

Acc math 7
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Name Key
 Date _____ Per. _____

- You'll need graph paper!

LINEAR GRAPHS USING $y = mx + b$ 4.1.4 - 4.1.7

Slope (rate of change) is a number that indicates the steepness (or flatness) of a line, that is, its rate of change, as well as its direction (up or down) left to right.

* Slope (rate of change) is determined by the ratio: $\frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{change in } y}{\text{change in } x}$

between *any* two points on a line. Some books and teachers refer to this ratio as the rise (y) over the run (x).

For lines that go up (from left to right), the sign of the slope is positive. For lines that go down (left to right), the sign of the slope is negative.

Any linear equation written as $y = mx + b$, where m and b are any real numbers, is in slope-intercept form. m is the slope of the line. b is the y-intercept, that is, the point $(0, b)$ where the line intersects (crosses) the y-axis.

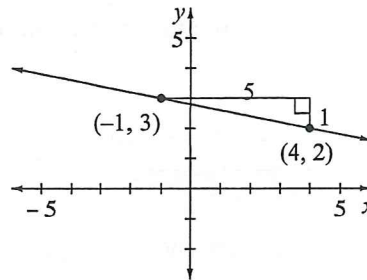
Example 1

Write the slope of the line containing the points $(-1, 3)$ and $(4, 2)$.

First graph the two points and draw the line through them.

Look for and draw a slope triangle using the two given points.

Write the ratio $\frac{\text{vertical change in } y}{\text{horizontal change in } x}$ using the legs of the right triangle: $\frac{1}{5}$.



Assign a positive or negative value to the slope depending on whether the line goes up (+) or down (-) from left to right. The slope is $-\frac{1}{5}$.

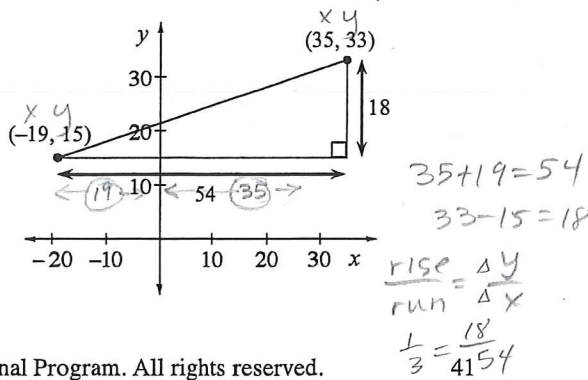
Example 2

Write the slope of the line containing the points $(-19, 15)$ and $(35, 33)$.

Since the points are inconvenient to graph, use a "generic slope triangle," visualizing where the points lie with respect to each other and the axes.

Make a sketch of the points.

Draw a slope triangle and determine the length of each leg. Write the ratio of y to x: $\frac{18}{54} = \frac{1}{3}$. The slope is $\frac{1}{3}$.



Example 3

Given a table, determine the rate of change (slope) and the equation of the line.

		+2	+2	+2	
x	-2	0	2	4	
y	1	4	7	9	
		+3	+3	+3	

rate of change = $\frac{3}{2}$

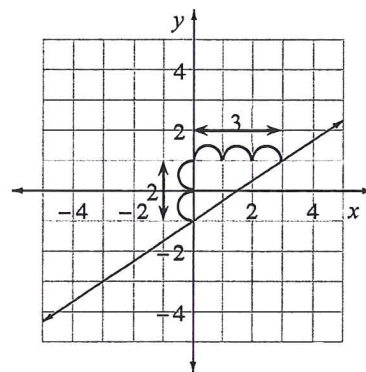
y-intercept = (0, 4)

The equation of the line is $y = \frac{3}{2}x + 4$.

Example 4

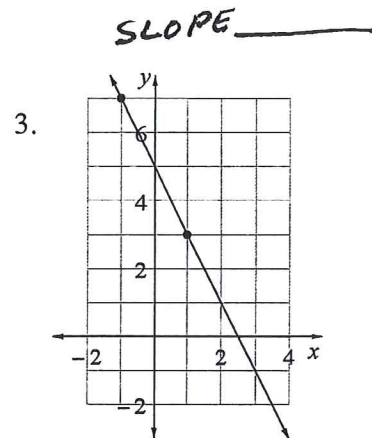
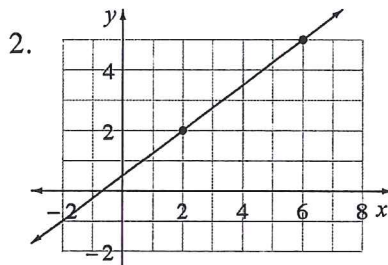
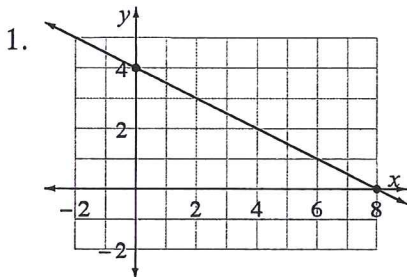
Graph the linear equation $y = \frac{2}{3}x - 1$.

