Math 60, Sections 4.7 and 4.8 Notes and Practice Name: Solutions

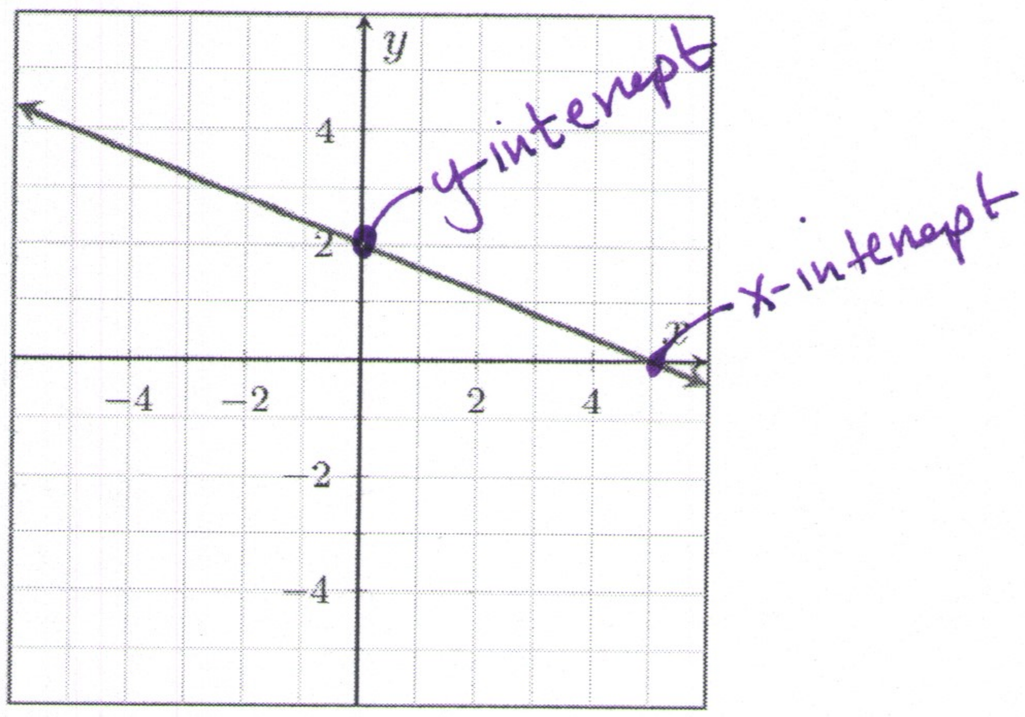
Section 4.7 Standard Form and Graphing Using Intercepts

Identifying Intercepts

The x-intercept occurs where the graph crosses the x-axis.
The y-intercept occurs where the graph crosses the y-axis.

1. Identify the x-intercept and the y-intercept for each line below.

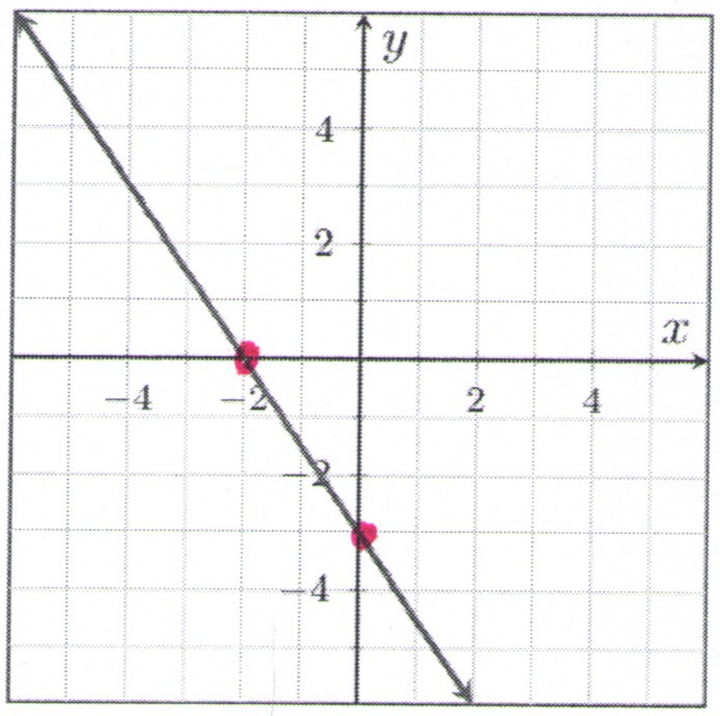
a.



x-intercept: (5, 0)

y-intercept: (0, 2)

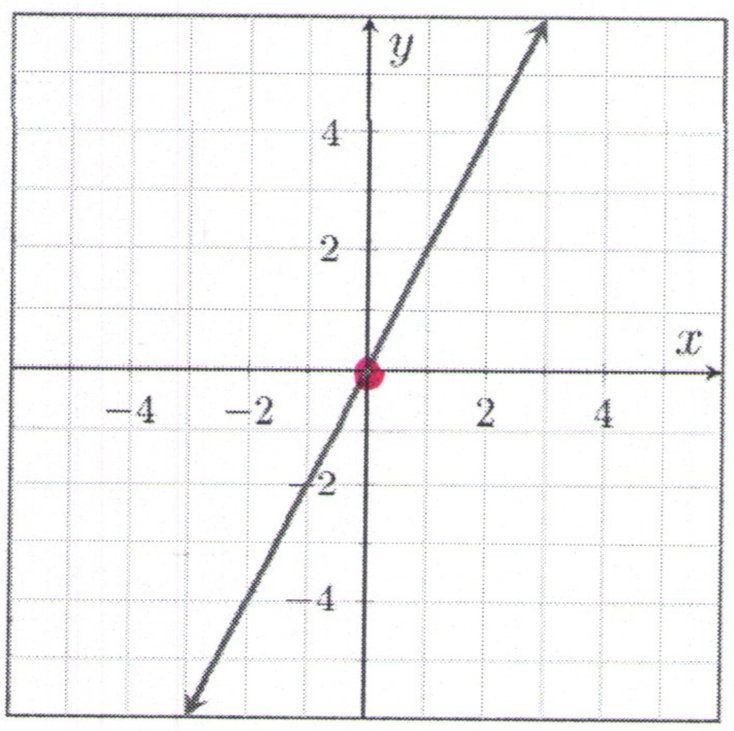
b.



x-intercept: (−2, 0)

y-intercept: (0, −3)

