

Algebra 2 Flying Off the Handle

Entering and Graphing the Data

1. Turn the calculator on. Press STAT .

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2. Press STAT 1

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L1	L2	L3	2	
0 58.75 34	65.5 0 39	3.51 5.57 8.45 10.51 12.38		

3. Press WINDOW

WINDOW	
Xmin=-10	
Xmax=10	
Xscl=1	
Ymin=-10	
Ymax=10	
Yscl=1	
Xres=1	

4. Press [2nd] [Y=]



5. Press Y=

Press CLEAR

21011 Plot2 Plot3 Yı⊟∎ean(Ls 2=

To clear equations Repeat for all equations in Y= Plot2 Plot3 Y1= Y2=

To clear list 1 and list 2, press 2nd 1 [2nd] [2] [ENTER].



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To switch on statplots

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Xlist<mark>E</mark>1 YlistE2

Mark: 🗖

Press 1 (ENTER ENTER 2nd 1 2nd 2 ENTER)





Algebra 2 Flying Off the Handle

6. Press GRAPH



Finding the Model Using Matrices





Finding the Model Using Transformations of $y = x^2$



This process may take many repetitive steps to make the necessary transformations for the model to fit the data. The process has been shortened for this tutorial.



Finding the Model Using Regression

- 1. Press STAT
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 Press ENTER

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- 2. Press GRAPH



Algebra 2 Flying Off the Handle



Finding the Model Using Microsoft Excel

1. Enter column headings and data into the spreadsheet.

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2. Select the data by clicking in the first cell, holding down shift and clicking in the last cell. Next choose Chart from the Insert menu.

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3. Select XY (Scatter) then click Next.

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4. Click Next.





5. Click on the **Titles** tab and enter labels for the *Chart title*, the *Value (X) axis*, and the *Value (Y) axis*.

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Chart title				0					100%	• • • •	Ariai	•
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6. Click on the Gridlines tab and select the Major gridlines under Value (X) axis.

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- 7. Click on the Legend tab and deselect Show legend then click Next.

8. Click Finish.

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9. Select the chart by clicking on its outer border.



10. Choose Add Trendline from the Chart menu.





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- 11. Select **Polynomial** and set the **Order** to 2 then click the **Options** tab.

12. Select the **Display equation on chart** check box then click **OK**.









Opening a Sketch in Geometer's Sketchpad

1. To *open* an existing sketch in Geometer's Sketchpad, select **Open** from the **File** menu.



2. A pop up window will appear. Follow the directions for your particular computer system to get to the file where the existing sketches are stored. Select the desired file (in this case, **Golden Triangles.gsp**) by clicking on the filename then the **Open** button.

Open	? 🛛
Look in: ଢ	Professional Development 💽 👉 🖻 📸 🛛
Solden Tria	angles
File name:	Golden Triangles Open
Files of type:	Sketchpad Files (*.gsp;*.gs4)

The sketch will open in its own window which you can manipulate like all other windows in Microsoft Windows. To maximize the window, you can double-click on the menu bar at the top of the window.

Sile Edit	eometer's Sketchpad - Golden T Display Construct Transform Mea	T <mark>riangles</mark> sure Graph Window Help	Doubl here.	le-click	
.	🗟 Golden Triangles - Investig	ating Leg Length			<u>^</u>
⊙ <u>\</u> A £	Triangle 1: Construct Triangle 1 Measure Segment BD Measure Segment ED	Triangle 2: Construct Triangle 2 Measure Segment CG	Triangle 3: Construct Triangle 3 Measure Segment JK	Triangle 4: Construct Triangle 4 Measure Segment MN	Triangle 5: Construct Triangle 5 Measure Segment QR
		В	Important!!! Click on the Constru	ict Triangle	

Working with the "Golden Triangles" sketch:

To work with the "Golden Triangles" sketch, you do not need to be familiar with how to use the Geometer's Sketchpad software. Some features that you may need to know about are:

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- □ Action buttons are buttons you can click on that cause a particular action to happen. In this sketch, buttons will either construct the next triangle in the sequence or measure a segment length.
- □ **Cleanup tools** are action buttons that cause certain parts of the sketch to disappear, thus "cleaning up" the sketch.
- □ **Page tabs** are divider tabs that separate different pages in the sketch. In this sketch, there are two pages: Investigating Leg Length and Investigating Dilations.





Part 1: Investigating Leg Length

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Graphing Calculator

2. You will see a table containing lists. Your calculator may contain data in its lists from a previous investigation. If the lists do not contain previous data, you may skip to step 6.

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Generating a Scatterplot of Leg Length vs. Triangle Number Using a

3. To clear this previous data, press STAT.

4. Highlight **ClrList**. Enter the lists that you wish to clear. Press **ENTER**.

5. Press ENTER again.



Algebra 2

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6. Enter the data into the lists. Be sure to press ENTER after each value.

7. Press 2nd [STAT PLOT].

- Use the arrows to select the necessary options. For Plot 1, be sure that the Plot is On and a scatterplot is chosen (first Type). The independent variable (XList) is in L₁ and dependent variable (YList) is in L₂.
- 11. Choose an appropriate window by selecting WINDOW and specifying the appropriate domain and range. Use the arrow keys to move up and down.
- 12. To view the scatterplot, press GRAPH.

Algebra 2 A Golden Idea











Part 1: Investigating Leg Length

Determining a Function Rule for Leg Length vs. Triangle Number Using a Graphing Calculator

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Note: Directions follow for use of a TI-83, TI-83+, or TI-84.

Using Successive Quotients:

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- 1. In the List Editor (Press <u>STAT</u> then press <u>ENTER</u>), copy List 2 into List 3. To do so, use the arrow keys to move the cursor to the List 3 header, then press <u>2nd</u> <u>2</u>. Press <u>ENTER</u>.
- 2. Delete the first element of List 3 by using the arrow keys to select it then press DEL.

keys to select it then press DEL.

