



**SUMMIT
MATH**

Learn at your **OWN** pace.

ALGEBRA 1

second edition

2

LINEAR EQUATIONS & INEQUALITIES

CONTENTS

Section 1	PLOTTING POINTS ON A GRAPH	3
Section 2	GRAPHING A LINE USING AN EQUATION & A T-CHART	9
Section 3	GRAPHING A LINE USING ITS INTERCEPTS	14
Section 4	CONSTANT RATES	19
Section 5	THE SLOPE OF A LINE	23
Section 6	WRITING A LINE'S EQUATION IN SLOPE-INTERCEPT FORM	32
Section 7	PARALLEL & PERPENDICULAR LINES	43
Section 8	SCENARIOS THAT INVOLVE LINEAR EQUATIONS	47
Section 9	LINEAR INEQUALITIES	54
Section 10	CUMULATIVE REVIEW	60
Section 11	ANSWER KEY	63
	HOMEWORK & EXTRA PRACTICE SCENARIOS	73

Section 3
**GRAPHING A LINE USING
ITS INTERCEPTS**

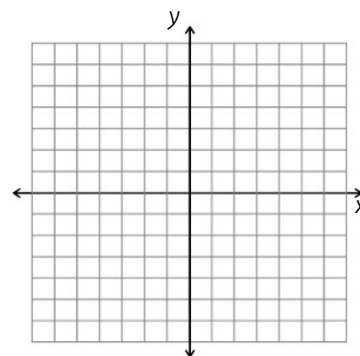
GUIDED DISCOVERY SCENARIOS

In the previous scenario, you were asked to think about a number that is easy to work with. In this section, you will learn how to graph an equation by replacing each variable with a "0".

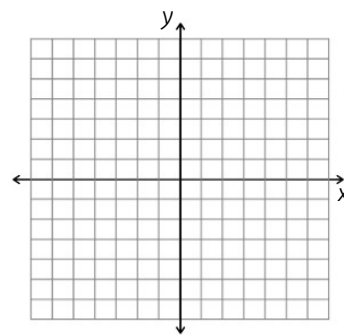
29. Consider the equation $-2x + 4y = 8$.

- Replace x with 0 and solve for y .
- Start with the original equation again. This time, replace y with 0 and solve for x .
- You now know 2 points on the line $-2x + 4y = 8$. Write the two points as ordered pairs.

30. Graph the points you found in the previous scenario and draw a line through them. After you draw the line, try to guess some other points that are on the line and plot them also.



31. Graph $3x + 6y = 18$ by repeating the strategy that you used in the previous scenario.



32. If a point has an x-value of 0, where will that point be located on the Cartesian plane?

33. If a point has a y-value of 0, where will it be located on the Cartesian plane?

Section 5
THE SLOPE OF A LINE

GUIDED DISCOVERY SCENARIOS

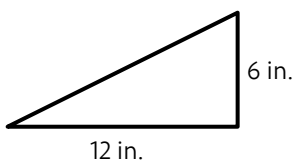
The Americans with Disabilities Act of 1990 (ADA) prohibits discrimination based on disability. One of the requirements of the ADA is that ramps for wheelchair usage may not be too steep. At what point does a ramp become too steep? To start with, define steepness as a ratio of the vertical and horizontal measurements of a ramp. As a fraction, steepness is $\frac{\text{vertical distance}}{\text{horizontal distance}}$.

49. The requirement created by the ADA is as follows: for every 1 foot that a ramp rises vertically, it should extend 12 feet horizontally. The required steepness, then, is 1:12. If you express this as a fraction, the required steepness is $\frac{1}{12}$.

a. If a ramp extends 24 feet horizontally, what is the required height of the ramp above the ground?

b. If a ramp extends horizontally 54 feet and vertically 4.5 feet, prove that it is legally constructed.

