

1. Write the prime factorization of each of the following. Indicate if it is a perfect square, perfect cube or neither.

a. 168

$$\begin{array}{c}
 4 \quad 42 \\
 \swarrow \quad \searrow \\
 2 \quad 2 \quad 7 \quad 6 \\
 \quad \quad \quad \swarrow \quad \searrow \\
 \quad \quad \quad 2 \quad 3
 \end{array}$$

$2 \times 2 \times 2 \times 3 \times 7$
neither

b. 576

$$\begin{array}{c}
 8 \quad 72 \\
 \swarrow \quad \searrow \\
 2 \quad 4 \quad 8 \quad 9 \\
 \quad \swarrow \quad \searrow \quad \swarrow \quad \searrow \\
 \quad 2 \quad 2 \quad 4 \quad 2 \quad 3 \quad 3 \\
 \quad \quad \quad \swarrow \quad \searrow \\
 \quad \quad \quad 2 \quad 2
 \end{array}$$

$(2 \times 2 \times 2 \times 2) \times (2 \times 2 \times 3 \times 3)$
 $2 \times 2 \times 2 \times 3 = 24$
perfect square

c. 512

$$\begin{array}{c}
 8 \quad 64 \\
 \swarrow \quad \searrow \\
 4 \quad 2 \quad 8 \quad 8 \\
 \swarrow \quad \searrow \quad \swarrow \quad \searrow \\
 2 \quad 2 \quad 4 \quad 2 \quad 2 \quad 4 \\
 \quad \swarrow \quad \searrow \quad \swarrow \quad \searrow \\
 \quad 2 \quad 2 \quad 2 \quad 2
 \end{array}$$

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
 $2 \times 2 \times 2 = 8$
perfect cube

2. Rewrite the following with positive exponents only:

a. x^{-3}
 $\frac{1}{x^3}$

b. $\frac{1}{d^{-4}}$
 d^4

c. $\left(\frac{a}{b}\right)^{-2}$
 $\frac{b^2}{a^2}$

3. Write as a single power.

a. $y^3 y^2$
 y^5

b. $\frac{a^6}{a^2}$
 a^4

c. $(d^7)^2$
 d^{14}

4. Evaluate the following. NO DECIMAL ANSWERS!

a. 3^{-2}
 $\frac{1}{3^2} = \frac{1}{9}$

b. 4^{-3}
 $\frac{1}{4^3} = \frac{1}{64}$

5. Simplify with positive exponents only.

a. $m^{-7} \times m^3$
 $\frac{1}{m^4}$

d. $(a^3 b)(a^{-1} b^4)$
 $a^2 b^5$

g. $(3m^4 n)^2$
 $9m^8 n^2$

b. $\frac{a^3}{a^{-8}} a^{11}$

e. $\frac{x^2 y}{x^3 y^{-2}}$
 $\frac{x^{-1} y^3}{x^1 y^3}$

h. $(m^2 n^{-4})^{-2}$
 $m^{-4} n^8$

c. $(x^2 y^{-3})^4$
 $x^8 y^{-12}$
 $\frac{x^8}{y^{12}}$

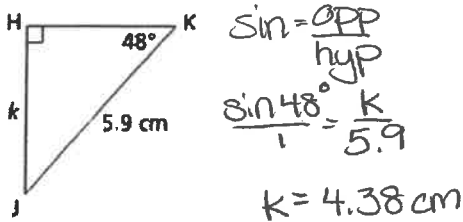
f. $\left(\frac{x^2 y}{y^{-2}}\right)^{-2}$
 $\frac{x^{-4} y^{-2}}{y^{-2}}$
 $\frac{1}{x^4}$

$\frac{n^8}{m^4}$

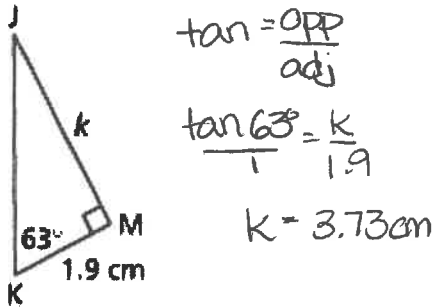
Chapter 3

1. Determine the indicated measurement.

a.



b.



