

Name: \_\_\_\_\_

**Algebra II Prerequisite Packet 1**

1. Consider the following numbers:  $0, -8, -\frac{2}{3}, 0.\bar{7}, 4.3, \pi, \sqrt{2}, \sqrt{-4}, \sqrt{81}$

Identify the numbers which are

a. rational numbers \_\_\_\_\_

b. integers \_\_\_\_\_

c. real numbers \_\_\_\_\_

2. Match each with the name of the property

- |  |  |
|--|--|
| _____ 1. $a(b + c) = ab + ac$                | a. commutative property for multiplication |
| _____ 2. $a(b + c) = a(c + b)$               | b. symmetric property                      |
| _____ 3. $a(b + c) = (b + c)a$               | c. transitive property                     |
| _____ 4. If $a = b$ , then $b = a$           | d. associative property for multiplication |
| _____ 5. $a(bc) = (ab)c$                     | e. commutative property for addition       |
| _____ 6. If $a = b$ and $b = c$ then $a = c$ | f. Inverse for multiplication              |
| _____ 7. $a \cdot \frac{1}{a} = 1$           | g. distributive property                   |
| _____ 8. $a \cdot 1 = a$                     | h. identity for multiplication             |

3. Simplify the following expressions. (Do not use a calculator)

a.  $8a^2(5a^3 - 2a - 7) =$  \_\_\_\_\_ b.  $\left(\frac{2}{3}p\right)\left(\frac{6}{7}q\right) =$  \_\_\_\_\_ c.  $\frac{12m^2n}{9mn^4} =$  \_\_\_\_\_

d.  $(a - 5)(4a - 9)$  e.  $(2x + 5y)^2$  f.  $(2x^2 - 3x + 5) - (7x^2 + 8x + 11)$  g.  $7(5 - 2x) - (1 - x)$

d. \_\_\_\_\_ e. \_\_\_\_\_ f. \_\_\_\_\_ g. \_\_\_\_\_

4. Find the value of each expression. (Do not use a calculator)

a.  $(-5)^2$  \_\_\_\_\_ b.  $-7^2$  \_\_\_\_\_ c.  $2 - 3 \cdot 2^2$  \_\_\_\_\_ d.  $-2(5 + 3)^2$  \_\_\_\_\_

e.  $4^{-2}$  \_\_\_\_\_ f.  $5 \cdot 3^0 + 10^0$  \_\_\_\_\_ g.  $12 - (5 - 8) - [-4 - (-18)]$  \_\_\_\_\_

5. Simplify each radical expression (no decimal approximations and no calculators)

a.  $8\sqrt{12}$  \_\_\_\_\_ b.  $(3\sqrt{2})^2$  \_\_\_\_\_ c.  $4\sqrt{5} \cdot 2\sqrt{10}$  \_\_\_\_\_

d.  $\frac{12\sqrt{20}}{\sqrt{5}}$  \_\_\_\_\_ e.  $5\sqrt{2} + \sqrt{3} + 8\sqrt{2}$  \_\_\_\_\_ f.  $\sqrt{98} + \sqrt{18}$  \_\_\_\_\_

6. Factor each of the following expressions:

a.  $3x^2 + 6x =$  \_\_\_\_\_ b.  $9x^2 - 25 =$  \_\_\_\_\_ c.  $x^2 + 7x + 6$  \_\_\_\_\_

d.  $2x^2 - 18 =$  \_\_\_\_\_ e.  $x^3 - 3x^2 - 10x =$  \_\_\_\_\_

7. a. If  $2x = 5y$  and  $y = 3z$  and  $z = \frac{1}{2}w$ , write  $x$  in terms of  $w$  \_\_\_\_\_

b. Express the amount of money : 3 one-dollar bills and  $x$  five dollar bills \_\_\_\_\_

c. The ratio of three angles of a triangle is 3:4:5. Define variables and write an equation to be used to find the measure of the largest angle. Solve it and state the measure of the largest angle.

