Constant Rates of Change

Slope: The change in one quantity divided by the change in another quantity.

$$m = \frac{rise}{run} \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Slope is a constant rate of change.}$$

Note: A. The steep a line is, the larger the slope will be.
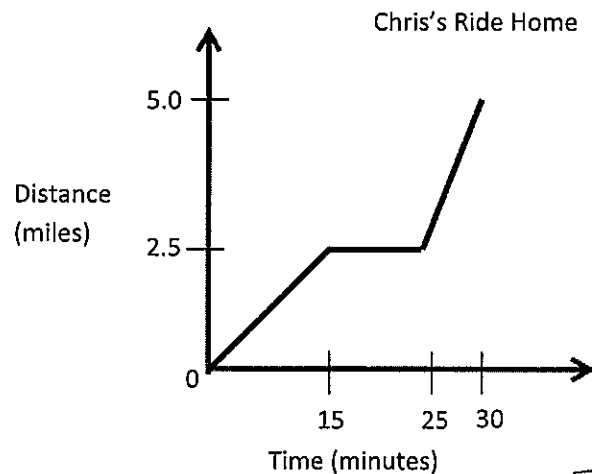This also means that steep lines represent the largest change between one quantity to another.

B. Horizontal lines have a slope of zero.

Examples:

1. Find the slope of the line that passes through these two ordered pairs.
(2, 5) and (−3, 1)

$$m = \frac{1-5}{-3-2} = \frac{-4}{-5} = \frac{4}{5}$$

2. Chris rode his skateboard to school. The graph below shows Chris's distance from home over time.

Chris's Ride Home

A. On what time interval is Chris traveling at a 4 miles an hour?
$15m = \frac{1}{4}hr = 0.25$
$5m = \frac{1}{12}hr = 0.083$

$\boxed{0 - 15 \text{min}}$

$\dfrac{2.5 m}{15 min} = \dfrac{2.5 m}{0.25 hr} = 10 m/hr$

B. On what time interval is Chris stopped?
$\boxed{[15-25 \text{min}]}$

$25 - 30 \text{ mn}$

$\dfrac{2.5 m}{\frac{1}{12} hr} = 2.5m (12hr) = 30 m/hr$

C. On what time interval is Chris traveling the fastest?

Steepest slope → fastest

$(25-30 \text{min})$

3. The graph below represents the total number of times a mother nags her son to clean his bedroom over a 5 – day period.

Mom's Nagging

N

# of nagging episodes

30

20

10

0   2   4   6

d

Time (days)
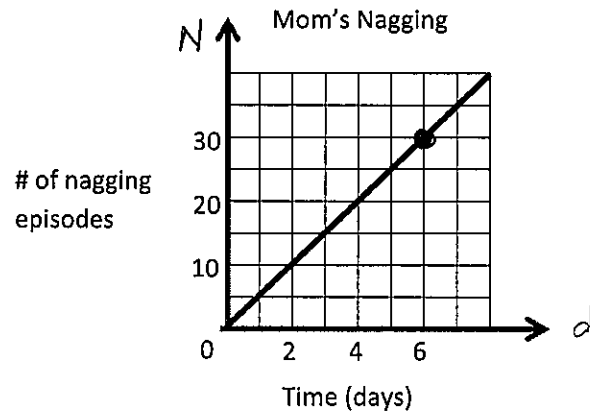
A. What is the slope of the line segment? Include the appropriate units in your answer.

$(0,0)$

$(6, 30)$

$$\text{slope} = \frac{30 - 0}{6 - 0} = \frac{30}{6} = 5 \text{ nagging episodes per day}$$

B. Write an equation that represents the total number of times a mom will nag her son about cleaning up his room, N, after, d, days.

$$y = mx + b$$

$$b = 0$$

$$m = 5$$

$$N = 5d + 0$$

$$N = 5d$$

C. If this trend continues, how many times will the mom nag the son in 30 days?

$$N = 5d$$

$$N = 5(30)$$

$$N = 150 \text{ nagging episodes}$$