

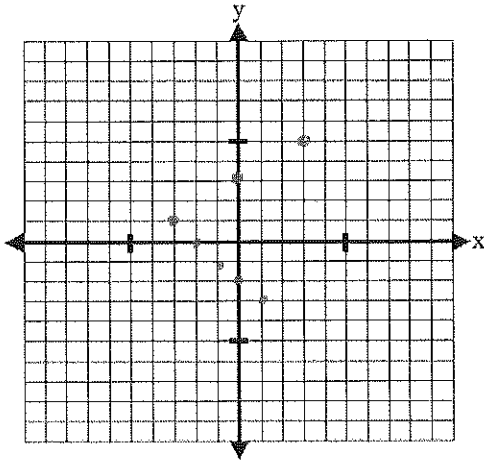
Name: Key

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Systems of Linear Equations & Quadratics Review

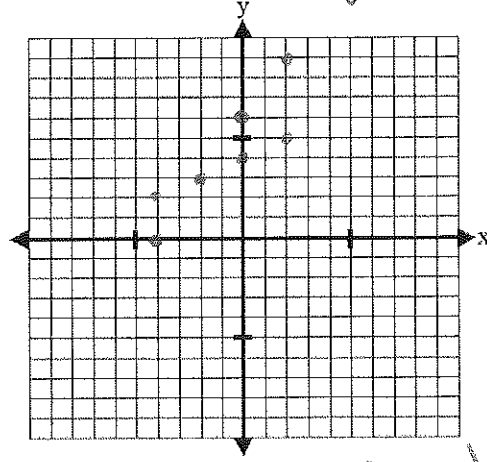
Solve the following systems of equations by graphing

1)  $2x - 3y = -9$   $y = \frac{2}{3}x + 3$   
 $y = -x - 2$



Solution:  $(-3, 1)$

2)  $3x - 2y = -12$   $y = \frac{3}{2}x + 6$   
 $-x + 2y = 8$   $y = \frac{1}{2}x + 4$



Solution:  $(-2, 3)$

Solve the following system of equations by substitution

3)  $x = 5y$   $2x + 3y = -13$  Solution:  $(-5, -1)$

$2(5y) + 3y = -13$

$13y = -13$

$y = -1$

$x = 5(-1)$

$x = -5$

4)  $2x + 3y = 3$   $x = 6y - 6$  Solution:  $(0, 1)$   
 $x - 6y = -6$   
 $+6y +6y$

$2(6y - 6) + 3y = 3$

$12y - 12 + 3y = 3$

$15y = 15$

$y = 1$

$2x + 3(1) = 3$   $2x = 0$

$x = 0$

Solve the following system of equations by elimination

5)  $(5x + 5y = 10) \cdot 3$   $(2x - 3y = 4) \cdot 5$  Solution:  $(2, 0)$

$+ 15x + 15y = 30$   
 $+ 10x - 15y = 20$

$25x = 50$

$x = 2$

$5(2) + 5y = 10$

$5y = 0$

$y = 0$

$-3(2x + 14y = 24)$   $2(3x - 5y = 10)$  Solution:  $(5, 1)$

$-6x - 42y = -72$   
 $+ 6x - 10y = 20$

$-52y = -52$

$y = 1$

$2x + 14(1) = 24$

$2x = 10$

$x = 5$

Solve each of the following by substitution or elimination

$$7) \begin{cases} 5x + 6y = 11 \\ 2x - 4y = -2 \end{cases} \cdot 2 \quad (1, 1)$$

$$+ \begin{cases} 10x + 12y = 22 \\ 6x - 12y = -6 \end{cases}$$

$$\hline 16x = 16$$

$$x = 1$$

$$5(1) + 6y = 11$$

$$y = 1$$

$$9) \begin{cases} -6x + 2y = 4 \\ -9x + 3y = 12 \end{cases} \cdot -3$$

$$18x - 6y = -12$$

$$-18x + 6y = 24$$

$$0 = 12$$

No Solution

$$8) \begin{cases} 3x + 4y = 5 \\ y - 2x = 4 \end{cases} \quad (-1, 2)$$

$$y - 2x = 4 \quad y = 2x + 4$$

$$3x + 4(2x + 4) = 5$$

$$3x + 8x + 16 = 5$$

$$11x = -11$$

$$x = -1$$

$$y - 2(-1) = 4$$

$$y + 2 = 4 \quad y = 2$$

$$10) \begin{cases} 7x + y = -2 \\ 3x + y = 2 \end{cases} \quad y = -7x - 2 \quad (-1, 5)$$

$$3x + (-7x - 2) = 2$$

$$3x - 7x - 2 = 2$$

$$-4x = 4$$

$$x = -1$$

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

$$y = 5$$

Solve each of the following systems of equations using the matrix method. Write each system of equations in matrix form and the answer.

