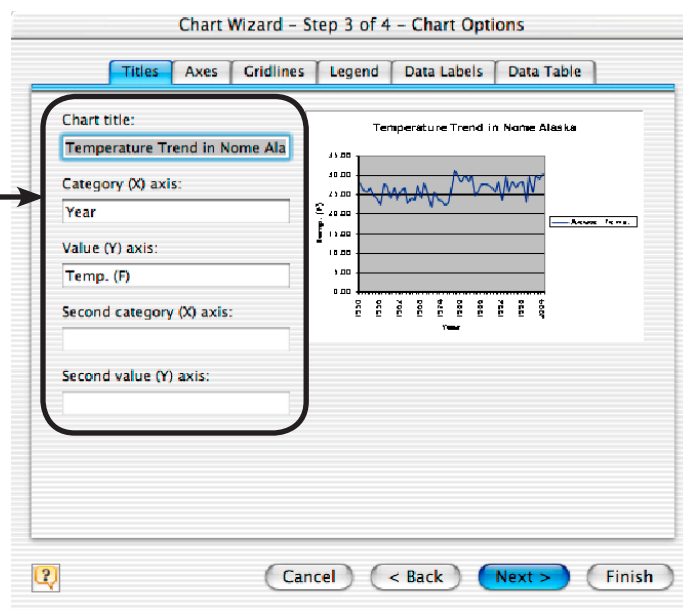
Name:_____

Is Nome, Alaska Getting Warmer?
Student Worksheet (6 of 7)

Levels

III-IV

Grades 5-8
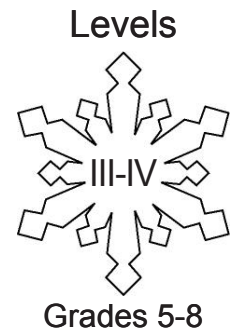
Screen 4 of 4 - Chart Location:

12.   This screen will ask if the chart should be a new worksheet or as an object on the current worksheet.
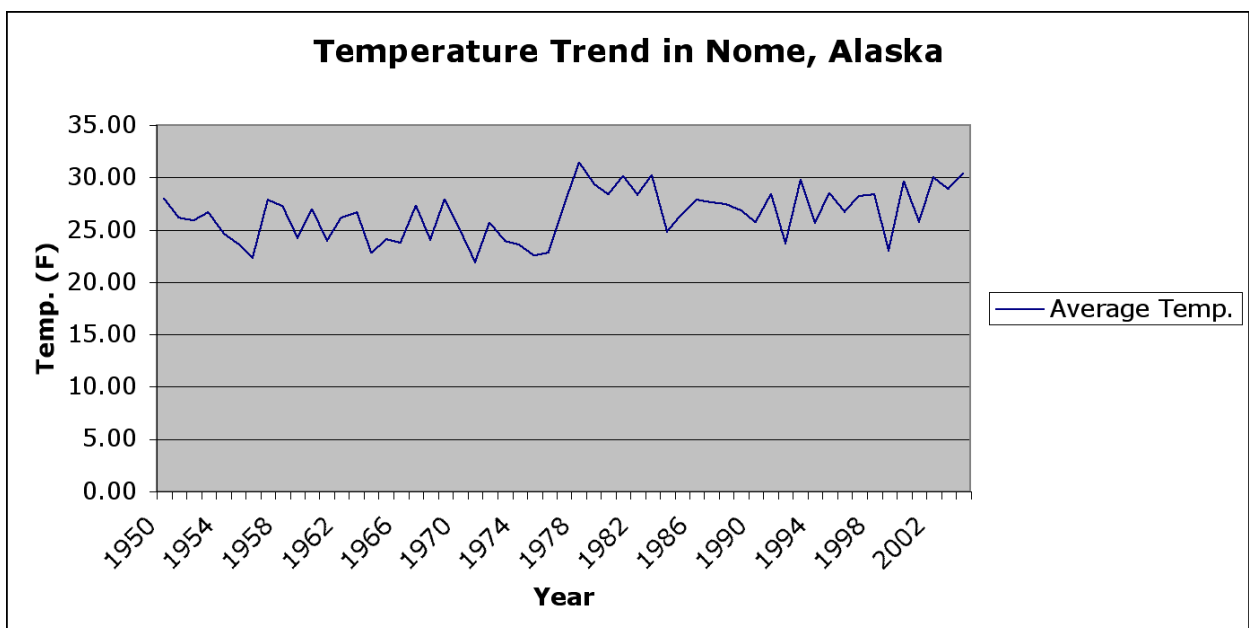
Click **Finish**.
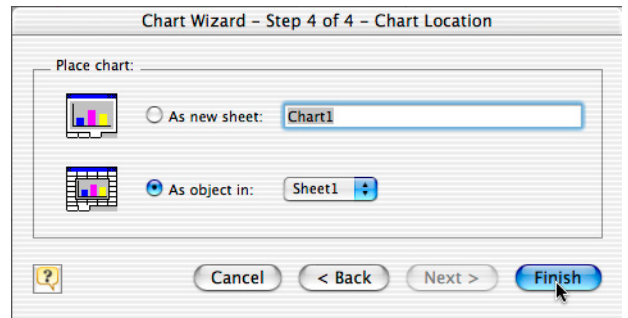
Part Three: Changing the Legend