Using $y = mx + b$, the slope in $y = \frac{2}{3}x - 1$ is $\frac{2}{3}$ and the y-intercept is the point (0, -1). To graph, begin at the y-intercept (0, -1). Remember that slope is $\frac{\text{vertical change}}{\text{horizontal change}}$, so go up 2 units (since 2 is positive) from (0, -1) and then move right 3 units. This gives a second point on the graph. To create the graph, draw a straight line through the two points.



Problems

Determine the slope of each line using the highlighted points.



SLOPE

SLOPE

SLOPE

Graph Paper.

Find the slope of the line containing each pair of points. Sketch a slope triangle to visualize the vertical and horizontal change.

4. (2, 3) and (5, 7)

5. (2, 5) and (9, 4)

6. (1, -3) and (7, -4)

7. (-2, 1) and (3, -3)

8. (-2, 5) and (4, 5)

9. (5, 8) and (3, 5)

Use a slope triangle to find the slope of the line containing each pair of points:

10. (50, 40) and (30, 75)

11. (10, 39) and (44, 80)

12. (5, -13) and (-51, 10)

$\frac{23}{-56}$

Identify the slope and y-intercept in each equation.

S = _____
y-intercept = _____

13. $y = \frac{1}{2}x - 2$

slope = _____
y-intercept = _____

14. $y = -3x + 5$

15. $y = 4x$ m = _____
b = _____

16. $y = -\frac{2}{3}x + 1$

Slope = _____
y-intercept = _____

17. $y = x - 7$

m = _____
b = _____

18. $y = 5$

m = _____
b = _____

Draw a graph to find the equation of the line with:

19. slope = $\frac{1}{2}$ and passing through (2, 3).

20. slope = $\frac{2}{3}$ and passing through (3, -2).

21. slope = $-\frac{1}{3}$ and passing through (3, -1).

22. slope = -4 and passing through (-3, 8).

For each table, determine the rate of change and the equation. Be sure to record whether the rate of change is positive or negative for both x and y.

23.

x	-2	-1	0	1	2
y	-5	-2	1	4	7

24.

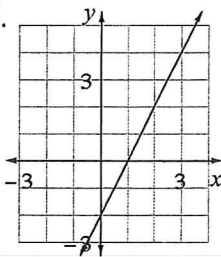
x	-2	0	2	4	6
y	7	3	-1	-5	-9

25.

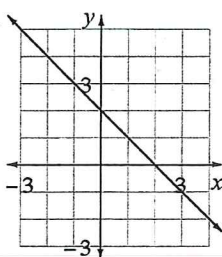
x	-6	-3	0	3	6
y	-3	-1	1	3	5

Using the slope and y-intercept, determine the equation of the line.

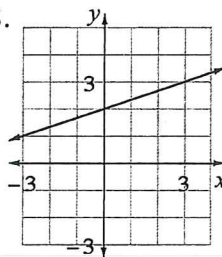
26.



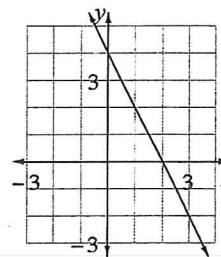
27.



28.



29.



Graph the following linear equations on graph paper.

