Skills Practice

Name _____ Date _____

I. Using Substitution to Solve Linear Systems

A. Solve each system of equations by substitution. Determine whether the system is consistent or inconsistent.

TEKS A.5C

1. $\begin{cases} y = 2x - 3 \\ x = 4 \end{cases}$

The solution is (4, 5).

The system is consistent.

2. $\begin{cases} 2x + y = 9 \\ y = 5x + 2 \end{cases}$

The solution is (1, 7).

The system is consistent.

3. $\begin{cases} y = 3x - 2 \\ y - 3x = 4 \end{cases}$

There is no solution.

The system is inconsistent.

4. $\begin{cases} \frac{1}{2}x + \frac{3}{2}y = -7 \\ \frac{1}{3}y = 2x - 10 \end{cases}$

The solution is (4, −6).

The system is consistent.

5. $\begin{cases} 0.8x - 0.2y = 1.5 \\ 0.1x + 1.2y = 0.8 \end{cases}$

The solution is (2, 0.5).

The system is consistent.

6. $\begin{cases} 0.3y = 0.6x + 0.3 \\ 1.2x + 0.6 = 0.6y \end{cases}$

The system has an infinite number of solutions.

The system is consistent.

B. Write a system of equations to represent each problem situation. Solve the system of equations using any method. Then, answer any associated questions.
TEKS A.2I, A.5C

1. Rachel needs to print some of her digital photos. She is trying to choose between Lightning Fast Foto and Snappy Shots. Lightning Fast Foto charges a base fee of $5 plus an additional $0.20 per photo. Snappy Shots charges a base fee of $7 plus an additional $0.10 per photo. Determine the number of photos for which both stores will charge the same amount. Explain which store Rachel should choose depending on the number of photos she needs to print.

Let *x* represent the number of photos printed. Let *y* represent the total cost (in dollars) to print *x* photos.

$\begin{cases} y = 0.20x + 5 & \text{Lightning Fast Foto} \\ y = 0.10x + 7 & \text{Snappy Shots} \end{cases}$

The solution is (20, 9). Both stores charge $9.00 for printing 20 photos. If Rachel wants to print fewer than 20 photos, then she should choose Lightning Fast Foto. If Rachel wants to print more than 20 photos, then she should choose Snappy Shots.

2. Raja is trying to decide which ice cream shop is the better buy. Cold & Creamy Sundaes charges $2.50 per sundae plus an additional $0.25 for each topping. Colder & Creamier Sundaes charges $1.50 per sundae plus an additional $0.50 for each topping. Determine the number of toppings for which both vendors charge the same amount. Explain which vendor is the better buy depending on the number of toppings Raja chooses.

Let x represent the number of toppings on a sundae. Let y represent the cost (in dollars) for a sundae with x toppings.

$$\begin{cases} y = 0.25x + 2.50 & \text{Cold and Creamy Sundaes} \\ y = 0.50x + 1.50 & \text{Colder and Creamier Sundaes} \end{cases}$$

The solution is (4, 3.50). Both vendors charges $3.50 for a sundae with 4 toppings. If Raja wants fewer than 4 toppings, then Colder & Creamier Sundaes is the better buy. If Raja wants more than 4 toppings, Cold & Creamy Sundaes is the better buy.

3. Marcus is selling T-shirts at the State Fair. He brings 200 shirts to sell. He has long-sleeved and short-sleeved T-shirts for sale. On the first day of the fair, he sells $\frac{1}{2}$ of his long-sleeved T-shirts and $\frac{1}{3}$ of his short-sleeved T-shirts for a total of 80 T-shirts sold. How many of each type of T-shirt did Marcus bring to the fair?

Let x represent the number of long-sleeved T-shirts Marcus brings to the fair. Let y represent the number of short-sleeved T-shirts Marcus brings to the fair.

$$\begin{cases} x + y = 200 \\ \frac{1}{2}x + \frac{1}{3}y = 80 \end{cases}$$

The solution is (80, 120). Marcus brought 80 long-sleeved T-shirts and 120 short-sleeved T-shirts to the fair.

4. Alicia has a booth at the flea market where she sells purses and wallets. All of her purses are the same price and all of her wallets are the same price. The first hour of the day, she sells 10 purses and 6 wallets for a total of $193. The second hour, she sells 2 purses and 1 wallet for a total of $37.50. How much does Alicia charge for each purse and each wallet?

Let x represent the charge for each purse. Let y represent the charge for each wallet.

$$\begin{cases} 10x + 6y = 193 \\ 2x + y = 37.5 \end{cases}$$

The solution is (16, 5.5). Alicia charges $16 for each purse and $5.50 for each wallet.

5. Johnny has some nickels and dimes in his pocket, and the change is worth $0.75. He has twice as many dimes as nickels. How many of each type of coin does Johnny have?

Let x represent the number of nickels Johnny has in his pocket. Let y represent the number of dimes Johnny has in his pocket.

$$\begin{cases} 0.05x + 0.10y = 0.75 \\ y = 2x \end{cases}$$

The solution is (3, 6). Johnny has 3 nickels and 6 dimes in his pocket.

6. Ms. Williamson woke up one morning to find that her water heater had sprung a leak. She called two different plumbers to get their rates. The first plumber charges sixty-four dollars just to walk in the door plus twenty-four dollars an hour. The second plumber charges a flat fifty-six dollars an hour. After how many hours will the cost for both plumbers be the same? Explain which plumber Ms. Williamson should use based on the number of hours she expects the repair to take.

Let x represent the number of hours. Let y represent the total cost of the plumber working for x hours.

$$\begin{cases} y = 64 + 24x & \text{The first plumber} \\ y = 56x & \text{The second plumber} \end{cases}$$

The solution is (2, 112). Both plumbers charge $112 for 2 hours of work. Ms. Williamson should use the first plumber if she expects the work will take longer than 2 hours. If Ms. Williamson expects the work will take less than two hours, so she should use the second plumber.

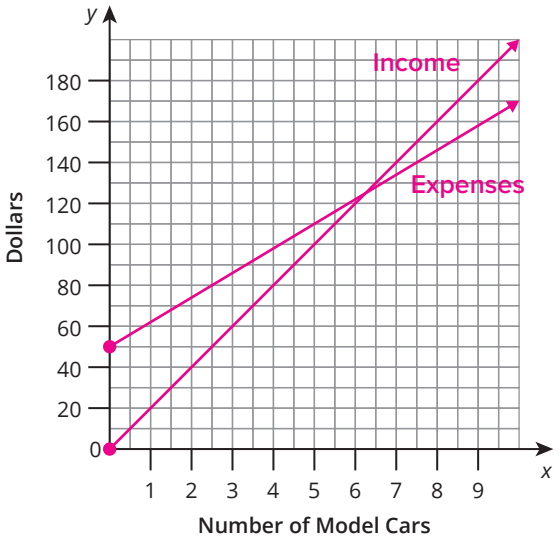
II. Using Graphing to Solve Systems of Equations

A. Write a system of linear equations to represent each problem situation. Define each variable. Then, graph the system of equations and estimate the point of intersection. Explain what the point represents with respect to the given problem situation.
TEKS A.2I, A.3.F, A.3G

1. Eric sells model cars from a booth at a local flea market. He purchases each model car from a distributor for $12, and the flea market charges him a booth fee of $50. Eric sells each model car for $20.

Eric's income can be modeled by the equation $y = 20x$, where y represents the income (in dollars) and x represents the number of model cars he sells. Eric's expenses can be modeled by the equation $y = 12x + 50$, where y represents the expenses (in dollars) and x represents the number of model cars he purchases from the distributor.

$$\begin{cases} y = 20x \\ y = 12x + 50 \end{cases}$$

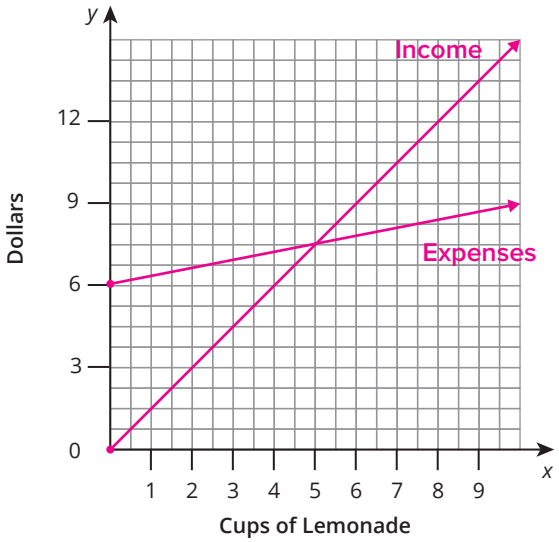


The break-even point is between 6 and 7 model cars. Eric must sell more than 6 model cars to make a profit.