50. In the previous scenario, steepness is defined as “vertical distance over horizontal distance” but it will soon become tedious to keep referring to that definition. From here on, steepness will be replaced with the word slope and it will be defined as the fraction “rise over run.” For example, consider the ramp shown below.

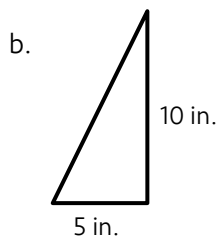
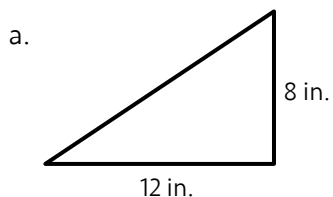


a. The ramp rises ___ inches and it runs ___ inches.

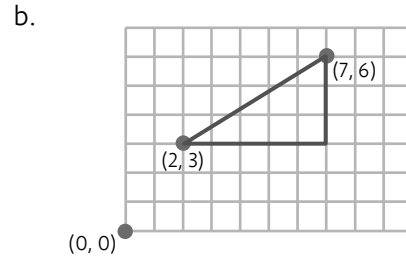
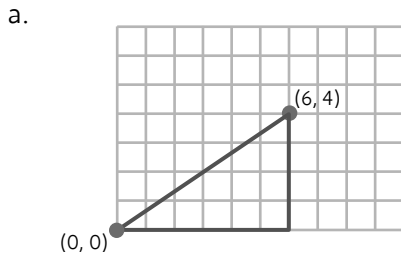
b. Thus, its $\frac{\text{rise}}{\text{run}}$ is ____ .

c. If you simplify the slope, it can be written as ____ .

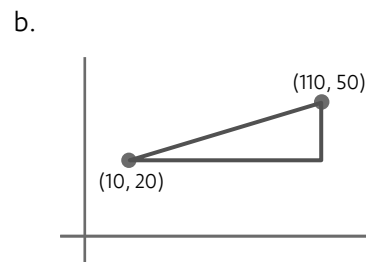
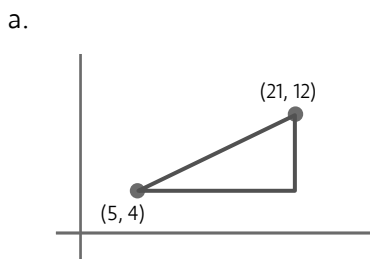
51. Identify the slope of each ramp shown.



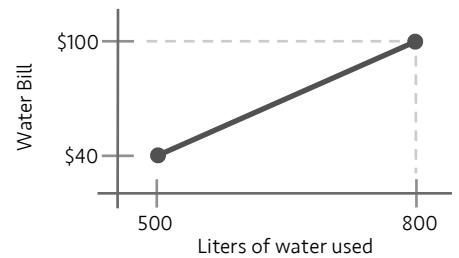
52. Identify the slope of each ramp shown.



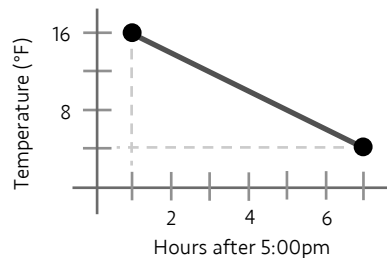
53. Identify the slope of each ramp shown.



54. Let's move beyond ramps. Since every slanting line is like a ramp, we can take a section of any line and identify its slope, or its "rise over run." Identify the slope of the line shown and explain what the slope means using the labels for each axis.



55. Identify the slope of the line shown and explain its meaning.

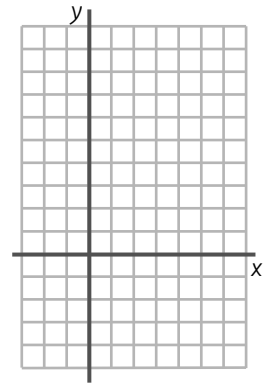


Section 6
***WRITING A LINE'S
EQUATION IN
SLOPE-INTERCEPT FORM***

77. Let's take another look at graphing. Consider the equation $y = 3x - 5$.

- Fill in the T-chart and graph the three ordered pairs.
- Plot three more points on the line.
- Use the points to find the slope of the line $y = 3x - 5$.
- Write the equation of the line again.
- Now write the slope of the line again.