3. Delete the last element of List 2 by using the arrow

- L1 L2 **₩**3 3 1 12.33 -----3 4.71 4 2.91 5 1.8 ----- L3 = L 2
- L1 L2 3 L3 12.33 7.62 4.71 2.91 1.8 120555 12.33 7.62 4.71 2.91 1.8 L300=12.33 L1 L2 L3 3 12.33 7.62 4.71 7.62 12055 4.71 2.91 1.8 2.91 1.8 1300=7.62









4. Use the arrow keys to select the List 4 header. We want List 4 to be the quotient of List 3 and List 2. Enter the formula L₄ = L₃/L₂ by pressing 2nd 3, ÷, then 2nd 2. List 4 now contains the successive quotients of the leg lengths, or y-values.

Algebra 2 A Golden Idea

L2	L3	T 1
12.33 7.62 4.71 2.91	7.62 4.71 2.91 1.8	
L4 =L3.	/Lz	
L2	L3	L4 4
12.33 7.62 4.71 2.91	7.62 4.71 2.91 1.8	.61811 .61783 .61856

- Return to the home screen by pressing 2nd MODE or [QUIT]. Calculate the mean value of the successive quotients (List 4) by using Math operations on the Lists. Retrieve the List menu by pressing 2nd STAT then choose the Math options using the arrow key ▶ twice. Use the down arrow key, ♥, to select option 3: mean.
- Enter the list name for which you want to find the mean value, in this case List 4, by pressing 2nd 4. Press ENTER.
- 4:median(5:sum(6:prod(7↓stdDev(moan(L+)

NAMES OPS DE LA CALLER

1 min(2 max(

%⊟mean(



7. Restore the deleted value from List 2. Return to the List Editor (Press <u>STAT</u> then press <u>ENTER</u>), and use the arrow keys to move to the bottom of List 2. Re-enter the value that you deleted.



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2. Press GRAPH then TRACE. Press A to select the function then trace to the prediction using the right and left arrow keys, **()**.

- 1. Press [WINDOW] to enlarge the window. Adjust the settings to make the window large enough to predict with.
- Using the Graph to Make Predictions

9. Enter the appropriate function rule into Y_1 . Press ENTER]. Press GRAPH].

Algebra 2 A Golden Idea











8. Use the mean value to determine the values of *a* and *b*

[Y=]. Clear out any equations by pressing [CLEAR].

in the general form $y = a(b)^x$. Graph the function rule

that you think might "fit" the data well. To do so, press



Algebra 2 A Golden Idea

Using the Table to Make Predictions

1. Press 2nd WINDOW. Enter values for TblStart and Δ Tbl, the value of the *x* increment.

2. Press 2nd GRAPH. Use the up and down arrow keys, A and , to scroll to the desired value.







Part 1: Investigating Leg Length



Determining a Function Rule for Leg Length vs. Triangle Number Using a Microsoft Excel Spreadsheet

1. Enter your data into a blank Excel spreadsheet.

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2. Choose **Chart** from the **Insert** menu.

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3. Select **XY** (Scatter) from the Chart Type selection box then click Next.

Chart Wizard - Step 1 of 4 -	Chart Type 🛛 🛛 🛛 🛛
Standard Types Custom Types Chart type: Column Bar Cine Pie YY (Scatter) Area Doughnut Radar Surface Bubble Stock	Chart sub-type:
Cancel	< Back Next > Einish

4. To select the Data Range, click the **Collapse Dialog** button next to the **Data Range** text box.

Chart Wizard	l - Step 2 of 4 - Chart Source Data	?×
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To creal workshe want in	e a chart, click in the Data range box. Then, on the et, select the cells that contain the data and labels you the chart.	
Data range: Series in:	 Rows Columns 	
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5. Select the cells containing your data then click the **Collapse Dialog** button next to the floating **Chart Source Data** box. You will return to the **Chart Wizard** dialog box.

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2	7.62							
3	4.71							
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L 5	1.8							

6. Click the **Series** tab in order to edit the source data features.

Chart Wizard -	Step 2 of 4	Chart Sourc	e Data	? 🗙
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7. Give "Series 1" an appropriate name. Click inside the **Name** text box and type an appropriate name. In this example, we will use "Leg Length." Click **Next**.

Chart Wizard - Step 2	of 4 - Cha	rt Source Data	? 🛛
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Leg Length	Name:	Leg Length	<u>.</u>
	<u>x</u> values: V Values:	=Sheet11\$D\$3	3C\$7
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8. At this point you can customize the chart options, including the **Chart title**, **Value** (*x*) **axis**, and **Value** (*y*) **axis** labels. Enter the pertinent **Chart Options**, including appropriate labels for the x-axis and y-axis. You can also customize the axes, gridlines, legend, and data labels by clicking on the appropriate tab at the top of the dialog box. Click **Next** when you are ready to continue.

Chart Wizard - Step 3 of 4 - Cl	hart Options ?	×
Chart Wizard - Step 3 of 4 - Cl Titles Axes Gridlines Le Chart title: th vs. Triangle Number Value (X) axis: Triangle Number Value (Y) axis: Leg Length (centimeters) Second category (X) axis:	hart Options	
Second value (Y) axis:	0 2 4 6 Triangle Number	
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Chart Wizard - Step 3 of 4	- Chart Options	?×					
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9. Select the location of the new chart, then click Finish.

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Algebra 2 A Golden Idea

Part 1: Investigating Leg Length

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Determining a Function Rule for Leg Length vs. Triangle Number Using a Microsoft Excel Spreadsheet

1. Click to select your chart. Choose Add Trendline from the Chart menu.

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2. The **Add Trendline** dialog box will appear. Click on the **parent function** for the trendline you wish to graph. If you select **Polynomial** or **Moving Average**, be sure to select the order or period, respectively.

Add Trendlin	ie	
Туре Ор	tions	
Trend/Regres	sion type	
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Power	Exponential	Period:
Based on <u>s</u> erie	s:	
Leg Length	~	
		OK Cancel

3. Click on the **Options** tab. Click on the **Display equation on chart** check box. Set any other features that you would like to customize related to your trend line. Click **OK**.