2. Ramona sets up a lemonade stand in front of her house. Each cup of lemonade costs Ramona \$0.30 to make, and she spends \$6 on the advertising signs she puts up around her neighborhood. She sells each cup of lemonade for \$1.50.

Ramona's income can be modeled by the equation $y = 1.50x$, where y represents the income (in dollars) and x represents the number of cups of lemonade she sells. Ramona's expenses can be modeled by the equation $y = 0.30x + 6$, where y represents the expenses (in dollars) and x represents the number of cups of lemonade she makes.

$$\begin{cases} y = 1.50x \\ y = 0.30x + 6 \end{cases}$$

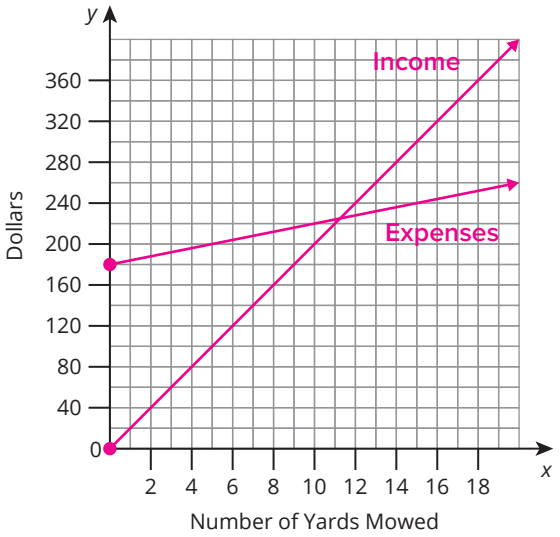


The break-even point is 5 cups of lemonade. Ramona must sell more than 5 cups of lemonade to make a profit.

3. Chen starts his own lawn mowing business. He initially spends $180 on a new lawnmower. For each yard he mows, he receives $20 and spends $4 on gas.

Chen's income can be modeled by the equation $y = 20x$, where y represents the income (in dollars) and x represents the number of yards he mows. Chen's expenses can be modeled by the equation $y = 4x + 180$, where y represents the expenses (in dollars) and x represents the number of yards he mows.

$$\begin{cases} y = 20x \\ y = 4x + 180 \end{cases}$$

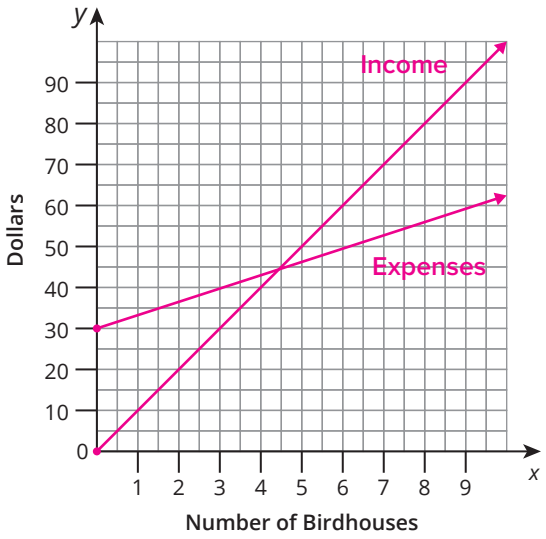


The break-even point is between 11 and 12 yards mowed. Chen must mow more than 11 yards to make a profit.

4. Olivia is building birdhouses to raise money for a trip to Hawaii. She spends a total of $30 on the tools needed to build the houses. The material to build each birdhouse costs $3.25. Olivia sells each birdhouse for $10.

Olivia's income can be modeled by the equation $y = 10x$, where y represents the income (in dollars) and x represents the number of birdhouses she sells. Olivia's expenses can be modeled by the equation $y = 3.25x + 30$, where y represents the expenses (in dollars) and x represents the number of birdhouses she builds.

$$\begin{cases} y = 10x \\ y = 3.25x + 30 \end{cases}$$

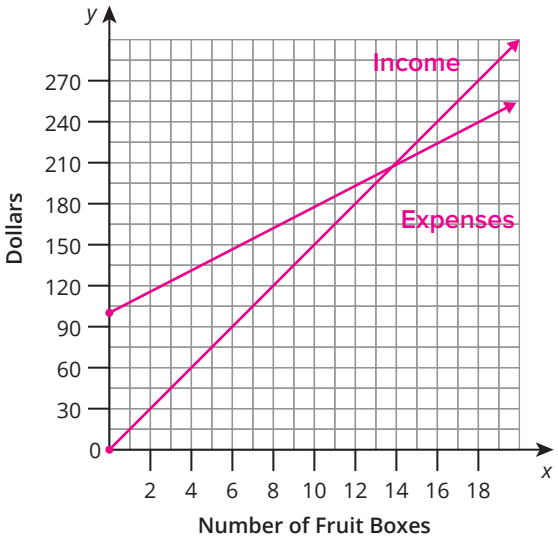


The break-even point is between 4 and 5 birdhouses. Olivia must sell more than 4 birdhouses to make a profit.

5. The Spanish Club is selling boxes of fruit as a fundraiser. The fruit company charges the Spanish Club $7.50 for each box of fruit and a shipping and handling fee of $100 for the entire order. The Spanish Club sells each box of fruit for $15.

The Spanish Club's income can be modeled by the equation $y = 15x$, where y represents the income (in dollars) and x represents the number of fruit boxes sold. The Spanish Club's expenses can be modeled by the equation $y = 7.50x + 100$, where y represents the expenses (in dollars) and x represents the number of fruit boxes ordered.

$$\begin{cases} y = 15x \\ y = 7.50x + 100 \end{cases}$$

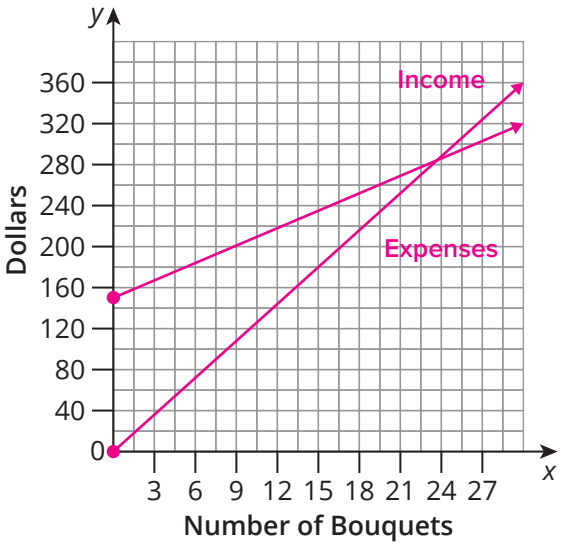


The break-even point is between 13 and 14 boxes of fruit. The Spanish Club must sell more than 13 boxes of fruit to make a profit.

6. Jerome sells flowers online for \$12 per bouquet. Each bouquet costs him \$5.70 to make. Jerome also paid a one-time fee of \$150 to advertise his company.

Jerome's income can be modeled by the equation $y = 12x$, where y represents the income (in dollars) and x represents the number of bouquets he sells. Jerome's expenses can be modeled by the equation $y = 5.70x + 150$, where y represents the expenses (in dollars) and x represents the number of bouquets he makes.

$$\begin{cases} y = 12x \\ y = 5.70x + 150 \end{cases}$$

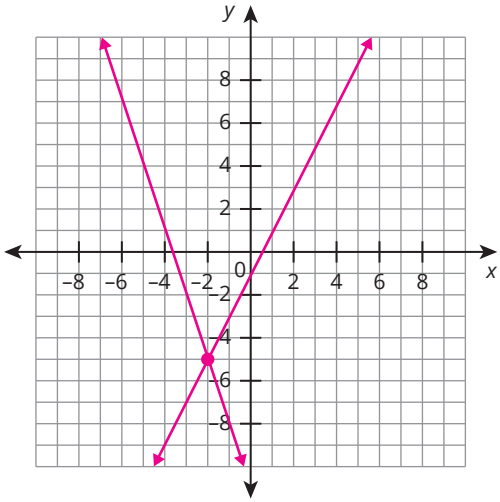


The break-even point is between 23 and 24 bouquets. Jerome must sell more than 23 bouquets to make a profit.