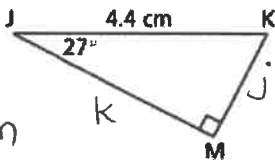
c.

2. Solve the triangle.

a. $\angle K = 180 - 90 - 27$
 $\angle K = 63^\circ$

$\sin = \frac{\text{opp}}{\text{hyp}}$
 $\frac{\sin 27^\circ}{1} = \frac{j}{4.4}$
 $j = 2 \text{ cm}$

$\cos = \frac{\text{adj}}{\text{hyp}}$
 $\frac{\cos 27^\circ}{1} = \frac{k}{4.4}$
 $k = 3.92 \text{ cm}$



Chapter 5

1. Expand and simplify.

a. $(9 + m)(9 + m)$
 $81 + 9m + 9m + m^2$
 $81 + 18m + m^2$

b. $(3a - 5)(2a - 3)$
 $6a^2 - 9a - 10a + 15$
 $6a^2 - 19a + 15$

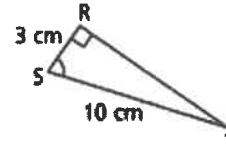
c. $(3x - 2)^2$
 $9x^2 - 6x - 6x + 4$
 $9x^2 - 12x + 4$

d. $(w + 4)(-2w^2 + 7w - 8)$
 $-2w^3 + 7w^2 - 8w - 8w^2 + 28w - 32$
 $-2w^3 - w^2 + 20w - 32$

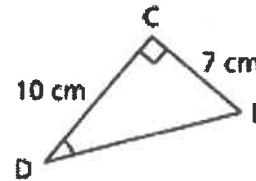
e. $(4n + 2) + (2n - 3)(3n - 2)$
 $4n + 2 + 6n^2 - 4n - 9n + 6$
 $6n^2 - 9n + 8$

f. $(f + 1)(2f - 4) - (3f + 1)$
 $2f^2 - 4f + 2f - 4 - 3f - 1$
 $2f^2 - 5f - 5$

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$
 $= \frac{3}{10}$
 $\theta = 73^\circ$

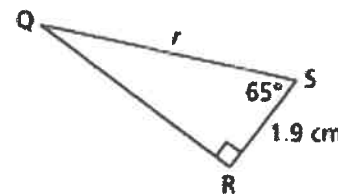


d.



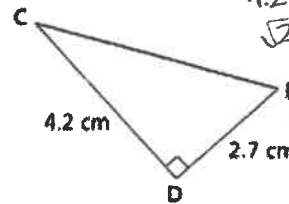
$\tan \theta = \frac{\text{opp}}{\text{adj}}$
 $= \frac{7}{10}$
 $\theta = 35^\circ$

e.



$\cos \theta = \frac{\text{adj}}{\text{hyp}}$
 $\frac{\cos 65^\circ}{1} = \frac{1.9}{r}$
 $r = 4.5 \text{ cm}$

$\text{leg}^2 + \text{leg}^2 = \text{hyp}^2$
 $4.2^2 + 2.7^2 = d^2$
 $\sqrt{24.93} = d^2$
 $d = 4.99 \text{ cm}$