Add Trendline 🛛 🔀
Type Options Trendline name Automatic: Expon. (Leg Length) Custom: Forecast Forecast Forward: O Units Backward: O Units Set intercept = O Units Set intercept = O Units Set intercept = O Display equation on chart Display R-squared value on chart Display R-squared value on chart Display R-squared value on chart O Display R-squared value on chart O Display R-squared value on chart Display R-squared value on chart
OK Lancel



4. Customize the appearance of the equation by double-clicking on the equation. The **Format Data Labels** dialog box will appear. You can change the appearance of the equation, including font, number, and alignment. Click **OK** when you are finished.



Format Data Labels		×				
Patterns Font Number	Alignment					
Eont:	F <u>o</u> nt style:	<u>S</u> ize:				
Arial	Bold	12				
Tr Alba Matter Tr Alba Super Tr Algerian Tr Arial ✓	Regular Italic Bold Bold Italic	9 A 10 11 12 V				
<u>U</u> nderline:	<u>⊂</u> olor:	B <u>a</u> ckground:				
None 💌	Automatic	🖌 Automatic 🖌				
rEffects Superscript Subscript	Aa	BbCcYyZz				
Auto scale This is a TrueType font. The same font will be used on both your printer and your screen.						
OK Cancel						



Using the Graph to Make Predictions

1. Double-click the trendline on your chart. The Format Trendline dialog box will appear.



2. Click the **Options** tab. In the **Forecast** text boxes, enter the number of units that you would like to extend the graph either **Forward** or **Backward** beyond your data set. Click **OK**.

Format Trendline	
Patterns Type Options Trendine name Options • Automatic: Expon. (Leg Length) Exponential construction Custom: Option Forecast Unit Backward: O Unit Set intercept = O O Display gquation on chart Display R-squared value on chart	
	OK Cancel

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3. Use the extended graph to estimate the necessary *x*- or *y*-value.

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Algebra 2 A Golden Idea

Part 2: Investigating Dilations

Generating a Scatterplot of Leg Length vs. Dilation Number Using a Graphing Calculator

1. Press STAT. Then press ENTER.

- 2. You will see a table containing lists. Your calculator may contain data in its lists from a previous investigation. If the lists do not contain previous data, you may skip to step 6.
- 3. To clear this previous data, press STAT.

4. Highlight **ClrList**. Enter the lists that you wish to clear. Press **ENTER**.

5. Press ENTER again.







6. Enter the data into the lists. Be sure to press ENTER after each value.

7. Press 2nd [STAT PLOT].

- Use the arrows to select the necessary options. For Plot 1, be sure that the Plot is On and a scatterplot is chosen (first Type). The independent variable (XList) is in L₁ and dependent variable (YList) is in L₂.
- 11. Choose an appropriate window by selecting WINDOW and specifying the appropriate domain and range. Use the arrow keys to move up and down.
- 12. To view the scatterplot, press GRAPH.

Algebra 2 A Golden Idea











Algebra 2 A Golden Idea

Part 2: Investigating Dilations



Using a Graphing Calculator

Note: Directions follow for use of a TI-83, TI-83+, or TI-84.

Using Successive Quotients:

- 1. In the List Editor (Press STAT) then press ENTER), copy List 2 into List 3. To do so, use the arrow keys to move the cursor to the List 3 header, then press 2nd 2. Press ENTER].
- 2. Delete the first element of List 3 by using the arrow keys to select it then press DEL.

3. Delete the last element of List 2 by using the arrow keys to select it then press DEL.

4. Use the arrow keys to select the List 4 header. We want List 4 to be the quotient of List 3 and List 2. Enter the formula $L_4 = L_3/L_2$ by pressing [2nd] 3], (\div) , then [2nd] 2]. List 4 now contains the successive quotients of the leg lengths, or y-values.



L1	L2	L3 3
011275	1.8 2.91 4.71 7.62 12.33	4.71 7.62 12.33
L3(1)=2	.91	





- 5. Return to the home screen by pressing 2nd MODE or [QUIT]. Calculate the mean value of the successive quotients (List 4) by using Math operations on the Lists. Retrieve the List menu by pressing 2nd STAT, then choose the Math options using the arrow key ▶ twice. Use the down arrow key, , , to select option 3: mean.
- Enter the list name of which you want to find the mean value, in this case List 4 by pressing 2nd 4. Press ENTER.

- 7. Restore the deleted value from List 2. Return to the List Editor (Press <u>STAT</u> then press <u>ENTER</u>) and use the arrow keys to move to the bottom of List 2. Re-enter the value that you deleted.
- 8. Use the mean value to determine the values of *a* and *b* in the general form y = a(b)^x. Graph the function rule that you think might "fit" the data well. To do so, press [Y=]. Clear out any equations by pressing [CLEAR].
- 9. Enter the appropriate function rule into Y₁. Press ENTER. Press GRAPH.

NAMES OPS **Minut** 1:min(2:max(



%⊟mean(

5:sum(

4:median(



Plot2 Plot3

Y1=



Algebra 2



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Algebra 2 A Golden Idea

Using the Graph to Make Predictions

1. Press WINDOW to adjust the window. Adjust the settings to enlarge the window enough to make predictions.

Press GRAPH then TRACE. Press ▲ to select the function then trace to the prediction using the right and left arrow keys,





Using the Table to Make Predictions

1. Press 2nd WINDOW. Enter values for TblStart and Δ Tbl, the value of the *x* increment.

2. Press 2nd GRAPH. Use the up and down arrow keys, ▲ and , to scroll to the desired value.







Algebra 2 A Golden Idea

Part 2: Investigating Dilations



Determining a Function Rule for Leg Length vs. Triangle Number Using a Microsoft Excel Spreadsheet

1. Enter your data into a blank Excel spreadsheet.

M	Microsoft Excel - Book1									
:B)	<u>Eile E</u> dit	<u>V</u> iew <u>I</u> ns	sert F <u>o</u> rmat	<u>I</u> ools <u>D</u> a	ata <u>W</u> indov	w <u>H</u> elp 4	Ado <u>b</u> e PDF			
: 🗅	📁 🖬 🕻	818	Q 🗳 🛍	1 % 0	2 - 🝼 🛙	- C+ -	😫 Σ ᠇	<u>A</u> ↓ <u> </u> 1	00% 🝷 🕜	1 1
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	F4	+	fx							
1	A	В	C	D	E	F	G	Н	1	
1										
2			Dilation Number	Leg Length						
3			0	1.8						
4			1	2.91			1			
5			2	4.71						
6			3	7.62						
7			4	12.33						
8										

