

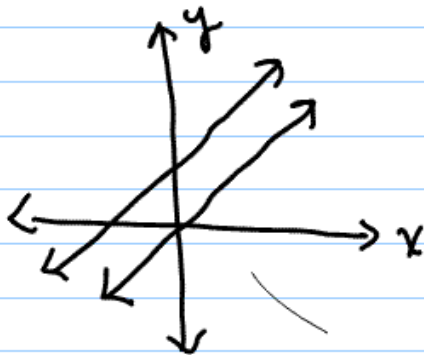
Section 2.4 More on Slope

Note Title

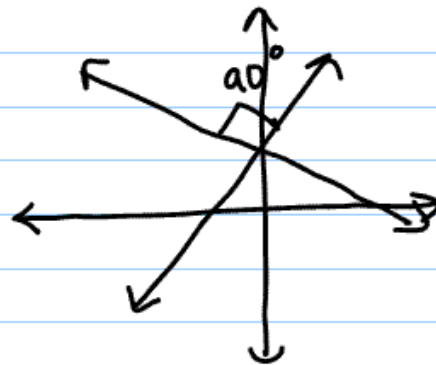
6/7/2006

Parallel and Perpendicular Lines:
You should know:

1. Two lines are parallel if and only if they have the same slope.
2. If the slope of one line is m , the slope of a line perpendicular to it is $-\frac{1}{m}$.



parallel \rightarrow same slope



perpendicular
 \rightarrow slopes are
negative reciprocals

(ex)

Find the equation of a line passing through the point $(2,3)$ and perpendicular to the line with equation $-10x + y = -13$.

First find the slope of $-10x + y = -13$

$$y = 10x - 13$$

↳ so slope of this line is 10

means the slope of the line we're looking for is $-\frac{1}{10}$

So we're looking for a line with $m = -\frac{1}{10}$ thru the point $(2,3)$

(note: we have slope & a point so the point-slope formula will come in handy)

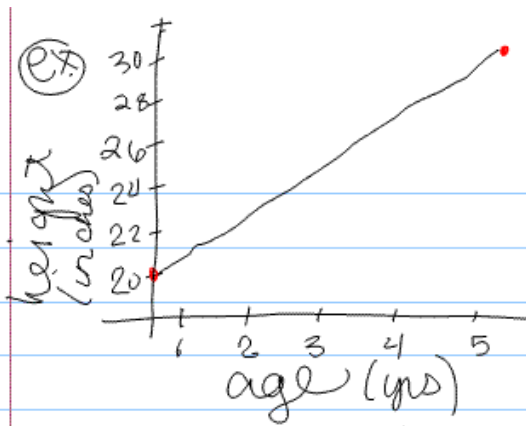
$$y - y_1 = m(x - x_1)$$

$$y - 3 = -\frac{1}{10}(x - 2)$$

Slope As a Rate of Change

Remember the idea of slope is

$$\frac{\text{Change in } y}{\text{Change in } x} = \frac{\text{rise}}{\text{run}}$$



the slope of this line is 2.

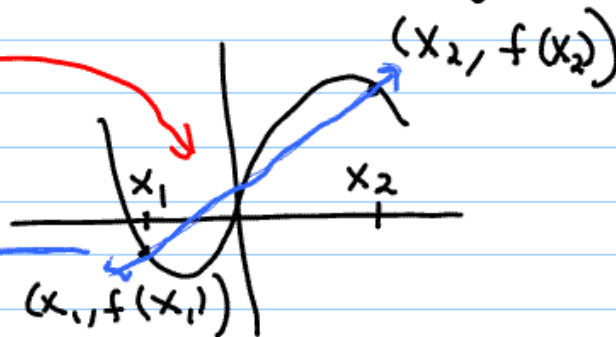
We can interpret this to mean that on average a child grows 2 inches/1 year since $\frac{2 \text{ inches}}{1 \text{ year}} = \frac{\text{change in } y}{\text{change in } x}$

Of course, this is an unrealistic example. Kids have growth spurts and grow at different rates depending on age.

