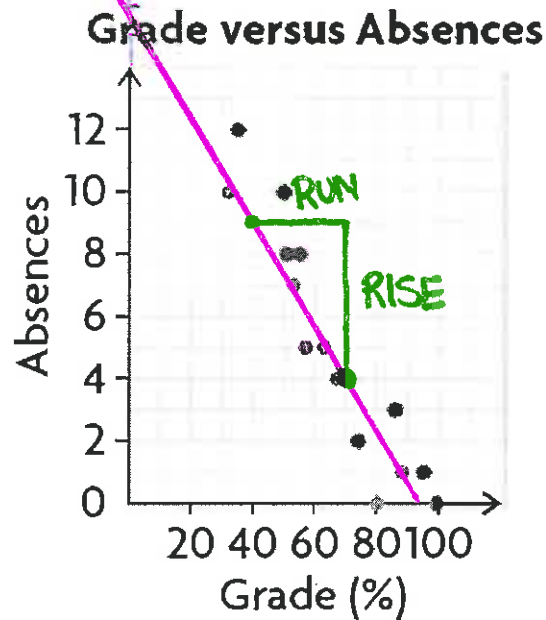


**Line of Best Fit:** A straight line that best approximates the trend in a scatter plot.

**Example 1:** The scatter plot below compares students' absences from math class with the grade they obtained in the course.



Draw a best fit line to estimate the slope and y - intercept

$$\text{Slope} = \frac{5}{-3} = -\frac{5}{3}$$

y-int is about 15.5  
(it is an estimate)

$$\therefore y = -\frac{5}{3}x + 15.5$$

**Interpolation:** estimating a value within the given set of data

**Extrapolation:** estimating a value outside a given set of data

**Linear Regression** (regression function): Using a graphing calculator to generate a line or curve of best fit.

**Example 2:** Below are the records for the farthest distance travelled on bicycle in one hour.

*x*

Year	1996	1998	1999	2002	2003	2004	2007	2008	2009
Distance (km)	78.04	79.14	81.16	82.60	83.72	84.22	86.77	87.12	90.60

*y*

International Human Powered Vehicle Association

a) Use technology to determine the equation of the line of best fit.

Enter Data: **STAT** Edit  
 1<sup>st</sup> row into L<sub>1</sub>  
 2<sup>nd</sup> row into L<sub>2</sub>

Generate Equation: **STAT** → **CALC**  
 4: LinReg(ax+b)  
**ENTER**  
**ENTER**

$y = ax + b$   
 $a = 0.858$   
 $b = -1635.7$

$\therefore y = 0.858x - 1635.7$   
 slope ↑  
 y-int ↓

\* If you entered data in different columns put letters after LinReg \*

b) Interpolate a possible world-record distance for the year 2006, to the nearest hundredth of a kilometer.

$$y = 0.858x - 1635.7$$

$$\hat{y} = 0.858(2006) - 1635.7$$

$$y = 1721.148 - 1635.7$$

$$y = 85.448$$

↓  
*x* (find *y*)

Possible world record for 2006 is 85.45 km

c) Compare your estimate with the actual world-record distance of 85.99 km.

slightly lower, but very close.  
 Our estimate (& best fit line) were good.

d) Extrapolate a possible world-record distance for the year 2014

$$y = 0.858x - 1635.7$$

$$= 0.858(2014) - 1635.7$$

$$= 1728.012 - 1635.7$$

$$= 92.312$$

↓  
*x*

Possible world record for 2014 is 92.31 km if record keeps following this trend.