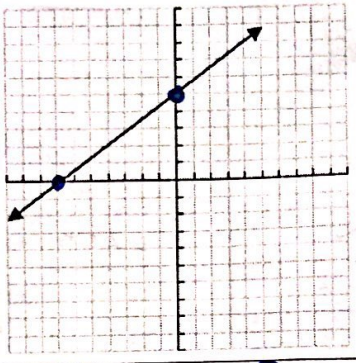
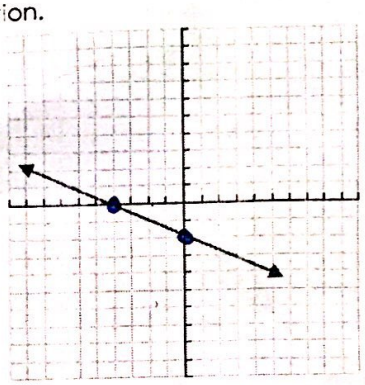
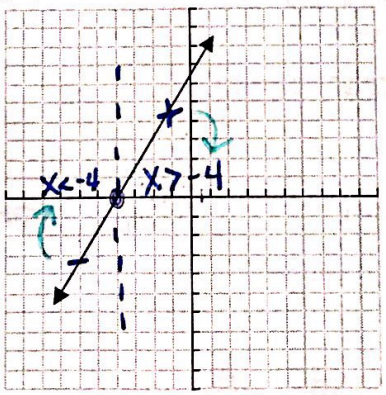
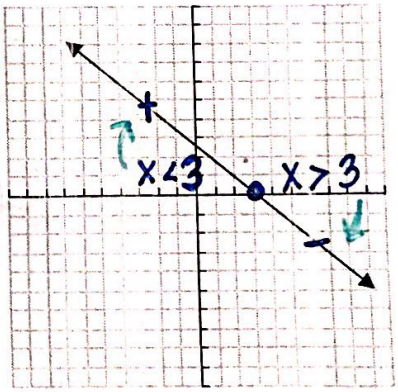
Foundations of Algebra
5.2 – Applications of Linear Functions

Name: Key
Date: _____ Block: _____

Learning Goal 5.2 – Applications of Linear Functions

What you need to know & be able to do	Things to remember	Examples
1. Determine the characteristics of linear functions Days 11 & 12	Domain: input, x-values, "left to right" Range – output, y-values, "bottom to top" x-intercept(s): where the graph crosses the x-axis. y-intercept(s): where the graph crosses the y-axis. maximum/minimum: the highest or lowest points. Increase: where the graph looks like it's going "up hill". Decrease: where the graph looks like it's going "down hill". Constant: where the graph is horizontal. End Behavior: "left side" $x \to -\infty$ "right side" $x \to \infty$ What direction do the left and right arrows go?	1. Determine the domain & range of the function.  Domain: $\mathbb{R}$ Range: $\mathbb{R}$ Interval of Increase: $\mathbb{R}$ Interval of Decrease: none Maximum: none Minimum: none End Behavior: As $x \to_{R} \infty$, $f(x) \to \infty$ As $x \to_{L} -\infty$, $f(x) \to -\infty$ Zeros: $x=-7$ X-Intercept: $(-7,0)$ Y-Intercept: $(0,5)$ 2. Determine the domain & range of the function.  Domain: $\mathbb{R}$ Range: $\mathbb{R}$ Interval of Increase: none Interval of Decrease: $\mathbb{R}$ Maximum: none Minimum: none End Behavior: As $x \to_{R} \infty$, $f(x) \to -\infty$ As $x \to_{L} -\infty$, $f(x) \to \infty$ Zeros: $x=-4$ X-Intercept: $(-4,0)$ Y-Intercept: $(0,-2)$
2. Determine where the graph is positive and negative Day 12	For what x-values is the graph in the positive (above x-axis) region and in the negative (below x-axis) region?	3. Give the inequality for the parts of the graph that are positive and negative.  Positive: $x > -4$ Negative: $x < -4$ 4. Give the inequality for the parts of the graph that are positive and negative.  Positive: $x < 3$ Negative: $x > 3$