$\tan E = \frac{\text{opp}}{\text{adj}}$
 $= \frac{4.2}{2.7}$
 $E = 57^\circ$

2. Factor by removing the GCF.

a. $14a^3b^2 - 28b^3c^2 + 21a^2c^3$
 $7(2a^3b^2 - 4b^3c^2 + 3a^2c^3)$

b. $24x^3 - 32x^2 - 40x^4$
 $8x^2(3x - 4 - 5x^2)$

3. Factor fully.

a. $n^2 - n - 12$
 $(n-4)(n+3)$

b. $w^2 - 22wx + 121x^2$
 $(w-11x)(w-11x)$

c. $8m - 4m^2$
 $4m(2-m)$

d. $-24m^2n - 6mn^2$
 $-6mn(4m+n)$

e. $x^2 + 8x + 12$
 $(x+6)(x+2)$

c. $5r^2s^3(r+3) - 4(r+3)$
 $(r+3)(5r^2s^3 - 4)$

f. $q^2 + 6q + 8$
 $(q+4)(q+2)$

g. $u^2 - 12u + 27$
 $(u-9)(u-3)$

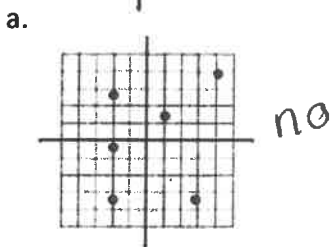
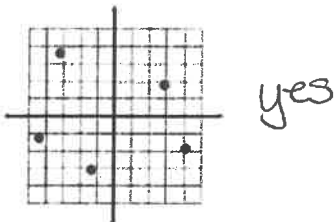
h. $16v^2 - 49$
 $(4v-7)(4v+7)$

i. $x^2 - 5x$
 $x(x-5)$

j. $5w^2 + 15w + 10$
 $5(w^2 + 3w + 2)$
 $5(w+2)(w+1)$

Chapter 6

1. Determine if each relation is a function.



b.

x	y
8	-3
7	-3
6	-3
5	-3
4	-3

yes

c.

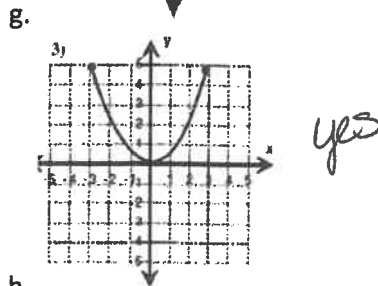
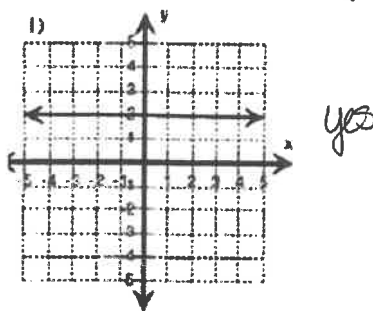
d.

x	y
-2	7
8	4
-1	-2
-2	3

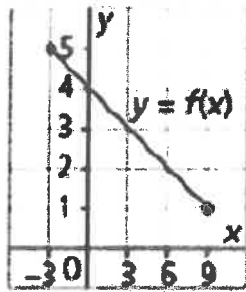
no

e. $\{(1, 3), (1, 5), (2, 7), (2, 9)\}$ no

f. $\{(1, 5), (3, 5), (4, 6), (9, 0)\}$ yes

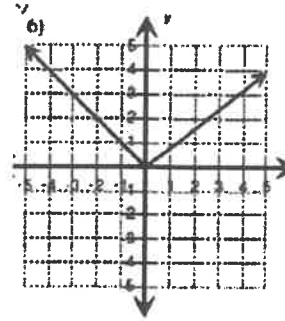


2. State the domain and range in interval notation.



domain
 $[-3, 9]$
 range
 $[1, 5]$

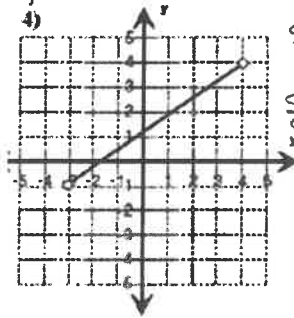
a.



domain
 $(-\infty, \infty)$
 range
 $[0, \infty)$

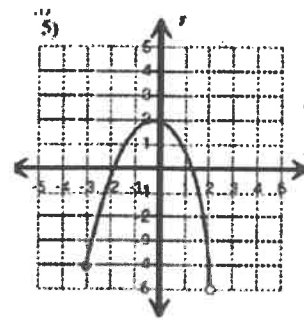
b.