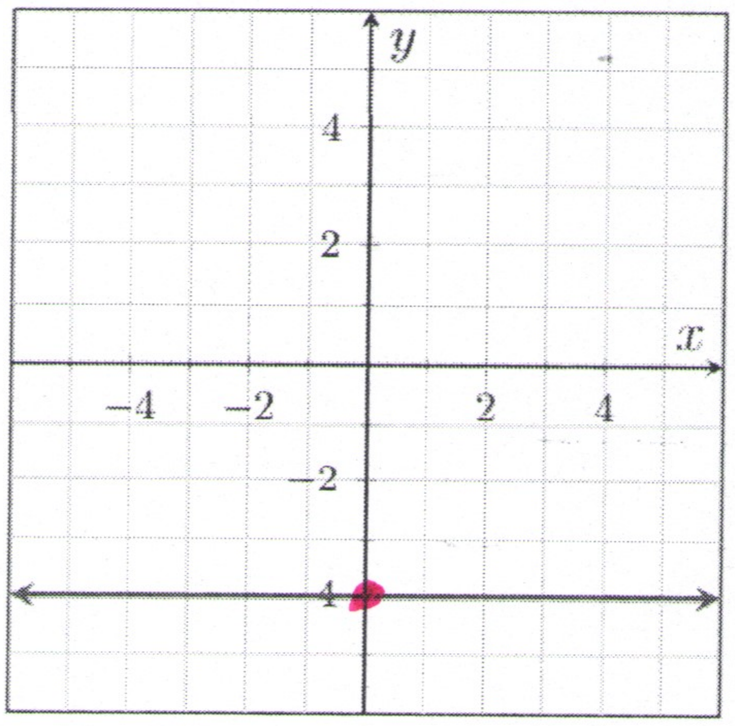
c.



x-intercept: (0, 0)

y-intercept: (0, 0)

d.



x-intercept: none

y-intercept: (0, −4)

What do you notice about all x-intercepts? The y-value is zero.

What do you notice about all y-intercepts? The x-value is zero. (reversed)

Standard Form of a Line: $Ax + By = C$

2. Find the x-intercept and y-intercept for the equation $x - y = 6$. Then graph the equation.

Let x=0

0 − y = 6

$\frac{-y}{-1} = \frac{6}{-1}$

y = −6

(0, −6)

y-intercept

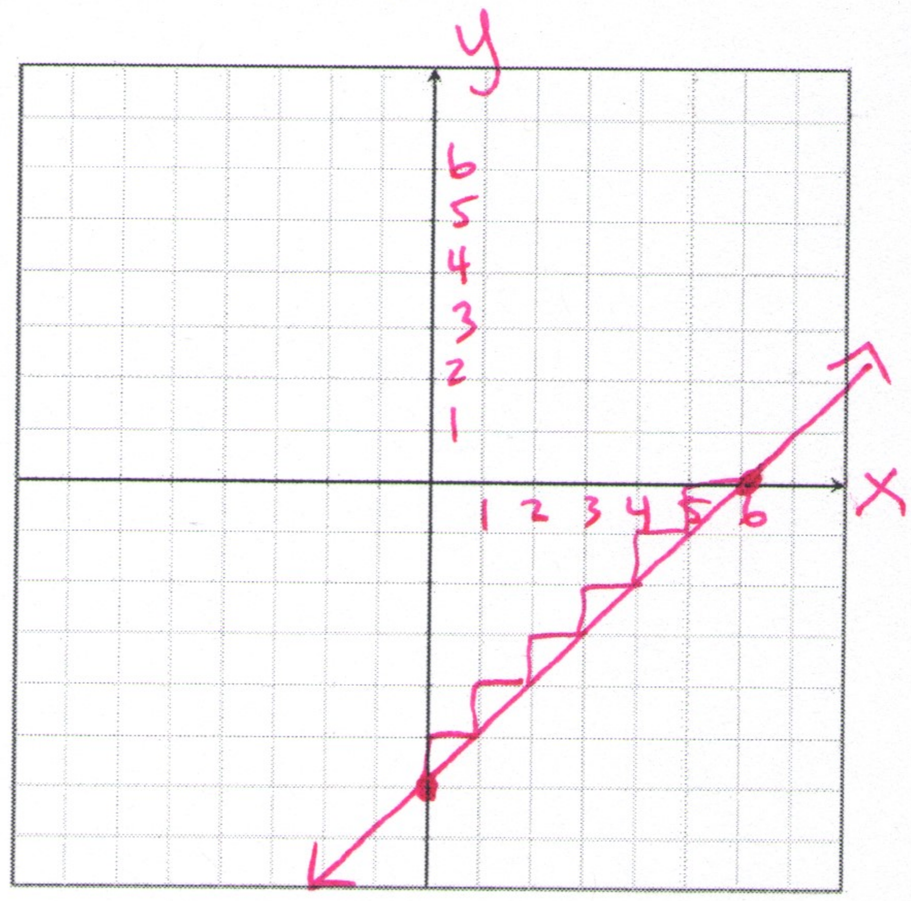
Let y=0

x − 0 = 6

x = 6

(6, 0)

x-intercept



Rewrite the equation in slope-intercept form and check the graph.

y = mx + b

x − y = 6

−x −x

−y = −x + 6

$\frac{-y}{-1} = \frac{-x}{-1} + \frac{6}{-1}$

y = x − 6

y = 1x − 6

m = 1 = $\frac{1}{1}$

y-intercept = −6

3. Find the x-intercept and y-intercept for the equation $-x + 3y = 10$. Then graph the equation.

Let x=0

−0 + 3y = 10

$\frac{3y}{3} = \frac{10}{3}$

$y = \frac{10}{3}$

$= 3\frac{1}{3}$

$(0, 3\frac{1}{3})$ ← graphing

or

$(0, \frac{10}{3})$ ← webwork

Let y=0

−x + 3(0) = 10

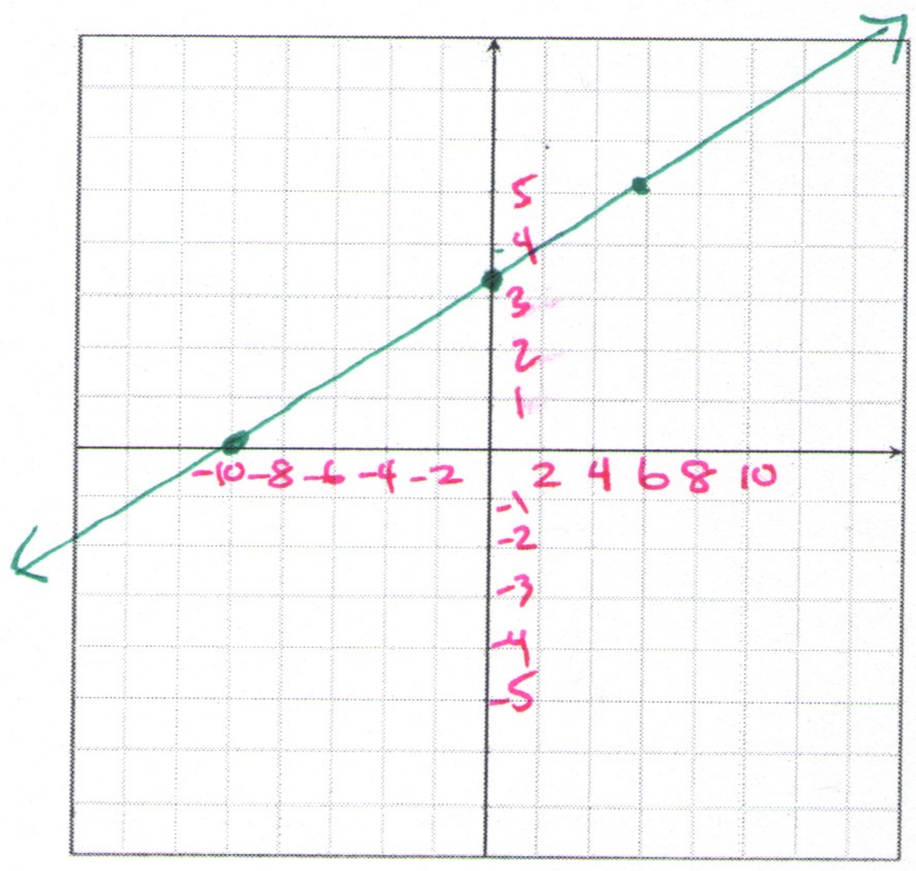
−x + 0 = 10

−x = 10

$\frac{-x}{-1} = \frac{10}{-1}$

x = −10

(−10, 0)