30. $y = \frac{1}{2}x + 2$

31. $y = -\frac{3}{5}x + 1$

32. $y = -4x$

33. $y = 2x + \frac{1}{2}$

34. $3x + 2y = 12$

$2y = 12 - 3x$
 $y = 6 - \frac{3}{2}x$
 $y = -\frac{3}{2}x + 6$

Answers

1. $-\frac{1}{2}$

2. $\frac{3}{4}$

3. -2

4. $\frac{4}{3}$

5. $-\frac{1}{7}$

6. $(-\frac{1}{6})(-\frac{1}{6})$

7. $-\frac{4}{5}$

8. 0

9. $\frac{3}{2}$

10. $-\frac{35}{20} = -\frac{7}{4}$

11. $\frac{41}{34}$

12. ~~$-\frac{33}{71}$~~

$-\frac{23}{56}$

13. $\frac{1}{2}; (0, -2)$

14. $-3; (0, +5)$

15. $4; (0, 0)$

16. $-\frac{2}{3}; (0, 1)$

17. $1; (0, -7)$

18. $0; (0, 5)$

19. $y = \frac{1}{2}x + 2$

20. $y = \frac{2}{3}x - 4$

21. $y = -\frac{1}{3}x$

22. $y = -4x - 4$

23. $3; y = 3x + 1$

24. $-2; y = -2x + 3$

25. $\frac{2}{3}; y = \frac{2}{3}x + 1$

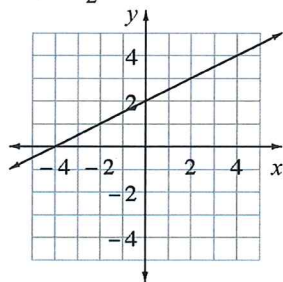
26. $y = 2x - 2$

27. $y = -x + 2$

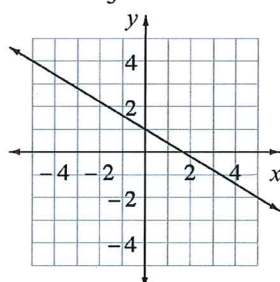
28. $y = \frac{1}{3}x + 2$

29. $y = -2x + 4$

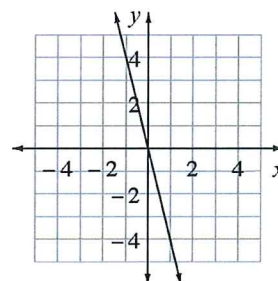
30. $y = \frac{1}{2}x + 2$



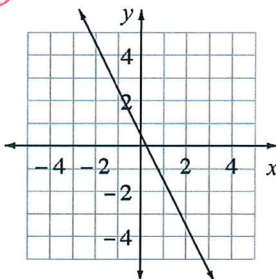
31. $y = -\frac{3}{5}x + 1$



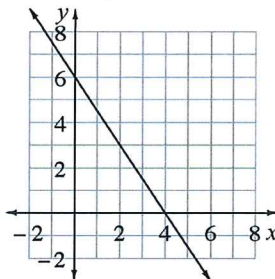
32. $y = -4x$



33. $y = -2x + \frac{1}{2}$

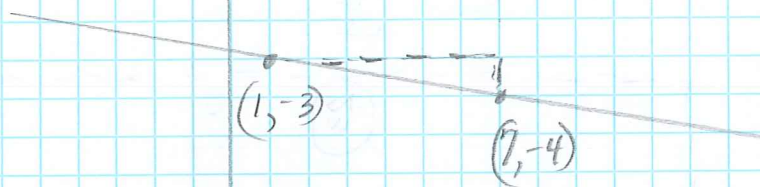


34. $y = -\frac{3}{2}x + 6$



$$\textcircled{6.} (1, -3) (7, -4)$$

$$\frac{\Delta y}{\Delta x} = \frac{-3 - (-4)}{1 - 7} = \frac{1}{-6} = \textcircled{-\frac{1}{6}}$$

