

Updated  
Systems of Equations Review Sheet

Name: Key

1. José had 4 times as many trading cards as Philippe. After José gave away 50 cards to his little brother and Philippe gave 5 cards to his friend for his birthday, they each had an equal amount of cards. Write a system to describe the situation and solve the system.

Variable:  $j = \# \text{ cards Jose has}$   
 Variable:  $p = \# \text{ card Philippe has}$

$$\begin{cases} j = 4p \\ j - 50 = p - 5 \end{cases}$$

$j = 60$   
 $p = 15$

2. An Algebra test is worth 100 points and has 25 questions. There are multiple choice questions worth 3 points each and short answer questions worth 8 points each. How many short answer questions are on the test?

Variable:  $m = \# \text{ of mult. choice}$   
 Variable:  $s = \# \text{ of short answer}$

$$\begin{cases} m + s = 25 \\ 3m + 8s = 100 \end{cases}$$

$s = 5$   
 $m = 20$

3. The total value of \$5 bills and \$10 bills in the cash box is \$410. There are eight more \$10 bills than \$5 bills. How many \$10 bills are there in the cash box?

Variable:  $x = \# \text{ of } \$5$   
 Variable:  $y = \# \text{ of } \$10$

$$\begin{cases} 5x + 10y = 410 \\ x + 8 = y \end{cases}$$

$x = 22$   
 $y = 30$

4. Juan has \$10,000 to invest into two bank accounts. One has a 4.5% interest rate and the other has a 5% interest rate. How much did Juan invest in each account, if he earns \$482.50 after one year?

Variable:  $x = \text{money at } 4.5\%$   
 Variable:  $y = \text{money at } 5\%$

$$\begin{cases} 0.045x + 0.05y = 482.50 \\ x + y = 10000 \end{cases}$$

$x = 3500$   
 $y = 6500$

5. Four years ago, Katie was twice as old as Anne was then. In 6 years, Anne will be the same age that Katie is now. How old is each person now?

Variable:  $k = \text{Katie's age}$   
 Variable:  $a = \text{Anne's age}$

$$\begin{cases} a + 6 = k \\ k - 4 = 2(a - 4) \end{cases}$$

$k = 16$   
 $a = 10$

6. Larry is 8 years older than his sister. In 3 years, he will be twice as old as she is now. How old are they now?

Variable:  $l = \text{Larry's age}$   
 Variable:  $s = \text{sister's age}$

$$\begin{cases} l = s + 8 \\ l + 3 = 2s \end{cases}$$

$l = 19$   
 $s = 11$

7. At Pizzazz Pizza, the total price for 5 large pizzas and 2 medium pizzas is \$81.50. The total for 4 large pizzas and 3 mediums pizzas is \$78.50. What is the price of a medium pizza?

Variable:  $l = \$ \text{ of large}$   
 Variable:  $m = \$ \text{ of medium}$

$$\begin{cases} 5l + 2m = 81.50 \\ 4l + 3m = 78.50 \end{cases}$$

$l = \$12.50$   
 $m = \$9.50$

8. The number of calories in a piece of cake is 20 less than 3 times the number in a scoop of ice cream. The cake and ice cream together have 620 calories. How many calories are in each?

Variable:  $C = \# \text{ calories cake}$   
 Variable:  $i = \# \text{ calories ice cream}$

$$\begin{cases} C = 3i - 20 \\ C + i = 620 \end{cases} \quad \begin{array}{l} C = 460 \\ i = 160 \end{array}$$

$$\begin{array}{r} -C - i = -620 \\ C - 3i = -20 \\ \hline -4i = -640 \\ i = 160 \end{array}$$

9. A change purse contains a total of 70 quarters and dimes. The total value of the coins is \$9.40. How many coins of each type does the purse contain?

Variable:  $q = \# \text{ of quarters}$   
 Variable:  $d = \# \text{ of dimes}$

$$\begin{cases} q + d = 70 \\ 0.25q + 0.10d = 9.40 \end{cases} \quad \begin{array}{l} q = 16 \\ d = 54 \end{array}$$

$$\begin{array}{r} -0.1q - 0.1d = -7 \\ 0.25q + 0.10d = 9.40 \\ \hline 0.15q = 2.40 \\ q = 16 \end{array}$$

10. Given that the sum of two numbers is 10 and their difference is 4, what are the numbers?

Variable:  $x = \text{first } \#$   
 Variable:  $y = \text{second } \#$

$$\begin{cases} x + y = 10 \\ x - y = 4 \end{cases} \quad \begin{array}{l} x = 7 \\ y = 3 \end{array}$$

$$\begin{array}{r} 2x = 14 \\ x = 7 \end{array}$$

11. Morgan has \$1,700 more invested at 7% than she does at 4%. The annual return from the 7% investment is \$239 more than the annual return from the 4% investment. How much is invested at each rate?