B. Graph the equations in each system. Tell whether the system has one solution, no solutions, or infinite solutions. If the system has one solution, write the values of the variables that make the equations true.
TEKS A.3F, A.5C

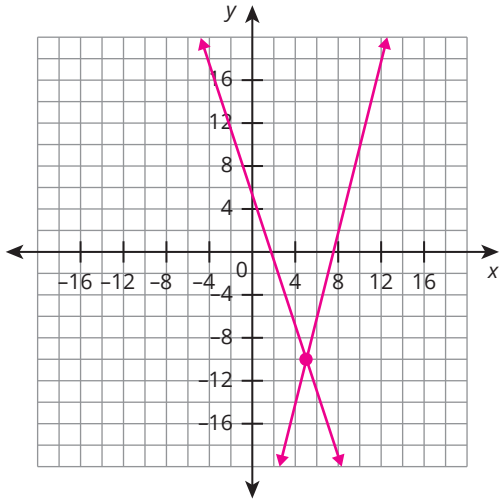
1. $\begin{cases} y = 2x - 1 \\ y = -3x - 11 \end{cases}$

one solution; (−2, −5)



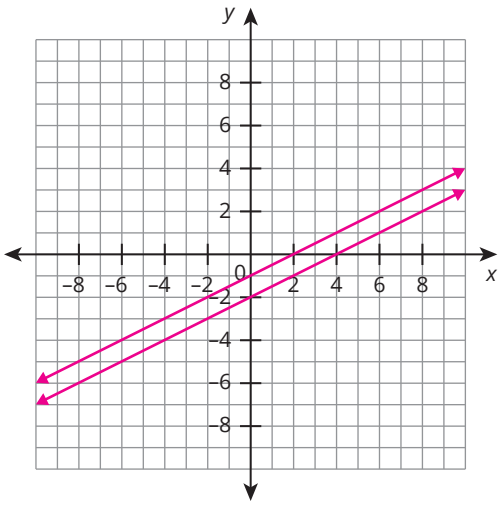
2. $\begin{cases} y = 4x - 30 \\ y = -3x + 5 \end{cases}$

one solution; (5, −10)



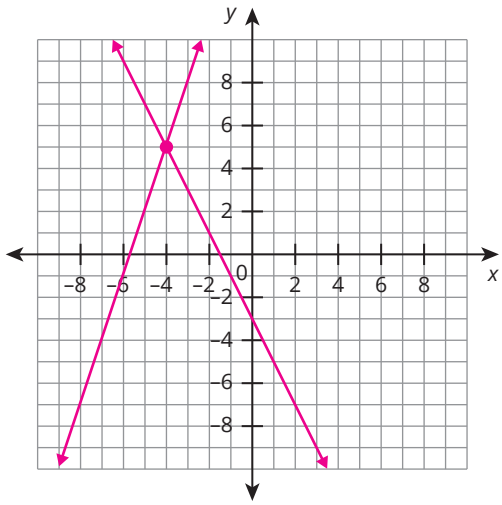
3. $\begin{cases} -5x + 10y = -10 \\ y = \frac{1}{2}x - 2 \end{cases}$

no solution



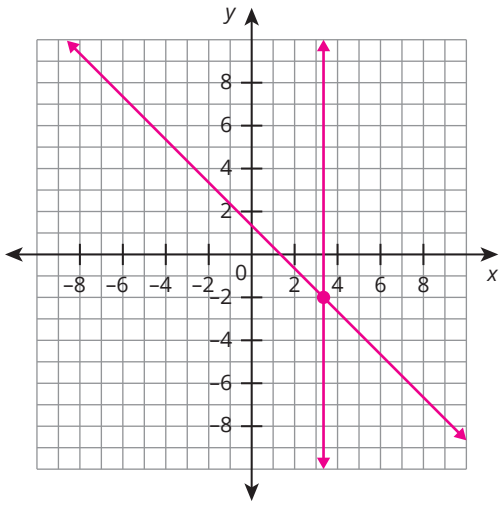
4. $\begin{cases} y = 3x + 17 \\ 10x + 5y = -15 \end{cases}$

one solution; (−4, 5)



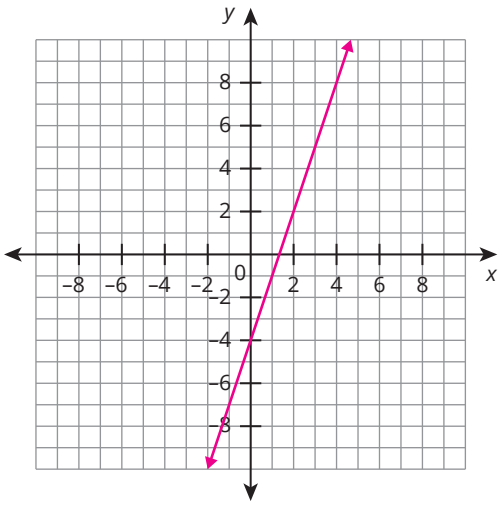
5. $\begin{cases} -8x - 8y = -10 \\ x = 3.25 \end{cases}$

one solution; (3.25, −2)



6. $\begin{cases} -1.5x + 0.5y = -2 \\ y + 7 = 3(x + 1) \end{cases}$

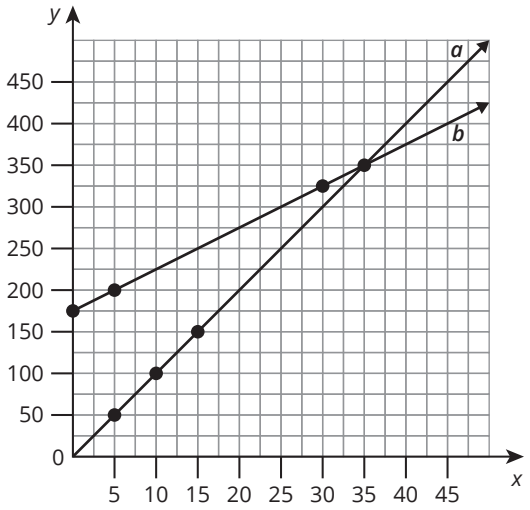
infinite solutions



C. Write a system of equations to represent each table or graph.

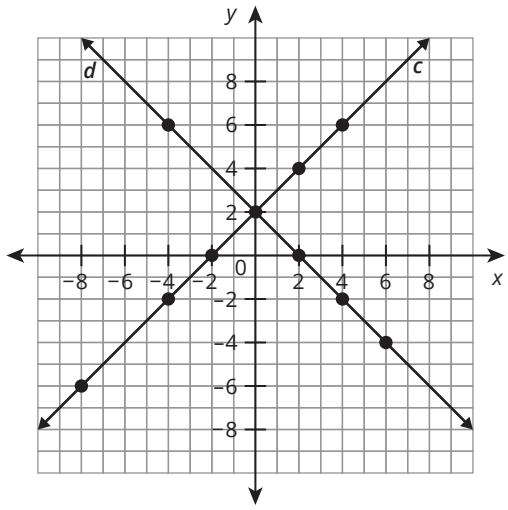
TEKS A.2I

1. Write a system of equations in slope-intercept form that represents lines *a* and *b*.



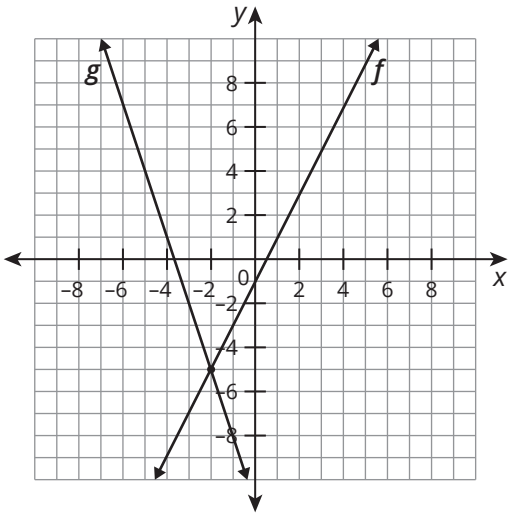
$\begin{cases} y = 10x \\ y = 5x + 175 \end{cases}$

2. Write a system of equations in standard form that represents lines *c* and *d*.



$\begin{cases} x - y = -2 \\ x + y = 2 \end{cases}$

3. Write a system of equations in slope-intercept form that represents lines *f* and *g*.



$\begin{cases} y = 2x - 1 \\ y = -3x - 11 \end{cases}$

4. Write a system of equations in slope-intercept form that represents lines *r* and *s*.

Line *r*

x	*y*
−2	−6
0	−5
3	−3.5
7	−1.5

Line *s*

x	*y*
−5	−16
−1	−8
4	2
8	10

$\begin{cases} y = \frac{1}{2}x - 5 \\ y = 2x - 6 \end{cases}$

5. Write a system of equations in standard form that represents lines *h* and *k*.

Line *h*

x	*y*
−5	−2
−1	2
2	5
6	9

Line *k*

x	*y*
−2	20
0	12
2	4
3	0

$\begin{cases} x - y = -3 \\ 4x + y = 12 \end{cases}$

6. Write a system of equations in slope-intercept form that represents lines *m* and *n*.

Line *m*

x	*y*
−4	30
−1	21
3	9
8	−6

Line *n*

x	*y*
−5	18
−2	12
1	6
4	0

$\begin{cases} y = -3x + 18 \\ y = -2x + 8 \end{cases}$

III. Using Linear Combinations to Solve a System of Linear Equations

A. Solve each system of equations using the linear combinations method.
TEKS A.5C

1. $\begin{cases} 3x + 5y = 8 \\ 2x - 5y = 22 \end{cases}$

The solution is (6, −2).