3. State the domain and range in set notation.



$\{x \mid -3 < x < 4, x \in \mathbb{R}\}$
 $\{y \mid -1 < y < 4, y \in \mathbb{R}\}$

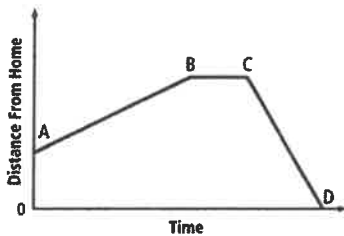
a.



$\{x \mid -3 \leq x \leq 2, x \in \mathbb{R}\}$
 $\{y \mid -5 < y \leq 2, y \in \mathbb{R}\}$

b.

4. The graph indicates a relationship between the distance from home and time as Jeremy went for a jog one day.



a. Describe a possible situation for each segment of the graph.

\overline{AB} - slow jog moving away from home
 \overline{BC} - at rest

\overline{CD} - quicker towards home

b. What do the slopes of the different line segments represent?

speed of jogging

c. During which segment is Jeremy jogging the fastest?

\overline{CD}

5. The altitude of an airplane after 5 min of flight was 1220 m. After 20 min, the altitude was 6860m.

a. Identify the dependent variable and the independent variable in this situation.

altitude

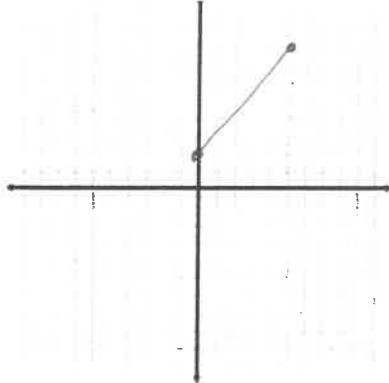
time

b. What is the meaning of the slope of the graph in this situation?

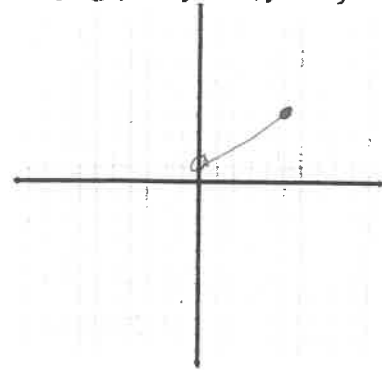
change of altitude of plane

6. Sketch a possible graph to represent a relation for each given domain and range.

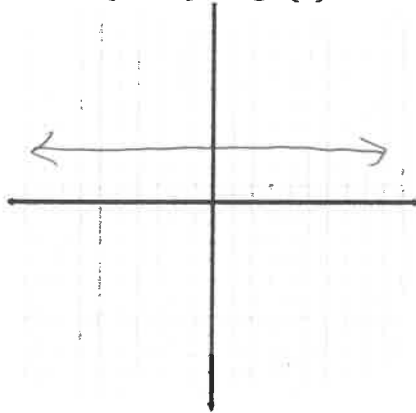
a. domain $[0,5]$, range $[2,8]$



c. domain $\{x \mid 0 < x \leq 5, x \in R\}$,
range $\{y \mid 1 < y \leq 4, y \in R\}$



b. domain $\{x \in R\}$, range $\{3\}$



Chapter 7

1. Determine the slope for each equation.

a. $y = -2x + 7$

$m = -2$

c. $y = 9 - 5x$

$m = -5$

b. $y + 7 = 3(x - 8)$

$m = 3$

d. $y = x$

$m = 1$

2. A line has a slope of $\frac{3}{5}$

a. What is the slope of a line that is parallel to this one?

$m = \frac{3}{5}$

b. What is the slope of a line that is perpendicular to this one?

