4.1 Slope - Day 1
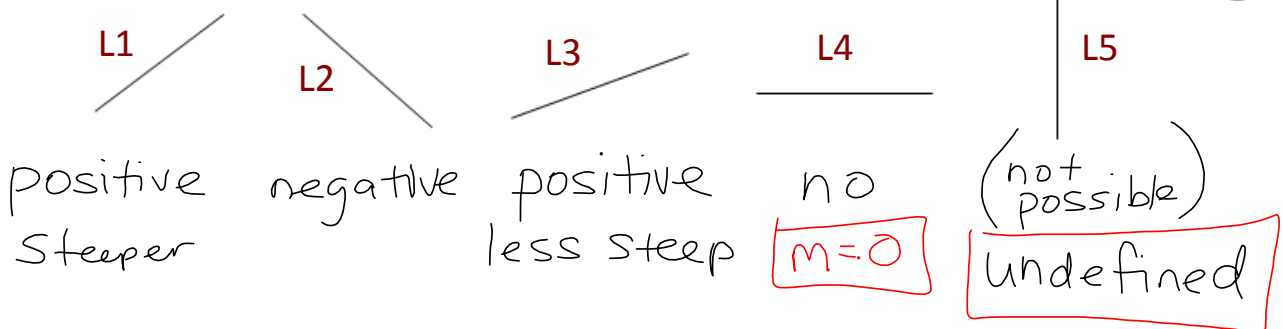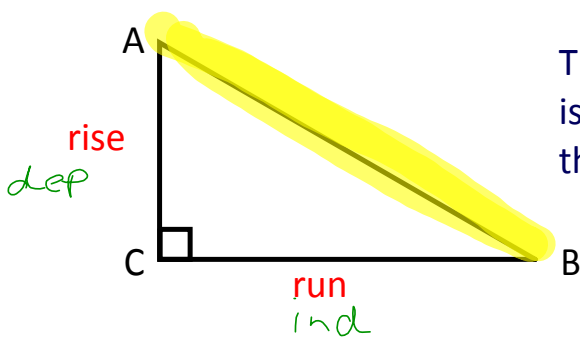
— constant of variation
= unit rate
— rate of change

Slope is used to describe how steep a line is. The letter "m" (lowercase) is commonly used for slope, for "monter", to go up.

$d \lfloor \overline{} \rfloor$ t

L1

L2

L3

L4

L5

positive
Steeper

negative

positive
less steep

no
$\boxed{M = 0}$

$\left(\begin{array}{c} not \\ possible \end{array}\right)$
$\boxed{undefined}$

Let's examine a line segment, AB:
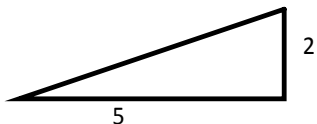
A

rise
dep

C

run
ind

B

The slope of AB, often written as $\boxed{m_{AB}}$ is defined as the ratio of the rise (AC) to the run (BC).

$\boxed{m = \dfrac{rise}{run}}$

$m = \dfrac{dep}{ind}$

Example 1: Find the slopes of the following.

a)
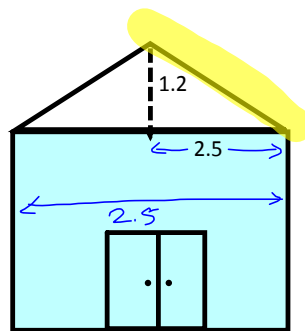

$$m = \frac{rise}{run}$$

$$m = \frac{2}{5}$$

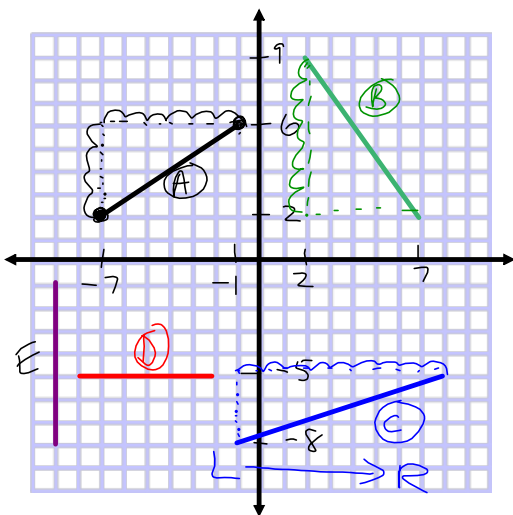$$\left(m = 0.4 \right)$$

↑ compare change to decimal

b)

$$m = \frac{rise}{run}$$

$$= \frac{1.2}{2.5}$$

$$= 0.48$$

c)