$$11) \begin{cases} 5x + 3y = 4 \\ 2x + 2y = 8 \end{cases} \quad (-4, 8)$$

$$\begin{bmatrix} 5 & 3 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 8 \end{bmatrix}$$

$$x = -4$$

$$\begin{bmatrix} 5 & 3 \\ 2 & 2 \end{bmatrix}^{-1} \begin{bmatrix} 4 \\ 8 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix} \quad y = 8$$

$$12) \begin{cases} 3x + 3y + z = 1 \\ 2x - 3y + z = 2 \\ x + y + z = 3 \end{cases} \quad (-1, 0, 4)$$

$$\begin{bmatrix} 3 & 3 & 1 \\ 2 & -3 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

$$x = -1$$

$$\begin{bmatrix} 3 & 3 & 1 \\ 2 & -3 & 1 \\ 1 & 1 & 1 \end{bmatrix}^{-1} \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \quad y = 0$$

$$z = 4$$

Find the inverse of the following matrices

$$13) A = \begin{bmatrix} -6 & 11 \\ -4 & 7 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 3.5 & -5.5 \\ 2 & -3 \end{bmatrix}$$

$$14) B = \begin{bmatrix} 2 & -10 \\ -11 & 8 \end{bmatrix}$$

$$B^{-1} = \begin{bmatrix} -4/47 & -5/47 \\ -11/47 & -1/47 \end{bmatrix}$$

$$x = \frac{-b}{2a}$$

Graph each of the following quadratic equations and identify the key characteristics