$m = -\frac{5}{3}$

3. A line has a slope of -4

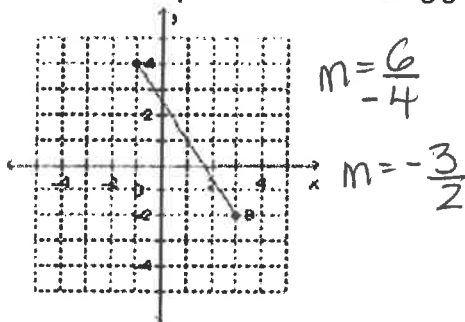
a. What is the slope of a line that is parallel to this one?

$m = -4$

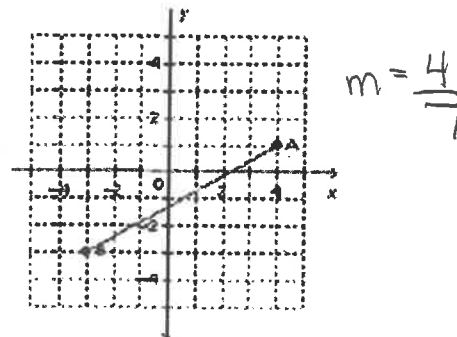
b. What is the slope of a line that is perpendicular to this one?

$m = \frac{1}{4}$

4. Determine the slope from the following graphs.



a.



b.

5. Determine the slope of a line that passes through the following points.

a. $(-6, 8)$ and $(-1, -2)$ $\frac{8 - (-2)}{-6 - (-1)} = \frac{10}{-5} = -2$

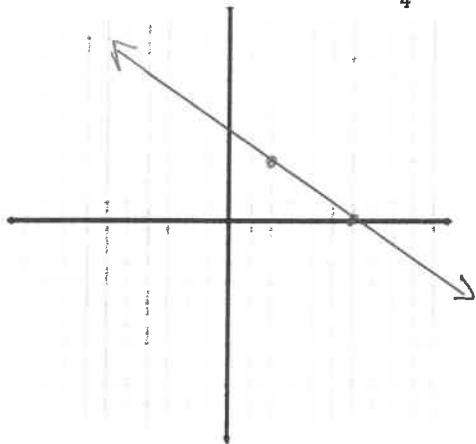
b. $(-3, 7)$ and $(5, -5)$ $\frac{7 - (-5)}{-3 - 5} = \frac{12}{-8} = -\frac{3}{2}$

6. The equations of two lines are given. Are the two lines parallel, perpendicular or neither? Explain your reasoning.

$y = -3x + 6$ $y = \frac{1}{3}x - 20$

perpendicular
slopes are negative reciprocals

7. Draw a line that has a slope of $-\frac{3}{4}$ and goes through the point $(2, 3)$.



8. State whether the following represent a linear relation.

a. $2x + 3y = 7$

yes

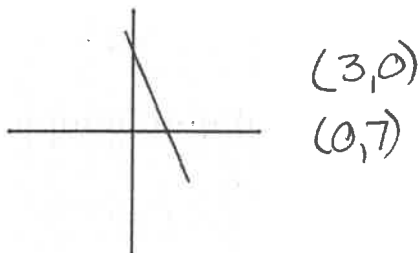
b. $\{(2, 7), (4, 10), (6, 13), (8, 16)\}$

yes

c. $x = -4$

yes

9. What are the coordinates of the x intercept and y intercept?



10. If $g(x) = 2x - 4$, determine:

a. $g(-1)$

$g(-1) = 2(-1) - 4$
 $= -6$

b. x if $g(x) = 2$

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

11. Calculate the x and y intercepts for each of the equations:

a. $2x - 5y = 20$

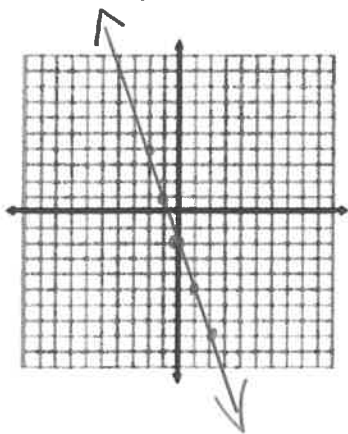
$$\begin{aligned} 2x &= 20 & -5y &= 20 \\ x &= 10 & y &= -4 \end{aligned}$$

