AGS 1 Name: _____ Period: _____ Date: _____

Unit 2.2 – Linear & Exponential Functions

Warmup – Simplify each equation

a) $f(n) = 5 - 2(n - 1)$

$= 5 - 2n + 2$

$f(n) = -2n + 7$

b) $y = -7 + 3(x + 2)$

$= -7 + 3x + 6$

$y = 3x - 1$

c) $f(n) = 8 - \frac{1}{2}(n - 2)$

$= 8 - \frac{1}{2}n + 1$

$f(n) = -\frac{1}{2}n + 9$

d) $f(t) = 6(t - 1) - 4$

$= 6t - 6 - 4$

$f(t) = 6t - 10$

e) $y = -3(x - 4) + 5$

$= -3x + 12 + 5$

$y = -3x + 17$

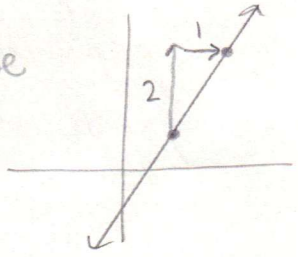
f) $y = \frac{2}{3}(x - 4) + 3$

$= \frac{2}{3}x - \frac{8}{3} + 3$

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

$y = \frac{2}{3}x + \frac{1}{3}$

Lesson

Word	Meaning/Notation	Example
Rate of Change	The ratio between the change of one variable and the change of another variable	$\frac{20 \text{ miles}}{1 \text{ gallon}}$ ← needs to be one unit 20 miles per gallon
Slope	Rate of change for a linear equation $= \frac{\text{rise}}{\text{run}}$	Slope is $\frac{2}{1}$ 

Finding and Comparing Rate of Change

1. Pumping 25 gallons of gas into a truck in 3 minutes.

Rate of Change

$\frac{25}{3} = 8.\overline{3}$ gallons/min (per)

Filling a bathtub with 40 gallons of water in 5 minutes

Rate of Change

$\frac{40}{5} = 8$ gallons/minute

Gas pump has the greatest rate of change.

$3 \cdot 12 = 36$ inches

2. A short bungee cord stretches 6 inches when attached to a 3 pound weight.

Rate of Change

$\frac{6}{3} = 2$ inches/pound

A slinky stretches 3 feet when attached to a 1 pound weight.

Rate of Change

$\frac{3 \text{ ft}}{1 \text{ pound}} = \frac{36 \text{ in}}{1 \text{ pound}}$

Slinky has the greatest rate of change.

3. A sunflower grows 2 inches every day.

Rate of Change

$\frac{2}{1} = 2$ inches/day

An amaryllis grows 18 inches in one week.

$1 \cdot 7 = 7$ days

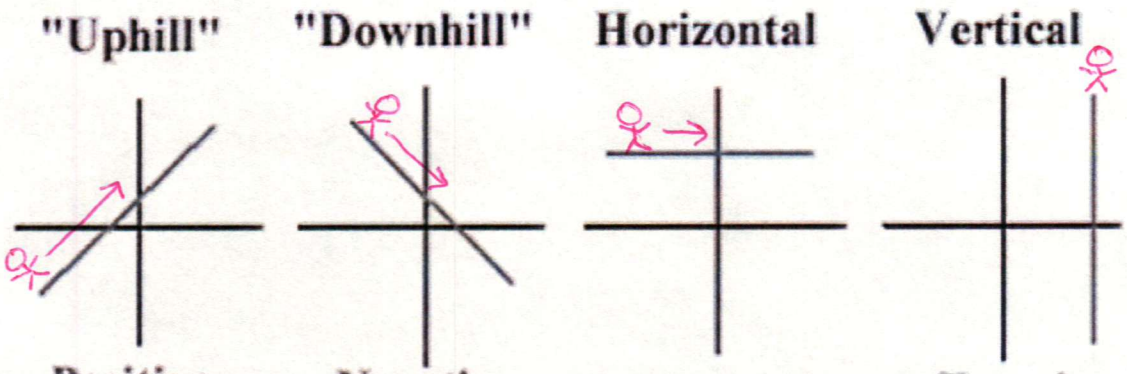
Rate of Change

$\frac{18 \text{ in}}{1 \text{ week}} = \frac{18 \text{ in}}{7 \text{ days}} = 2.57$ in/day

Amaryllis has the greatest rate of change.

**In order to compare the rate of change, all units must be the same. Convert units as needed, for example feet → inches.

Finding Slope



Slope = rate of change $= \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$

Given 2 points on a line, (x_1, y_1) and (x_2, y_2), use the slope formula to find the slope between the two points.

4. (1, –19) and (–2, –7)

$\frac{-7-(-19)}{-2-1} = \frac{-7+19}{-3} = \frac{12}{-3}$

Slope = –4 ↘

5. (–4, 7) and (–6, –4)

$\frac{-4-7}{-6-(-4)} = \frac{-11}{-6+4} = \frac{-11}{-2}$

Slope = $\frac{11}{2}$ ↗

6. (12, –18) and (–15, –18)

$\frac{-18-(-18)}{12-(-15)} = \frac{-18+18}{12+15} = \frac{0}{27}$

Slope = 0 ↔

7. (17, –13) and (17, 8)

$\frac{8-(-13)}{17-17} = \frac{8+13}{0} = \frac{21}{0}$

Slope = Undefined ↕

8. (3, –20) and (5, 8)

$\frac{8-(-20)}{5-3} = \frac{8+20}{2} = \frac{28}{2}$

Slope = 14 ↗

9. (–19, 12) and (–9, 1)

$\frac{1-12}{-9-(-19)} = \frac{-11}{-9+19} = \frac{-11}{10}$

Slope = $\frac{-11}{10}$ ↘