2. $\begin{cases} 4x - y = 2 \\ 2x + 2y = 26 \end{cases}$

The solution is (3, 10).

3. $\begin{cases} 10x - 6y = 26 \\ 5x - 5y = 5 \end{cases}$

The solution is (5, 4).

4. $\begin{cases} 2x - 4y = 4 \\ -3x + 10y = 14 \end{cases}$

The solution is (12, 5).

5. $\begin{cases} 3x + 2y = 14 \\ 4x + 5y = 35 \end{cases}$

The solution is (0, 7).

6. $\begin{cases} x + 6y = 11 \\ 2x - 12y = 10 \end{cases}$

The solution is (8, 0.5).

7. $\begin{cases} 1.5x + 1.2y = 0.6 \\ 0.8x - 0.2y = 2 \end{cases}$

The solution is (2, −2).

8. $\begin{cases} \frac{3}{4}x + \frac{1}{2}y = -\frac{3}{4} \\ \frac{2}{3}x + \frac{2}{3}y = \frac{2}{3} \end{cases}$

The solution is (−5, 6).

B. Write a system of equations to represent each problem situation. Solve the system of equations using the linear combinations method.
TEKS A.2I, A.5C

1. The high school marching band is selling fruit baskets as a fundraiser. They sell a large basket containing 10 apples and 15 oranges for $20. They sell a small basket containing 5 apples and 6 oranges for $8.50. How much is the marching band charging for each apple and each orange?

Let x represent the amount charged for each apple. Let y represent the amount charged for each orange.

$$\begin{cases} 10x + 15y = 20 \\ 5x + 6y = 8.50 \end{cases} \qquad \begin{array}{l} 10x + 15y = 20 \\ -2(5x + 6y = 8.50) \end{array}$$

$$\begin{array}{r} 10x + 15y = 20 \\ -10x - 12y = -17 \\ \hline 3y = 3 \\ y = 1 \end{array} \qquad \begin{array}{r} 10x + 15(1) = 20 \\ 10x + 15 = 20 \\ 10x = 5 \\ x = 0.5 \end{array}$$

The solution is (0.5, 1). The band charges $0.50 for each apple and $1.00 for each orange.

2. Asna works on a shipping dock at a tire manufacturing plant. She loads a pallet with 4 Mudslinger tires and 6 Roadripper tires. The tires on the pallet weigh 212 pounds. She loads a second pallet with 7 Mudslinger tires and 2 Roadripper tires. The tires on the second pallet weigh 184 pounds. How much does each Mudslinger tire and each Roadripper tire weigh?

Let x represent the weight of a Mudslinger tire. Let y represent the weight of a Roadripper tire.

$$\begin{cases} 4x + 6y = 212 \\ 7x + 2y = 184 \end{cases} \qquad \begin{array}{r} 4x + 6y = 212 \\ -3(7x + 2y = 184) \end{array}$$

$$\begin{array}{r} 4x + 6y = 212 \\ -21x - 6y = -552 \\ \hline 17x = -340 \\ x = 20 \end{array} \qquad \begin{array}{r} 4(20) + 6y = 212 \\ 80 + 6y = 212 \\ 6y = 132 \\ y = 22 \end{array}$$

The solution is (20, 22). Each Mudslinger tire weighs 20 pounds and each Roadripper tire weighs 22 pounds.

3. The Pizza Barn sells one customer 3 large pepperoni pizzas and 2 orders of breadsticks for $30. They sell another customer 4 large pepperoni pizzas and 3 orders of breadsticks for $41. How much does the Pizza Barn charge for each pepperoni pizza and each order of breadsticks?

Let x represent the charge for each pepperoni pizza. Let y represent the charge for each order of breadsticks.

$$\begin{cases} 3x + 2y = 30 \\ 4x + 3y = 41 \end{cases} \qquad \begin{array}{r} 3(3x + 2y = 30) \\ -2(4x + 3y = 41) \end{array}$$

$$\begin{array}{r} 9x + 6y = 90 \\ -8x - 6y = -82 \\ \hline x = 8 \end{array} \qquad \begin{array}{r} 3(8) + 2y = 30 \\ 24 + 2y = 30 \\ 2y = 6 \\ y = 3 \end{array}$$

The solution is (8, 3). The Pizza Barn sells each pepperoni pizza for $8 and each order of breadsticks for $3.

4. Nancy and Warren are making large pots of chicken noodle soup. Nancy opens 4 large cans and 6 small cans of soup and pours them into her pot. Her pot contains 115 ounces of soup. Warren opens 3 large cans and 5 small cans of soup. His pot contains 91 ounces of soup. How many ounces of soup does each large can and each small can contain?

Let x represent the number of ounces in a large can of soup. Let y represent the number of ounces in a small can of soup.

$$\begin{cases} 4x + 6y = 115 \\ 3x + 5y = 91 \end{cases} \qquad \begin{array}{l} 3(4x + 6y = 115) \\ -4(3x + 5y = 91) \end{array}$$

$$\begin{array}{r} 12x + 18y = 345 \\ -12x - 20y = -364 \\ \hline -2y = -19 \\ y = 9.5 \end{array} \qquad \begin{array}{r} 3x + 5(9.5) = 91 \\ 3x + 47.5 = 91 \\ 3x = 43.5 \\ x = 14.5 \end{array}$$

The solution is (14.5, 9.5). Each large can contains 14.5 ounces of soup and each small can contains 9.5 ounces of soup.

5. Taylor and Natsumi are making block towers out of large and small blocks. They are stacking the blocks on top of each other in a single column. Taylor uses 4 large blocks and 2 small blocks to make a tower 63.8 inches tall. Natsumi uses 9 large blocks and 4 small blocks to make a tower 139.8 inches tall. How tall is each large block and each small block?

Let x represent the height (in inches) of each large block. Let y represent the height (in inches) of each small block.

$$\begin{cases} 4x + 2y = 63.8 \\ 9x + 4y = 139.8 \end{cases} \qquad \begin{array}{l} -2(4x + 2y = 63.8) \\ 9x + 4y = 139.8 \end{array}$$

$$\begin{array}{r} -8x - 4y = -127.6 \\ 9x + 4y = 139.8 \\ \hline x = 12.2 \end{array} \qquad \begin{array}{r} 4(12.2) + 2y = 63.8 \\ 48.8 + 2y = 63.8 \\ 2y = 15 \\ y = 7.5 \end{array}$$

The solution is (12.2, 7.5). Each large block is 12.2 inches tall and each small block is 7.5 inches tall.

6. Dave has 2 buckets that he uses to fill the water troughs on his horse farm. He wants to determine how many ounces each bucket holds. On Tuesday, he fills an empty 2000-ounce water trough with 7 large buckets and 5 small buckets of water. On Thursday, he fills the same empty water trough with 4 large buckets and 10 small buckets of water. How many ounces does each bucket hold?

Let x represent the number of ounces the large bucket holds. Let y represent the number of ounces the small bucket holds.

$$\begin{cases} 7x + 5y = 2000 \\ 4x + 10y = 2000 \end{cases}$$

$$\begin{aligned} -2(7x + 5y &= 2000) \\ 4x + 10y &= 2000 \end{aligned}$$

$$\begin{aligned} -14x - 10y &= -4000 \\ 4x + 10y &= 2000 \\ \hline -10x &= -2000 \\ x &= 200 \end{aligned}$$

$$\begin{aligned} 7(200) + 5y &= 2000 \\ 1400 + 5y &= 2000 \\ 5y &= 600 \\ y &= 120 \end{aligned}$$

The solution is (200, 120). The large bucket holds 200 ounces. The small bucket holds 120 ounces.

IV. Graphing Inequalities in Two Variables

A. Tell whether the graph of each linear inequality will have a dashed line or a solid line. Explain your reasoning.
Prerequisite for TEKS A.3D

1. $x - 3y \leq 32$

The line will be solid because the symbol is $\leq$.

2. $8y + 7x > 15$

The line will be dashed because the symbol is $>$.

3. $y < 14x + 9$

The line will be dashed because the symbol is $<$.

4. $-5.2y - 8.3x \leq -28.6$

The line will be solid because the symbol is $\leq$.

