2.12 Linear Functions

Rates of Change

Standards:

F.IF.6

F.LE.1b

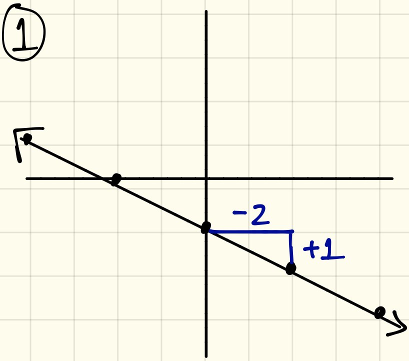
$\boxed{\text{Old}}$ Slopes

Let's recall how to find slopes:

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

Find the slopes in each representation:

①



$m = \frac{-1}{2}.$

②

	x	f(x)	
+2	−5	7	−3
+2	−3	4	−3
+2	−1	1	−3
+2	1	−2	−3
	3	−5	

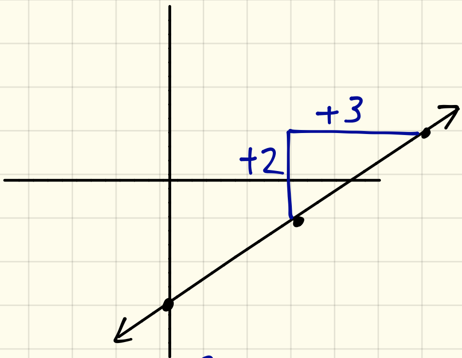
$m = \frac{-3}{2}$

③

	x	f(x)	
−5	−5	−7	−2
−5	−10	−9	−2
−5	−15	−11	−2
−5	−20	−13	−2
	−25	−15	

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

④



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

• Linear Functions have <u>constant</u> slopes!

$\boxed{\text{new}}$ Rate of Change

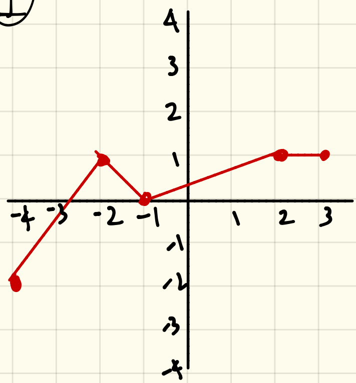
The <u>rate</u> <u>of</u> <u>change</u> is the steepness of the line.

Rate of Change = slope = $\dfrac{\text{rise}}{\text{run}}$ ← Formula for finding "rate of change" graphically.

• Linear Functions have a <u>constant</u> rate of change!

[Examples] Using the graphs, determine the rate of change over the interval given

1



a over the internal (-4, -2)

between (-4, -2) and (-2, 1)

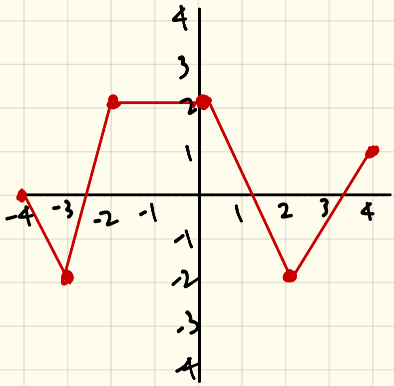
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - {}^-2}{-2 - {}^-4} = \frac{3}{2}$$

b over the interval (-2, -1)

between (-2, 1) and (-1, 0)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 1}{-1 - {}^-2} = \frac{-1}{1} = -1.$$

②



ⓐ over the interval (0,2)

between (0,2) and (2,-2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2-2}{2-0} = \frac{-4}{2} = -2$$

ⓑ over the interval (2,4)

between (2,-2) and (4,1)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - {-2}}{4-2} = \frac{3}{2}.$$