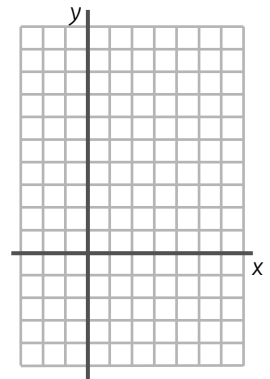
x	y
1	
2	
3	



78. Consider the equation $y = -2x + 4$.

- Fill in the T-chart and graph the three ordered pairs.
- Plot five more points on the line.
- Use the points to find the slope of the line $y = -2x + 4$.
- Write the equation of the line again.
- Now write the slope of the line again.

x	y
1	
2	
3	



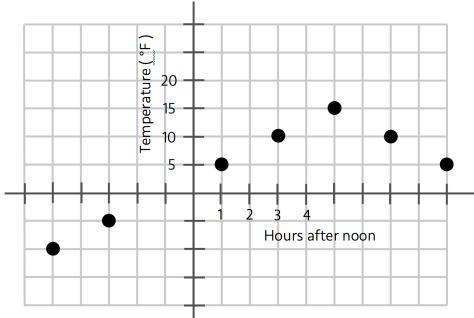
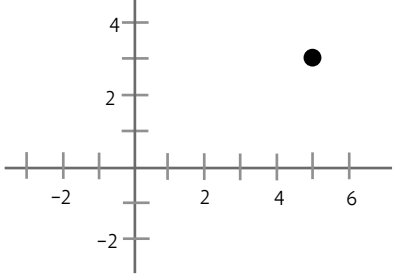
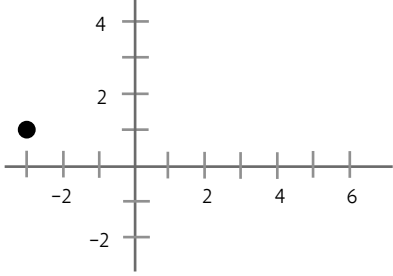
79. What did you notice when you wrote the equation of the line and the slope of the line?

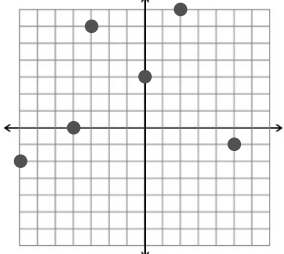
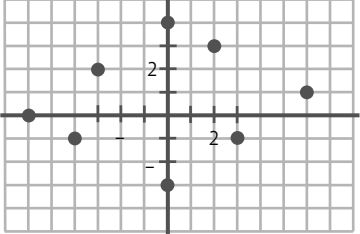
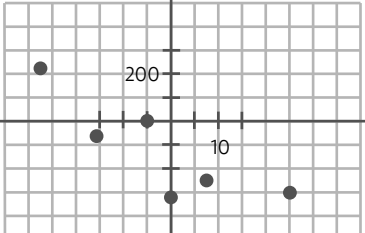
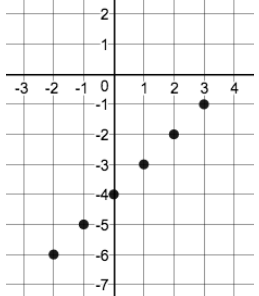
80. If the equation of a line is $y = 6x - 2$, what is the slope of this line?