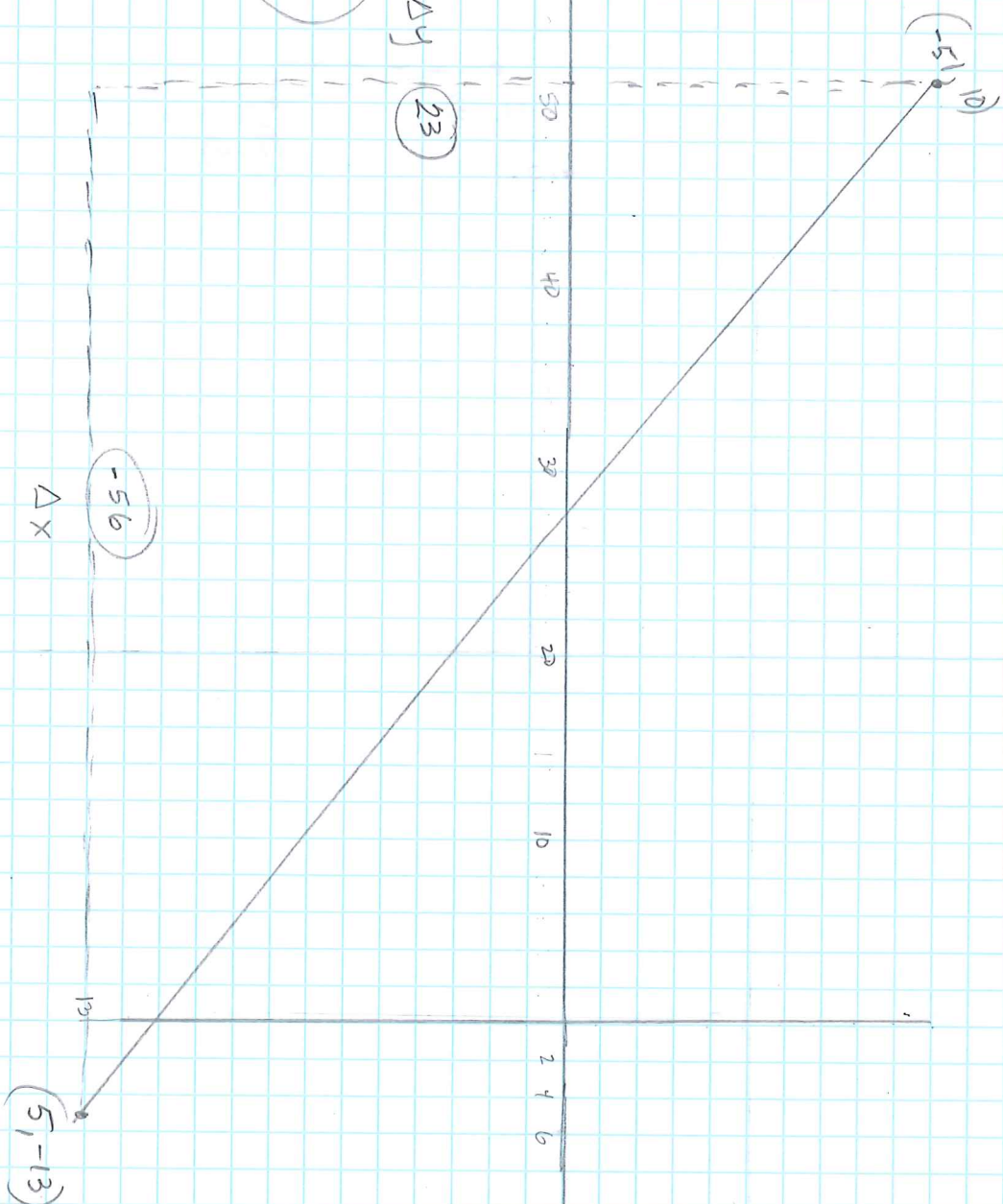


12.

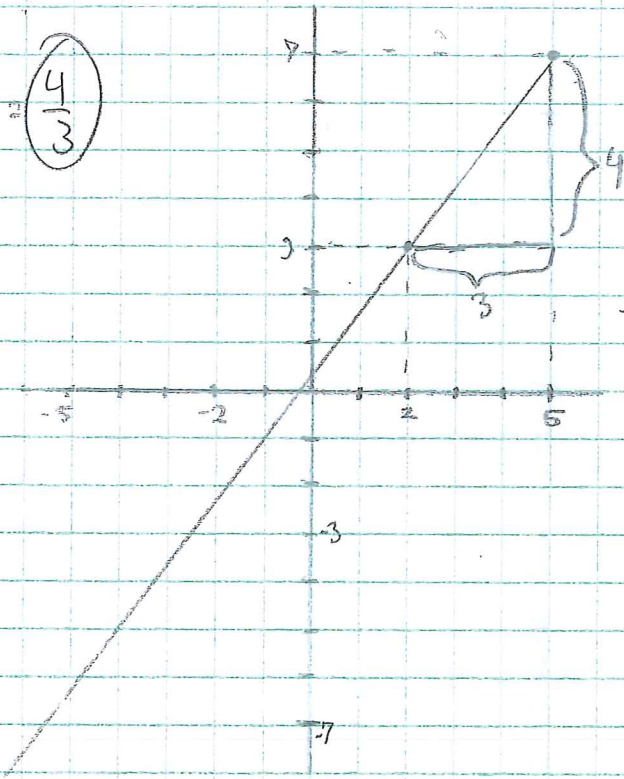
$(-51, 10)$ $(5, -13)$

$$\frac{\Delta y}{\Delta x} = \frac{10 - (-13)}{-51 - 5} = \frac{23}{-56} = -\frac{23}{56}$$