2. Choose **Chart** from the **Insert** menu.





3. Select **XY** (Scatter) from the Chart Type selection box then click Next.

Chart Wizard - Step 1 of 4 -	Chart Type 🛛 🛛 🔀
Standard Types Custom Types Chart type: Column Bar Cine Pie YY (Scatter) Area Doughnut Radar Surface Bubble Stock	Chart sub-type:
Cancel	< Back Next > Einish

4. To select the Data Range, click the **Collapse Dialog** button next to the **Data Range** text box.

Chart Wizard	- Step 2 of 4 - Chart Source Data	? 🗙
Data Range	Series	
To creat workshe want in t	e a chart, click in the Data range box. Then, on the et, select the cells that contain the data and labels you he chart.	
<u>D</u> ata range: Series in:	© Rows O Columns	N
	Cancel < <u>B</u> ack <u>N</u> ext > E	inish



5. Select the cells containing your data then click the **Collapse Dialog** button next to the floating **Chart Source Data** box. You will return to the **Chart Wizard** dialog box.

_			
fx			
С	D	E	Chart Wizard - Step 2 of 4 - Chart Source Data - Data r ? 🔀
			=Sheet1!\$C\$3:\$D\$7
Dilation	Leg		
Number	Length		
0	1.8		
1	2.91		
2	4.71		
3	7.62		
4	12.33		

6. Click the **Series** tab to edit the source data features.

Chart Wizard - Step 2 of 4 - Chart Source Data	? 🗙
Data Range Series	• Series1
Cancel < <u>B</u> ack <u>N</u> ext >	Einish



7. Give "Series 1" an appropriate name. Click inside the **Name** text box and type an appropriate name. In this example, we will use "Leg Length." Click **Next**.

Chart Wizard - Step 2	of 4 - Chart	t Source Data	? 🗙
Data Range Series			
	LegLen	gth	
14		+	
10			
6	+	+ Log	Length
2			
0 1	2 3	4 5	
<u>S</u> eries			
Leg Length	<u>N</u> ame:	Leg Length	3
	<u>X</u> Values:	=Sheet1(\$C\$3(\$C\$7)	
Add Remove	<u>v</u> values:	=5066011\$0\$53\$0\$7	
Cancel	<u> </u>	ack Next >	Einish

8. At this point you can customize the chart options, including the **Chart title**, **Value** (*x*) **axis**, and **Value** (*y*) **axis** labels. Enter the pertinent **Chart Options**, including appropriate labels for the x-axis and y-axis. You can also customize the axes, gridlines, legend, and data labels by clicking on the appropriate tab at the top of the dialog box. Click **Next** when you are ready to continue.

Chart Wizard - Step 3 of 4 - Ch	iart (Op	tions				?×
Titles Axes Gridlines Le	gend	ſ	Data Labels				
Chart title: Leg Length vs. Dilation Numbe			Leg Leng	th vs. Dil	ation Nurr	nber	
V <u>a</u> lue (X) axis:		14					- II
Dilation Number		12				+	- 1
Value (Y) axis:	dt.	10					
Leg Length	9 Lei	6					
Second category (X) axis:	Ē	4	•	-			
		0					
Second value (Y) axis:			0 1	2 Dilation	3 Number	4	5
Ca	ncel		< <u>B</u> ack		ext > 💦	Eir	nish



9. Select the location of the new chart, then click Finish.

Chart Wiza	rd - Step 4 of 4 - 0	Chart Location	? 🛛
Place chart: -			
	C As new <u>s</u> heet:	Chart1	
	• As <u>o</u> bject in:	Sheet1	•
0	Cancel	< <u>B</u> ack	Next > <u>F</u> inish





10. You can customize the features of your chart by double-clicking the part that you wish to change. For example, to change the scale of the *x*-axis, double-click the *x*-axis. The **Format Axis** dialog box will appear. Click on the **Scale** tab, then change the major unit. Click **OK**.

Format Axis	2	S			
Patterns Scale	Font Number Alignment				
Value (X) axis scale	~				
Auto					
Mi <u>n</u> imum:	0				
Ma <u>x</u> imum:	5				
Major unit:	1				
🗹 Minor unit:	0.2				
Value (Y) axis					
<u>⊂</u> rosses at:	0				
Display <u>u</u> nits:	None 🛛 🗹 Show display units label on chart				
📃 Logarithmic scal	e				
Values in reverse order					
Value (Y) axis crosses at <u>m</u> aximum value					
	OK Cancel				





Algebra 2 A Golden Idea

Part 2: Investigating Dilations



Determining a Function Rule for Leg Length vs. Triangle Number Using a Microsoft Excel Spreadsheet

5. Click to select your chart. Choose Add Trendline from the Chart menu.

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:图)	<u>File E</u> dit	<u>V</u> iew Ins	ert F <u>o</u> rmal	t <u>I</u> ools	⊆hart	Window	Help	Adobe PDF									
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	A	В	C	D	ļ	Location		G	Н	1	J	K	L	M	N	0	1
1						Add Data											
			Dilation	Leg		 Add Trendlii	ne N										
2			Number	Length			3	-									-
4			1	2.5		5-D <u>v</u> iew		-									
5			2	4.7	1												
6			3	7.8	2												
7			4	12.3	13		<u>.</u>			E						<u> </u>	
8					-					Leg Leng	th vs. Di	ilation Nu	umber				
9				1	-					100							-
11					-		14										-
12							14										
13							12							+			
14							12										
15							10										
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26					_		0										-
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20			-		-			U			4	100	-	4		8	-
30					-						Dilatio	n Number					-
31										1	3.∎1						
32																	-



6. The **Add Trendline** dialog box will appear. Click on the **parent function** for the trendline you wish to graph. If you select **Polynomial** or **Moving Average**, be sure to select the order or period, respectively.

Add Trendlin	ie	
Туре Ор	tions	
Trend/Regres	sion type	
Linear	Logarithmic	Order:
Power	Exponential	Period:
Based on <u>s</u> erie	s:	
Leg Length	~	
		OK Cancel

7. Click on the **Options** tab. Click on the **Display equation on chart** check box. Set any other features that you would like to customize related to your trend line. Click **OK**.

