

Algebra 2
1st Semester Final Review #3

Name: Key

1. Name the property of real numbers illustrated by each equation.

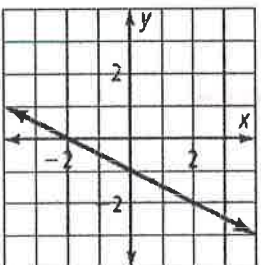
a) $2(3 + \sqrt{5}) = 2 \cdot 3 + 2 \cdot \sqrt{5}$
distributive

b) $16 + (-13) = -13 + 16$
commutative prop of add.

c) $5(0.2 \cdot 7) = (5 \cdot 0.2) \cdot 7$
associative prop of mult.

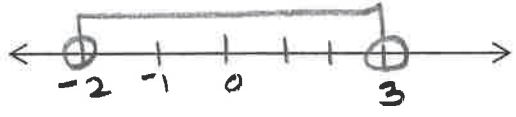
5. Find the slope and y-intercept of the line.

$m = -1/2$
 $b = -1$



2. Solve the compound inequality. Graph the solution.
 $3x > -6$ and $2x < 6$

$x > -2$ and $x < 3$



6. In the following problems, y varies directly with x.

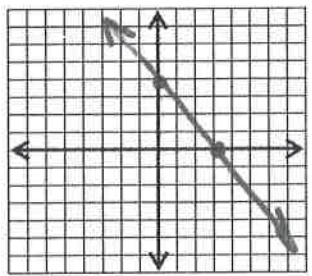
a) If $y = 3$ when $x = -9$, find x when $y = 5$.
 $x = -15$

b) If $y = -14$ when $x = -7$, find x when $y = 22$.
 $x = 11$

c) If $y = 5$ when $x = 8$, find x when $y = 2$.
 $x = 16/5$

d) If $y = 4$ when $x = 14$, find y when $x = 5$.
 $y = 10/7$

3. Graph the equation.
 $4x + 3y = 12$



7. Find the slope and y-intercept of each line.

a) $3x - 4y = 12$
 $-4y = -3x + 12$
 $y = 3/4x - 3$
 $m = 3/4$
 $b = -3$

b) $y = -2$
 $m = 0, b = -2$

c) $4x - 3y = -6$
 $m = 4/3, b = 2$

d) $f(x) = \frac{5}{4}x + 7$
 $m = 5/4, b = 7$

4. Write an equation for each line.

a) $m = -4$ and the y-intercept is 3.
 $y = mx + b$
 $y = -4x + 3$

b) $m = -1$ and the y-intercept is 2.
 $y = -x + 2$

8. Find the slope of the line that passes through each pair of points.

a) $(-3, -2)$ and $(1, 6)$
 $m = 2$

b) $(4, -1)$ and $(-2, -3)$
 $m = 1/3$

9. Determine whether y varies directly with x . If so, find the constant of variation.

$$y = kx$$

a) $y = \frac{4}{9}x$

yes, $k = \frac{4}{9}$

b) $y + 4x = 0$

yes, $k = -4$

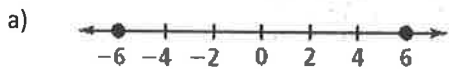
c) $y = 3x$

yes, $k = 3$

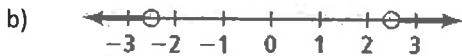
d) $y + 2 = x$

NO

10. Write an absolute value equation or inequality to describe each graph.



$$6 \leq x \leq -6$$



$$2\frac{1}{2} < x < -2\frac{1}{2}$$

11. Without graphing, determine whether each system is consistent or inconsistent.

a)
$$\begin{cases} 2x + y = 3 \rightarrow y = -2x + 3 \\ y = -2x - 1 \end{cases}$$
 // lines, inconsistent

b)
$$\begin{cases} x + 3y = 9 \rightarrow y = -\frac{1}{3}x + 3 \\ 9y + 3x = 27 \rightarrow y = -\frac{1}{3}x + 3 \end{cases}$$