Rewrite the equation in slope-intercept form and check the graph.

solve for y

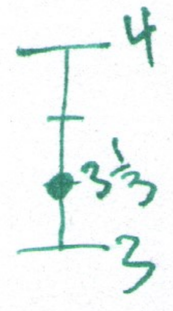
−x + 3y = 10

+x +x

$\frac{3y}{3} = \frac{x}{3} + \frac{10}{3}$

$y = \frac{1}{3}x + \frac{10}{3}$

$\frac{x}{3} = \frac{1x}{3}$ $= \frac{1}{3} \cdot \frac{x}{1} = \frac{1}{3}x$



$y=mx+b$ $Ax+By=C$

4. Rewrite the line in slope-intercept in standard form.

a. $y=4x-2$

$-4x \quad -4x$

$-4x+y=-2$

b. $y=-\frac{1}{2}x+6$ multiply by the LCD = 2

$2y=-1x+12$

$+x \qquad +x$

$x+2y=12$

5. An office manager is ordering markers and tissues. Let t be the number of tissue boxes ($2 each) and let m be the number of packages of markers ($16 each). Assuming she has a total budget of $500, the number of markers and tissue boxes she can purchase can be modeled by the equation $2t+16m=500$.

x y

Use t on the horizontal axis and m on the vertical axis.

$2t+16m=500$

a. Find the t-intercept. What does this represent?

$2t+16(0)=500$

$2t=500$

$t=250$ tissue boxes

If they only bought tissues, they could buy 250 boxes.

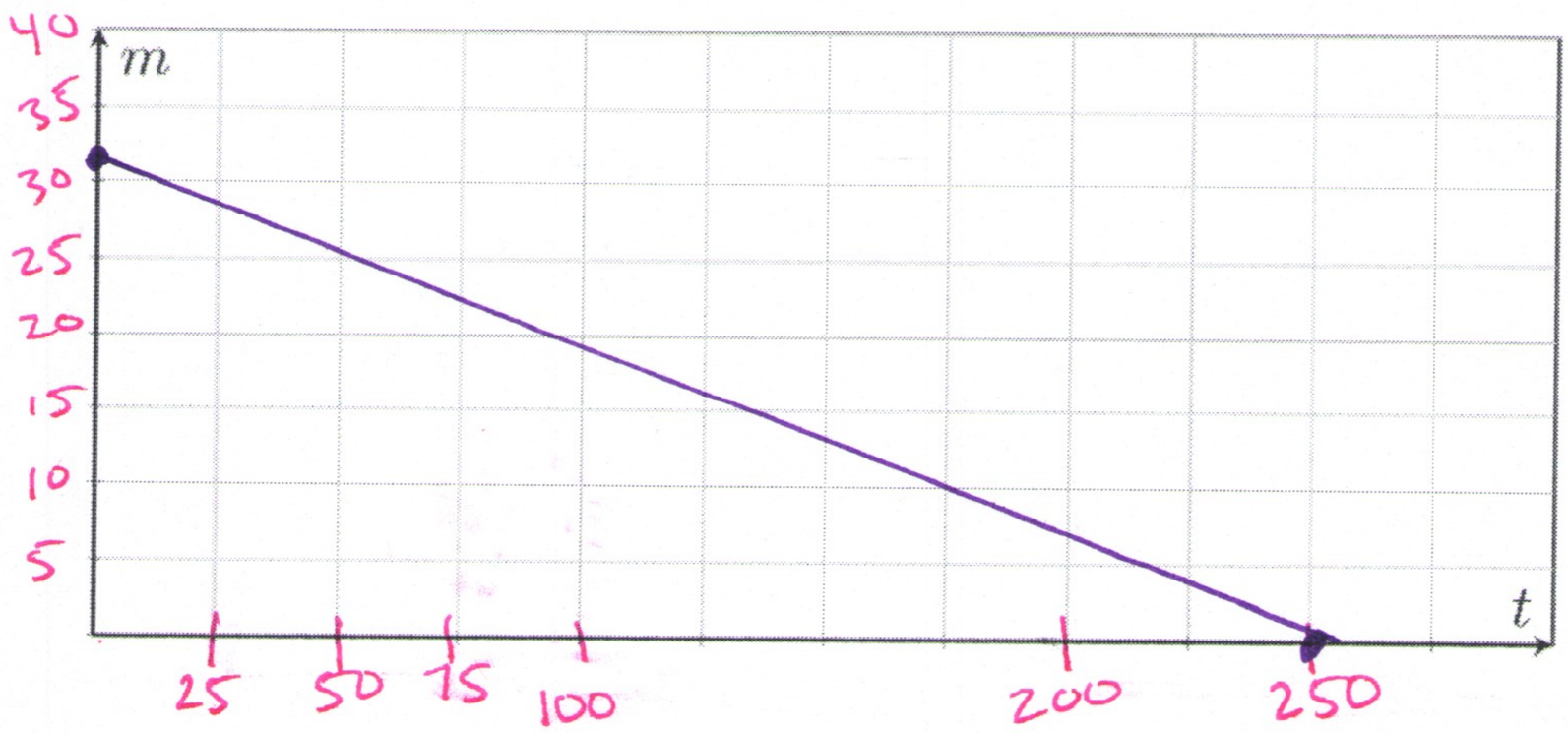
b. Find the m-intercept. What does it represent?

$2(0)+16m=500$

$\frac{16m}{16}=\frac{500}{16}$ $m=31.25$ boxes of markers

If we only bought markers we could buy 31 boxes.

c. Graph this equation using the intercepts. Label the axes and scale.



(2,31)

d. Solve $2t+16m=500$ for m to put it in slope-intercept form. Use this to state and interpret the slope for this equation.

