5.6: Fit a Line to Data

Goals: *Decide if a set of data has a positive correlation, negative correlation or relatively no correlation
*Write an equation of a line to model non-linear data if possible

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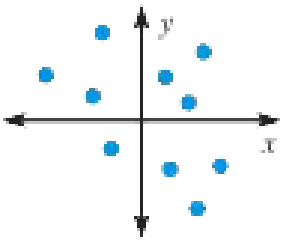
Positive correlation: if, on a scatter plot, *y* tends to increase as *x* increases, then it is a positive correlation

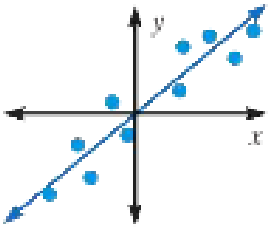
Negative correlation: if, on a scatter plot, *y* tends to decrease as *x* increases, then it is a negative correlation

Relatively no correlation: *x* and *y* appear to have no relationship when displayed on a scatter plot

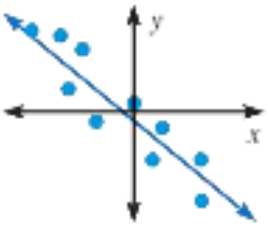
Ex: State the type of correlation the graphs below display:



Relatively no correlation



positive correlation



negative correlation

Ex: Describe a situation you would consider to represent a positive correlation

Ex: height and age, textbook size and grade level, homework amount and grade level

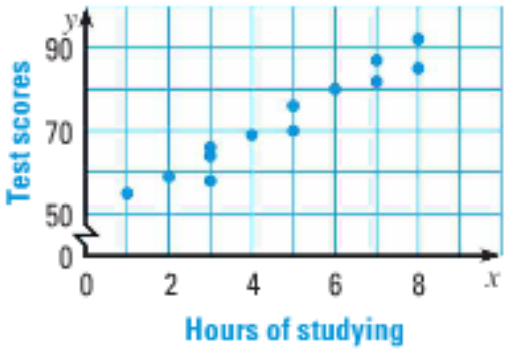
Ex: Describe a situation you would consider to represent a negative correlation

Ex: amount of time spent texting while studying and math grade

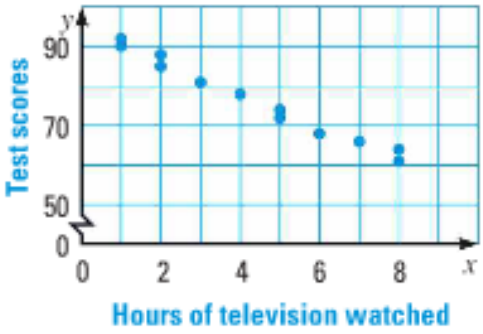
Ex: Describe a situation you would consider to have relatively no correlation

Ex: Describe the correlation of the data graphed in the scatter plot

a.



b.



Positive correlation

negative correlation

Ex: Using the scatter plots above, predict a reasonable test score for 4.5 hours of studying and 4.5 hours of television watched.

About 70% each

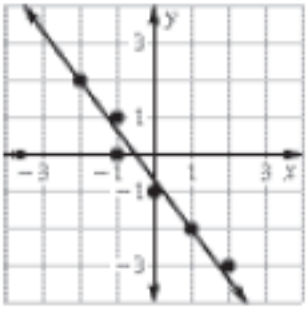
Make a scatter plot of the data then draw a line of best fit. Be sure to state which points you are using for your line, then write the equation of your line in slope-intercept form.

Ex:

x	−2	−1	−1	0	1	2
y	2	1	0	−1	−2	−3

. *Sample answer:*

$$y = -\frac{4}{3}x - \frac{2}{3}$$

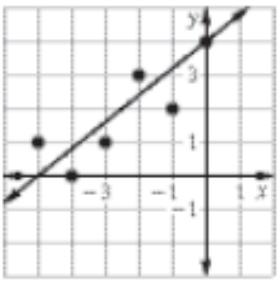


Ex:

x	−5	−4	−3	−2	−1	0
y	1	0	1	3	2	4

Sample answer:

$$y = \frac{4}{5}x + 4$$



Make a scatter plot of the data. *Describe* the correlation of the data. If possible, fit a line to the data and write the equation of the line.

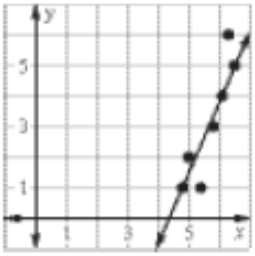
Ex:

x	4.8	5	5.4	5.8	6.1	6.3	6.5
y	1	2	1	3	4	6	5

. positive correlation

Sample answer:

$y = \frac{30}{13}x - \frac{131}{13}$



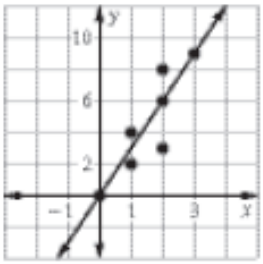
Ex:

x	3	2	2	2	1	1	0
y	9	8	6	3	4	2	0

positive correlation

Sample answer:

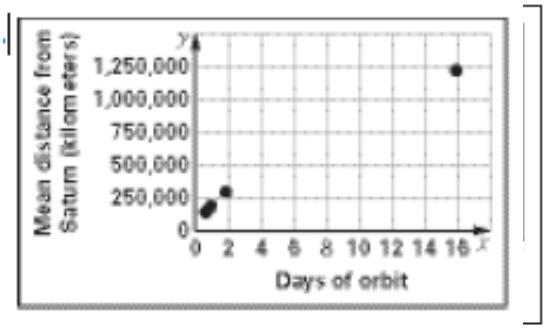
$y = 3x$

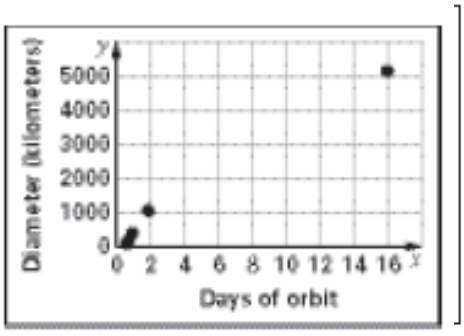


Ex: Saturn's Moons The table shows a moon's mean distance from the Saturn, the moon's diameter, and the number of days it takes the moon to orbit Saturn.

Moon	Mimas	Janus	Tethys	Prometheus	Titan
Mean distance (km)	185,520	151,470	294,660	139,350	1,221,830
Days of orbit	0.94	0.6945	1.88	0.6139	15.94
Diameter (km)	392	178	1060	92	5150

a. Make a scatter plot where x is the number of days of orbit and y is the mean distance from Saturn. Make another scatter plot where x is the number of days of orbit and y is the diameter of the moon.





b. Draw conclusions about the data.

The farther away from Saturn, the longer the orbit. The larger the moon, the longer the orbit.