

Unit 4 (Algebraic Systems) Test Review Sheet

Directions: Be sure to show all work, communicate your thought process, and justify your reasoning. Remember to check that your answers are complete, correct, and reasonable. If you complete work on scrap paper, please attach it.

1. Each box represents the system of equations formed by those at the left of each row and the top of each column. Indicate the number of solutions each system of equations will have.

	$4y - 8x = 12$	$y = 8 - x$	$y = 7$	$y = -(x + 2)^2$
$30x = 15y$				
$y = 7 - x^2$				You may skip this one 😊
$y = x - 2 $				
$y = x + 2 $				

2. Solve each system of equations by using elimination.

a. $4x - 12y = 94$
 $3y + 5x = -26.5$

$-4x - 9y = -10$
b. $7x - 2y = 53$

3. Solve each system of equations by using substitution.

a. $-3x + 5y = -9$
 $x - y = -1$

b. $8y = 9x - 50$
 $-y + 3x = -10$

4. a. Given the functions $f(x) = -2|x| - 5$ and $g(x) = \frac{x^2}{3} - 10$, state any two intervals that contain a value of x for which $f(x) = g(x)$.

b. Given the functions $f(x) = \sqrt{x - 1} + 1$ and $g(x) = \frac{(x - 5)^2}{5}$, state any two intervals that contain a value of x for which $f(x) = g(x)$.

5. a. Consider the functions $w(x) = (x + 5)^2 - 1$, $z(x) = |x + 5| - 1$, and $r(x) = 2x + 9$.
Determine the x -value for which $r(x) = w(x) = z(x)$.

Substitute the value you found into each equation, to prove that the value is the true solution to the equation $r(x) = w(x) = z(x)$.

b. Three functions are equal when $x = 3$. State any possibility for three such functions.

6. a. Solve $2|x - 1| = 2x^2 - 3$. Round to the nearest tenth.

b. Solve $\sqrt{x - 3} + 4 = 5(x - 7)^2$. Round to the nearest tenth.

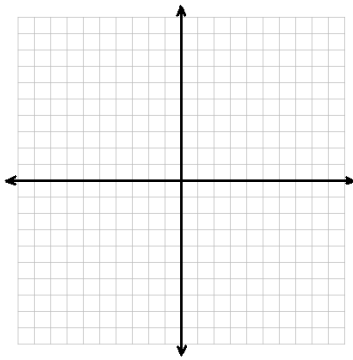
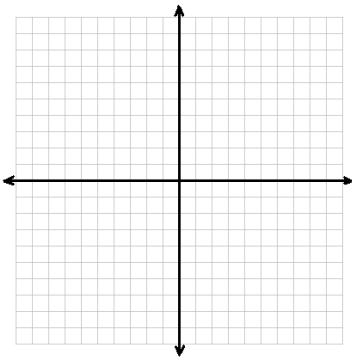
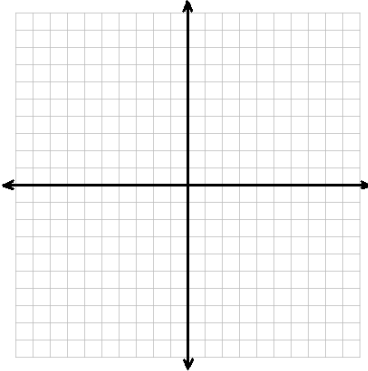
7. Functions t and v are defined as follows.

$$t(x) = (x - 3)^2 - 9$$

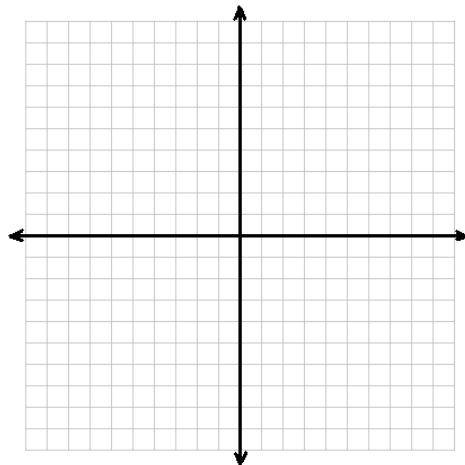
$$v(x) = \frac{3}{x}$$

Determine the point where the graphs of $t(x)$ and $v(x)$ intersect.
Round to the nearest tenth, as necessary.