$2t+16m=500$

$-2t \qquad -2t$

$\frac{16m}{16}=\frac{-2t}{16}+\frac{500}{16}$

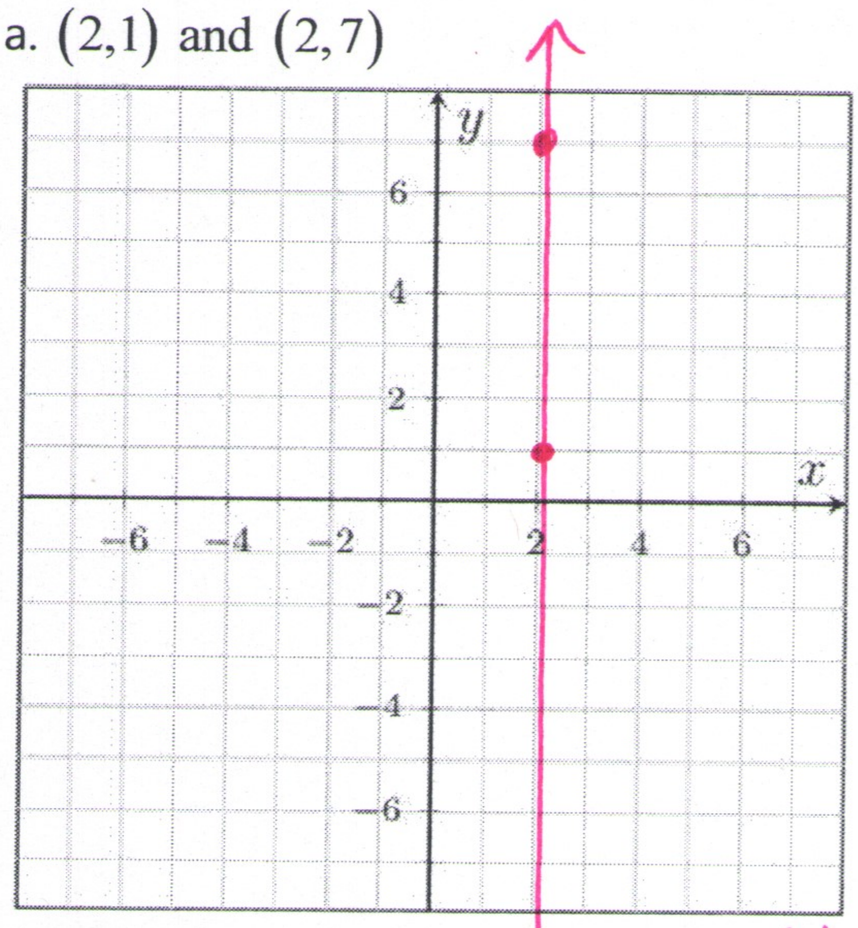
$m=-\frac{1}{8}t+31.25$

For one less box of markers purchased you can buy 8 boxes of tissues.

Section 4.8 Horizontal, Vertical, Parallel and Perpendicular Lines

6. Graph and find the slope of the line between each pair of points. Then write the equation of each line.

a. $(2,1)$ and $(2,7)$

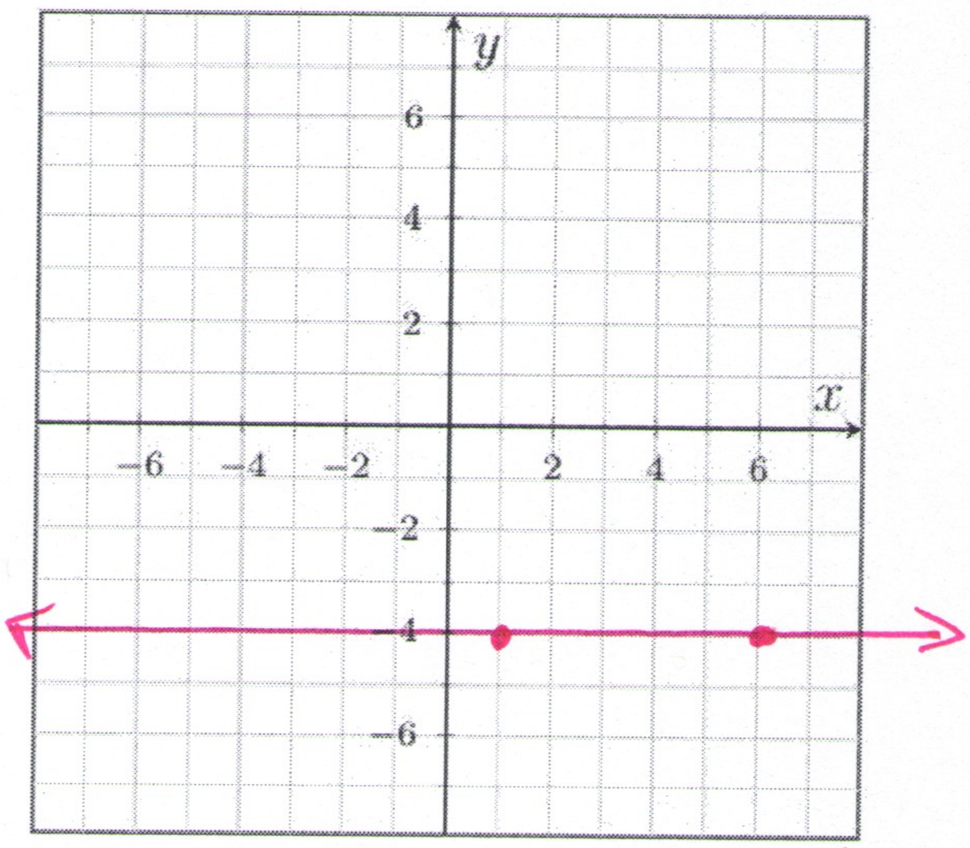


x	y
2	1
2	7
2	2
2	5

Slope: undefined

Equation: $x=2$

b. $(6,-4)$ and $(1,-4)$



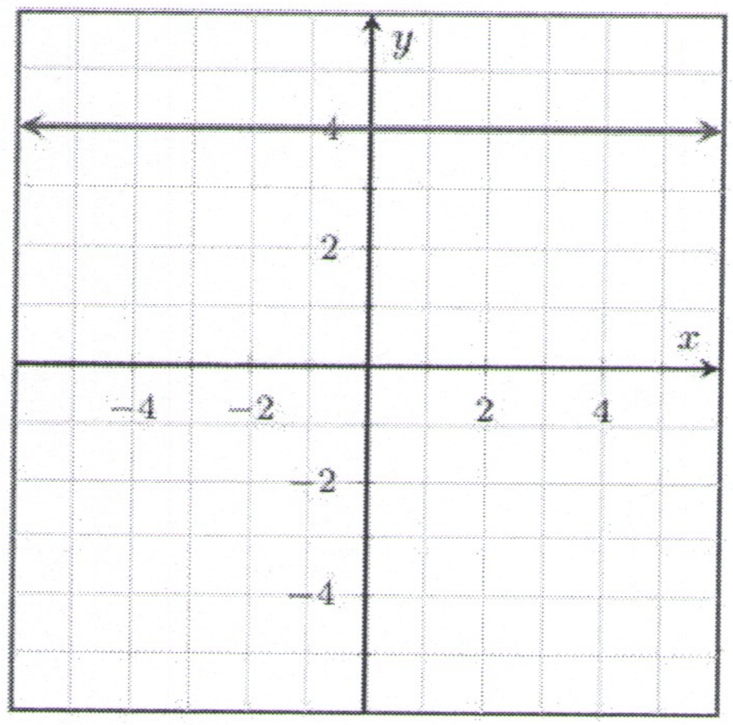
x	y
0	−4
2	−4
−10	−4
100	−4

Slope: $m=0$

Equation: $y=-4$

7. Write the equation of each line. Then identify the slope, y-intercept and x-intercept.

a.