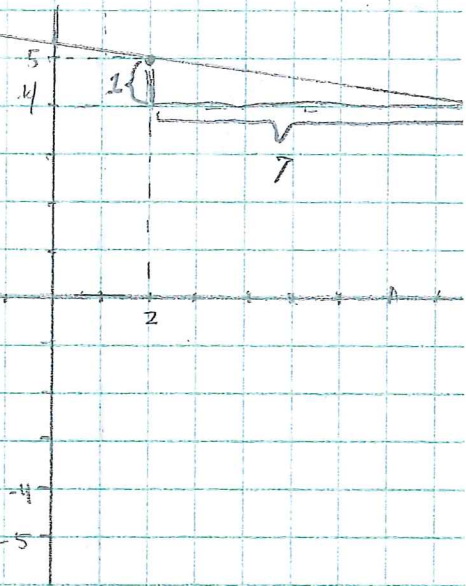
Δy (23)



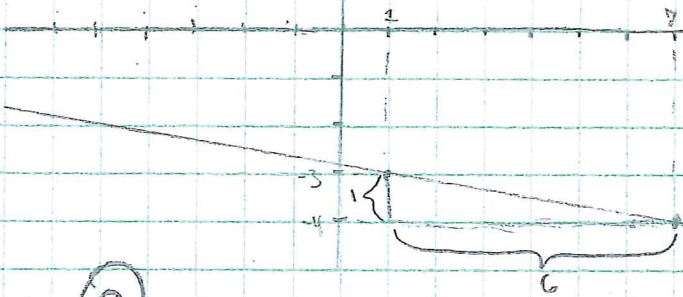
4.) $\frac{\text{rise}}{\text{run}} = \frac{4}{3}$



5.) $\frac{\text{run}}{\text{rise}} = \frac{1}{7}$

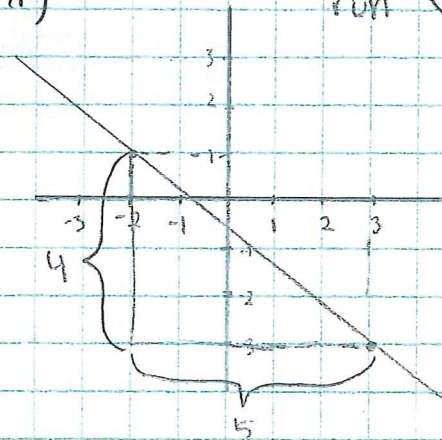


6.) $\frac{\text{rise}}{\text{run}} = \frac{-1}{6}$

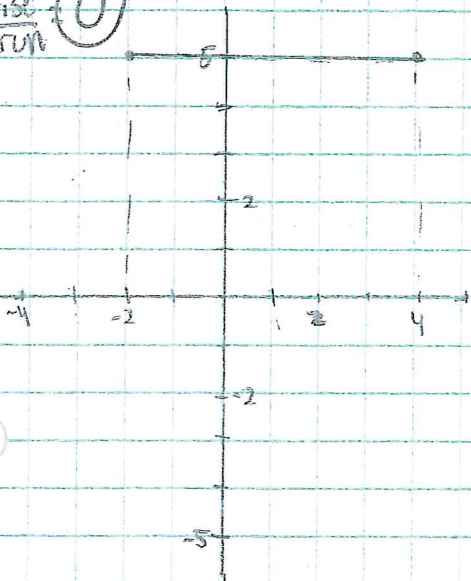


7.)

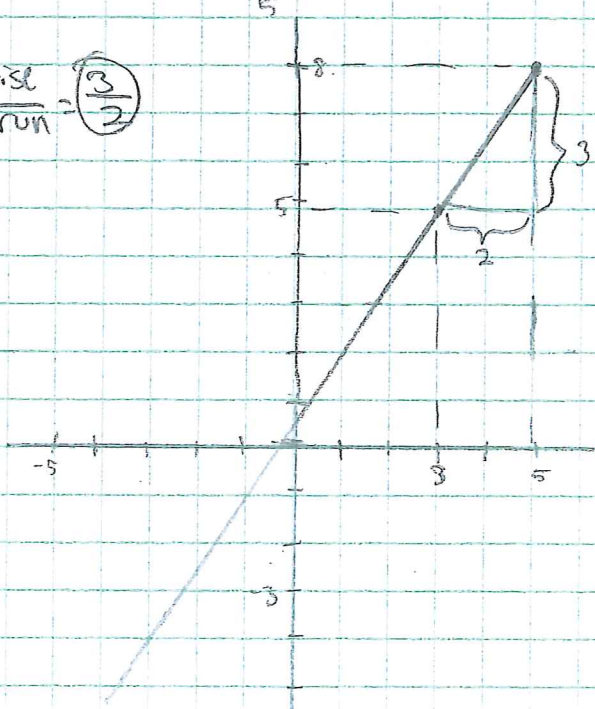
$\frac{\text{rise}}{\text{run}} = \frac{-1}{5}$