Add Trendline 🛛 🔀
Type Options Trendline name Automatic: Expon. (Leg Length) Custom: Forecast Forecast Forward: O Units Backward: O Units Set intercept = O Units Set intercept = O Units Set intercept = O Display equation on chart Display R-squared value on chart Display R-squared value on chart Display R-squared value on chart O Display R-squared value on chart O Display R-squared value on chart Display R-squared value on chart
OK Lancel



8. Customize the appearance of the equation by double-clicking on the equation. The **Format Data Labels** dialog box will appear. You can change the appearance of the equation, including font, number, and alignment. Click **OK** when you are finished.



Format Data Labels		X
Patterns Font Number Font: Arial The Alba Matter The Alba Super The Algerian The Arial	Alignment Font style: Bold Regular Italic Bold Bold Italic	Size: 12 9 10 11 12 11 12
Underline:	<u>C</u> olor: Automatic	Background:
Effects Strikethrough Superscript Subscript	Preview Aa	BbCcYyZz
✓ Auto scale This is a TrueType font. The san your screen.	ne font will be used	l on both your printer and
	C	OK Cancel



Using the Graph to Make Predictions

4. Double-click the trendline on your chart. The Format Trendline dialog box will appear.



5. Click the **Options** tab. In the **Forecast** text boxes, enter the number of units that you would like to extend the graph either **Forward** or **Backward** beyond your data set. Click **OK**.

Format Trendline	
Patterns Type Options Trendline name Automatic: Expon. (Leg Length) Qustom: Custom: Forecast Unit Backward: Q Unit Set intercept = 0 Utts Opisplay equation on chart Display R-squared value on chart	
	OK Cancel

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6. Use the extended graph to estimate the necessary *x*- or *y*-value.

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Using the CBL2 and Light Probe to Collect Data

 Plug the light sensor into a Channel port of your CBL2. Run a data collection program, such as the DataMate App. Press APPS, then use
 to scroll down to DataMate.

The DataMate program will automatically recognize the light sensor. The number in the top right corner is the reading of light intensity in milliwatts per square centimeter.

2. If DataMate does not automatically recognize the light sensor, then select option 1: SETUP by pressing 1.

3. Select the Channel port into which you plugged the light sensor. Press • or • so that the arrow is next to the appropriate Channel. Press ENTER.

Look for the LIGHT sensor. If you do not see it on the current screen, select 7: MORE by pressing 7. When you see LIGHT listed, select 5: LIGHT by pressing 5.



CH 1: LIG	HT Ø.ØØ89
HODE: TINE	GRAPH-20
1:SETUP	4:ANALYZE
2:STHKT 3:GRAPH	6:QUIT

▶ CH 1: CH 2: CH 3: DIG : NODE:TIMEGRAPH-20
1:OK 3:ZERO 2:Calibrate 4:Save/Load

SELECT SENSOR
1:TEMPERATURE
2:PH
3:CONDUCTIVITY
4:PRESSURE
STUKLE
0.0E001001E 7.0005
A:RETURN TO SETUR SCREEN
Biller Bill raber driberen
SELECT SENSOR
SELECT SENSOR 1:Accelerometer
SELECT SENSOR 1:Accelerometer 2:Colorimeter
SELECT SENSOR 1:Accelerometer 2:Colorimeter 3:Co2 GAS
SELECT SENSOR 1:Accelerometer 2:Colorimeter 3:Co2 GAS 4:Microphone
SELECT SENSOR 1:ACCELEROMETER 2:COLORIMETER 3:CO2 GAS 4:MICROPHONE 5:LIGHT 5:LIGHT
SELECT SENSOR 1:ACCELEROMETER 2:COLORIMETER 3:CO2 GAS 4:MICROPHONE 5:LIGHT 6:D.OXYGEN(MG/L) 2:MORF



5. Select the light probe that you are using by pressing 1,2, or 3. You will be returned to the main screen.

	Algebra 2
I've Seen	n the Light!

. .



- 6. Read the light intensity (in milliwatts per square centimeter) by observing the number in the top-right corner of the screen.
- CH 1: LIGHT Ø.ØØ89 Mode: Time Graph-20 1:Setup 4:Analyze 2:Start 5:Tools 3:Graph 6:Quit
- To collect the next data point, move the light probe away from the light source, then read the intensity. Continue until you have collected the necessary data.
- 8. Press 6 to return to the home screen.



Algebra 2 I've Seen the Light!

Generating a Scatterplot Using a Graphing Calculator

1. Enter data into the **STAT** lists.

2. Turn on the [STAT PLOT] by pressing 2nd Y=. Select the necessary options. In this case, choose a scatterplot with independent variable in [L1] and dependent variable in [L2].

3. Choose an appropriate window by pressing WINDOW and specifying the appropriate domain and range. Use I to move up and down the list. Type the desired value then press ENTER.

4. To view the graph, select GRAPH.











Algebra 2 I've Seen the Light!

Generating a Scatterplot Using Microsoft Excel

1. Enter your data into a blank Excel spreadsheet.

X N	Microsoft Excel - Book1								
[图]	<u>Eile E</u> dit	<u>V</u> iew <u>I</u> ns	ert F <u>o</u> rmat <u>T</u> o	iols <u>D</u> ata <u>W</u> ir	idow <u>H</u> elp	Adobe PDF	8		
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	220		50134	Reply	with Changes	s End Revi	ew	A 🕰 🐔 .	
	E21	+	fx						
	A	В	С	D	E	F	G	Н	L
1									1
			Distance	Intoncity					
3			(D)	(I)					
4			(m)	(mW/cm ²)					
5			0.6	0.7454	1				
6			0.7	0.5657					
7			0.8	0.4588					
8			0.9	0.3199					
9		3	1	0.2538					
10			1.1	0.2149					
11			1.2	0.1751					
12			1.3	0.1479					
13			1.4	0.1333					
14			1.5	0.1236					
15			1.6	0.11					
16			1.7	0.0973					
17		1	1.8	0.0906					1
18			1.9	0.0808					
19			2	0.075					
20									