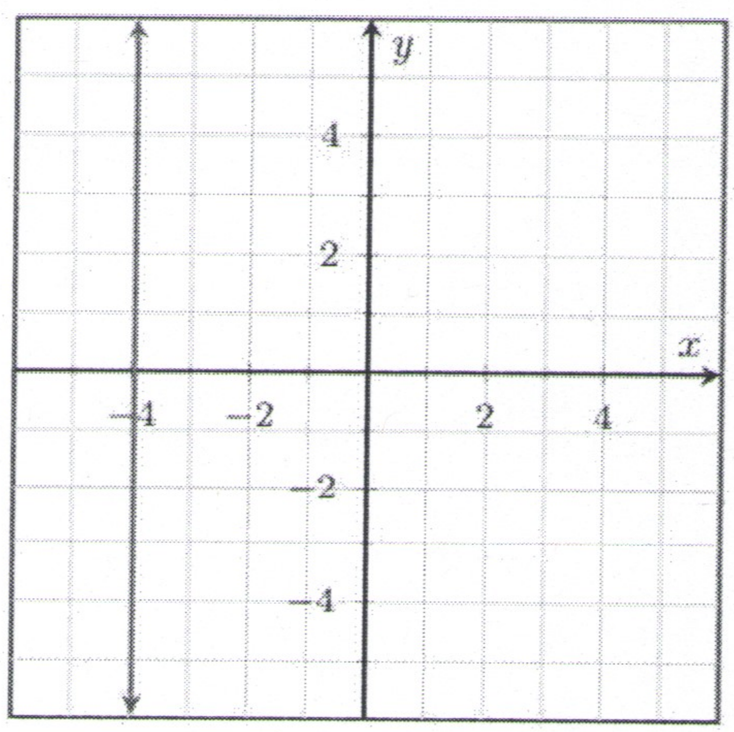
Equation: $y=4$

Slope: $m=0$

x-intercept none

y-intercept $(0,4)$

b.



Equation: $x=-4$

Slope: undefined

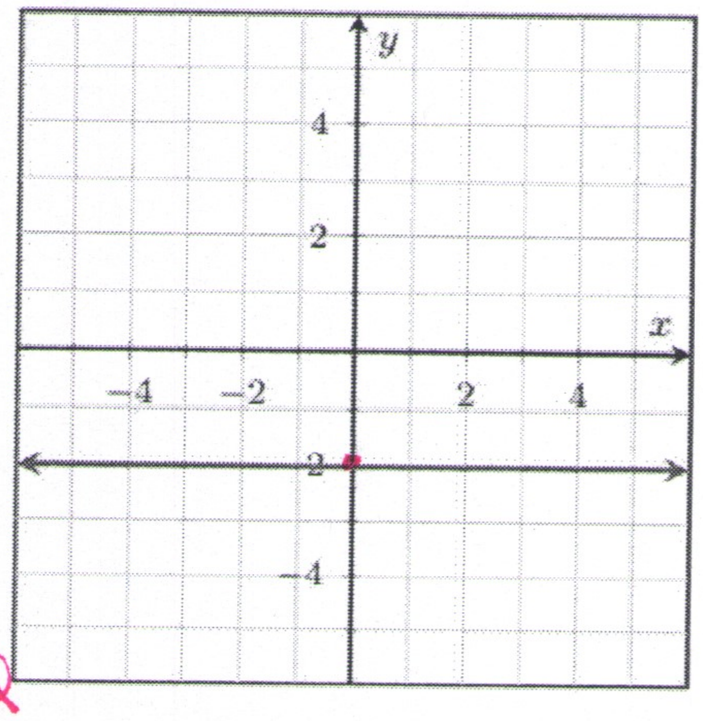
x-intercept: $(-4,0)$

y-intercept: none

8. Write the equation of each line. Then identify the slope, y-intercept and x-intercept.

Standard form $Ax+By=C$ ← diagonal slanted

a.



horizontal line

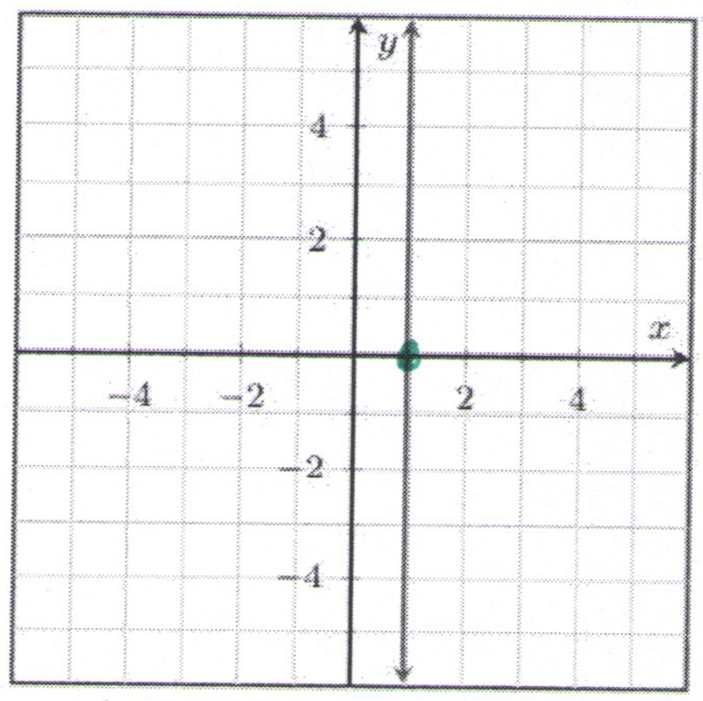
Equation: $y=-2$

Slope: $m=0$ $\frac{\text{rise}}{\text{run}}=\frac{0}{4}$

x-intercept none

y-intercept $(0,-2)$

b.