Equation: \_\_\_\_\_

Largest  $\angle$  \_\_\_\_\_

8. Solve the following equations. Show work.

a.  $2x(x-5) = 16 - x(13-2x)$

b.  $a - 6 = -6 - (3a - 7) - 2a$

c.  $\frac{2}{3}(y-9) = \frac{3}{4}(y+8)$

d.  $\frac{x}{180-x} = \frac{7}{5}$

e.  $x^2 - x = 6$

f.  $3x^2 - 5x = 0$

g.  $x^2 = 4x + 21$

h.  $x^2 + 5x + 3 = 0$  (*show & use quadratic formula*)

i.  $\frac{x}{x+3} = \frac{x-4}{3}$

j.  $3(2x-2) = 5x - (6-x)$

k.  $3x^2 = 75$

l.  $3(x+4) - (x+2) = 2(x+8)$

9. Solve each of the following literal equations for  $x$ . Show appropriate work in space provided.

a.  $a + bx = c$

b.  $2a - x = b$

c.  $\frac{a}{x} = b$

d.  $a + bx = c$

e.  $ax + bx = c + d$

f.  $ax + b = cx + d$

g.  $P = 2l + 2x$

h.  $A = \frac{1}{2}h(b + x)$

10. Write an equation of each line described below. Write answers  $c$  &  $d$  in  $y = mx + b$  form and answers  $e$  &  $f$  in point slope form :  $y - y_1 = m(x - x_1)$ . Show appropriate work.

a. vertical line thru  $(5,2)$  \_\_\_\_\_ b. horizontal line thru  $(-2,6)$  \_\_\_\_\_

c. line thru  $(15, -1)$  with slope  $\frac{2}{3}$

d. line thru  $(2,3)$  and  $(-2, 5)$

e. line thru  $(-3,9)$  and parallel to  $y = \frac{2}{3}x + 1$  f. line thru  $(6, 2) \perp$  to  $5x + 2y = 12$

11.a. Find the x-intercept and y-intercept of the line with equation  $5x - 2y = 7$

x-intercept ( \_\_\_\_\_, \_\_\_\_\_ )    y-intercept ( \_\_\_\_\_, \_\_\_\_\_ )

b. Let  $A = (5, -1)$  and  $B = (-9, -5)$  and write and use appropriate formulas to find:

- (i) the midpoint between A and B                      (ii) the distance from A to B

Answer \_\_\_\_\_

Answer \_\_\_\_\_

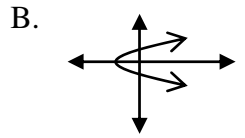
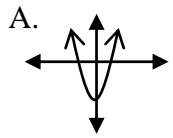
12. Solve each system of equations. Show key steps.

a. 
$$\begin{cases} y = 2x - 1 \\ 4x + 6y = -14 \end{cases}$$

b. 
$$\begin{cases} 20x - 8y = -4 \\ 3x + 4y = 7.2 \end{cases}$$

13. Describe the vertical line test used to determine whether or not a relation is a function and use it to determine which of these graphs IS a function.

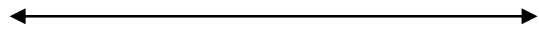
Ans. \_\_\_\_\_



\_\_\_\_\_

14. Solve the inequality: graph the solution on number line and describe using a compound sentence.

$|20 - 2x| \geq 10$



\_\_\_\_\_

15. Determine  $k$  so that point P is on the given line.  $P = (k, 2k)$ ; Line:  $3x + 4y = -22$

16. If  $f(x) = -x^2 + 3x + 1$  &  $g(x) = 4x + 2$  find the following (show work)

$f(2) =$

$f(4) + g(3) =$

17. Use the coordinate planes provided below to graph each equation or system of equations and inequalities. Identify the solution to the equation and indicate the solution to the inequality by shading clearly.

a.  $\begin{cases} y = 2 \\ 3x - 4y = -20 \end{cases}$

b.  $\begin{cases} 2x + y = 5 \\ x - 3y = 6 \end{cases}$

c.  $\begin{cases} x \geq -1 \\ y \leq 2 \end{cases}$

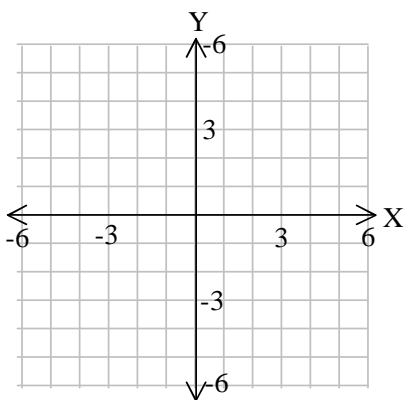
d.  $\begin{cases} y < -2x + 3 \\ 2x - y > 5 \end{cases}$

