

Linear Regression

Is there a relationship between Math SAT scores (on a 200 – 800 scale) and the number of hours spent studying for the test? The table below shows the data collected from a study involving 20 students as they prepared for and took the Math section of the SAT.

Hours Spent Studying	Math SAT Score
4	390
9	580
10	650
14	730
4	410
7	530
12	600
22	790
1	350
3	400
8	590
11	640
5	450
6	520
10	690
11	690
16	770
13	700
13	730
10	640

1. Enter the data into list L_1 (Hours Spent Studying) and list L_2 (Math SAT score).
2. Create a scatter plot of the data by pressing 2nd Y= (STATPLOT) and choose the first plot. Turn the plot ON, set the icon to Scatter Plot (the first one), set Xlist to L_1 and Ylist to L_2 , and select a Mark of your choice.
3. Hit ZOOM 9: ZoomStat to see the scatter plot.
4. To find the equation for the *line of best fit*, press STAT, arrow right to CALC, and arrow down to 4: LinReg (ax+b). Hit ENTER. When LinReg appears on the home screen, type the parameters L_1 , L_2 , Y_1 . (To type L_1 and L_2 , press 2nd [1] and 2nd [2]. To type Y_1 , press VARS, arrow right to Y-VARS, choose 1: Function, then choose 1: Y_1 .)
5. The last parameter, Y_1 , will put the equation into Y= for you. Press Y= to see the *linear regression equation*.
6. Press GRAPH to see the *line of best fit*, also called the *regression line*.

7. If a student studied for 15 hours, based upon this study, what would be the expected Math SAT score?

8. If a student obtained a Math SAT score of 720, based upon this study, how many hours did the student most likely spend studying?

9. If a student spent 100 hours studying, what would be the expected Math SAT score?

Example:

In a mathematics class of ten students, the teacher wanted to determine how a homework grade influenced a student's performance on the subsequent test. The homework grade and subsequent test grade for each student are given in the accompanying table.

Homework Grade (x)	Test Grade (y)
94	98
95	94
92	95
87	89
82	85
80	78
75	73
65	67
50	45
20	40

a Give the equation of the linear regression line for this set of data.

b A new student comes to the class and earns a homework grade of 78. Based on the equation in part *a*, what grade would the teacher predict the student would receive on the subsequent test, to the *nearest integer*.