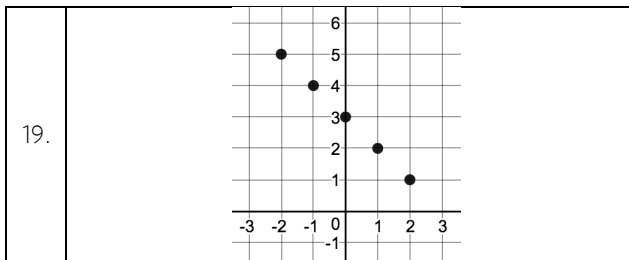
81. If the equation of a line is $y = \frac{3}{4}x - 1$, what is the slope of this line?

Section 11

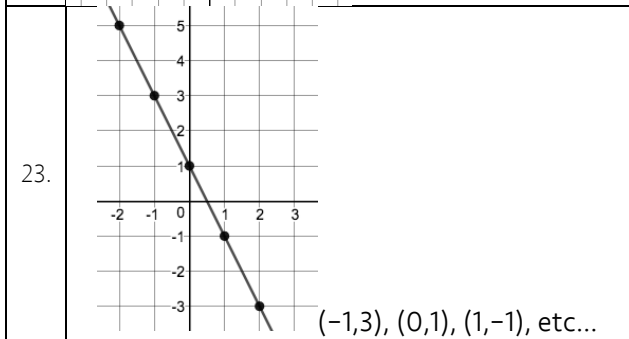
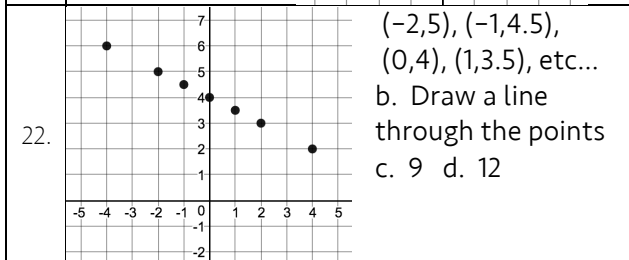
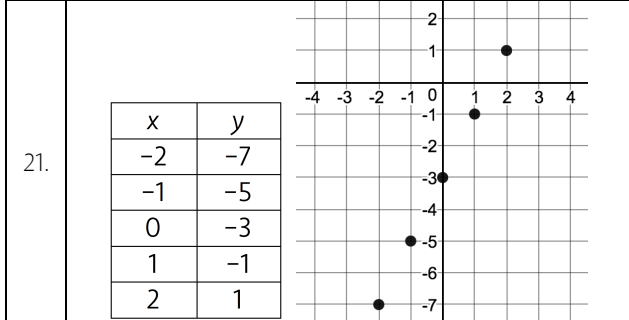
ANSWER KEY

1.	a. 15 seconds after 2:00pm, your heart rate is 75 beats per minute b. 105 seconds after 2:00pm, your heart rate is 150 beats per minute
2.	The temperature at 1pm is 5°F. At 3pm, it is 10°F. At 5pm, it is 15°F.
3.	
4.	2.5 degrees per hour (10 degrees in 4 hours)
5.	
6.	
7.	a. - b. Left 3 units, up 6 units c. Right 5 units, down 1 unit d. Left 7 units, down 2 units e. Up 3 units from (0, 0) f. Left 4 units from (0, 0)

	
8.	
9.	
10.	a. 2 gal b. 14 gal. c. 26 gal. d. -
11.	$A = 2m$
12.	a. 6 gallons per min. b. $6(5) = 30$ gallons c. $6(6.5) = 39$ gallons
13.	a. If $m = 12, A = 23$ b. If $m = 0, A = 5$
14.	a. If $x = 2, y = 5$ b. If $x = 0, y = 11$
15.	a. -4 b. -3 c. -2 d. -1 e. -5 f. -6
16.	a. (0, -4) b. (1, -3) c. (2, -2) d. (3, -1) b. (-1, -5) c. (-2, -6)
17.	
18.	The points form a line.