5. $\frac{2}{3}x + \frac{4}{9}y \geq 3$

The line will be solid because the symbol is $\geq$.

6. $y - 17 > x + 8$

The line will be dashed because the symbol is $>$.

7. $185x + 274y \geq 65$

The line will be solid because the symbol is $\geq$.

8. $36 < 9y - 2x$

The line will be dashed because the symbol is $<$.

B. For each inequality, use the test point (0, 0) to determine which half-plane should be shaded.
Prerequisite for TEKS A.3D

1. $5x + 7y > -13$

The half-plane that includes (0, 0) should be shaded because the inequality is true for that point.

2. $y - 30 \leq 9x$

The half-plane that includes (0, 0) should be shaded because the inequality is true for that point.

3. $-8y > 6x + 12$

The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.

4. $46 \geq -5y + 10x$

The half-plane that includes (0, 0) should be shaded because the inequality is true for that point.

5. $31.9x + 63.7y < -44.5$

The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.

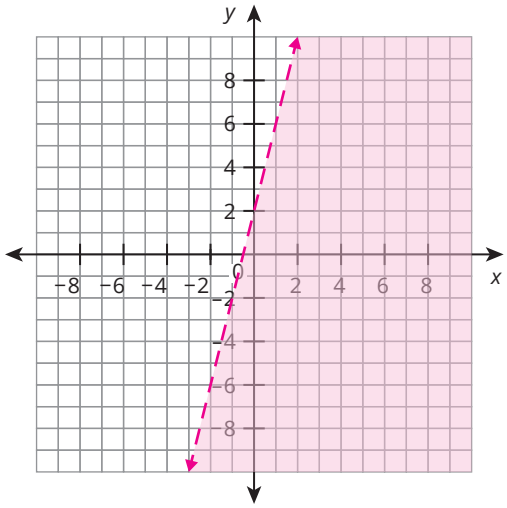
6. $y - \frac{5}{6} > \frac{1}{2}x + \frac{1}{3}$

The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.

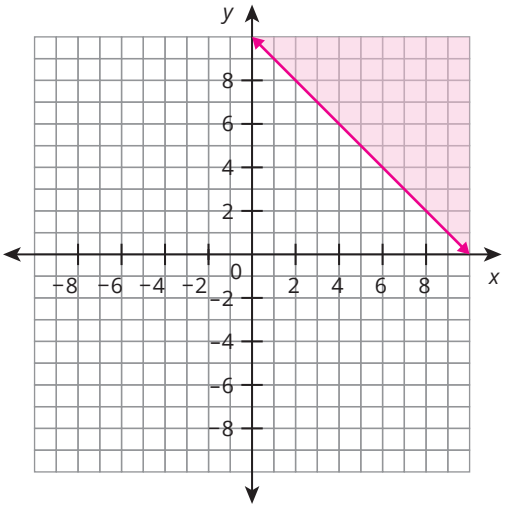
C. Graph each linear inequality.

TEKS A.3D

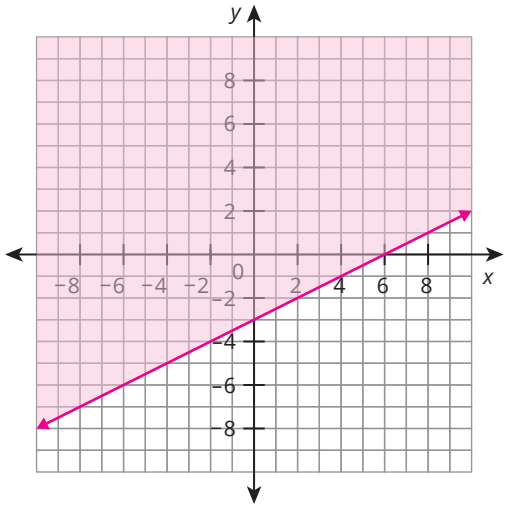
1. $y < 4x + 2$



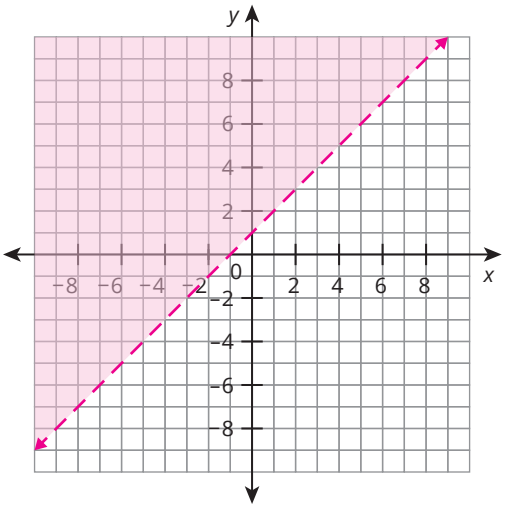
2. $y \geq 10 - x$



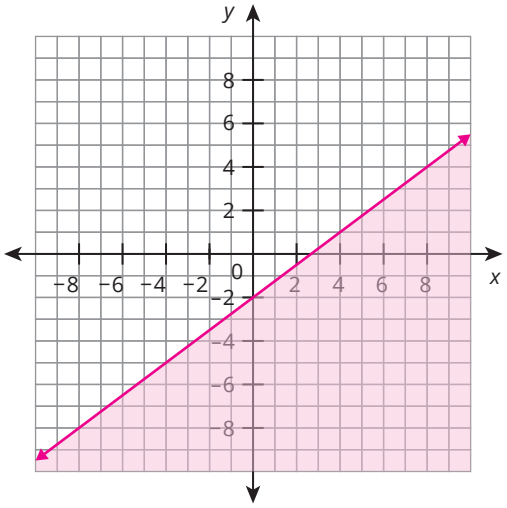
3. $y \geq \frac{1}{2}x - 3$



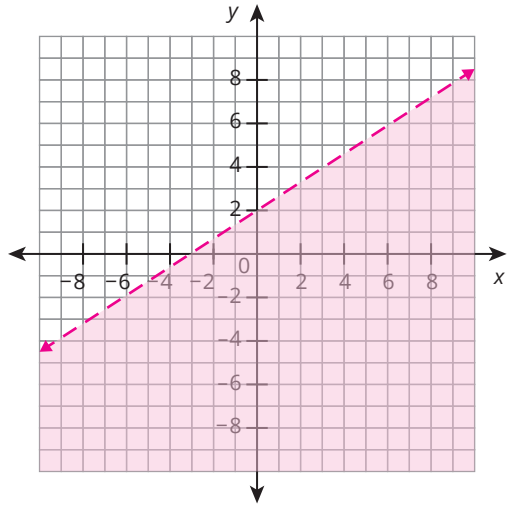
4. $-x + y > 1$



5. $3x - 4y \geq 8$



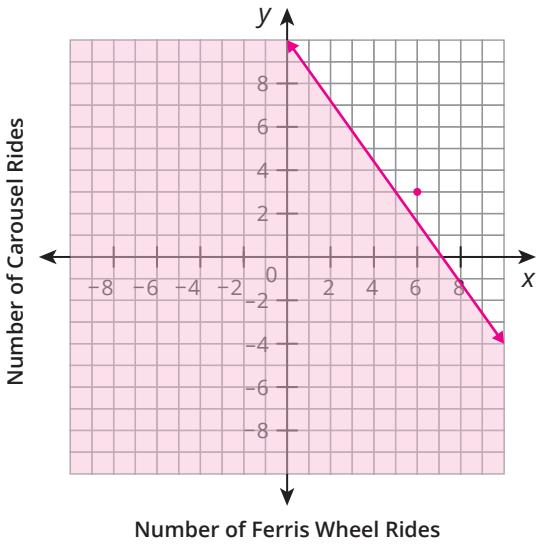
6. $\frac{3}{8}y - \frac{1}{4}x < \frac{3}{4}$



D. Write and graph an inequality for each problem situation. Then determine if the ordered pair is a solution for the problem situation.
TEKS A.2H, A.3D

1. Marcus has 50 tokens to spend at the school carnival. The Ferris wheel costs 7 tokens and the carousel costs 5 tokens. Write and graph an inequality that represents the possible ways Marcus could use his tokens on the two rides. Is the ordered pair (6, 3) a solution for the problem situation?