$x = \$ @ 4\%$   
 $1700 + x = \$ @ 7\%$

$$\begin{array}{r} 0.07(1700 + x) = 239 + 0.04x \\ 119 + 0.07x = 239 + 0.04x \\ 0.03x = 120 \\ x = 4000 \end{array} \quad \begin{array}{l} 4\%: \$ 4000 \\ 7\%: \$ 5700 \end{array}$$

12. A restaurant serves a vegetarian and a chicken lunch special each day. Each vegetarian special is the same price. Each chicken special is the same price. However, the price of the vegetarian special is different from the price of the chicken special.

- On Thursday, the restaurant collected \$467 selling 21 vegetarian specials and 40 chicken specials.
- On Friday, the restaurant collected \$484 selling 28 vegetarian specials and 36 chicken specials. What is the cost of each lunch special?

Variable:  $v = \$ \text{ of vegetarian dish}$   
 Variable:  $c = \$ \text{ of chicken dish}$

$$\begin{cases} 21v + 40c = 467 \\ 28v + 36c = 484 \end{cases} \quad \begin{array}{l} v = \$ 7 \\ c = \$ 8 \end{array}$$

$$\begin{array}{r} -21v - 27c = -363 \\ 21v + 40c = 467 \\ \hline 13c = 104 \\ c = 8 \end{array}$$

$$\begin{array}{r} 7v + 9c = 121 \\ 7v = 121 - 9c \\ 7v = 121 - 72 \\ 7v = 49 \\ v = 7 \end{array}$$

13. The senior classes at High School A and High School B planned separate trips to New York City. The senior class at High School A rented and filled 1 van and 6 buses with 372 students. High School B rented and filled 4 vans and 12 buses with 780 students. Each van and each bus carried the same number of students. How many students can a van carry? How many students can a bus carry?

Variable:  $v = \# \text{ of students in van}$   
 Variable:  $b = \# \text{ of students in bus}$

$$\begin{cases} v + 6b = 372 \\ 4v + 12b = 780 \end{cases} \quad \begin{array}{l} v = 18 \\ b = 59 \end{array}$$

$$\begin{array}{r} -2v - 12b = -744 \\ v + 6b = 372 \\ \hline 4v + 12b = 780 \\ \hline 2v = 36 \\ \frac{2v}{2} = \frac{36}{2} \\ v = 18 \end{array}$$

14. Brenda's school is selling tickets to a spring musical. On the first day of ticket sales the school sold 3 senior citizen tickets and 9 child tickets for a total of \$75. The school took in \$67 on the second day by selling 8 senior citizen tickets and 5 child tickets. What is the price each of one senior citizen ticket and one child ticket?

Variable:  $s = \$$  of senior ticket

Variable:  $c = \$$  of child ticket

$$\begin{cases} -15s - 45c = -375 \\ 3s + 9c = 75 \\ 8s + 5c = 67 \\ 72s + 45c = 603 \\ 57s = 228 \end{cases}$$

$$\begin{cases} s = \$4 \\ c = \$7 \end{cases}$$

15. The cost of 5 squash and 2 zucchinis is \$1.32. Three squash and 1 zucchini cost \$0.75. Find the cost of each vegetable.

Variable:  $s = \$$  of squash

Variable:  $z = \$$  of zucchini

$$\begin{cases} 5s + 2z = 1.32 \\ 3s + z = 0.75 \\ -6s - 2z = -1.50 \end{cases}$$

$$\begin{cases} s = \$0.18 \\ z = 0.21 \\ -s = -0.18 \end{cases}$$

16. The Timeless Trolley costs \$1 per mile. Turbo Trolley charges \$0.50 per miles for a ride plus a \$10 initial fee.

a. Write two equations to model the above situation and then make a graph of your equations.