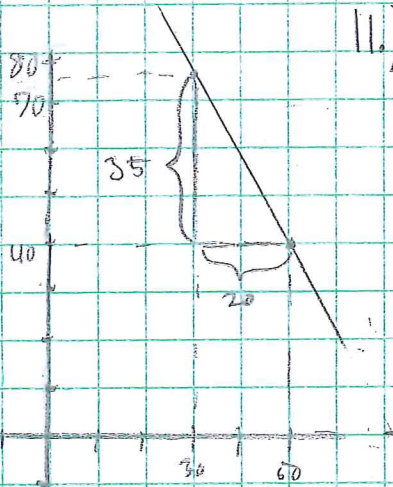
8.) $\frac{\text{rise}}{\text{run}} = 0$



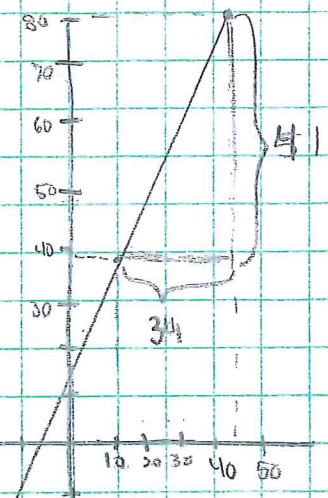
9.) $\frac{\text{rise}}{\text{run}} = \frac{3}{2}$



10.) $\frac{\text{rise}}{\text{run}} = \frac{35}{20}$
 $\frac{7}{4}$

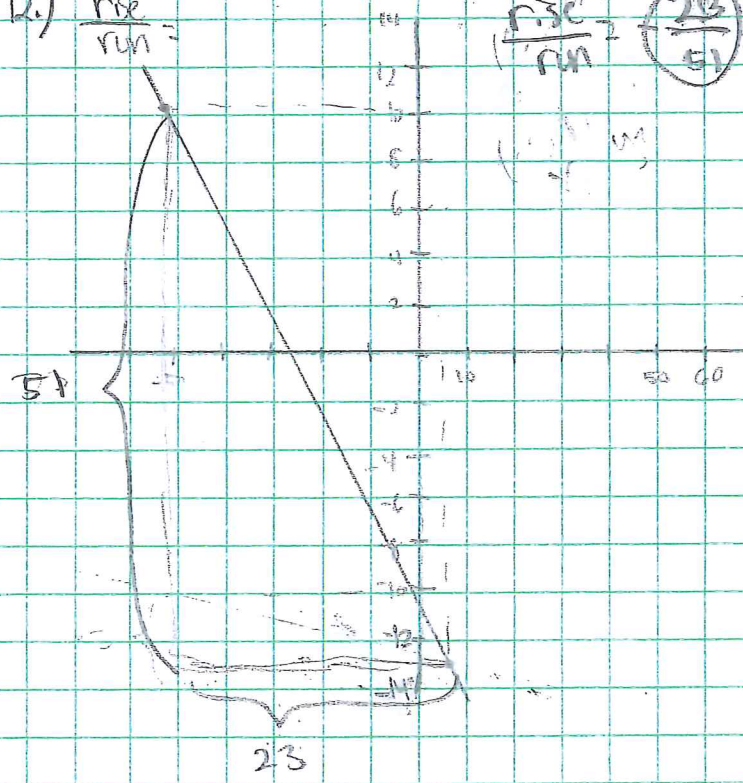


11.)