b. $7y + 4x + 56 = 0$

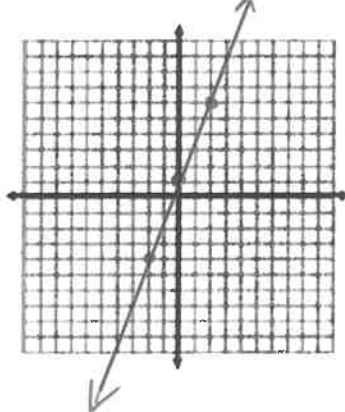
$$\begin{aligned} 4x + 56 &= 0 & 7y + 56 &= 0 \\ 4x &= -56 & 7y &= -56 \\ x &= -14 & y &= -8 \end{aligned}$$

12. Graph the following equations

a. $y = -3x - 2$

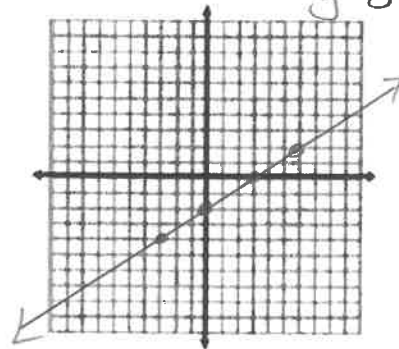


b. $y = \frac{5}{2}x + 1$



c. $2x - 3y - 6 = 0$

$$\begin{aligned} 3y &= -2x + 6 \\ y &= \frac{2}{3}x - 2 \end{aligned}$$



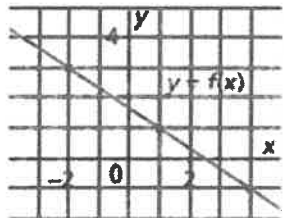
13. Write an equation of a line that has a slope of -4 and a y-intercept of 9.

$$y = -4x + 9$$

14. Write an equation of a line that has a slope of $-\frac{2}{3}$ and passes through the point (-2,5)

$$y - 5 = -\frac{2}{3}(x + 2)$$

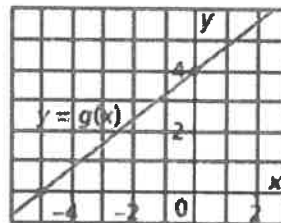
15. Write an equation for each graph.



a.

$$\begin{aligned} y - 3 &= -\frac{2}{3}(x + 2) \\ y - 3 &= -\frac{4}{6}(x + 2) \end{aligned}$$

b.



$$y = \frac{4}{5}x + 4$$

16. Write an equation in slope-intercept form that:

a. Has a slope of -4 and passes through (1,4)

$$\begin{aligned} y - 4 &= -4(x - 1) \\ y - 4 &= -4x + 4 \\ y &= -4x + 8 \end{aligned}$$

b. Passes through (-3,5) and (-1,2)

$$\frac{5 - 2}{-3 - (-1)} = \frac{3}{-2}$$

$$\begin{aligned} y - 5 &= -\frac{3}{2}(x + 3) \\ y - 5 &= -\frac{3}{2}x - \frac{9}{2} \\ y &= -\frac{3}{2}x + \frac{1}{2} \end{aligned}$$

$$\begin{aligned} -\frac{9}{2} + \frac{5}{1} \\ -\frac{9}{2} + \frac{10}{2} \\ \frac{1}{2} \end{aligned}$$

c. Is parallel to $y = -\frac{1}{3}x - 7$ and has an x-intercept of -3 $\rightarrow (-3, 0)$