$x = \#$  of miles

$y =$  total cost

$$\begin{cases} y = x \text{ (Timeless Trolley)} \\ y = 0.5x + 10 \text{ (Turbo)} \end{cases}$$

b. If you are going 25 miles, which trolley company should you call?

Timeless:  $y = \$25$

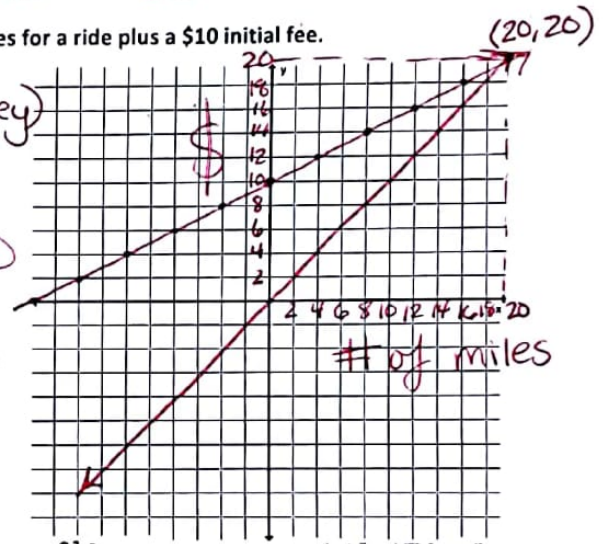
Turbo:  $y = 0.5(25) + 10 = \$22.50$

c. If you are going 15 minutes, which company should you call?

Timeless:  $y = \$15$  Turbo:  $y = 0.5(15) + 10 = \$17.50$

d. For what length of drive is the cost equal?

(Look at the graph)  $20 \text{ mi} = \$20$   
20 miles



17. The Big Cab Company charges just \$0.20 a mile and \$12 to get in the cab. Fast Cab charges no fee to get in, but \$1.40 a mile for a ride.

a. Write two equations to model the above situation.

$x =$  miles

$y =$  charge (\$)

$$\begin{cases} y = 0.2x + 12 \text{ (Big Cab)} \\ y = 1.4x \text{ (Fast Cab)} \end{cases}$$

b. What is the maximum number of WHOLE miles that you could ride the cab for Fast Cab to be the better deal?

$$0.2x + 12 = 1.4x$$

$$12 = 1.2x$$

$x = 10$  (at 10 miles they cost the same)

Lets try 9 miles:  $y = 0.2(9) + 12 = \$13.8$

$y = 1.4(9) = 12.60$  ← F.C. is better @ 9 miles

18. A 25 animal farm consists of only pigs and cows. The number of cows is the same as 4 more than twice the number of pigs.

How many of each animal are there?

$C = \#$  of cows

$P = \#$  of pigs

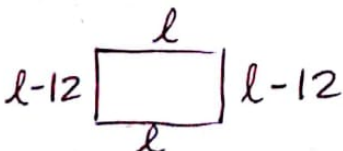
$$\begin{cases} C = 2P + 4 \\ C + P = 25 \end{cases}$$

Subst.:  $2P + 4 + P = 25$   
 $3P + 4 = 25$

$3P = 21$   
 $P = 7$

$$\begin{cases} P = 7 \\ C = 18 \end{cases}$$

19. The width of a rectangle is 12 cm less than the length. The perimeter is 156 cm. Find the width and length.



$$2l + 2(l-12) = 156$$

$$2l + 2l - 24 = 156$$

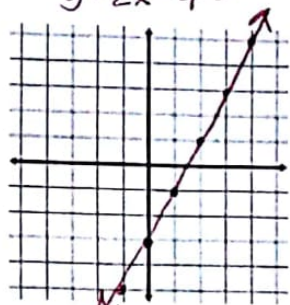
$$4l - 24 = 156$$

$$4l = 180$$

$$\begin{cases} l = 45 \text{ cm} \\ w = 33 \text{ cm} \end{cases}$$

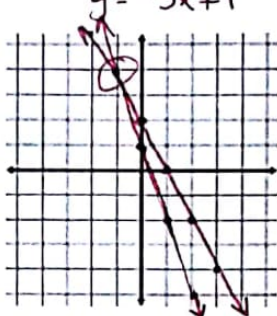
Solve each system by graphing.