Average rate of change

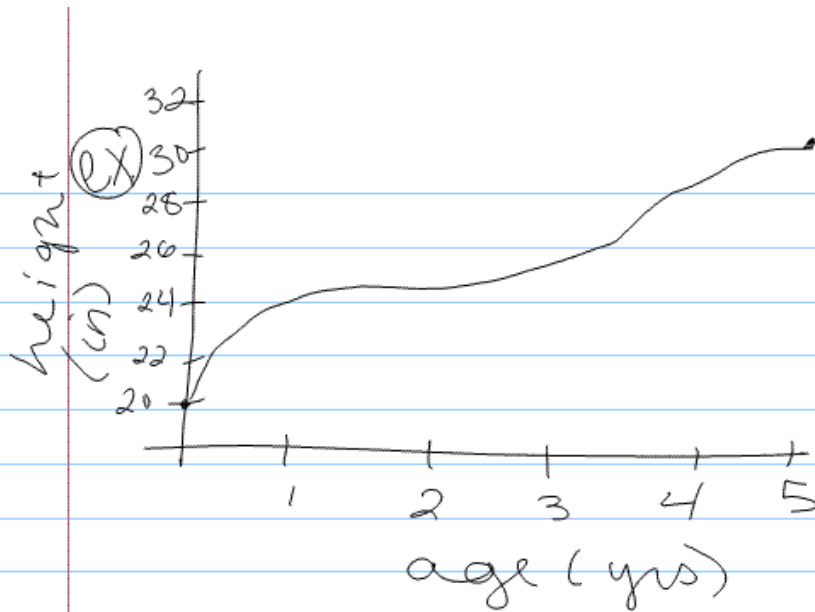
This comes from the slope of a line through two points on a graph:

this line is called the secant line



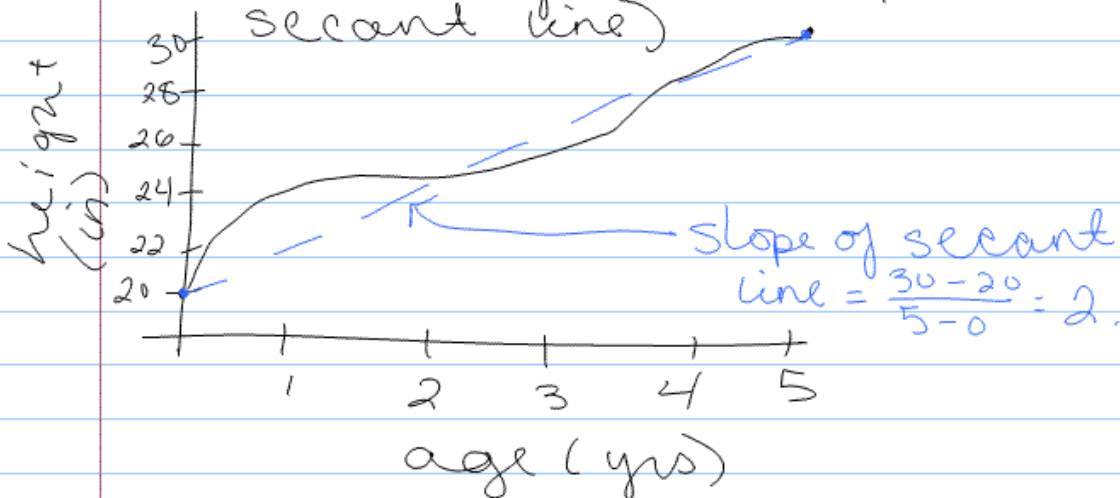
slope of this line =

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$



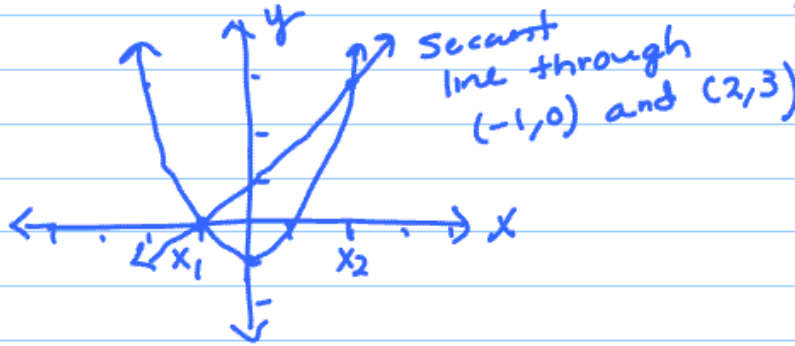
this may be a more accurate graph.

If I still want to know how much a kid grows per year, I can use the average rate of change (a.k.a. slope of the secant line)



ex.

Consider the graph of
 $f(x) = x^2 - 1$, let $x_1 = -1$ and
 $x_2 = 2$



Find average rate of change
 from $x_1 = -1$ to $x_2 = 2$

Find slope of the secant line:

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(2) - f(-1)}{2 - (-1)}$$

$$= \frac{3 - 0}{3} = 1$$

average rate of change = 1