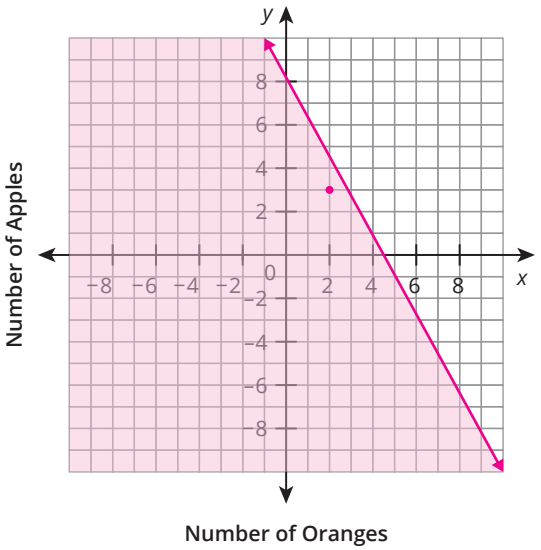
$7x + 5y \leq 50$



No. The ordered pair (6, 3) is not a solution to the inequality. It is not in the shaded half-plane.

2. Sophia has $2 to buy oranges and apples. Oranges cost $0.45 each and apples cost $0.25 each. Write and graph an inequality that represents the possible ways Sophia could spend her $2. Is the ordered pair (2, 3) a solution for the problem situation?

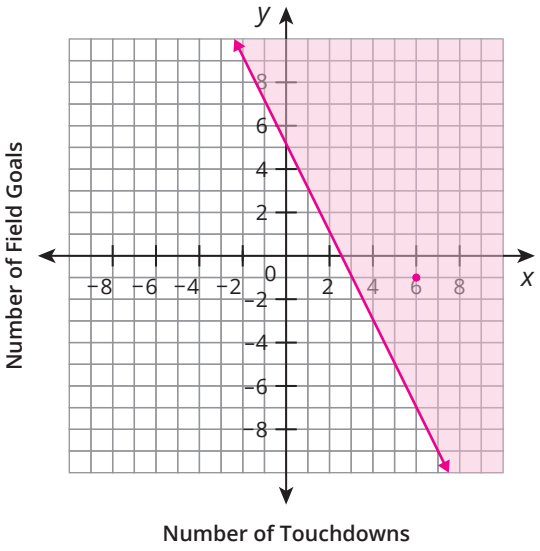
$0.45x + 0.25y \leq 2$



Yes. The ordered pair (2, 3) is a solution to the inequality. It is in the shaded half-plane.

3. Noah plays football. His team's goal is to score at least 15 points per game. A touchdown is worth 6 points and a field goal is worth 3 points. Noah's league does not allow teams to try for the extra point after a touchdown. Write and graph an inequality that represents the possible ways Noah's team could score points to reach their goal. Is the ordered pair (6, −1) a solution for the problem situation?

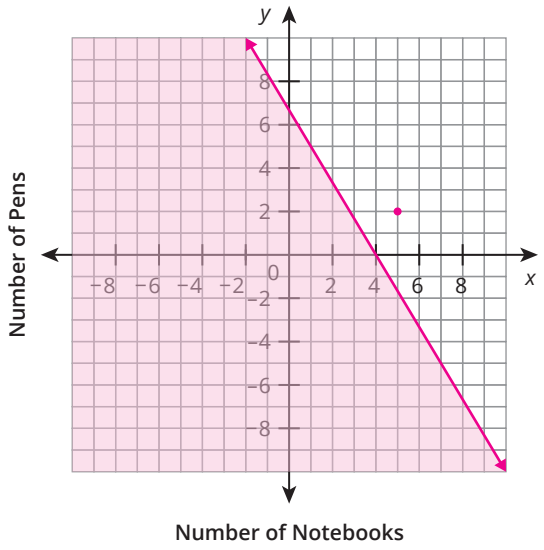
$6x + 3y \geq 15$



No. The ordered pair (6, −1) is not a solution for the problem situation. It is in the correct shaded half-plane, but it is not a reasonable answer because Noah's team cannot score a negative number of field goals.

4. Lea has $5 to buy notebooks and pens. Notebooks cost $1.25 each and pens cost $0.75 each. Write and graph an inequality to represent the possible ways Lea could spend her $5. Is the ordered pair (5, 2) a solution for the problem situation?

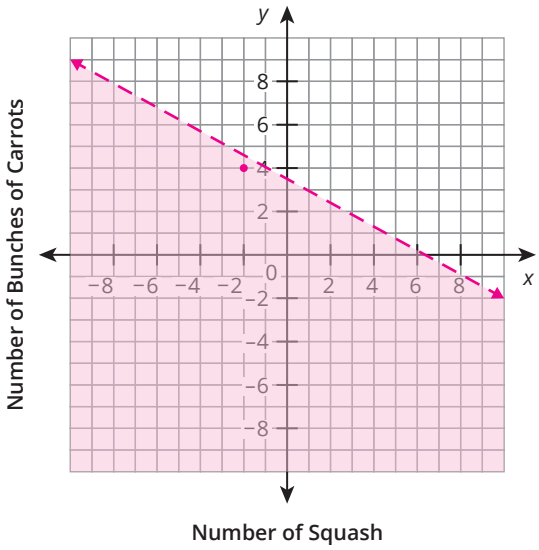
$1.25x + 0.75y \leq 5$



No. The ordered pair (5, 2) is not a solution to the inequality. It is not in the shaded half-plane.

5. Leon has \$10 to buy squash and carrots. Squash cost \$1.50 each and carrots cost \$2.75 per bunch. Write and graph an inequality that represents the possible ways Leon could spend less than \$10. Is the ordered pair (–2, 4) a solution for the problem situation?

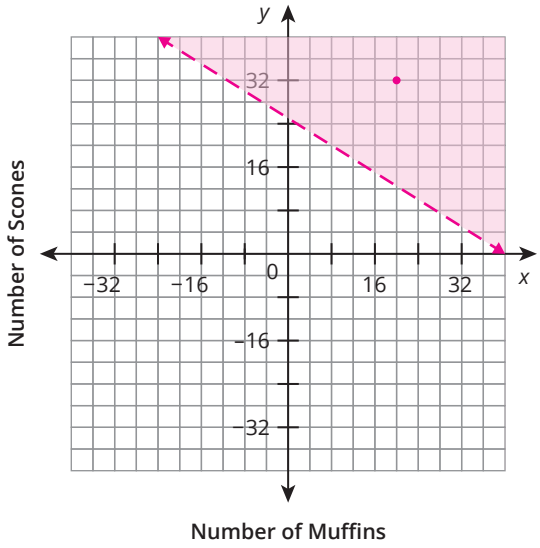
$1.50x + 2.75y < 10$



No. The ordered pair (−2, 4) is not a solution for the problem situation. It is in the correct shaded half-plane, but it is not a reasonable answer because Leon cannot purchase a negative number of squash.

6. Olivia makes and sells muffins and scones at a school bake sale. She sells muffins for \$0.50 each and scones for \$0.80 each. She hopes to raise more than \$20. Write and graph an inequality that represents the possible ways Olivia could reach her goal. Is the ordered pair (20, 32) a solution for the problem situation?

$0.50x + 0.80y > 20$



Yes. The ordered pair (20, 32) is a solution to the inequality. It is in the shaded half-plane.

V. Systems of Linear Inequalities

A. Write a system of linear inequalities that represents each problem situation. Remember to define your variables.

Extension of TEKS A.2H, A.2I

1. Jamal runs the bouncy house at a festival. The bouncy house can hold a maximum of 1200 pounds at one time. He estimates that adults weigh approximately 200 pounds and children under 16 weigh approximately 100 pounds. For 1 four-minute session of bounce time, Jamal charges adults $3 each and children $2 each. Jamal hopes to make at least $24 for each session.

x = the number of adults

y = the number of children

$$\begin{cases} 3x + 2y \geq 24 \\ 200x + 100y \leq 1200 \end{cases}$$

2. Carlos works at a movie theater selling tickets. The theater has 300 seats and charges $7.50 for adults and $5.50 for children. The theater expects to make at least $2000 for each showing.

x = the number of adults

y = the number of children

$$\begin{cases} x + y \leq 300 \\ 7.50x + 5.50y \geq 2000 \end{cases}$$

3. The maximum capacity for an average passenger elevator is 15 people and 3000 pounds. It is estimated that adults weigh approximately 200 pounds and children under 16 weigh approximately 100 pounds.

x = the number of adults

y = the number of children

$$\begin{cases} x + y \leq 15 \\ 200x + 100y \leq 3000 \end{cases}$$

4. Pablo's pickup truck can carry a maximum of 1000 pounds. He loads his truck with 20-pound bags of cement and 80-pound bags of cement. He hopes to load at least 10 bags of cement into his truck.

x = the number of 20-pound bags

y = the number of 80-pound bags

$$\begin{cases} x + y \geq 10 \\ 20x + 80y \leq 1000 \end{cases}$$

5. Eiko is drawing caricatures at a fair for 8 hours. She can complete a small drawing in 15 minutes and charges $10 for the drawing. She can complete a larger drawing in 45 minutes and charges $25 for the drawing. Eiko hopes to make at least $200 at the fair.

x = the number of small drawings

y = the number of large drawings

8 hours = 480 minutes

$$\begin{cases} 10x + 25y \geq 200 \\ 15x + 45y \leq 480 \end{cases}$$

6. Sofia is making flower arrangements to sell in her shop. She can complete a small arrangement in 30 minutes that sells for $20. She can complete a larger arrangement in 1 hour that sells for $50. Sofia hopes to make at least $350 during her 8-hour workday.

x = the number of small arrangements

y = the number of large arrangements

8 hours = 480 minutes

$$\begin{cases} 20x + 50y \geq 350 \\ 30x + 60y \leq 480 \end{cases}$$

B. Determine whether each given point is a solution to the system of linear inequalities.
TEKS A.3H

1. $\begin{cases} 2x - y > 4 \\ -x + y \leq 7 \end{cases}$

Point: $(-2, -10)$

Yes. The point $(-2, -10)$ is a solution to the system of inequalities.

