Foundations of Algebra   Unit 5: Linear Functions   Notes

Day 16 – Comparing Linear Functions

Linear Functions can come in many forms:

Context:

The basketball team won the championship. They are selling special championship T-shirts for a cost of $7 each.

rate of change
(b) y-intercept = 0

$y = 7x + 0$

Graph:

+10
+70
(0,0)
$m = \dfrac{+70}{+10} = 7$ $b = 0$
$\dfrac{rise}{run} = \dfrac{\$7}{1\ T\text{-}shirt}$
$y = 7x + 0$

Table:

Number of T-shirts	Cost in dollars
0	b = 0
1	7
2	14
3	21
4	28
5	35

rate of change $= \dfrac{7-0}{1-0} = \dfrac{\$7}{T\text{-}shirt}$
y-intercept
$\dfrac{-14}{-2} = 7$ $y = 7x + 0$

Equation:

Let y represent: total cost of T-shirts
Let x represent: number of T-shirts
$y = 7x$
$y = 7x + 0$
Rate of change   y-intercept

Now that you have studied linear functions and their characteristics for over two weeks, you need to be able to compare and answer questions in whatever form is given to you. The best way to develop your comparing skills is just to practice; there is not actual lesson – just practice problems for you to try.

Practice 1: Which function has the biggest y-intercept?

equation $y = mx + b$

Function A: y-int. (0,6)

y int

x	y
0	6
1	9
2	12
3	15

+1 → +3

$y = 3x + 6$
$\dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{9-6}{1-0} = \dfrac{3}{1} = 3$

Function B: y int (0,4)

↓2
(0,4)
$\dfrac{\downarrow 2}{\rightarrow 5} = \dfrac{-2}{5}$ $y = -\dfrac{2}{5}x + 4$
SLOPE (m)

Function C: y int (0, 2.5)

$y = -10x + 2.5$

$m = -10$ $b : 2.5$

Practice 2: Which function has the greatest rate of change?

Function A:

Distance Ascended by a Mountain Climber
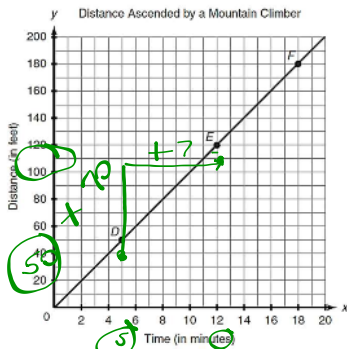
+7
+70
5
$m: \dfrac{70}{7}$ m = 10

Function B:

Number of Minutes on an Exercise Bike	Total Number of Calories Burned
15	180
30	360
45	540
60	720

+15 → +180

$\dfrac{\Delta Y}{\Delta X} = \dfrac{180}{15} = 12$ m = 12

$\dfrac{y_2 - y_1}{x_2 - x_1}$ $\dfrac{360-180}{30\cdot 15} =$

Function C:

$30x + 2y = -24$
$-30x \qquad -30x$
$\dfrac{2y}{2} = \dfrac{-30x}{2} - \dfrac{24}{2}$
$y = -15x - 12$
m = -15

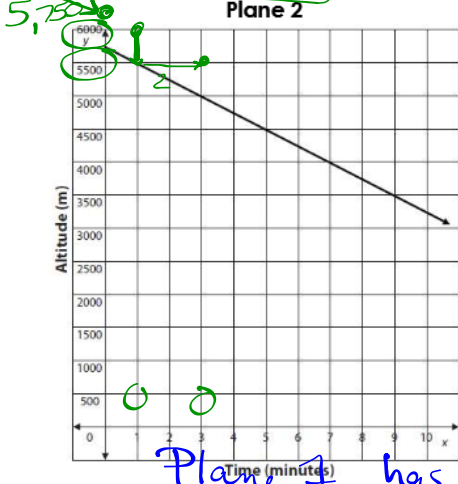✱ Greatest ROC (slope) is based off of # ... we don't care if it's negative.

1

Foundations of Algebra   Unit 5: Linear Functions   Notes

Practice 3: Two airplanes are in flight. The function f(x) = 400x + 1200 represents the altitude, f(x), of Plane 1 after x minutes. The graph below represents the altitude of the second airplane.

Plane 1

Plane 2

5,750

Compare the starting altitudes of the two planes.

y-int (b)

Plane 1   **Plane 2**
(0, 1200)   (0, 5750)

Plane 2 begins at a higher altitude b/c 5,750 m is greater than 1,200 m.

Compare the rates of change of the two planes.

slope (m)

Plane 1   **Plane 2**
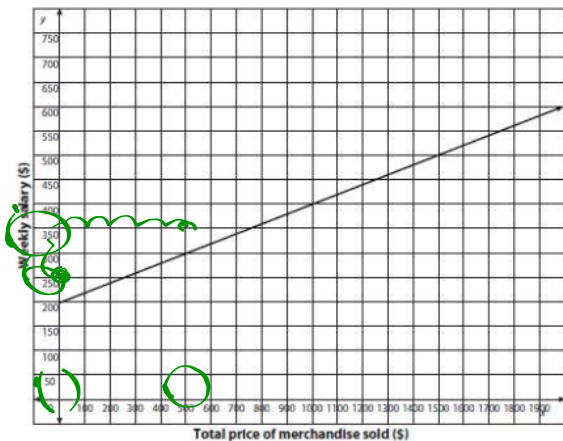m = 400   > $\frac{\downarrow 500}{\rightarrow 2} = \frac{-500}{2} = -250$

Plane 1 has a greater ROC.

$y = mx + b$

Practice 4: Your employer has offered two pay scales for you to choose from. The first option is to receive a base salary of $250 a week plus 15% of the price of any merchandise you sell. The second option is represented in the graph below.

b   m

Option 2

a. Create an equation to represent the first option for one week's worth of pay.
$y = .15x + 250$

b. Create an equation to represent the second option for one week's worth of pay.
$y = \frac{5}{?}x + 200$ $\frac{\uparrow 100}{\rightarrow 500}$
$y = .20x + 200$

c. Which option has a higher base salary? Explain how you know.

Option A has a higher starting salary (y-int) b.
250 > 200

d. Which option has a higher rate for selling merchandise? Explain how you know.

Option B has a higher rate for selling merchandise (m: slope)
.15 < .2

20

2