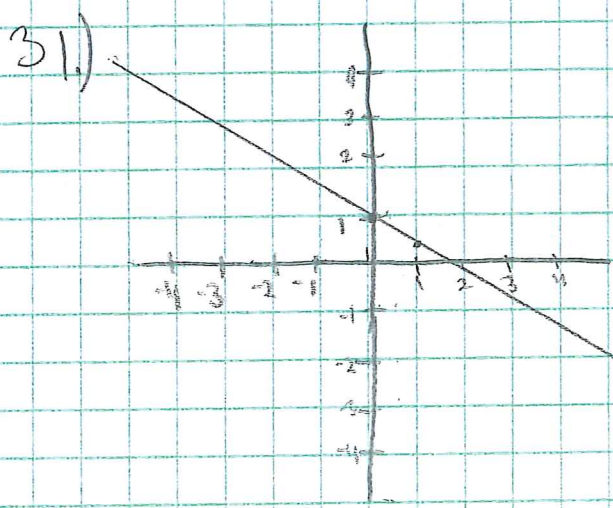
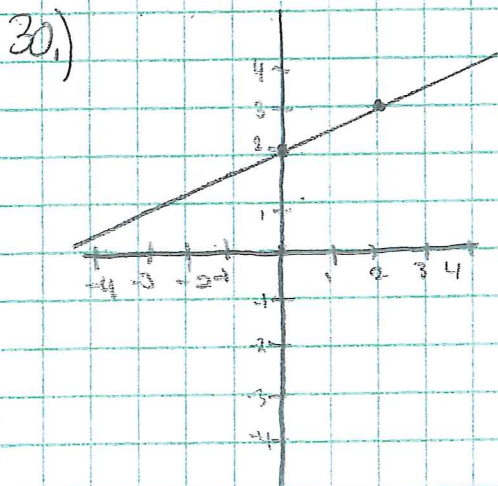
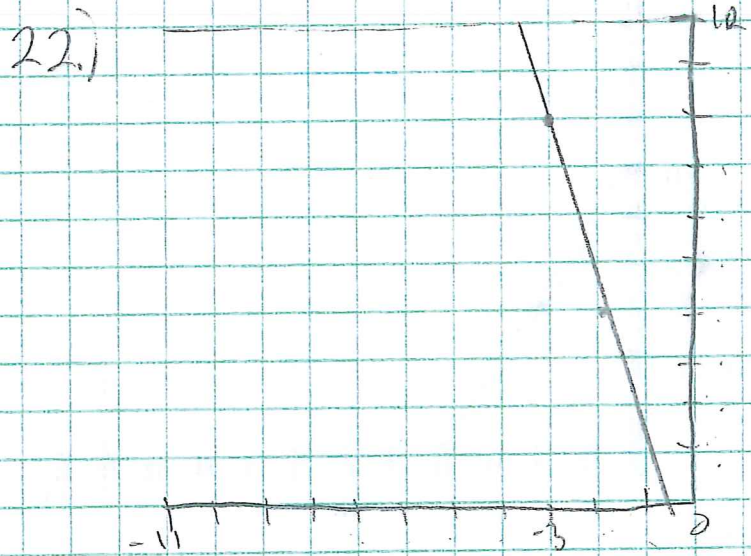
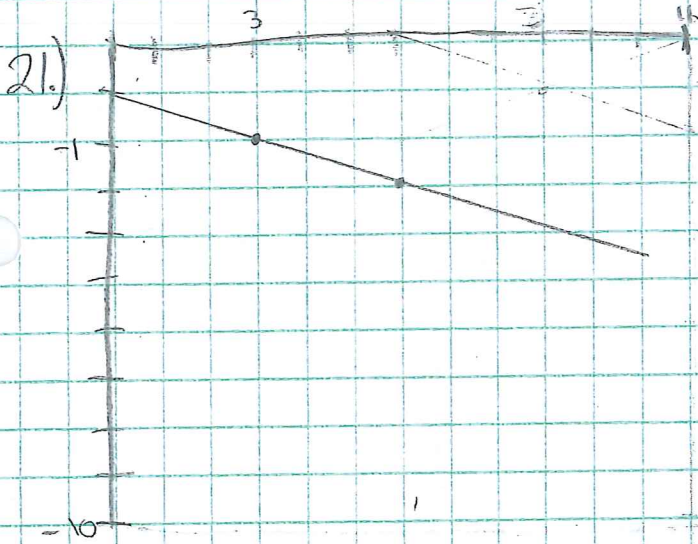
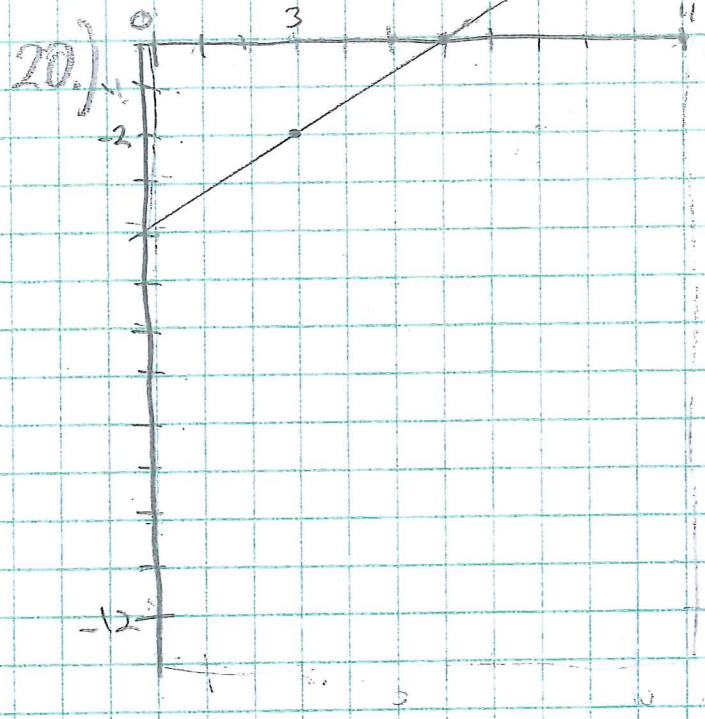
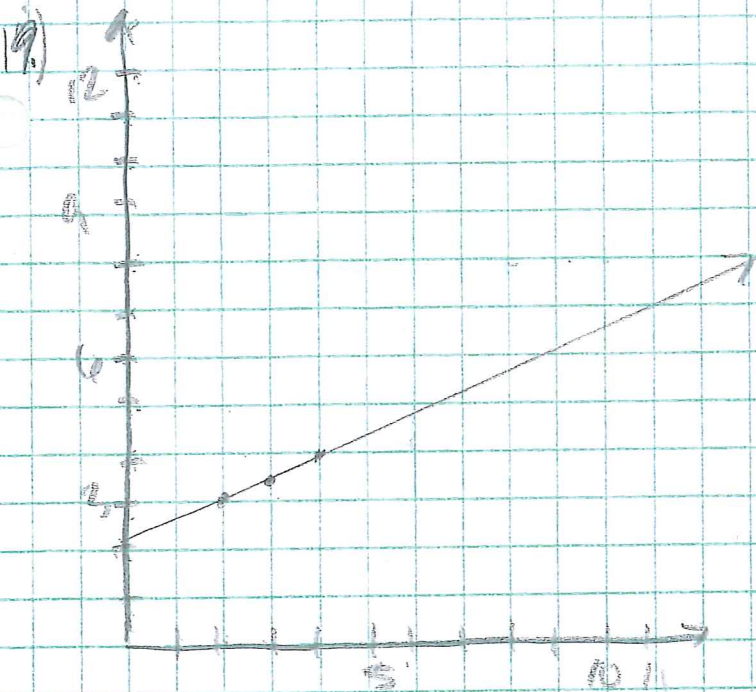
$\frac{\text{rise}}{\text{run}} = \frac{40}{34}$