8. Solve and graph the solution to each system of inequalities.

$y \leq 2 x - 4 $ <p>a. $x \geq 2$ $y \geq -5$</p> <div style="text-align: center; margin-top: 20px;">  </div>	<p>b. $-9y > 18x + 63$ $15y - 10x < 45$</p> <div style="text-align: center; margin-top: 20px;">  </div>	<p>c. $y \geq 2 x + 2 - 3$ $-13y + 39x < -65$</p> <div style="text-align: center; margin-top: 20px;">  </div>
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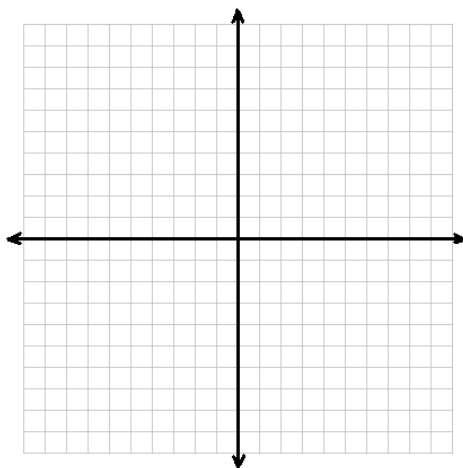
9. a. Paul signed up to participate in some studies regarding exercising. For each “short survey” he completes, he earns one dollar, and for each “long survey” he completes, he earns two dollars. Each week, Paul cannot complete more than 8 surveys. Paul would like to make at least \$10 completing surveys this week. Shade the area of the graph that represents the possibilities of the amounts of each type of survey Paul can take. Describe one of these possibilities. Also describe why the graph is not a sufficient representation of the solution set.



b. Gloria placed two orders for flowers recently. She first ordered three sets of sunflowers and five sets of hydrangeas, for a total of \$91.25. Her second order included two sets of sunflowers and six sets of hydrangeas, for a total of \$89.50. Gloria is trying to figure out how much she will have to pay for three sets of sunflowers and three sets of hydrangeas this month. Help her do so!

c. Admission to a benefit fair to raise money for research to assist in finding a cure for cancer was \$15 per person, with a 25% discount for students. A total of 977 people attended the benefit, which generated a total amount of \$13,781.25 for the cause! The organization running the event is trying to determine how many students attended the event. Assuming all students used the discount and no one entered the fair for free, determine how many students attended the fair.

d. Joanna burns 4 calories per minute lifting weights and 8 calories per minute running. Joanna would like to complete a workout that is less than 10 minutes, but she would like to burn at least 40 calories. Shade the area of the graph that represents the possibilities of the amounts of each type of workout Joanna should do. Describe one of these possibilities.



10. Determine the solution to each system of linear equations.

a. $x - 5y + 8z = 54$
 $3x + 5y - 8z = -26$
 $-3x - y - 8z = -14$

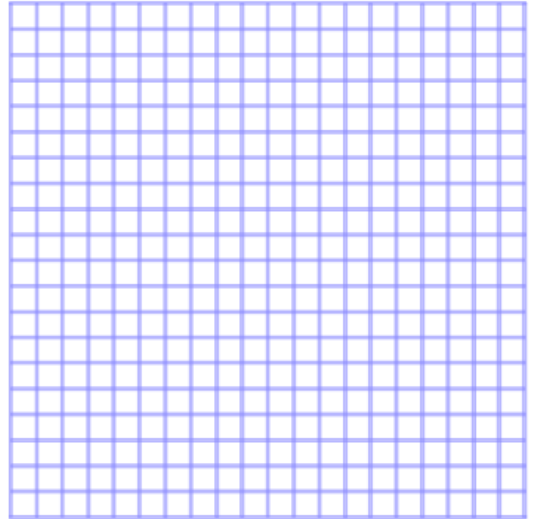
$x =$ _____ $y =$ _____ $z =$ _____

b. $4x - 2y - 4z = -36$
 $x - 3y + 2z = -28$
 $-8x - 6y - z = 59$

$x =$ _____ $y =$ _____ $z =$ _____

11. Solve each problem, and be sure to show all work.
You may use the graphs provided, as necessary and if desired.

a. A family is re-tiling their kitchen floor with red and brown tiles only. The red tiles take up 36 square inches each, and the brown tiles each cover 24 square inches. The design the family wants to use for the tiling patterns requires that there must be at least triple as many red tiles as brown tiles, and that at least 20 brown tiles and 10 red tiles must be used. The red tiles cost \$2.50 each, and the brown tiles cost \$1.75 each. The family has a total of \$1,600 to spend and would like to maximize the amount of space covered by the tiles so that they can have the smallest gaps between the tiles as possible. How many of each type of tile should the family purchase?



b. Tony and his friends are making some holiday decorations to sell in order to raise money to help pay medical bills for rescued animals. Decoration A costs 50 cents to make and generates a revenue of \$2.50. Decoration B takes costs 40 cents to make and generates a revenue of \$2.00. Tony and his friend want to make at least 200 decorations. Due to a sampling survey they carried out, Tony figured out that they need at least 45 of decoration B and more than 20 of decoration A. Their budget is \$190, and they would like to generate as much revenue as possible to donate. How many of each decoration should Tony and his friends make?

