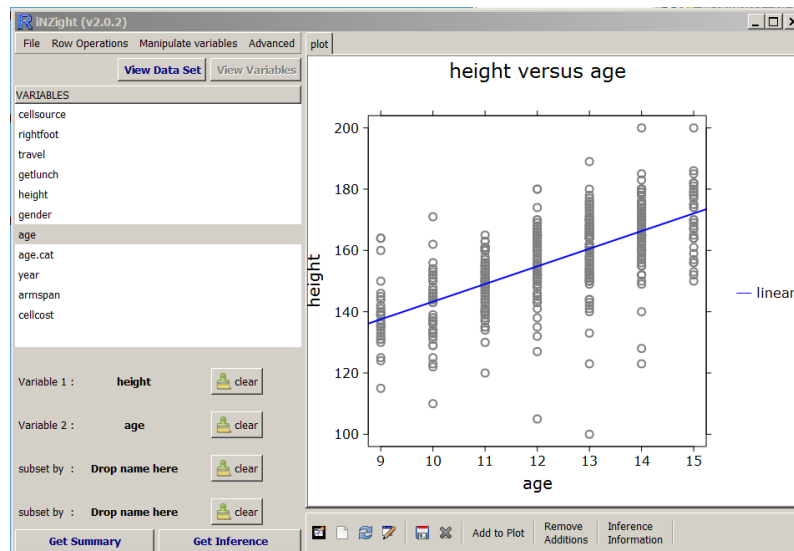# Interpreting the Slope of a Trend Line

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This is a scatter plot of heights versus ages for about 460 school students.

[*Data used: as a csv file and as a tab-delimited txt file.*]

After first adding a linear trend to this plot and then clicking "Get Summary" we get:

Linear Trend: **height** = 85.68 + 5.76 ∗ **age**.

In high-school mathematics, the equation for a straight line is usually written in the order …
height = 5.76 * **age** + 85.68.

or in general form, as $y = m*x + c$

where **m** is the number for the *gradient* or **slope** of the line,
and **c** is the **intercept**, the *y*-value when *x*=0.

In our example, *y* is *height*, *x* is *age* and "Get Summary" gives you the values of *m* and *c* that produce the trend line on the graph. We won't worry about the intercept because we have no data near *x*=*age*=0 and wouldn't expect this trend relationship to still hold that far away from our data anyway so, for this problem ,the intercept is not a meaningful number.

The slope of the line is 5.76. What does this number mean?

The **slope** of a line is the **change in y** produced by **a 1 unit increase in x.**

For our example, the trend line would predict that if someone was 1-year older (x increases by 1), then they would be about 5.76 cm taller (*y* increases by 5.76).

Below are similar, but more complicated formulae for curves written in the way typically used by statisticians because it generalises in a straightforward way to include more terms. Interpretation of the terms for quadratic and cubic curves is much more difficult than for lines and is beyond this course. The notation allows more and more powers of x to be added in an obvious progression.

Line: $Y = b_0 + b_1x$

Quadratic curve: $Y = b_0 + b_1x + b_2x^2$

Cubic curve: $Y = b_0 + b_1x + b_2x^2 + b_3x^3$
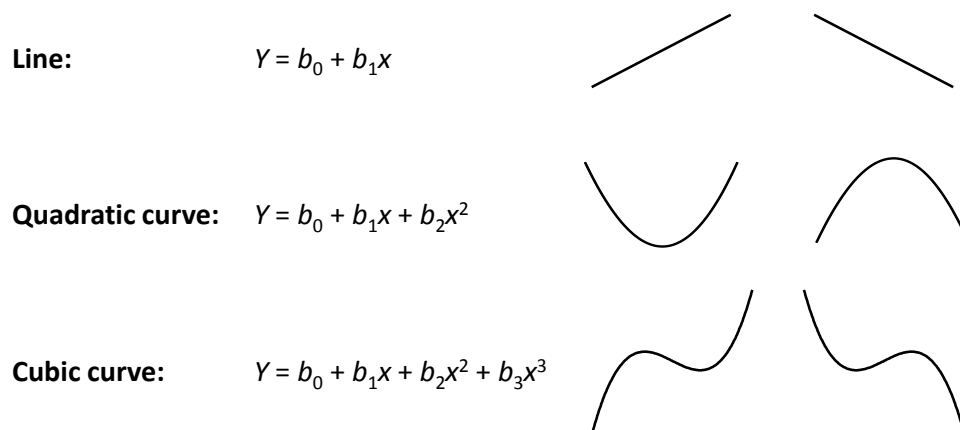
In each of these formulae, b_0 is the intercept.

mathsisfun links:

- The straight line graph
- Equation of a line
- Quadratic graph

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