(A) $m_{\textcircled{A}} = \frac{rise}{run}$

$$= \frac{4}{6}$$

$$= \frac{2}{3}$$

(B) $m_B = \frac{rise}{run}$

$$= -\frac{7}{5}$$

$$m_{\textcircled{C}} = \frac{rise}{run}$$

$$= \frac{3}{9}$$

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

$$m_D = \frac{rise}{run} \quad * \; horizontal$$

$$= \frac{0}{6}$$

$$m = 0$$

$$m_E = \frac{rise}{run}$$

$$= \frac{7}{0}$$

$$* \; undefined$$

It would be good to be able to <u>calculate</u> the slope instead of having to graph the line and then count squares.
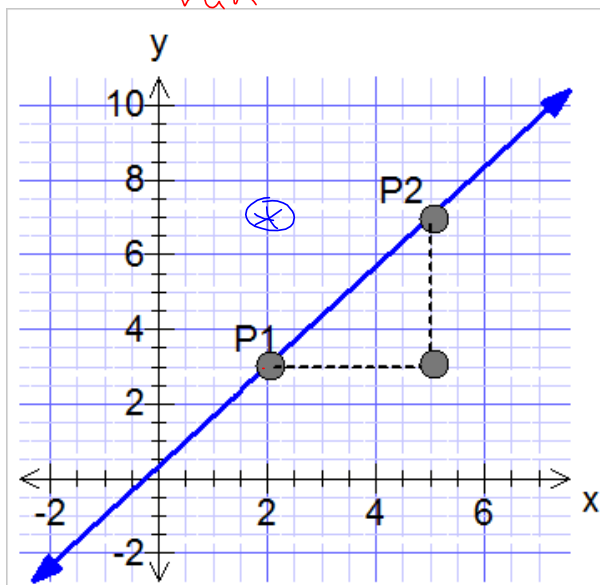
The slope between points (x_1, y_1) and (x_2, y_2) is

$$\frac{rise}{run} \quad m = \frac{y_2 - y_1}{x_2 - x_1} \quad or \quad m = \frac{\Delta y}{\Delta x}$$

$\Delta = change$

rise

run

P1 has coordinates: $(2, 3)$
P2 has coordinates: $(5, 7)$

Creating a right triangle, what are the coordinates of the new point? $(5, 3)$

rise = $7 - 3$ run = $5 - 2$

$= 4$ $= 3$

slope = $\dfrac{4}{3}$

Example 2: Determine the slope between the pairs of points.

① x_1 y_1 ② x_2 y_2

a) (-2, 5) & (3, -7)

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-7 - 5}{3 - (-2)}$

$= \dfrac{-12}{5}$ $\boxed{m = -\dfrac{12}{5}}$

b) (1,-3) & (8, 10)

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{10 - (-3)}{8 - 1}$

$\boxed{m = \dfrac{13}{7}}$

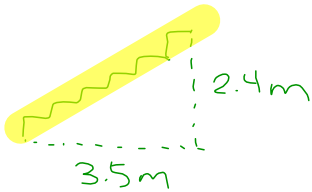$\dfrac{-3 - 10}{1 - 8}$

$= \dfrac{-13}{-7}$

$= \dfrac{13}{7}$

Example 3:
For safety, the slope of a staircase must be greater than 0.58 and less than 0.70. A staircase has a vertical rise of 2.4 m over a horizontal run of 3.5 m.

a) Find the slope of the staircase.

2.4m

3.5m

$m = \dfrac{rise}{run}$

$= \dfrac{2.4}{3.5}$
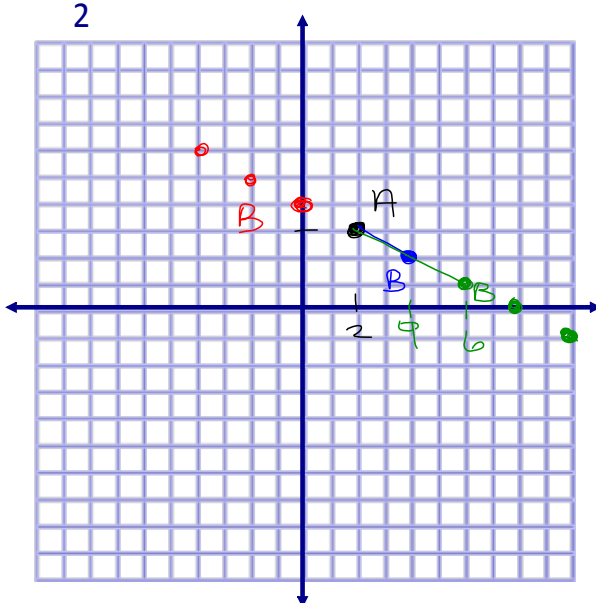
$\boxed{m \doteq 0.69}$

b) Is the staircase safe?

b) ∴ Safe
(between
          0.58 → 0.7)

Example 4:
Point A (2,3) is plotted on the grid. Draw line segment AB with a slope of $\dfrac{-1}{2}$. What are possible coordinates of B? ③

Slope $= \dfrac{-1}{2}$ $\dfrac{rise}{run}$

$\dfrac{-2}{4}$ $\dfrac{rise}{run}$

B(4,2)

B(6,1)

B(8,0)

(-1,10)

B(0,4)

Homework
pg. 258 C2, 1, 3, 5, 9, 12, 13, 14

Attachments

3.6 slopes.ppt