$$y - 0 = -\frac{1}{3}(x + 3)$$

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

17. Write an equation in general form that:

a. Has a slope of $\frac{2}{3}$ and passes through $(-1, 4)$

$$y - 4 = \frac{2}{3}(x + 1)$$

$$(y - 4 = \frac{2}{3}x + \frac{2}{3}) \cdot 3$$

$$3y - 12 = 2x + 2$$

$$3y = 2x + 14$$

$$0 = 2x - 3y + 14$$

b. Is perpendicular to $y - 4 = 2(x + 7)$ and passes through $(-3, -5)$

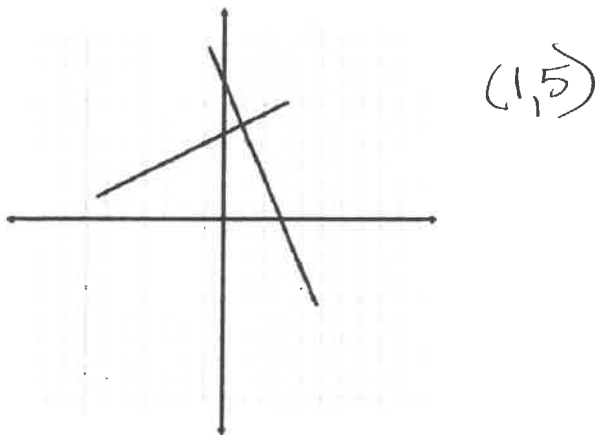
$$(y + 5 = -\frac{1}{2}(x + 3)) \cdot -2$$

$$-2y - 10 = x + 3$$

$$0 = x + 2y + 13$$

Chapter 8 & 9

1. Determine the solution to the system of equations.

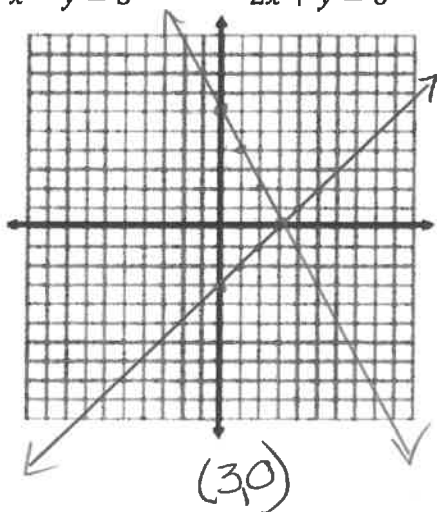


2. Solve the following systems graphically.

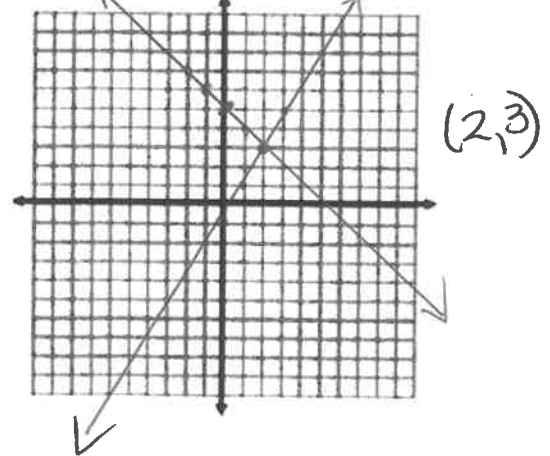
a. $x - y = 3$ $2x + y = 6$

$$y = x - 3$$

$$y = -2x + 6$$



b. $y = -x + 5$ $y = 2x - 1$



3. Solve the following systems using substitution.

a. $x + y = -5$ $x = -y - 5$
 $x + 3y = -15$

$$\begin{aligned} -y - 5 + 3y &= -15 \\ -5 + 2y &= -15 \\ 2y &= -10 \\ y &= -5 \end{aligned}$$

$$\begin{aligned} x - 5 &= -5 \\ x &= 0 \\ (0, -5) \end{aligned}$$

b. $4x + y = -5$ $y = -4x - 5$
 $2x + 3y = 5$

$$\begin{aligned} 2x + 3(-4x - 5) &= 5 \\ 2x - 12x - 15 &= 5 \\ -10x &= 20 \\ x &= -2 \end{aligned}$$