13.   Note that the label for the line on the graph says AVERAGE. It would be more descriptive if it said Average Temp.

Go back to the Excel worksheet and in cell N5 change the word AVERAGE to "Average Temp.," and then press return. Notice that the chart automatically updates with the new legend.
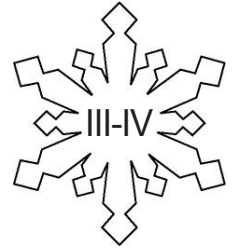
Your graph should look like this:

Name:_____

Is Nome, Alaska Getting Warmer?
Student Worksheet (7 of 7)

Part Four: Adding a Trend Line

14. The graph represents the average yearly temperature from the years 1950 to 2004, but it is difficult to see if there is a trend in the data. In Excel, a trend line can be added to a graph.
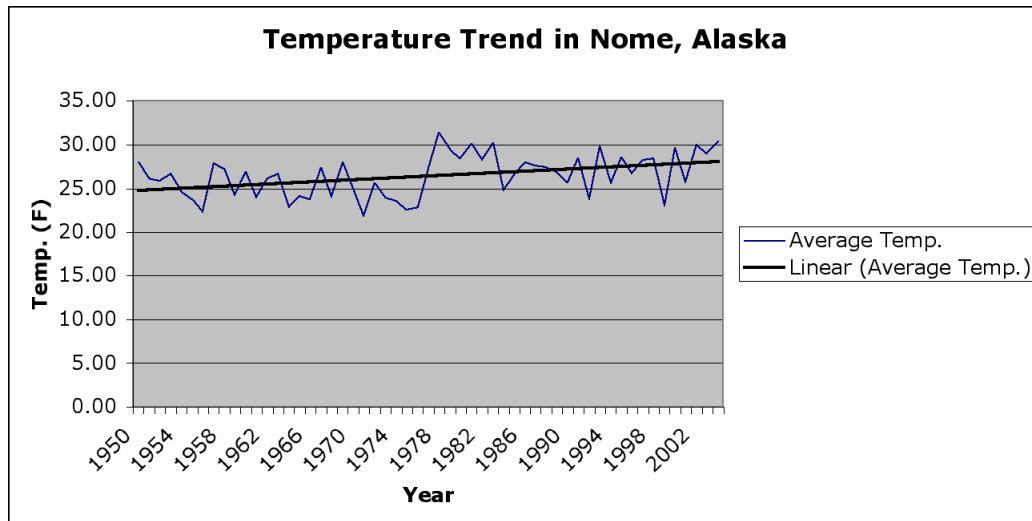
Select the graph by clicking on it. It will have black boxes along the border when it is selected.

15. Go the menu and choose **Chart □ Add Trend Line**.

16. Select the Linear type of trend line and click **OK**.
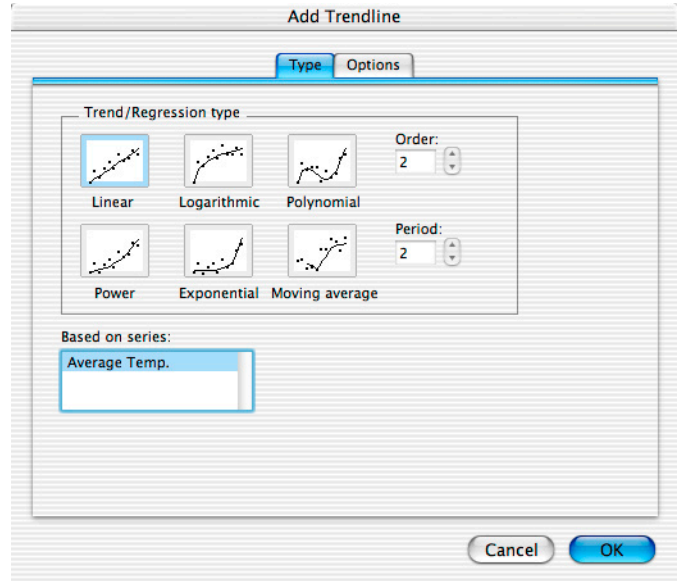
The graph will show a new line that represents a "line of best fit" through your data.

17. Answer the following question: Based on the data and the graph is Nome getting warmer, cooler or remaining the same? Explain.

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