12.) $\frac{\text{rise}}{\text{run}} =$

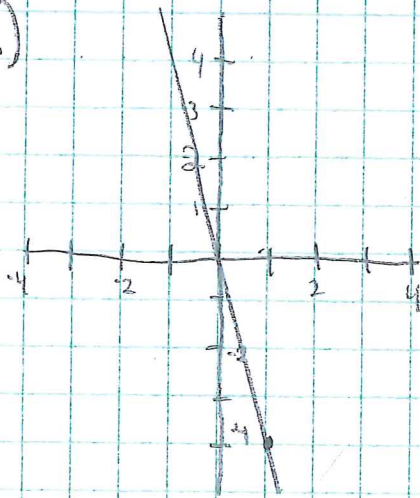


$\frac{\text{rise}}{\text{run}} = \frac{51}{23}$

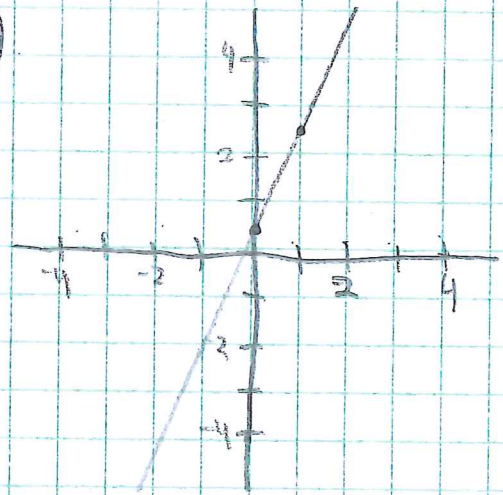
~~$\frac{12-10}{60-50} = \frac{2}{10} = \frac{1}{5}$~~



32.)



33.)



34.)