3. Characteristics of functions without a graph. Day 11 & 12	X-intercept: (a, 0) Y-intercept (0, b)	5. Which functions have an interval of increase? How do you know? ↳ positive slope A. f(x) = 2x – 5 B. f(x) = -½x + 4 C. f(x) = -3x – 1 D. f(x) = 3x + 9	6. What are the x and y intercepts for the equation 3x – 6y = 24? x-int (y=0): 3x – 6(0) = 24; 3x = 24; x = 8; (8, 0) y-int (x=0): 3(0) – 6y = 24; –6y = 24; y = –4; (0, –4)
4. Characteristics in the Real World Day 13	Domain: x- values Range: y-values X-intercept: (a, 0) Y-intercept (0, b) Slope: Change in y over change in x	7. Calculate the slope and y-intercept. Interpret them in terms of the problem scenario. | Number of Balloons	Total Cost of Balloons (in Dollars)
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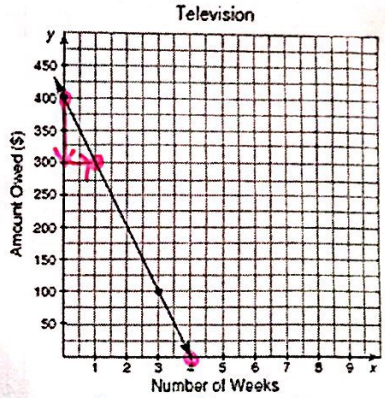
2	6
4	12
6	18
8	24	 Slope: $\frac{\$6}{2 \text{ ballons}} = \frac{\$3}{1 \text{ balloon}}$ y-int: (0, 0) If you buy 0 balloons you will spend $0.	8. Calculate the slope, x-intercept, and y-intercept. Interpret them in terms of the problem scenario.  y-int: (0, 400) To start, you owe $400 x-int: (4, 0) After 4 weeks, you paid the TV off Slope: $\frac{\$100}{1 \text{ week}}$ you pay 100 of your bill each week
		9. Which domain would be the most appropriate set to use for a function that relates x amount of people in a house to the total number y amount of household devices? A. Set of Whole Numbers B. Set of Integers C. Set of Rational Numbers D. Set of Real Numbers Can't have negative or partial people	10. At an ice cream shop, the profit, P(c), is modeled by the function P(c) = 0.87c, were c represents the number of ice cream cones sold. What set of numbers would be appropriate for the domain and range? Explain why. → $0.87 per cone Domain: Set of whole numbers (can't have partial or negative cones) Range: set of rational numbers (dealing with money) .87(0) = $0 .87(1) = $0.87 .87(2) = $1.74

5. Creating Equations from a Word Problem Day 14 & 15	Standard Form: Ax + By = C *Total *Two different amounts Slope Intercept Form: y = mx + b *Rate *Starting Amount/ One Time Fee	11. Ed has $36 to buy paints and brushes for a school project. Jars of paint cost $4 each. The brushes are $2 each. Write an equation to determine the combination of brushes and paint he can buy. If he buys 3 jars of paint, how many brushes can he buy? → x $4x + 2y = 36$ $4(3) + 2y = 36$ $12 + 2y = 36$ $2y = 24$ $y = 12$ 12 brushes	12. Gail orders CDs for $8 each plus a total shipping cost of $5. Write an equation to determine the total cost of purchasing CDs. If Gail spent $53, how many CDs did she order? → y $y = 8x + 5$ $53 = 8x + 5$ $48 = 8x$ $6 = x$ 6 cds
6. Comparing Linear Functions Day 16	Determine what the slope and y-intercepts are and interpret them in a real world context before comparing.	13. Which function has the greater rate of change and y-intercept? Function 1: y = 2x + 3 Function 2: (0, 4), (1, 8), (2, 12) Slope: Function 1: 2 Function 2: 4 Function 2's Slope is bigger y-int: Function 1: (0,3) Function 2: (0,4) Function 2's y-int is bigger	14. The table to the right shows the distance (in meters) Runner A and Runner B ran at different time intervals. Which runner has a faster average speed from 20 to 31 seconds? Runner A: $\frac{119 \text{ meters}}{11 \text{ seconds}} = 10.8 \frac{m}{sec}$ Runner B: $\frac{74 \text{ meters}}{11 \text{ seconds}} = 6.7 \frac{m}{sec}$ Runner A is faster.

Time	Runner A	Runner B
0	0	0
9	120	120
20 (+11)	168 (+49)	213 (+74)
31	287	287

15. Which function has the greatest y-intercept?

Function A: f(x) = 3x

(0, 0)

Function B: 2x + 3y = 12

$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2x}{3} + \frac{12}{3}$

$y = -2/3x + 4$

(0, 4)

Function C: a line that has a slope of 2 And passes through (1, -4). *(Hint: 5.1 – Day 10)*

$y = mx + b$

$-4 = 2(1) + b$

$-4 = 2 + b$

$-2 \quad -2$

$-6 = b$

(0, -6)

Function D: = Greatest