same line
consistent

12. Solve by substitution.

$$\begin{cases} y = x + 1 \\ 2x + y = 7 \end{cases} \quad 2x + (x + 1) = 7$$

$$3x + 1 = 7$$

$$3x = 6$$

$$x = 2$$

$$y = 3$$

$(2, 3)$

13. Solve by elimination.

$$\begin{cases} x + 5y = 1 \\ 2x + 10y = 2 \end{cases}$$

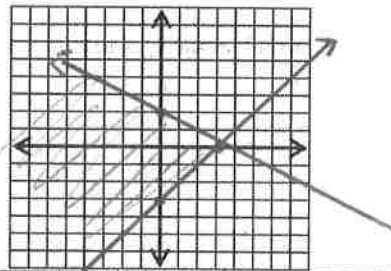
$$-2x - 10y = -2$$

$0 = 0$ Infinite Solutions

14. Solve the system of inequalities by graphing.

$$y \geq x - 3$$

$$y \leq -\frac{1}{2}x + 2$$



15. Find the maximum or minimum values of the objective function.

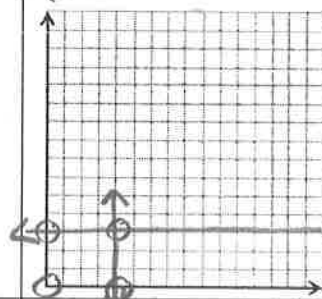
$$x \leq 4$$

$$y \leq 3$$

$$x \geq 0$$

$$y \geq 0$$

maximum for $P = 2x + y$



$$(0, 0) \rightarrow P = 0$$

$$(0, 3) \rightarrow P = 3$$

$$(4, 0) \rightarrow P = 8$$

$$(4, 3) \rightarrow P = 11$$

Max is 11
at $(4, 3)$

16. Solve by elimination.

$$x + y + z = -4$$

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

$$x - 4y - 2z = -15$$

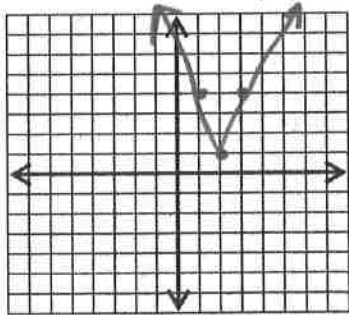
$$x = \frac{-53}{11}$$

$$y = \frac{47}{11}$$

$$z = \frac{-38}{11}$$

17. Graph and list the vertex, tell if it is a max or min and list the axis of symmetry.

$$y = 3(x-2)^2 + 1$$



$V(2, 1)$
min
aos: $x = 2$

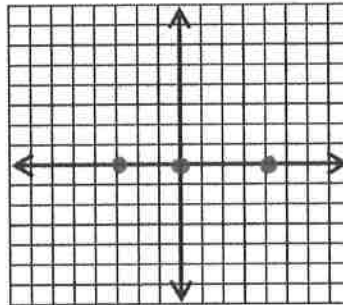
21. Factor and sketch the zeros of the function.

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

$$y = x(x^2 - x - 12)$$

$$y = x(x-4)(x+3)$$

$$x = 0, 4, -3$$



18. Write each polynomial in standard form, classify it by degree and number of terms.

a) $3c^2 - 4c + 9 - 4c^2 - c^2 - 4c + 9$
quadratic trinomial

b) $3x^2y - 3xy - 5x^2y - 2x^2y - 3xy$
quad. binomial

c) $6a^2b^2c^1$
6-degree monomial

d) $5x^2 - 5x - x^2 + x + 4x - 6x^3 - 1$
 $-6x^3 + 4x^2 - 1$ cubic trinomial

22. Factor each expression.

a) $16 - 64p^2$ $16(1 - 4p^2)$
 $16(1 - 2p)(1 + 2p)$

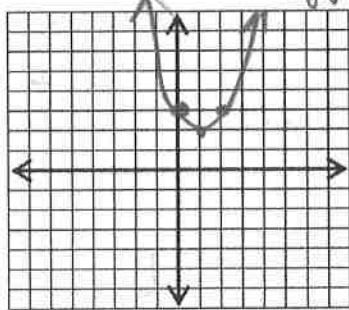
b) $25h^3 - 16h$ $h(25h^2 - 16)$
 $h(5h - 4)(5h + 4)$

c) $4k^3 - 24k^2 + 36k$ $4k(k^2 - 6k + 9)$
 $4k(k - 3)(k - 3)$

d) $b^2 - 11b + 30$
 $(b - 5)(b - 6)$

19. Use $-\frac{b}{2a}$ to determine the vertex. List the axis of symmetry and y-intercept for the quadratic equation and draw the graph.

