Notes for 2.3 Linear Functions (pp. 214 – 220)

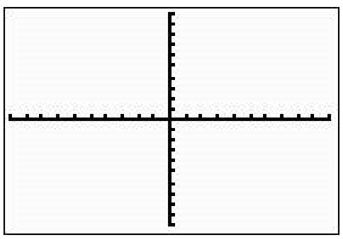
Topics: Linear Functions, Standard Form, Slope, Average Rate of Change, Models

Name:
Date:
Instructor:

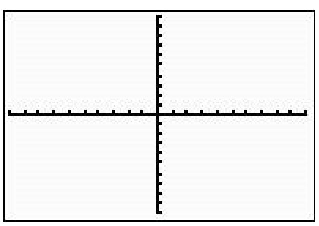
I. Linear Functions (p.214)

A function *f* is a **linear function** if ________________________ for real numbers *a* and *b*.
If $a \neq 0$, then the domain and the range of the linear function are both ________________.
If $a = 0$, then the equation becomes the constant function, _______________. In this case, the domain is ___________ and the range is ___________.

II. Graphing a Linear Function (pp.214 – 216)
A. Graphing using the intercepts:
Recall: The x-intercept is ____ and is the point (0, #).
Ex. Graph $f(x) = -2x + 4$. Label each intercept. State the domain and range.

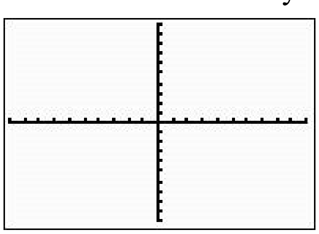


B. Graphing a constant function:
Ex. Graph $f(x) = 2$. Label any intercepts. State the domain and range.



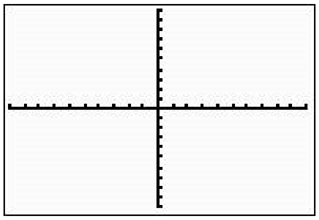
This graph is a _____________________line and **is** a function.

C. Graphing $x = a$:
Ex. $x = -3$. Label any intercepts. State the domain and range.



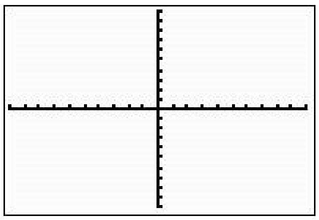
This graph is a _____________________ line and **is not** a function. (Why?)

D. Graphing a linear equation that is in standard form:
A linear equation of the form **A*x* + B*y* = C,** with A, B, and C are integers and A > 0, is considered to be written in **standard form**.
Ex. Graph $2x + 5y = 0$. State the domain and range.



This can be done by substituting for the intercept points.

To find another point, choose a value for x that will give a "good" result to use when solving for y.
Ex. Graph $4x + 5y = 20$. State the domain and range.



III. Slope of a Line (pp. 216 – 219)

The **slope, *m*,** of the line through the points (x_1, y_1) and (x_2, y_2) is

$$m = \frac{rise}{run} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } \Delta x \neq 0$$

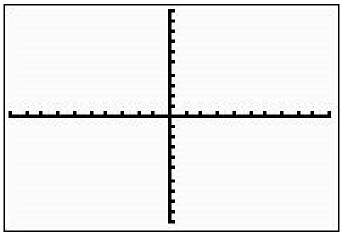
* Δx means "the change or the difference in x" and
Δy means "the change or the difference in y".
*Be consistent when placing values into the formula. Also, show the – (-#) to avoid sign mistakes when doing the arithmetic of the fraction.

Ex. Find the slope of the line that passes through:
a. (-3, 7) and (4, -9)

b. (3, 12) and (3, -4)

c. (-7, 4) and (-2, 4)

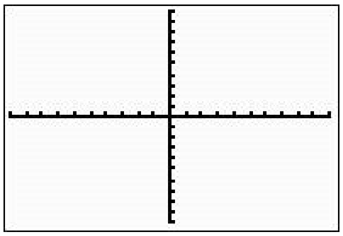
Summary of slopes:



A line with **positive slope** ___________________
A line with **zero slope** _____________________
A line with **negative slope** ___________________
A line with **undefined slope** ___________________

Slope will always be consistent between any two points on a line.

Ex. Graph the line that passes through (3, -4) with a slope of $\frac{-1}{3}$.



IV. Application of Slope

Ex. Discuss the slope of the line as it relates to the actual retail sales.

V. Solve a Linear Equation Using Two Different Methods

Method 1: Graph the left side of the equation as a line and the right side of the equation as a line, then find their point of intersection. The x coordinate of that intersection point is the solution.

* This is easiest done using the calculator: Enter the left side into Y_1 and the right side into Y_2, then ZOOM 6 to get the graph drawn. Adjust the WINDOW as needed so that the calculator can "see" the point of intersection. Use 2^{nd} CALC (on top of TRACE) 5:Intersection ENTER ENTER ENTER to get the point of intersection.

Ex. $\frac{-1}{3}x+4=\frac{5}{3}x-2$

Method 2: Write the equation with 0 on one side, then find the x intercept point. The x coordinate of that point is the solution to the equation.

* In the calculator: Once the equation = 0, enter the variable side into Y_1 and ZOOM 6. Adjust the WINDOW as needed so the calculator can "see" the x intercept. Use 2^{nd} CALC (on top of TRACE) 2:Zero, then move the cursor to the left of the x intercept, ENTER, then move it to the right of the x intercept, ENTER, then ENTER to make the calculator guess.

*Linear Models (pp. 219 – 220) is very important. Study Example 9.

Assignments:
Text: pp. 221 – 226 #1 – 6, 7 – 17 odd, 25 – 28, 29 – 41 odd, 45 – 57 odd, 59 – 64, 65, 69, 71