2. Choose **Chart** from the **Insert** menu.

M N	Kicrosoft Excel - Book1								
:2)	<u>File E</u> dit	⊻iew	Inse	ert	F <u>o</u> rmat	<u>T</u> ools	Dat	a <u>W</u> indo	w <u>H</u> elp
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	121 22 2	1 🗠)		<u>R</u> o	WS		8	Reply wit	h <u>C</u> hange:
	N28	-		⊆o	lumns				
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1			1	CĿ	_{iart} N				
2				≦y	mbol				
3				Pa	ge <u>B</u> reak				
4			fx	Eu	nction				
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7			1	Co	mment				
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10			tor	DIa	igram				
11				<u>o</u> ⊧	ject		-		
12			2	Ну	perlijnk	Ctrl+K			
14							-		







3. Select **XY** (Scatter) from the Chart Type selection box then click Next.

Chart Wizard - Step 1 of 4 - Chart Type	? 🗙
Standard Types Custom Types Chart type: Chart sub-type: Column Image: Chart sub-type: Bar Image: Chart sub-type: Line Image: Chart sub-type: Pie Image: Chart sub-type: Area Image: Chart sub-type: Doughnut Image: Chart sub-type: Surface Image: Chart sub-type: Stock Image: Chart sub-type:	
Scatter. Compares pairs of values. Press and Hold to <u>Vi</u> ew Sample	
Cancel < Back Next > Eir	ish

4. To select the Data Range, click the **Collapse Dialog** button next to the **Data Range** text box.

Chart Wizard	- Step 2 of 4 - Chart Source Data	?×
Data Range	Series	
To create workshee want in ti	e a chart, click in the Data range box. Then, on the it, select the cells that contain the data and labels you ne chart.	
<u>D</u> ata range:		R
Series in:	O Rows	~
	Columns	



5. Select the cells containing your data then click the **Collapse Dialog** button next to the floating **Chart Source Data** box. You will return to the **Chart Wizard** dialog box.

	Distance	Intensity							
Н	(D)	(I) 2	Chart W	izard - Ste	p 2 of 4 - (Chart Sour	ce Data - D	ata r 👔	
	(m)	(mW/cm ⁻)	=Sheet14	C\$5:\$D\$19					
	0.6	0.7454							
	0.7	0.5657							
ł	0.8	0.4588							
Į	0.9	0.3199							
	1	0.2538							
I	1.1	0.2149							
I	1.2	0.1751							
Į	1.3	0.1479							
	1.4	0.1333							
I	1.5	0.1236							
I	1.6	0.11							
Į	1.7	0.0973							
	1.8	0.0906							
I	1.9	0.0808							
	2	0.075							

6. Click the **Series** tab to edit the source data features.

Source Data	. ? 🛛
Data Range	Series
0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0	• • • • • • • • • • • • • • • • • • •
 Data range: Series in:	=Sheet1!\$C\$5:\$D\$19
	Cancel < Back Next > Einish



7. Give "Series 1" an appropriate name. Click inside the **Name** text box and type an appropriate name. In this example, we will use "Leg Length." Click **Next**.

Chart Wizard - Step 2	of 4 - Chart Source Data	· ? 🛛				
Data Range Series						
	Light Intensity					
0.8						
0.6		A Linkk lakus sike				
0.3	• • • •					
0.1	****					
0 0.5	1 1.5 2 2	2.5				
Series						
	Name: Light Intensity					
×	Y Values: =Sheet1!\$D\$	5:\$D\$19				
Add Remove						
Cancel < Back Next > Einish						

8. At this point you can customize the chart options, including the **Chart title**, **Value** (*x*) **axis**, and **Value** (*y*) **axis** labels. Enter the pertinent **Chart Options**, including appropriate labels for the x-axis and y-axis. You can also customize the axes, gridlines, legend, and data labels by clicking on the appropriate tab at the top of the dialog box. Click **Next** when you are ready to continue.

Chart Wizard - Step 3 of 4 - Ch	nart Options	?×
Titles Axes Gridlines Lei Chart title: Light Intensity Value (X) axis: Distance (m) Value (Y) axis: Intensity (mW/cm2) Second category (X) axis: Second value (Y) axis:	rgend Data Labels	2.5
Ca	ncel < <u>B</u> ack <u>N</u> ext > <u>F</u> i	nish



9. Select the location of the new chart, then click **Finish**.

Chart Wizard - Step 4 of 4 - Chart Location						
Place chart: -						
	C As new <u>s</u> heet:	Chart1				
	• As object in:	Sheet1	•			
2	Cancel	< <u>B</u> ack Next	: > <u>Fi</u> nish			

📧 Microsoft Excel - Book1														
:1	<u>Eile E</u> dit	<u>V</u> iew Ins	ert F <u>o</u> rmat <u>T</u> o	ools <u>D</u> ata <u>W</u> in	dow <u>H</u> elp	Ado <u>b</u> e PDF	8							
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: (20	Pa Pa 12		5 X3 B	a 🔂 🕅 🍽 Reply	with Change	s End Revi	ew							
_	L28	-	fx			i dente								
	А	В	С	D	Е	F	G	Н	i I	J	K	L	М	N
1					1		0				1			
2			Distance	Intensity										-
3			(D)	(I)										
4			(m)	(mW/cm^2)	2 									2
-			0.6	0.7454	5				Light I	atoncity				
6			0.0	0.5657	2				Light i	nensny				
7			0.8	0.4588		0.8 - -								
8			0.9	0.3199										
9			1	0.2538		0.7						1		
10			1.1	0.2149		0.6 -		_						
11			1.2	0.1751		n2)		•						
12			1.3	0.1479		≥ 0.5 1			•			63		
13	1		1.4	0.1333		1 0.4								
14			1.5	0.1236		, it								
15			1.6	0.11		Ē 0.3 −			•			-		
16			1.7	0.0973		= n2 +								
17			1.8	0.0906	8					***				
18			1.9	0.0808		0.1					* * * *	• •	_	
19			2	0.075										
20						0		0.5	1	1.	5	2	2.5	
21				-				10.00	Di	stance (m)	925	6629	inini i	
23									2.					
24														



Generating a Scatterplot Using TI-Interactive

- 1. Open a new TI-Interactive document.
- 2. Select the list icon from the scroll bar to activate the **DATA EDITOR**.



