3.4 Exponential Functions Rates of Change

Standards:

F.IF.6

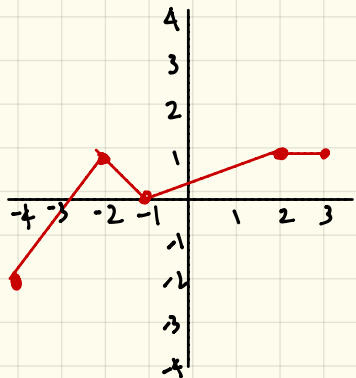F.LE.1c

Linear Functions Rates of Change

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

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

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

Using the graphs, determine the rate of change over the interval given

ⓐ over the internal (-4, -2)

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

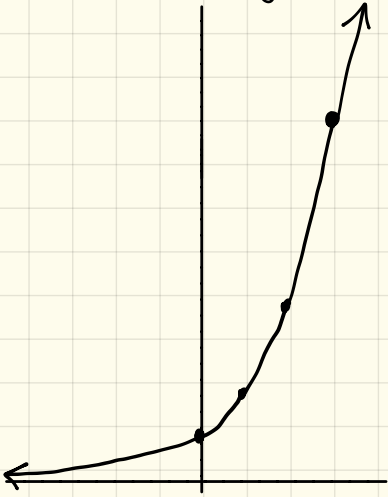$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - {}^-2}{-2 - {}^-4} = \frac{3}{2}$$

ⓑ over the interval (-2, -1)

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

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

Exponential Functions Rates of Change

Let's consider the function $f(x) = 2^x$. Graph the function & determine the rate of change being asked.

Ⓐ Find the rate change between $(0,1)$ and $(1,2)$

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

ⓑ Find the rate change between $(1,2)$ and $(3,8)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-2}{3-1} = \frac{6}{2} = \boxed{3}$$

• Exponential Functions <u>do not</u> have a constant rate of change.