$$\begin{aligned} 4(-2) + y &= -5 \\ -8 + y &= -5 \\ y &= 3 \\ (-2, 3) \end{aligned}$$

c. $7x + y - 10 = 0$ $y = -7x + 10$
 $3x - 2y = -3$

$$\begin{aligned} 3x - 2(-7x + 10) &= -3 \\ 3x + 14x - 20 &= -3 \\ 17x &= 17 \\ x &= 1 \end{aligned}$$

$$\begin{aligned} 3(1) - 2y &= -3 \\ 3 - 2y &= -3 \\ -2y &= -6 \\ y &= 3 \quad (1, 3) \end{aligned}$$

4. Solve the following systems using elimination.

a. $-3x - y = 5$
 $2x + y = -5$

$$\begin{aligned} -x &= 0 \\ x &= 0 \end{aligned}$$

$$\begin{aligned} 2(0) + y &= -5 \\ 0 + y &= -5 \\ y &= -5 \\ (0, -5) \end{aligned}$$

b. $(2x - 4y = 13) \cdot 2$
 $4x - 5y = 8$

$$\begin{aligned} -4x + 8y &= -26 \\ \hline 3y &= -18 \\ y &= -6 \end{aligned}$$

$$\begin{aligned} 4x - 5(-6) &= 8 \\ 4x + 30 &= 8 \\ 4x &= -22 \\ x &= \frac{-22}{4} \rightarrow -\frac{11}{2} \\ (-\frac{11}{2}, -6) \end{aligned}$$

c. $(-0.5x + 0.2y = -1) \cdot 3$
 $0.3x - 0.6y = -1.8$

$$\begin{aligned} -1.5x + 0.6y &= -3 \\ \hline -1.2x &= -4.8 \\ x &= 4 \end{aligned}$$

$$\begin{aligned} -0.5(4) + 0.2y &= -1 \\ -2 + 0.2y &= -1 \\ 0.2y &= 1 \\ y &= 5 \quad (4, 5) \end{aligned}$$

5. Determine the number of solutions for each system.

a. $y = 3x - 5$
 $y = -4x + 5$

slope - different
 yint - different
 1 solution

b. $4x - 2y = -0.2$
 $-x + -0.5y = 0.05$

$$\begin{aligned} -2y &= -4x - 0.2 \\ y &= 2x + 0.1 \\ -0.5y &= x + 0.05 \\ y &= 2x - 0.1 \end{aligned}$$

slope - different
 yint - same
 1 solution

c. $y = 3x - 2$
 $y = 3x + 2$

slope - same
 yint - different
 parallel lines
 no solution

6. Determine if each point is a solution to the system.

a. $(-2, 3)$
 $2x - y = -7$
 $3x + y = 7$

$$\begin{aligned} 2(-2) - 3 &= -7 \\ -4 - 3 &= -7 \\ -7 &= -7 \checkmark \end{aligned}$$

$$\begin{aligned} 3(-2) + 3 &= 7 \\ -6 + 3 &= 7 \\ -3 &= 7 \quad \times \\ \text{no!} \end{aligned}$$

b. $(-1, 1)$
 $3x - 4y = 7$
 $9x + 6y = 3$

$$\begin{aligned} 3(-1) - 4(1) &= 7 \\ -3 - 4 &= 7 \\ -7 &= 7 \quad \times \end{aligned}$$

no!

c. $(4, -3)$
 $2x - y = 11$
 $x + 2y = -2$

$$\begin{aligned} 2(4) + 3 &= 11 \\ 8 + 3 &= 11 \\ 11 &= 11 \checkmark \end{aligned}$$

$$\begin{aligned} 4 + 2(-3) &= -2 \\ 4 - 6 &= -2 \\ -2 &= -2 \checkmark \\ \text{yes!} \end{aligned}$$