20. The points form a line.



24. a. If the equation is true when the variables are replaced with the numbers in the ordered pair.
 b. Yes; $6(-1.1) + 3(3.2) = 3$
 c. No; $6(201) + 3(-400) = 6$

25. Ordered pairs on the line:
 (5, 0), (5/2, 1), (0, -2), (-5, -4)

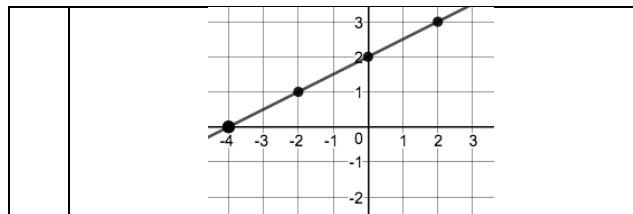
26. Make a T-chart. Replace x with a number and solve for y. For example, if $x = 1$, then $4(1) + 2y = 16$. If you solve for y, $y = 6$. This shows that one point on the line is (1, 6).

27. a. (4, 7) b. (-5, 23) c. (11, -2)

28. Most likely, the easiest number is 0.

29. a. $-2(0) + 4y = 8 \rightarrow y = 2$
 b. $-2x + 4(0) = 8 \rightarrow x = -4$
 c. (0, 2) and (-4, 0)

30. Other points: (-2, 1), (2, 3), (-6, -1), (4, 4), ...



31.

If $x = 0, y = 3$: (0, 3). If $y = 0, x = 6$: (6, 0)

32. On the y-axis

33. On the x-axis

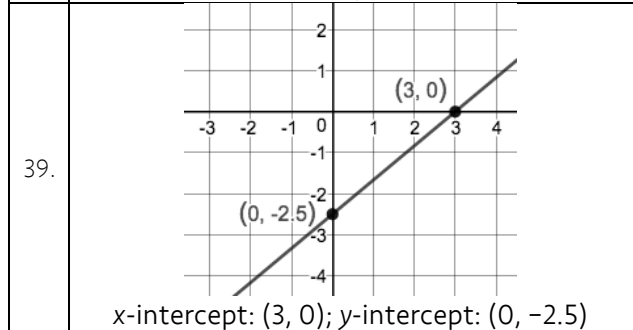
34. a. x-intercept b. y-intercept

35. a. (-2, 0) b. (0, 3)

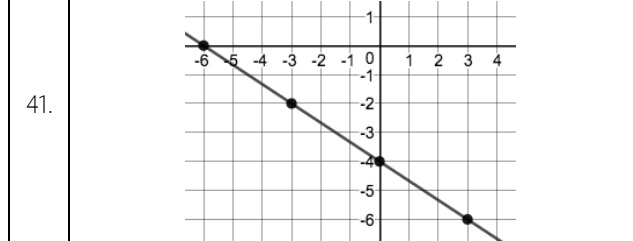
36. Write the equation, replace y with 0 and solve for x.

37. Write the equation, replace x with 0 and solve for y.

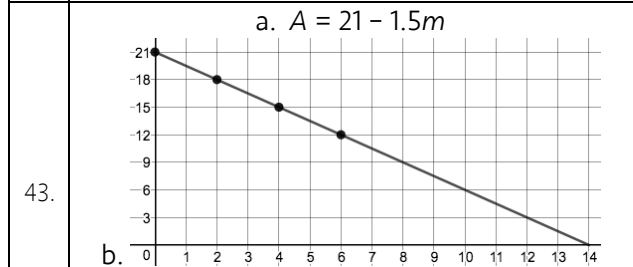
38. x-int: (2, 0); y-int: (0, -5.5)



40. Part c. and d. are NOT in Standard Form
 (0, 4) is incorrect. It should be (0, -4)



42. $Ax + By = C$



b. 0
 c. The x-int. is (14, 0): the tub will be empty after 14 minutes. The y-int. is (0, 21): the tub initially contained 21 gallons of water.

44. \$24 per week (\$144 over 6 weeks)