2. $\begin{cases} x + 5y < -1 \\ 2y \geq -3x - 2 \end{cases}$

Point: $(0, -1)$

Yes. The point $(0, -1)$ is a solution to the system of inequalities.

3. $\begin{cases} 4x + y < 21 \\ \frac{1}{2}x \leq 36 - 5y \end{cases}$

Point: $(3, 7)$

No. The point $(3, 7)$ is not a solution to the system of inequalities.

4. $\begin{cases} 5x + 3y > 6 \\ -2x + 2y < 20 \end{cases}$

Point: $(-2, 6)$

Yes. The point $(-2, 6)$ is a solution to the system of inequalities.

5. $\begin{cases} 15x + 25y \geq 300 \\ 20x + 30y \leq 480 \end{cases}$

Point: $(14, 8)$

No. The point $(14, 8)$ is not a solution to the system of inequalities.

6. $\begin{cases} -2.1x + 7y \geq -49.5 \\ -y \leq -6.3x + 78 \end{cases}$

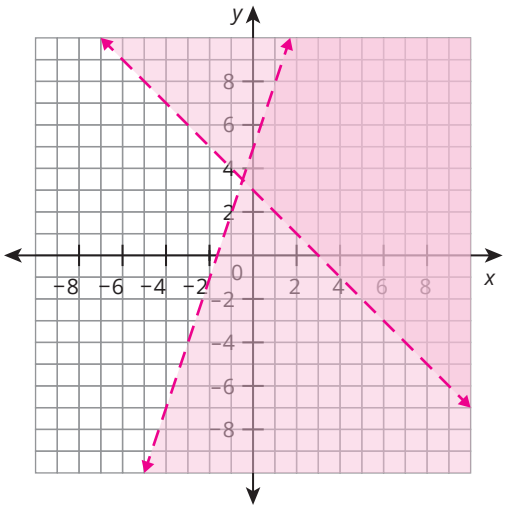
Point: $(10, -8)$

No. The point $(10, -8)$ is not a solution to the system of inequalities.

C. Graph each system of linear inequalities and identify two solutions.

TEKS A.3H

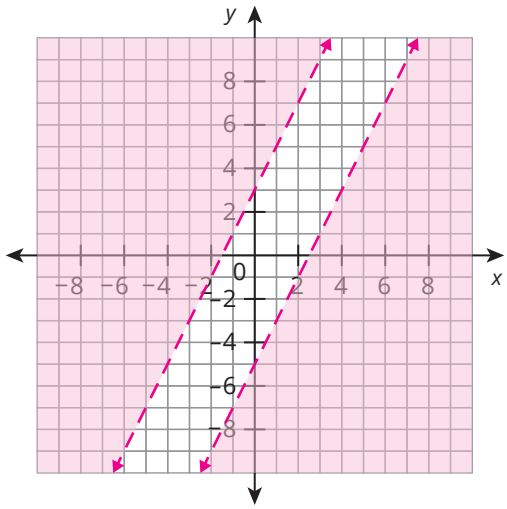
1. $\begin{cases} 3x - y > -5 \\ y + x > 3 \end{cases}$



Answers will vary.

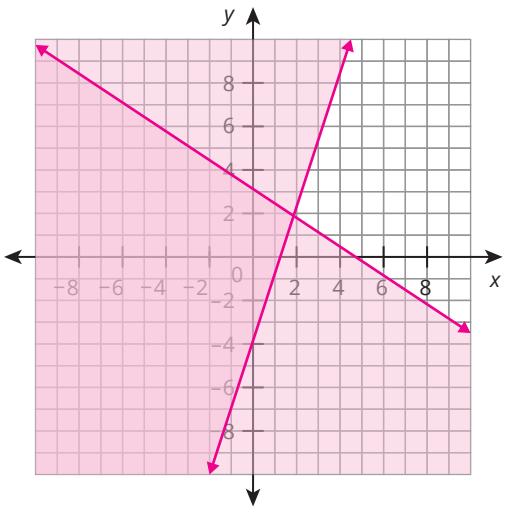
(2, 3) and (6, 0)

2. $\begin{cases} y > 2x + 3 \\ y < 2x - 5 \end{cases}$



No solution

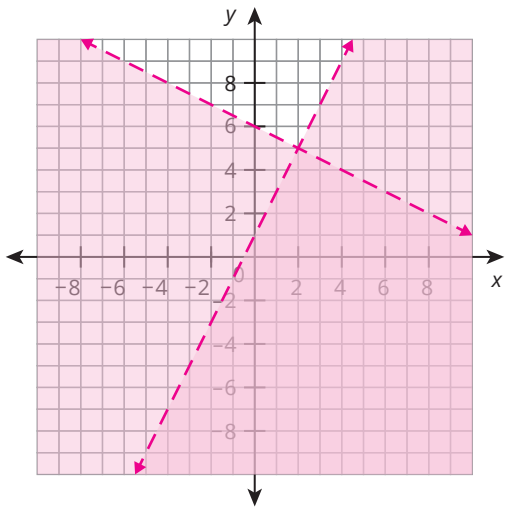
3. $\begin{cases} y \leq -\frac{2}{3}x + 3 \\ y \geq 3x - 4 \end{cases}$



Answers will vary.

(1, 2) and (−2, 2)

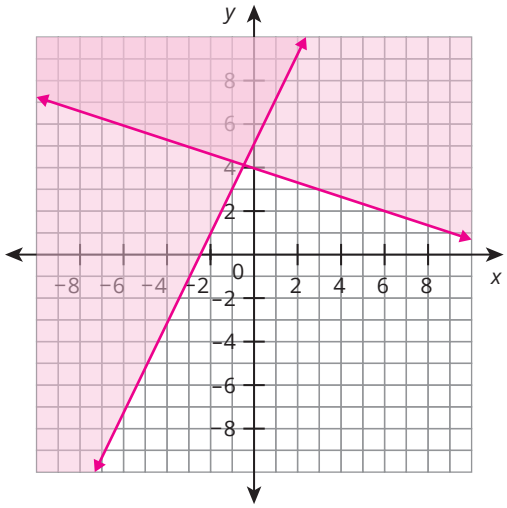
4. $\begin{cases} y - 2 < -\frac{1}{2}(x - 8) \\ y < 2x + 1 \end{cases}$



Answers will vary.

(3, 1) and (2, −2)

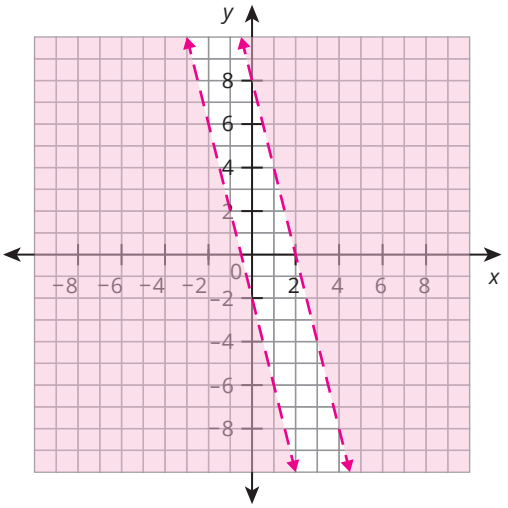
5. $\begin{cases} y \geq -\frac{1}{3}x + 4 \\ 2x - y \leq -5 \end{cases}$



Answers will vary.

(−1, 6) and (1, 10)

6. $\begin{cases} y > -4x + 8 \\ 4x + y < -2 \end{cases}$



No solution

VI. Solving Systems of Equations and Inequalities

A. Write a system of equations or inequalities to represent each problem situation. Solve the system using your preferred method and answer any associated questions.
TEKS A.2I, A.5C

1. Jun received two different job offers to become a real estate sales agent. Dream Homes offered Jun a base salary of $20,000 per year plus a 2% commission on all real estate sold. Amazing Homes offered Jun a base salary of $25,000 per year plus a 1% commission on all real estate sold. Determine the amount of real estate sales in dollars for which both real estate companies will pay Jun the same amount. Explain which offer Jun should accept based on the amount of real estate sales he expects to have.

