

Line up to be Measured

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Activity overview

Students will measure their heights and arm spans and fit a linear model to the data.

Concepts

- *Identify trends in data and find a function to model the data*
- *Approximate and interpret rates of change from graphical and numerical data*

Teacher preparation

Measurements are easier to make when the tape measure is taped to the wall vertically and horizontally from a corner of the room.

Classroom management tips

Students should work in pairs to gather the data and then enter the data into one calculator's Lists and Spreadsheets. When all the data has been collected it can be sent out to the class using Connect-to-Class.

TI-Nspire Applications

TI-Nspire Lists and Spreadsheets, Data and Statistics, the Movable Line, and Linear Regressions are used in this activity.

Step-by-step directions

Have students work in pairs to measure their height and arm spans. Remind them to use the same units if tape measures are in cm or inches.

Data should be entered into the teacher's calculator or the computer NSpire software in the Lists and Spreadsheet application. Column A=height, Column B=armspan

Data can then be sent out to the students' calculators using Connect-to-Class or alternatively projected through the computer or on a viewscreen.

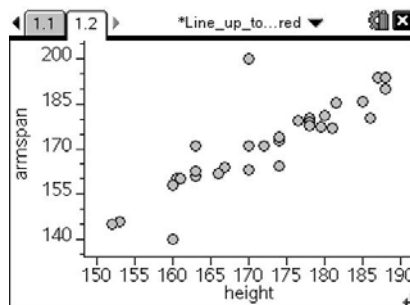
Included here is a sample file that was collected from a sample of teachers.

	A	B	C	D	E
	height	armspan			
1	174	173			
2	166.8	164			
3	166	162			
4	188	190			
5	186	180.5			
A7	174				

Press **(2nd)** > Data & Statistics

Move cursor to the bottom of the screen onto "Click to add variable", click and choose **height**.

Move to the left of the screen onto "Click to add variable", click and choose **armspan**.




Discuss the appropriate function to model the data.


You may also want to initiate a discussion as to “outliers”. Perhaps the height and armspan data were switched on input.

Press **menu** > Analyze > Add Movable Line.

Move the cursor over the line near the ends to get the rotational symbol.

Click  to grab the line, then manipulate the slope until you are satisfied the slope fits the data.

Move the cursor over the line somewhere near the middle to get the translational symbol.

Click  to grab the line, then manipulate the position of the line until you are satisfied it fits the data.

These steps may be repeated until students are happy with the fit.

You may also wish to show the residual squares on the screen while manipulating the line.

Press **menu** > Analyze > Residuals > Show Residual Squares.

At this time you can discuss the data outliers and how they affect the fit of the line.

Have students record their final linear function.

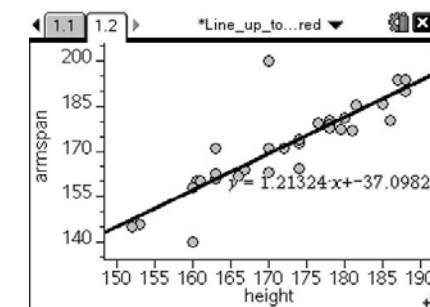
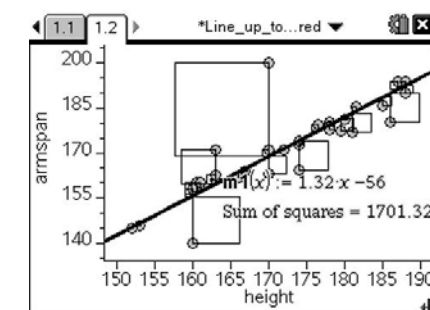
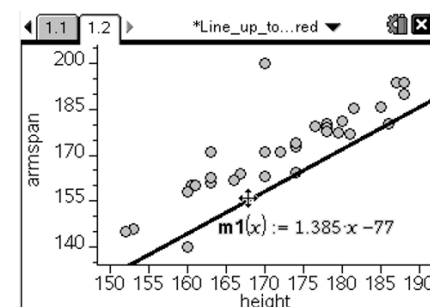
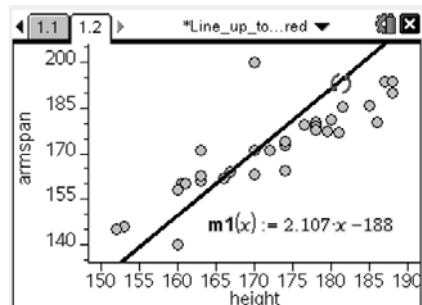
Before moving on you may want to hide the movable line and/or the residual squares.

Press **menu** > Analyze > Residuals > Hide Residual Squares.

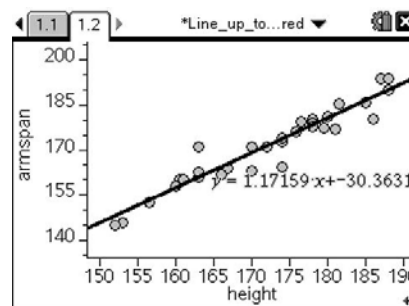
Or Press **menu** > Analyze > Remove Movable Line.

Press **menu** > Analyze > Regression > Show Linear (mx+b)

Students enjoy seeing how close they came to the calculator’s line-of-best-fit.



As an extension you may want to remove the outliers and see how that affects the regression.



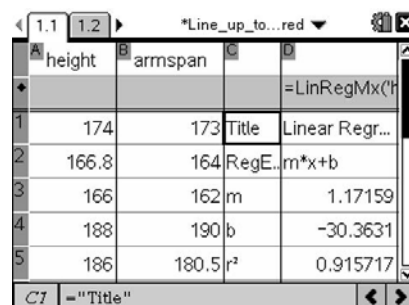
Regressions can also be done from the spreadsheet page.

Move to an empty cell.

Press $\left[\text{menu} \right]$ > Statistics > Stat Calculations > Linear Regression (mx+b).

In the X List choose **height**, $\left[\text{tab} \right]$ to the next field. In the Y List choose **armspan**.

Scrolling down will show you the linear correlation coefficient and the residual list if you want to investigate the data further.



	height	armspan		
				=LinRegMx(Y
1	174	173	Title	Linear Regr...
2	166.8	164	RegE..m*x+b	
3	166	162	m	1.17159
4	188	190	b	-30.3631
5	186	180.5	r ²	0.915717

Student TI-Nspire Document

Line_up_to_be_Measured.tns

Contains sample data though it would be best for students to collect their own.