e.  $y = 2|x - 2| - 3$

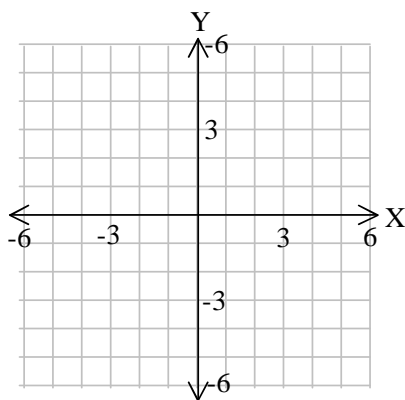
Sol. \_\_\_\_\_

Sol. \_\_\_\_\_

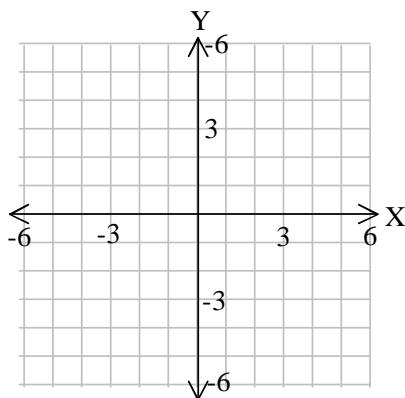
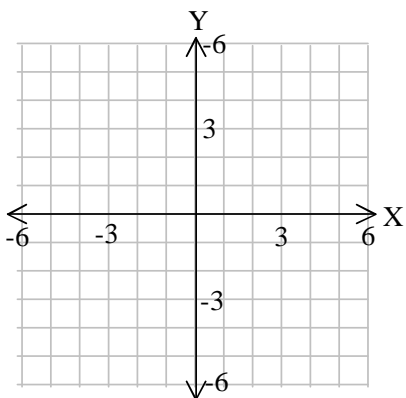
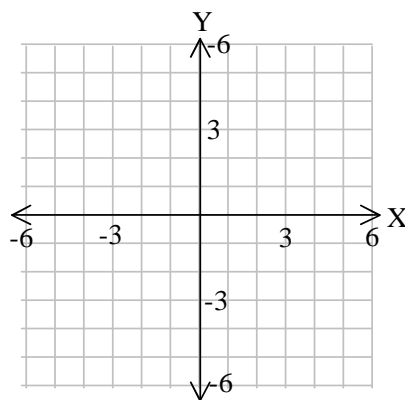
a.



b.



c.



## Application Problems

18. The width of a sheet of cardboard is three inches more than twice the length. If the area is 77 inches squared, what are the length and width of the cardboard rectangle?
19. Callie is five years more than three times as old as her sister Tanya. The sum of their ages is 25. How old is Callie?
20. Alexis and Maria each choose a number between 1 and 20. Kevin looks at the numbers and tells them that Maria's number is one more than twice Alexis' number. Bohdan multiplies the numbers and gets 36. What is Maria's number.
21. Tiger Woods hits a golf ball with an initial UPWARD velocity of 29.4 meters per second (we're not calculating distance, only height and time). The golf ball lands on the green, which is 12 meters below the tee box (use this for the initial height, the tee box is 12 meters ABOVE the green).

Given:  $h = -4.9t^2 + vt + c$

$h$  = height

$t$  = time

$v$  = initial velocity

$c$  = initial height

- a) Write an equation for this situation.
- b) How long does it take the ball to land on the green?
- c) How high above the green is the ball after 4 seconds?
- d) How high above the green is the ball after 6 seconds?

22. The wire supporting a 20-foot tall phone pole is attached to the top of the pole, and to the ground 12 feet from the pole. How long is the wire?
23. Mary and Benjamin are driving to their friend Paul's house for a birthday party. Mary drives 9 miles north and 6 miles east to get there, while Benjamin drives 3 miles south and 7 miles west. How far does Mary live from Benjamin (round to the tenth of a mile)?
24. The Yellow Cab Company charges just \$0.25 a mile, but it costs \$5 to get in the cab. Express Cab charges no fee to get in the cab, but \$1.50 a mile for the ride.
- a) If you are going 7 miles, which cab company should you call?
  - b) If you are going 3 miles, which cab company should you call?
  - c) For what length of drive is the cost equal?
25. Alyssa scored 54 points in her basketball game. If she made 24 shots (none of them were free throws), how many of her shots were 2-pointers, and how many were 3-pointers?
26. You combine a 10% saltwater mixture with a 40% saltwater mixture to create 6 gallons of a 30% saltwater solution. How many gallons of each mixture did you use?
27. Planters is making a new mixture combining Peanuts and Cashews. Cashews cost \$7 a pound and Peanuts are \$4 a pound. How many pounds of each should be added to make a ten pound mixture that sells for \$4.20 a pound?