Sample answer.

Let x represent the amount of Jun's real estate sales in dollars. Let y represent the yearly income when Jun has x dollars in real estate sales.

$$\begin{cases} y = 0.02x + 20{,}000 & \text{Dream Homes} \\ y = 0.01x + 25{,}000 & \text{Amazing Homes} \end{cases}$$

Substitution Method:

$$0.02x + 20{,}000 = 0.01x + 25{,}000$$
$$0.01x + 20{,}000 = 25{,}000$$
$$0.01x = 5000$$
$$x = 500{,}000$$

$$y = 0.02(500{,}000) + 20{,}000$$
$$y = 10{,}000 + 20{,}000$$
$$y = 30{,}000$$

The solution is (500,000, 30,000). Both real estate companies will pay Jun $30,000 per year for $500,000 in real estate sales. If Jun expects to sell less than $500,000 of real estate per year, then he should accept the offer from Amazing Homes. If Jun expects to sell more than $500,000 of real estate per year, then he should accept the offer from Dream Homes.

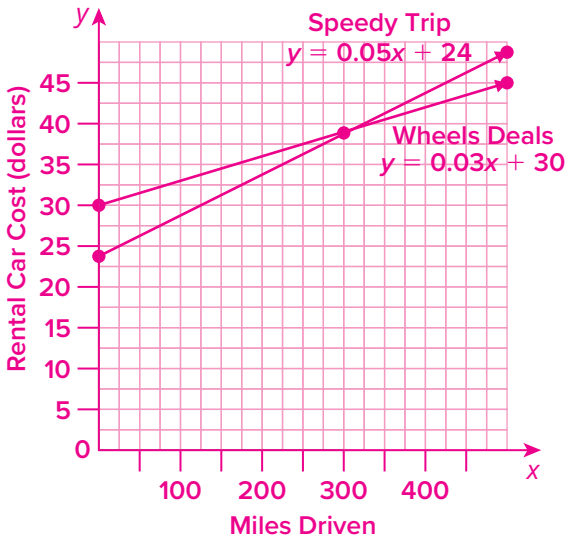
2. Stella is trying to choose between two rental car companies. Speedy Trip Rental Cars charges a base fee of $24 plus an additional fee of $0.05 per mile. Wheels Deals Rental Cars charges a base fee of $30 plus an additional fee of $0.03 per mile. Determine the amount of miles driven for which both rental car companies charge the same amount. Explain which company Stella should use based on the number of miles she expects to drive.

Sample answer.

Let x represent the number of miles driven. Let y represent the total cost of a rental car when driven x miles.

$$\begin{cases} y = 0.05x + 24 \\ y = 0.03x + 30 \end{cases}$$

Graphing Method:



The solution is (300, 39). Both rental car companies charge $39 for a car driven 300 miles. If Stella expects to drive fewer than 300 miles, then she should use Speedy Trip Rental Cars. If Stella expects to drive more than 300 miles, then she should use Wheels Deals Rental Cars.

3. Renee has two job offers to be a door-to-door food processor salesperson. Pro Process Processors offers her a base salary of $15,000 per year plus an additional $25 for each processor she sells. Puree Processors offers her a base salary of $18,000 per year plus an additional $21 for each processor she sells. Determine the number of food processors Renee would have to sell for both companies to pay her the same amount. Explain which job offer Renee should accept based on the number of food processors she expects to sell.

Sample answer.

Let x represent the number of food processors sold. Let y represent Renee's yearly income when she sells x food processors.

$$\begin{cases} y = 25x + 15{,}000 & \text{Pro Process Processors} \\ y = 21x + 18{,}000 & \text{Puree Processors} \end{cases}$$

Substitution Method:

$$25x + 15{,}000 = 21x + 18{,}000$$
$$4x + 15{,}000 = 18{,}000$$
$$4x = 3000$$
$$x = 750$$

$$y = 25(750) + 15{,}000$$
$$y = 18{,}750 + 15{,}000$$
$$y = 33{,}750$$

The solution is (750, 33,750). Both companies will pay Renee $33,750 for selling 750 food processors. If Renee expects to sell fewer than 750 food processors in one year, then she should accept the offer from Puree Processors. If Renee expects to sell more than 750 food processors in one year, then she should accept the offer from Pro Process Processors.

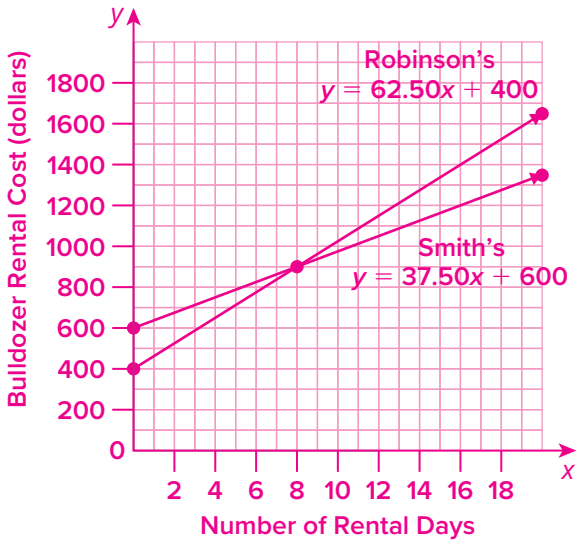
4. Alex needs to rent a bulldozer. Smith's Equipment Rentals rents bulldozers for a delivery fee of $600 plus an additional $37.50 per day. Robinson's Equipment Rentals rents bulldozers for a delivery fee of $400 plus an additional $62.50 per day. Determine the number of rental days for which both rental companies charge the same amount. Explain which company Alex should choose based on the number of days he expects to rent a bulldozer.

Sample answer.

Let x represent the number of days Alex rents a bulldozer. Let y represent the cost to rent a bulldozer for x days.

$$\begin{cases} y = 37.50x + 600 & \text{Smith's Equipment Rentals} \\ y = 62.50x + 400 & \text{Robinson's Equipment Rentals} \end{cases}$$

Graphing Method:



The solution is (8, 900). Both rental companies charge $900 to rent a bulldozer for 8 days. If Alex expects to use the bulldozer for fewer than 8 days, then he should choose Robinson's Equipment Rental. If Alex expects to use the bulldozer for more than 8 days, then he should choose Smith's Equipment Rental.

5. The school volleyball team is selling t-shirts and baseball hats as a fundraiser for their program. The t-shirts are selling for $15 each and the baseball hats are selling for $12 each. If the school volleyball team sold a total of 84 items for a total of $1146, determine how many of each item they sold.

Sample answer.

Let x represent the number of t-shirts sold. Let y represent the number of baseball hats sold.

$$\begin{cases} x + y = 84 \\ 15x + 12y = 1146 \end{cases}$$

Linear Combinations Method:

$$-15(x + y) = -15(84)$$
$$15x + 12y = 1146$$

$$-15x - 15y = 1260$$
$$15x + 12y = 1146$$
$$-3y = -114$$
$$y = 38$$

$$x + 38 = 84$$
$$x = 46$$

The solution is (46, 38). The volleyball team sold 46 t-shirts and 38 baseball hats.

6. At Bonnie's Burgers the total bill for one table of diners included 4 veggie burger combos and 2 beef burger combos for $97.94. At another table the total bill came to $78.95 for 2 veggie burger combos and 3 beef burger combos. Determine the cost of a veggie burger combo and the cost of a beef burger combo at Bonnie's Burgers.

Sample answer.

Let x represent the cost of a veggie burger combo. Let y represent the cost of a beef burger combo.

$$\begin{cases} 4x + 2y = 97.94 \\ 2x + 3y = 78.95 \end{cases}$$

Linear Combinations Method:

$$\begin{aligned} 4x + 2y &= 97.94 \\ -2(2x + 3y) &= -2(78.95) \end{aligned}$$

$$\begin{aligned} 4x + 2y &= 97.94 \\ -4x - 6y &= -157.90 \\ \hline -4y &= -59.96 \\ y &= 14.99 \end{aligned}$$

$$\begin{aligned} 4x + 2(14.99) &= 97.94 \\ 4x + 29.98 &= 97.94 \\ 4x &= 67.96 \\ x &= 16.99 \end{aligned}$$

The solution is (16.99, 14.99). At Bonnie's Burgers a veggie burger combo costs $16.99 and a beef burger combo cost $14.99.