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



$x_v = \frac{2}{2} = 1$
 $y_v = 1 - 2 + 3 = 2$
 $V(1, 2)$
aos: $x = 1$
 $b = 3$

23. Factor each expression.

a) $8x^2 + 13x - 6$ $(8x - 3)(x + 2)$

b) $8m^3 - 1$ $(2m - 1)(4m^2 + 2m + 1)$

c) $6x^2 + 28x - 10$ $2(3x^2 + 14x - 5)$
 $2(3x - 1)(x + 5)$

d) $125 + 27y^3$
 $(5 + 3y)(25 - 15y + 9y^2)$

20. Determine the standard form equation given the zeros.

a) $x = -3, 1, 0$

$$y = (x+3)(x-1)x$$

$$y = (x^2 + 2x - 3)x$$

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

24. Use long division to divide.

$$\frac{x^2 - x + 8 + \frac{-12}{x+3}}{x+3} \cdot x^3 + 2x^2 + 5x + 12$$

$$x^3 + 3x^2$$

$$-x^2 + 5x$$

$$-x^2 - 3x$$

$$8x + 12$$

$$8x + 24$$

$$-12$$

25. Use synthetic division to divide.

$$\frac{4n^3 - 6n^2 + 2n - 7}{n - 2} = 4n^2 + 2n + 6 + \frac{5}{n-2}$$

$$\begin{array}{r|rrrr} 2 & 4 & -6 & 2 & -7 \\ & & 8 & 4 & 12 \\ \hline & 4 & 2 & 6 & 5 \end{array}$$

29. Put the slope intercept form equation

$$y = -\frac{1}{5}x - 2 \text{ into standard form.}$$

$$5y = -x - 10$$

$$x + 5y = -10$$

26. Evaluate by synthetic division.

Find $P(-2)$ for $P(x) = x^3 - 4x^2 - x - 6$

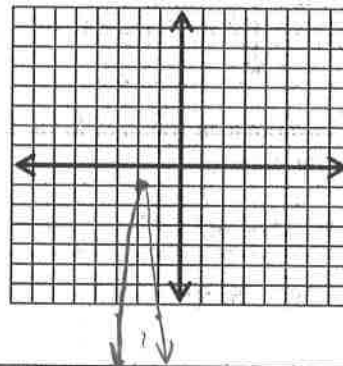
$$\begin{array}{r|rrrr} -2 & 1 & -4 & -1 & -6 \\ & & -2 & 12 & -22 \\ \hline & 1 & -6 & 11 & -28 \end{array}$$

$$P(-2) = -28$$

30. Graph each and list the vertex, tell if it is a max or min and list axis of symmetry.

$$y = -7(x+2)^2 - 1$$

Vertex: $(-2, -1)$
 Axis of Symmetry: $x = -2$
 max



27. Expand using Pascal's triangle.

$$(y-2)^4$$

$$\begin{array}{ccccccc} & & & 1 & & & \\ & & & & 1 & & \\ & & 1 & & 2 & & 1 \\ & 1 & & 3 & & 3 & & 1 \\ 1 & & 4 & & 6 & & 4 & & 1 \end{array}$$

$$y^4 - 8y^3 + 24y^2 - 32y + 16$$

31. Solve each equation and graph the solution.

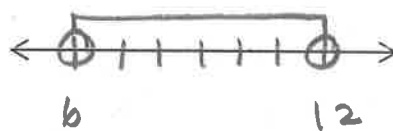
a) $|2c - 6| - 9 = 5$

$$2c - 6 = 14 \quad 2c - 6 = -14$$

$$c = 10 \quad c = -4$$



b) $|2y - 18| + 4 < 10$



$$y < 12 \text{ and } y > 6$$

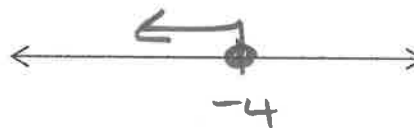
28. Categorize each number into one or more real number sets.

- a) $\sqrt{7}$ real, irrational
- b) -4 real, rational, integer
- c) $\frac{12}{7}$ real, rational
- d) 3π real, irrational
- e) $-\frac{3}{4}$ real, rational

32. Solve each inequality. Graph the solution.

a) $-3x - 11 \geq 1$

$$x \leq -4$$



b) $-3 < -2x + 13 < 1$

$$x > 6 \text{ and } x < 8$$