Equation: $x=1$

Slope: undefined $\frac{\text{rise}}{\text{run}}=\frac{3}{0}$

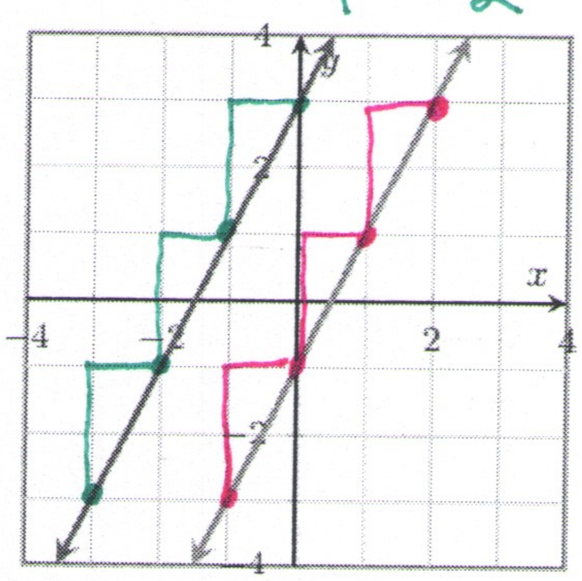
x-intercept: $(1,0)$

y-intercept: none

Parallel and Perpendicular Lines

9. Determine whether the lines are parallel, perpendicular or neither. Then write the slope of each line.

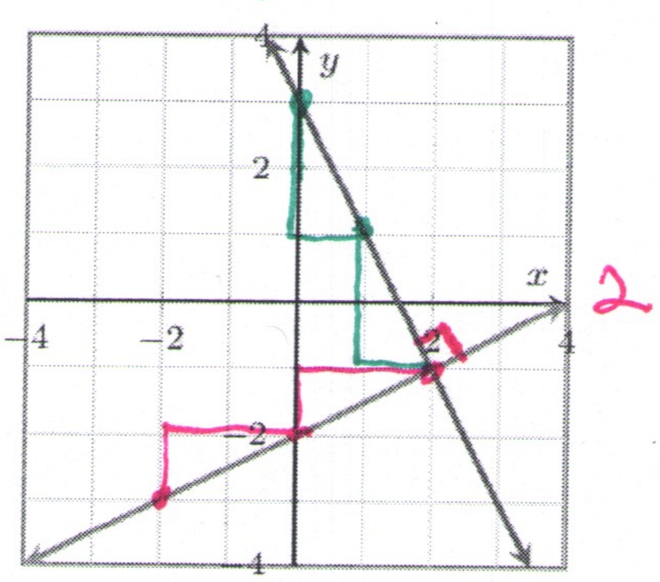
a. parallel



Slope of line 1: $\frac{2}{1}$ or 2

Slope of line 2: $\frac{2}{1}$ or 2

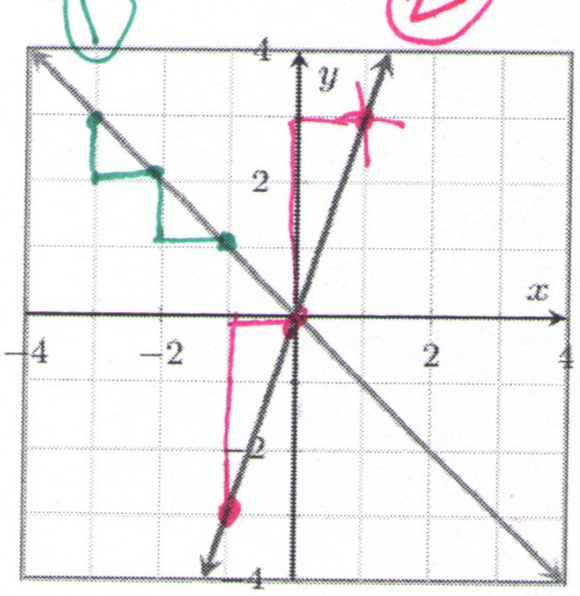
b. perpendicular



Slope of line 1: $-\frac{2}{1}$

Slope of line 2: $\frac{1}{2}$

c. neither



Slope of line 1: -1

Slope of line 2: $\frac{3}{1}$

What do you notice about the slopes of parallel lines? same slope

What do you notice about the slopes of perpendicular lines? they are opposite reciprocals

ex: $\frac{1}{5}$ and $-\frac{5}{1}$

the slopes multiply to get -1.

or $x=$ one vertical and one horizontal $y=$

10. Determine whether each pair of lines is parallel, perpendicular or neither.

a. $y = -5x + 1$ and $y = \frac{1}{5}x - 4$

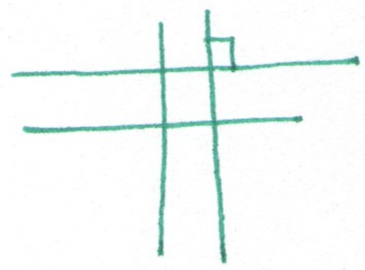
$m = -5$ $m = \frac{1}{5}$

perpendicular the slopes are opposite reciprocals

b. $x = 2$ and $y = 3$

vert horiz.

perpendicular



c. $y = 3x + 1$ and $y = -3x + 1$

$m = 3$ $m = -3$

neither

d. $2x + y = 4$ and $6x + 3y = 7$

$-2x$ $-2x$ $-6x$ $-6x$

$y = mx + b$

$y = -2x + 4$ $\frac{3y}{3} = \frac{-6x}{3} + \frac{7}{3}$

$m = -2$ $y = -2x + \frac{7}{3}$

parallel $m = -2$

More Practice

11. A couple is planning their wedding. They want the total cost of catering (x, in dollars) and renting the venue (y, in dollars) to be $4,000. They plan to hit this limit. This can be modeled by the equation $x + y = 4000$.

Use t on the horizontal axis and m on the vertical axis.

a. Find the x-intercept. What does this represent?

$y=0$: $x + 0 = 4000$

$x = 4000$ $(4000, 0)$

If they spent $0 on catering they could spend $4,000 on food.

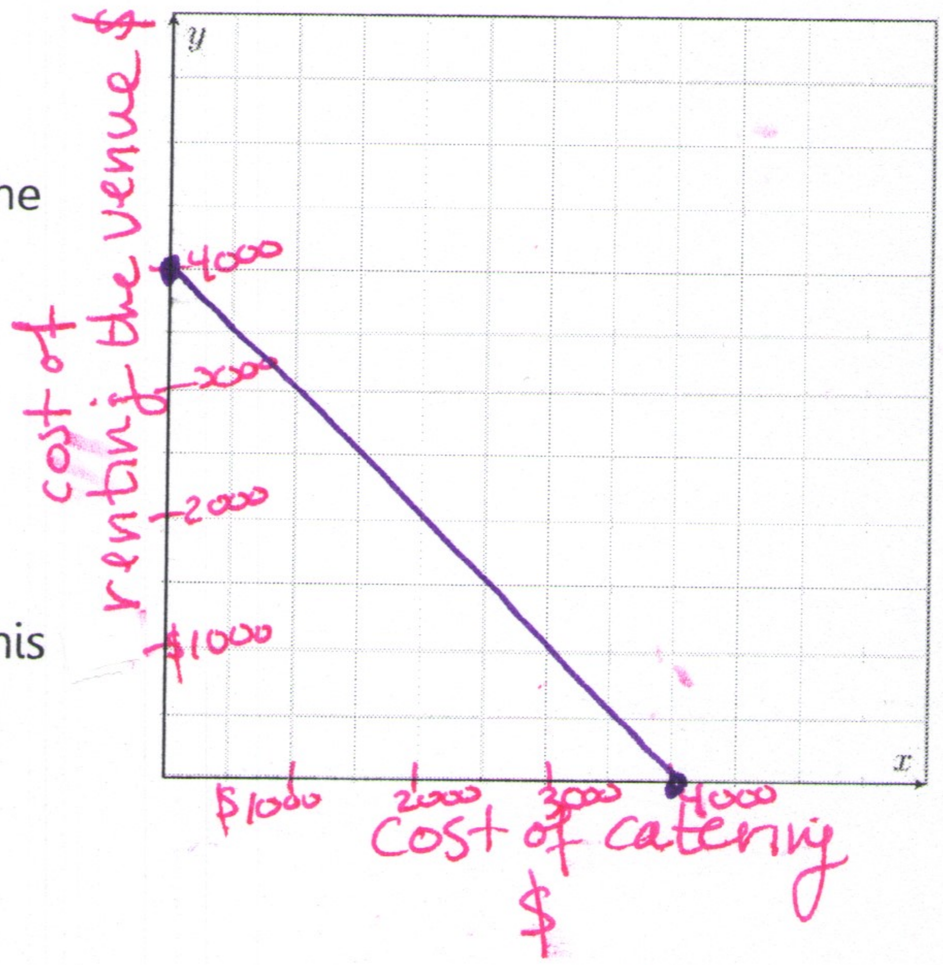
b. Find the y-intercept. What does it represent?