20.  $\begin{cases} y = 2x - 4 \\ 3y = 6x - 12 \\ y = 2x - 4 \end{cases}$  *same line!*



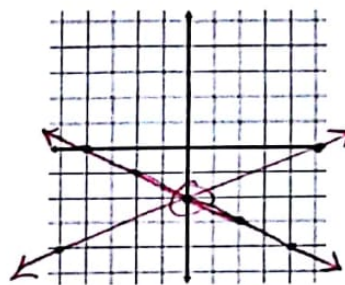
Infinitely many

21.  $\begin{cases} y = -2x + 2 \\ 2y = -4x + 4 \\ 2y = -6x + 2 \\ y = -3x + 1 \end{cases}$



(-1, 4)

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



(0, -2)

Solve each system using substitution or elimination.

23.  $\begin{cases} 2x - 4y = -4 \\ x - y = 1 \end{cases}$  Sub:  $2(1+y) - 4y = -4$   
 $2 + 2y - 4y = -4$   
 $2 - 2y = -4$   
 $-2y = -6$   
 $y = 3$   
 $x = 1 + y = 4$

(4, 3)

$x - 3 = 1$   
 $x = 4$

26.  $\begin{cases} -2x + y = -17 \\ 4x - 2y = 34 \end{cases}$  *same*  
 $\frac{4x - 2y}{-2} = \frac{34}{-2}$   
 $-2x + y = -17$

Infinitely Many

24.  $\begin{cases} 2x - 3y = 14 \\ 7x + 3y = 4 \end{cases}$  *added together*  
 $9x = 18$   
 $x = 2$   
 $2(2) - 3y = 14$   
 $4 - 3y = 14$   
 $-3y = 10$   
 $y = -\frac{10}{3}$

(2, -10/3)

27.  $\begin{cases} 3x + y + 1 = 0 \\ 5x - y - 17 = 0 \end{cases}$   
 $8x - 16 = 0$   
 $8x = 16$   
 $x = 2$

(2, -7)

25.  $\begin{cases} 0.3x - 0.4y = 1.2 \\ 0.5x + 0.3y = -0.2 \end{cases}$   
 $(0.3x - 0.4y = 1.2) \cdot 30$   
 $(0.5x + 0.3y = -0.2) \cdot 40$   
 $9x - 12y = 36$   
 $20x + 12y = -8$   
 $29x = 28$   
 $x = 28/29$

(28/29, -66/29)

28.  $\begin{cases} 5x + y = 11 \\ 2x + 6y = -18 \end{cases}$   
 $(5x + y = 11) \cdot 6$   
 $30x + 6y = 66$   
 $(2x + 6y = -18) \cdot 3$   
 $6x + 18y = -54$   
 $-28x = -84$   
 $x = 3$

(3, -4)

Give the best method to solve each system. Then, use that method to solve the system.

29.  $\begin{cases} \frac{7}{4}y = x \\ 4x + 3y = 19 \end{cases}$   
 $4(\frac{7}{4}y) + 3y = 19$   
 $7y + 3y = 19$   
 $10y = 19$   
 $y = \frac{19}{10}$   
 $x = \frac{7}{4} \cdot \frac{19}{10} = \frac{133}{40}$

Subst. (133/40, 19/10)

30.  $\begin{cases} 3x + 4y = 10 \\ -3x - 3y = 7 \end{cases}$   $y = 17$

Elim. (-19 1/3, 17)

31.  $\begin{cases} 2x + 3y = 12 \\ -5x + 4y = 10 \end{cases}$   
 $(2x + 3y = 12) \cdot 5$   
 $(-5x + 4y = 10) \cdot 2$   
 $10x + 15y = 60$   
 $-10x + 8y = 20$   
 $23y = 80$   
 $y = \frac{80}{23}$

Elim. (18/23, 80/23)

32. Circle which system(s) will have the same solution set as the system:  $x - 2y = 8$  and  $3x - 2y = 12$ .

a)  $2x - 4y = 16$  and  $3x - 2y = 12$  *same as 2nd*

b)  $10x - 20y = 80$  and  $15x - 10y = 60$  *10x 1st, 5x 2nd*

c)  $5x - 2y = 16$  and  $5x - 2y = 12$  *Not equal to either*

d)  $0.5x - y = 4$  and  $-1.5x + y = -6$  *1/2 x 1st, -1/2 x second*

a, b, d