3. Create a scatterplot. Select the scatterplot icon from the **DATA EDITOR** toolbar and from the drop down menu.



4. Click on the **STAT PLOTS** tab then enter the list names that contain the data, independent variable first and dependent variable second.

Functions	s 🖌	×
		-
	L2	-
Independent Va	riable;	•
	Copy All Close He	



5. Set an appropriate window and label the axes by clicking the **FORMAT** button. In the **Window** tab, enter the appropriate domain and range for the function.

Graph	
웹 ≌ ♥ ♀ ☑ + ↓ ↓ ↓ ↓ ?	
$\square \sqcap \bowtie \And \checkmark \blacksquare \lor \vdash \sqcap \bowtie \bowtie \blacksquare $	Format X
Functions Trace Format Table	Window Animate Axes Grid Trace Labels
10.	
6	Xmin: [-10.
	Automatic XStep Xmax. 10.
	Ymin: -10.
	Ymax: 10.
	Yscale: 1.
-8	Cancel Apply Help
-10.	

6. After entering the Xmin, Xmax, Xscale, Ymin, Ymax, and Yscale, click the APPLY button.

Format 🔀
Window Animate Axes Grid Trace Labels
Xmin: D.
Automatic XStep Xmax: 3.
Xstep: 083682 Xscale: 1
Ymin: 0.
Ymax: 1.
Yscale: .1
OK Cancel Apply L Help



7. The scatterplot should be displayed with the specified domain and range.



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Press [Y=] then enter the function. Press [GRAPH] to view the graph.

verify using a graph.

3. Substitute this value of k into the parent function and

home screen and using List operations. Press [2nd]MODE]. Press 2nd STAT) 3. Enter [L3] by pressing 2nd 3,

L1 L2 R 7454 .67.89.1112 11.12 'AA L3 =L1 *L2



I've Seen the Light! **Determining a Function Rule Using a Graphing Calculator**

Algebra 2







1. The graph appears to be an inverse variation function,

Go to the List Editor by pressing [STAT] [ENTER]. Use \checkmark to select the List 3 header. Enter the formula [L3] =

[L1] [L2] by pressing [2nd] 1 [×] 2nd [2]. Press [ENTER].

2. Find the average value of List 3 by returning to the

 $y = \frac{k}{x}$, so multiply xy to find k, the constant of

variation.

then press [ENTER].



4. This function is not a good fit. Try inverse-square variation, $y = \frac{k}{x^2}$. Multiply x^2y in order to find an approximate value for *k*, the constant of variation.

Go to the List Editor by pressing STAT ENTER. Use \checkmark to select the List 4 header. Enter the formula [L4] = [L1]² [L2] by pressing 2nd 1 x² × 2nd 2. Press ENTER.

- 5. Find the average value of List 4 by returning to the home screen and using List operations. Press 2nd MODE. Press 2nd STAT ►► 3. Enter [L4] by pressing 2nd 4, then press ENTER.
- 6. Substitute this value of *k* into the parent function and verify using a graph.

Press Y=, then enter the function. Press GRAPH to view the graph.

Algebra 2 I've Seen the Light!

L2	L3	T 1 4
7,56889 7,56889 7,56889 7,56889 7,56889 7,5689 7,568 7,569 7,568 7,568 7,568 7,568 7,568 7,569 7	4994 25994 2595791 255791 2556728 255612 255	
L4 =L1	²*L2∎	







Using the Graph to Make Predictions

1. Press WINDOW to enlarge the window. Adjust the settings to make the window large enough to predict with.

Press GRAPH then TRACE. Press ▲ to select the function then trace to the prediction using the right and left arrow keys,

Using the Table to Make Predictions

1. Press 2nd WINDOW. Enter values for TblStart and Δ Tbl, the value of the *x* increment.

2. Press 2nd GRAPH. Use the up and down arrow keys, ▲ and , to scroll to the desired value.







X	Y1	Y2
.78 .79 .81 ₩8 88 88 88 88 88 88 88 88 88 88 88 88	487456 487456 487456 4374661 4374661 49669 49669 49669	
X=.82		

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Algebra 2 I've Seen the Light!

Determining a Function Rule Using Microsoft Excel



1. Click to select your chart. Choose Add Trendline from the Chart menu.



2. The **Add Trendline** dialog box will appear. Click on the **parent function** for the trendline you wish to graph. If you select **Polynomial** or **Moving Average**, be sure to select the order or period, respectively.

Add Trendline	e		×
Type Opti Trend/Regress Linear	ons ion type Logarithmic	Order: Polynomial Period:	
Power Based on geries Light Intensity	Exponential	Moving Average	
		OK Cancel	



3. Click on the **Options** tab. Click on the **Display equation on chart** check box. Set any other features that you would like to customize related to your trend line. Click **OK**.

Add Trendline	X
Type Options Trendline name Automatic: Power (Light Intensity) <u>C</u>ustom: Forecast Units Backward: Units Set intercept = Mipisplay equation on chart YDrolay R-squared value on chart 	
	OK Cancel

4. Customize the appearance of the equation by double-clicking on the equation. The **Format Data Labels** dialog box will appear. You can change the appearance of the equation, including font, number, and alignment. Click **OK** when you are finished.





Format Data Labels		×
Patterns Font Number Eont: Arial Image: Arial Image: Arial Image: Arial Image: Arial Image: Arial <td>Alignment Font style: Bold Regular Italic Bold Bold Italic Color: Automatic Preview AaBt</td> <td>Size: 12 9 10 11 12 Background: Automatic</td>	Alignment Font style: Bold Regular Italic Bold Bold Italic Color: Automatic Preview AaBt	Size: 12 9 10 11 12 Background: Automatic
Subscript Auto scale This is a TrueType font. The sam your screen.	e font will be used on	both your printer and

Using the Graph to Make Predictions

1. Double-click the trendline on your chart. The Format Trendline dialog box will appear.





2. Click the **Options** tab. In the **Forecast** text boxes, enter the number of units that you would like to extend the graph either **Forward** or **Backward** beyond your data set. Click **OK**.