$x=0$: $0 + y = 4000$

$y = 4000$

$(0, 4000)$

c. Graph this equation using the intercepts. Label the axes and scale.



$x + y = 4000$

d. Solve ~~$2t + 16m = 500$~~ to put it in slope-intercept form. Use this to state and interpret the slope for this equation.

$x + y = 4000$

$-x \quad -x$

$y = -x + 4000$

The slope is -1 or $\frac{-1}{1}$. This means for every dollar less they spend on the venue they can spend one more on catering.

12. Find the x-intercept and y-intercept for the equation $6x-2y=12$. Then graph the equation.

Let x=0:

$6(0)-2y=12$

$\frac{-2y}{-2}=\frac{12}{-2}$

$y=-6$

$(0,-6)$

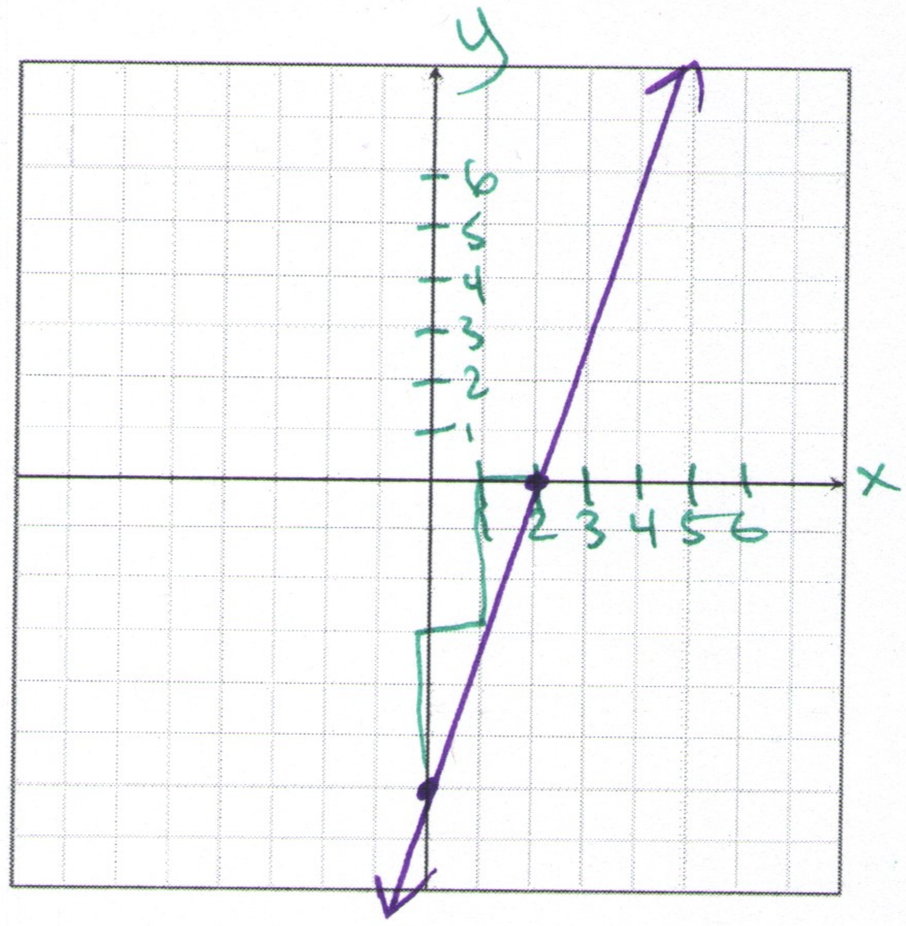
Let y=0:

$6x-2(0)=12$

$\frac{6x}{6}=\frac{12}{6}$

$x=2$

$(2,0)$



Rewrite the equation in slope-intercept form and check the graph.

$6x-2y=12$

$-6x \quad -6x$

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

$y=3x-6$

m=3

y-int=6 ✓

13. Rewrite the line in slope-intercept in standard form.

a. $y=-x+7$

$+x \quad +x$

$x+y=7$

b. $y=\frac{2}{5}x-1$ .5 .8

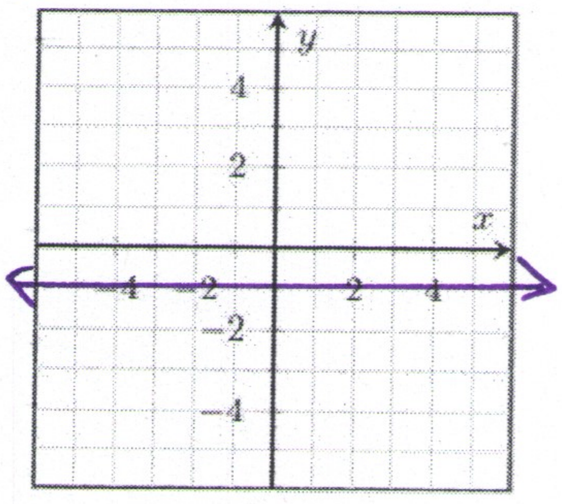
$5y=2x-5$

$-2x \quad -2x$

$-2x+5y=-5$

14. For parts a and b, graph each line and determine its slope. For parts c and d, state the equation of the line and its slope.

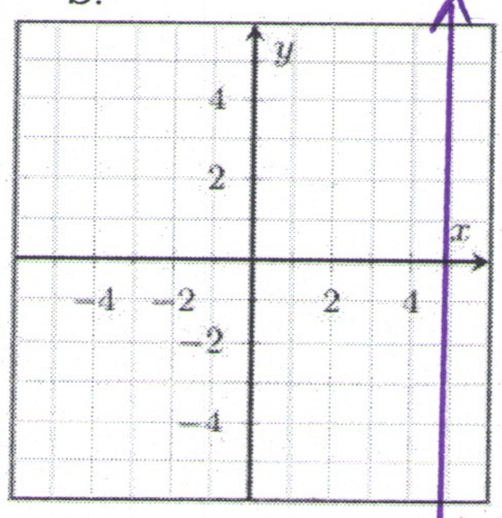
a.



