TAKEAWAY

Linear relationships can be modeled by graphs, tables and equations. Every linear relationship displays a **constant** rate of change. The rate of change and the y-intercept of a linear equation help us make sense of the relationship between the two variables (input and output).

Algebra CC HW #

1) The height of a Willow Oak tree over a 20 year period is modeled by the table below.

X Time (years)	0	5	10	15	20
Y Height (feet)	3	10.5	18	25.5	33

a) Write an equation that represents the linear relationship between height and time. Explain the meaning of the y-intercept and slope in your equation.

$y = 1.5x + 3$

(0,3) (20,33)

$\frac{\Delta y}{\Delta x} = \frac{33-3}{20-0} \rightarrow \frac{30}{20} = \frac{1.5 \text{ ft}}{1 \text{ yr}}$

the tree grows 1.5 feet every year

y int : 3

the tree started having its height measured when it was 3 feet tall.

b) Using your equation determine when the tree will reach its maximum height of 60 feet.

$y = 1.5x + 3$

$60 = 1.5x + 3$

$57 = 1.5x$

$38 = x$

in 38 years, the tree reaches the maximum height

2) Carla borrowed $4500 to pay her tuition bill. She makes monthly payments of equal amounts towards her loan. After 3 payments, she owed $1800. It took her a total of 5 payments to pay the entire bill. Write an equation that represents the amount of money Carla owes (y) after making (x) payments. Explain the meaning of the rate of change and y-intercept.

$ owed → $y = mx + b$ ← initial loan

$ per payment, # of payments

(0,-4500) (3,-1800) (5,0)

$\frac{\Delta y}{\Delta x} = \frac{-1800-0}{3-5}$

$= \frac{900}{1}$ ← $, ← payments

Carla pays $900 per payment

y int : -4500

amount of money Carla owed at the start of the loan

$y = 900x - 4500$