Format Trendline	
Patterns Type Options Trendline name • Automatic: Power (Light Intensity) • Custom: • Custom: Forecast • Custom: Set intercept = • Display gquation on chart Display R-squared value on chart	
	OK Cancel

3. Use the extended graph to estimate the necessary *x*- or *y*-value.





Determining a Function Rule Using TI-Interactive

1. The graph appears to be an inverse variation function, $y = \frac{k}{x}$, so multiply xy to find k, the

constant of variation then find the average value. In the Data Editor, click the Formula tab under the List 3 header.

🗒 Data Editor							
File Edit V	'iew Insert	Format Lis	t Data He	lp			
🚯 🖌	6	୍ର ୯					
TI Math		▼ 10 ▼	B Z	<u> </u>			
listname formula	L1 {}	L2 {}	L3 {}	L4 {}			
1	0.6	0.7454	~				
2	0.7	0.5657					
3	0.8	0.4588					
4	0.9	0.3199					
5	1	0.2538					
6	1.1	0.2149					
7	1.2	0.1751					
8	1.3	0.1479					
9	1.4	0.1333					
10	1.5	0.1236					
11	1.6	0.11					
12	1.7	0.0973					
13	1.8	0.0906					
14	1.9	0.0808					
15	2	0.075					
16							

2. Enter the formula L1*L2 inside the Formula: text box. Click OK.

	_	🛄 Data Ed	itor		(
L3 Information		File Edit V	iew Insert	Format Lis	t Data Help	5
Name:	ок 📐	🛐 🖌	6	ה 6		
L3	Palette	TI Math		▼ 10 ▼	BZ	U
Formula:	Cancel	listname formula	L1 {}	L2 {}	L3 {}	L4 {}
L1*L2		1	0.6	0.7454	0.44724	
	Help	2	0.7	0.5657	0.39599	
		3	0.8	0.4588	0.36704	
		4	0.9	0.3199	0.28791	
		5	1	0.2538	0.2538	
		6	1.1	0.2149	0.23639	
		7	1.2	0.1751	0.21012	
		8	1.3	0.1479	0.19227	
		9	1.4	0.1333	0.18662	
		10	1.5	0.1236	0.1854	
		11	1.6	0.11	0.176	
		12	1.7	0.0973	0.16541	
		13	1.8	0.0906	0.16308	
		14	1.9	0.0808	0.15352	
		15	2	0.075	0.15	
		16				
		17				
		18				
		19				
		•				•



3. From the List menu, choose Calculate, then choose Calculate Mean.

🗒 Data Edi	itor				×		
File Edit V	'iew Insert	Format Lis	t Data He	Þ			
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listname	L1	L2	Calculate	Þ	F	ind Minimum	
formula	{}	{}	{}	-{}	F	ind Maximum	
1	0.6	0.7454	0.44724		C	alculate Mean 📐	
2	0.7	0.5657	0.39599		C	alculate Median [®]	
3	0.8	0.4588	0.36704		C	alculate Sum	
4	0.9	0.3199	0.28791		Calculate Product		
5	1	0.2538	0.2538		Calculate Standard Deviation		
6	1.1	0.2149	0.23639		0	alculate Variance	
7	1.2	0.1751	0.21012				
8	1.3	0.1479	0.19227				
9	1.4	0.1333	0.18662				
10	1.5	0.1236	0.1854				
11	1.6	0.11	0.176				
12	1.7	0.0973	0.16541				
13	1.8	0.0906	0.16308				
14	1.9	0.0808	0.15352				
15	2	0.075	0.15				
16							
17							
18							
19					-		
•				•			
Return the me	an value of a	list			11		

4. From the Input List drop-list box, choose L3. Click Calculate.

Calculate Mean						
Calculate						
Сору						
Cancel						
Help						



5. Substitute this value of k into the parent function and verify using a graph. From your Scatterplot, click the **Functions** button.



Inside the **Functions** dialog box, click the f(x) tab, then enter your function in the top text box. Click **Close** when complete.



6. This function is not a good fit. Try inverse-square variation, $y = \frac{k}{x^2}$. Multiply $x^2 y$ in order to find an approximate value for k, the constant of variation. In the **Data Editor**, clear **L3** then repeat Steps 1 through 5. Set **L3** = (**L1**)² × **L2** by following steps 1 and 2. Find the average value of L3 by following Step 3.

Algebra 2 I've Seen the Light!

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🖽 Data Ed	itor				×	🛄 Data	🗒 Data Editor					
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listname	L1	L2	L3	L4		listnam	ne L1	L2	Calculate	•	Find Minimum	
formula	{}	{}	{}	{}		formul	a {}	{}	{}	{}	Find Maximum	
1	0.6	0.7454	0.26834			1	0.6	0.7454	0.26834		Calculate Mean	
2	0.7	0.5657	0.27719			2	0.7	0.5657	0.27719		Calculate Median	
3	0.8	0.4588	0.29363			3	0.8	0.4588	0.29363		Calculate Sum	
4	0.9	0.3199	0.25912			4	0.9	0.3199	0.25912		Calculate Product	
5	1	0.2538	0.2538			5	1	0.2538	0.2538		Calculate Standard Deviation	
6	1.1	0.2149	0.26003			6	1.1	0.2149	0.26003		Calculate Variance	
7	1.2	0.1751	0.25214			7	1.2	0.1751	0.25214			
8	1.3	0.1479	0.24995		_	8	1.3	0.1479	0.24995			
9	1.4	0.1333	0.26127		_	9	1.4	0.1333	0.26127			
10	1.5	0.1236	0.2781			10	1.5	0.1236	0.2781			
11	1.6	0.11	0.2816		_	11	1.6	0.11	0.2816			
12	1.7	0.0973	0.2812			12	1.7	0.0973	0.2812			
13	1.8	0.0906	0.29354		_	13	1.8	0.0906	0.29354			
14	1.9	0.0808	0.29169		-	14	1.9	0.0808	0.29169			
15	2	0.075	0.3		_	15	2	0.075	0.3			
16					-	16						
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						Mean: .27	73441	Can	cel			
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Graph the function over the scatterplot, substituting the average value of L3 for k.