Equation: $y=-1$

Slope: m=0

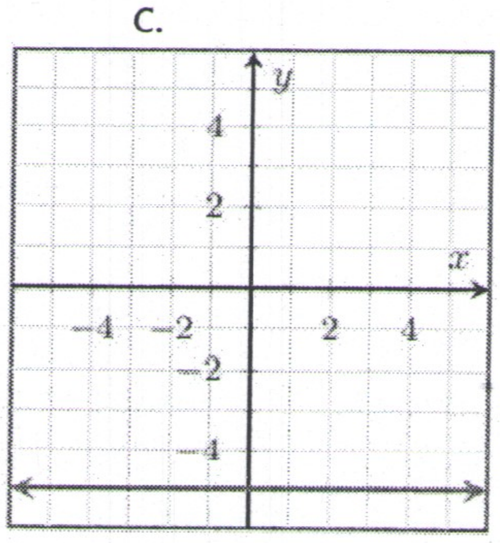
b.



Equation: $x=5$

Slope: undefined

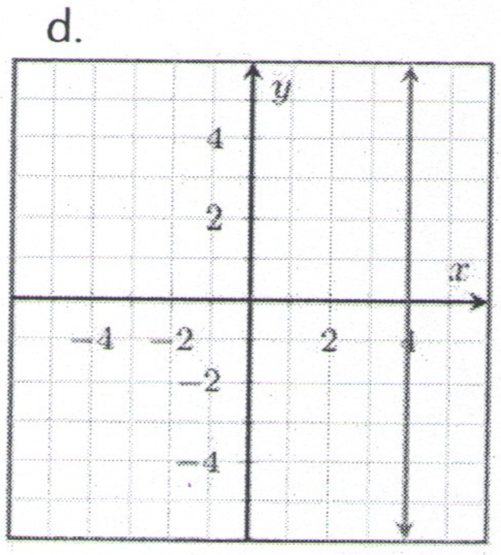
c.



Equation: y=-5

Slope: m=0

d.

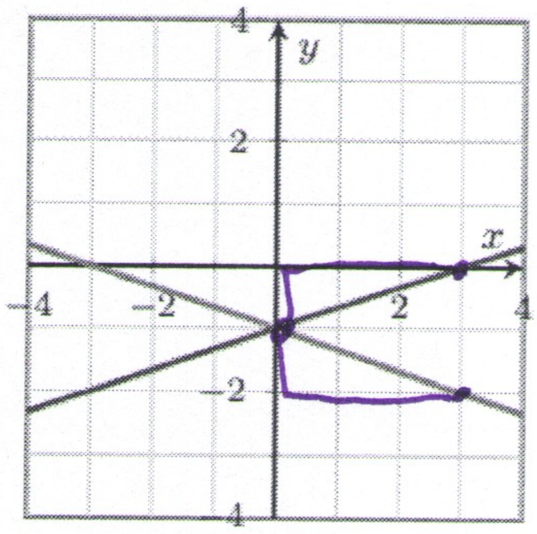


Equation: x=4

Slope: undefined

15. Determine whether the lines are parallel, perpendicular or neither. Then write the slope of each line.

a.

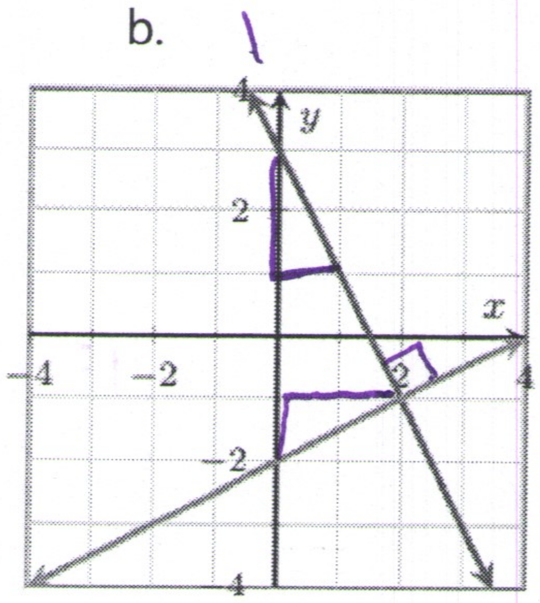


Slope of line 1: $\frac{1}{3}$

Slope of line 2: $-\frac{1}{3}$

neither

b.

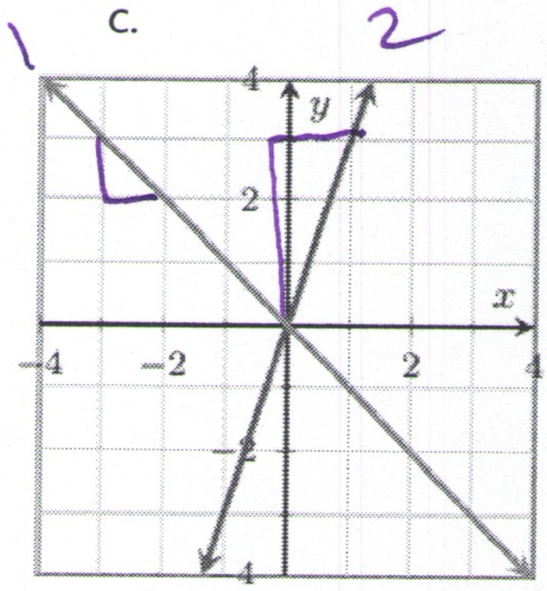


Slope of line 1: $-\frac{2}{1}$

Slope of line 2: $\frac{1}{2}$

perpendicular

c.



Slope of line 1: $-\frac{1}{1} = -1$

Slope of line 2: $\frac{3}{1} = 3$

neither

16. Determine whether each pair of lines is parallel, perpendicular or neither.

a. $y = 7x + 1$ and $y = x - 7$

$m = 7 \quad m = 1$

neither

b. $y = 8x + 1$ and $y = -\frac{1}{8}x + 3$

$m = 8 \qquad m = -\frac{1}{8}$

perpendicular

c. $x = -5$ and $x = 4$

parallel

(both vertical)

d. $3x + y = 4$ and $6x + 2y = 7$

$-3x \quad -3x \qquad -6x \quad -6x$

$y = -3x + 4$

$m = -3$

$\frac{2y}{2} = \frac{-6x}{2} + \frac{7}{2}$

$y = -3x + \frac{7}{2}$

parallel $\quad m = -3$

e. $y = 5x - 2$ and $y = -2x - 2$

$m = 5 \qquad m = -2$

neither

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

perpendicular

4.8 # 30. Line k has the equation $y = 5x + 7$
Line ℓ is parallel to line k but passes through the point $(2, 9)$.

Find an equation for ℓ in point-slope and slope-intercept form.

$m = 5 \qquad (2, 9)$

$y = m(x - x_1) + y_1$

$y - y_1 = m(x - x_1)$

$y = 5(x - 2) + 9$ point-slope form

$y = 5x - 10 + 9$

$y = 5x - 1$