15)  $y = x^2 - 2x - 6$

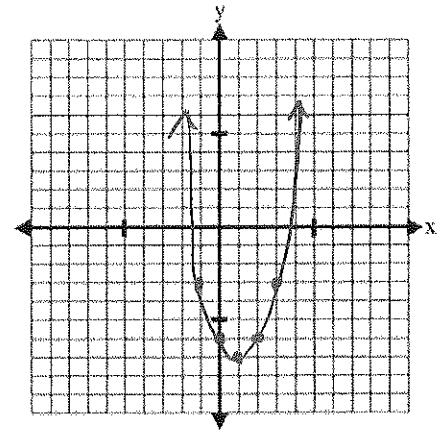
$$x = \frac{2}{2(1)} = 1$$

AOS:  $x = 1$

Vertex:  $(1, -7)$

Minimum or Maximum: Minimum at  $y = -7$

y-intercept:  $(0, -6)$



16)  $y = -2x^2 + 4x + 7$

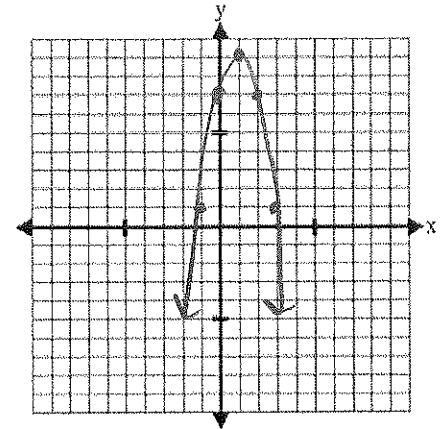
$$x = \frac{-4}{2(-2)} = 1$$

AOS:  $x = 1$

Vertex:  $(1, 9)$

Minimum or Maximum: Maximum at  $y = 9$

y-intercept:  $(0, 7)$



17)  $y = 3x^2 + 6x - 7$

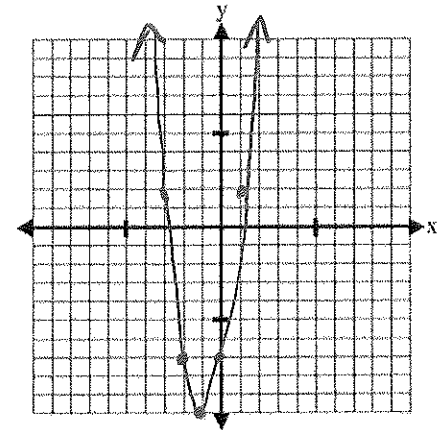
$$x = \frac{-6}{2(3)} = -1$$

AOS:  $x = -1$

Vertex:  $(-1, -10)$

Minimum or Maximum: Minimum at  $y = -10$

y-intercept:  $(0, -7)$



18)  $y = -x^2 + 8x - 7$

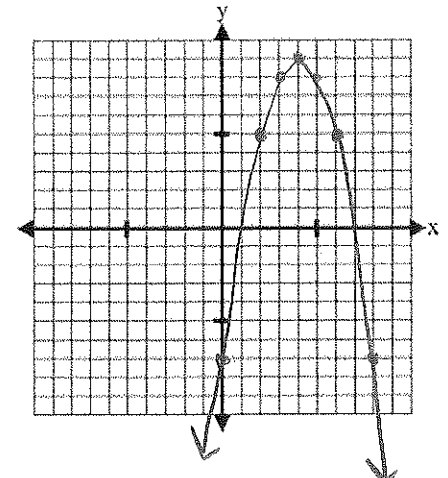
$$x = \frac{-8}{2(-1)} = 4$$

AOS:  $x = 4$

Vertex:  $(4, 9)$

Minimum or Maximum: Maximum at  $y = 9$

y-intercept:  $(0, -7)$



★ do not multiply out → use vertex form

Graph each of the following quadratic equations and identify the key characteristics

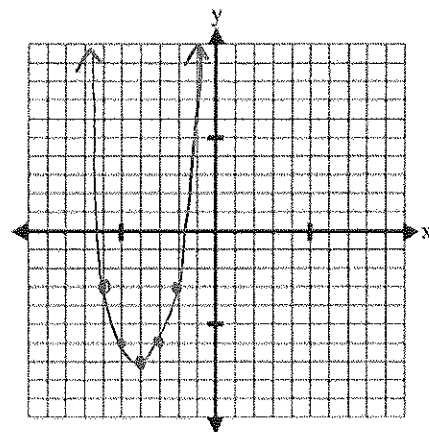
19)  $y = (x + 4)^2 - 7$

AOS:  $x = -4$

Vertex:  $(-4, -7)$

Minimum or Maximum: minimum at  $y = -7$

y-intercept:  $(0, 9)$



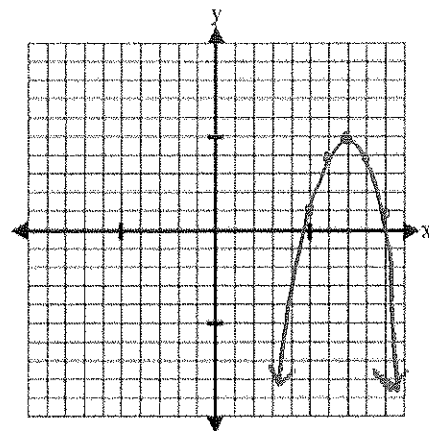
20)  $y = -(x - 7)^2 + 5$

AOS:  $x = 7$

Vertex:  $(7, 5)$

Minimum or Maximum: maximum at  $y = 5$

y-intercept:  $(0, -44)$



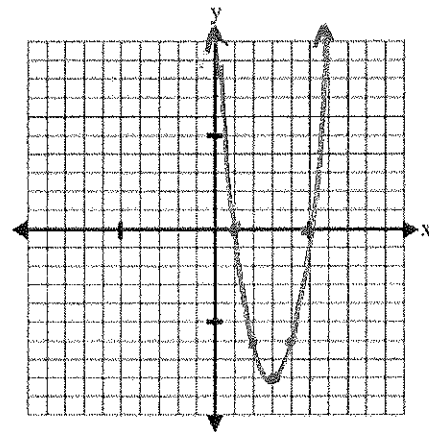
21)  $y = 2(x - 3)^2 - 8$

AOS:  $x = 3$

Vertex:  $(3, -8)$

Minimum or Maximum: minimum at  $y = -8$

y-intercept:  $(0, 10)$



22)  $y = -3(x + 1)^2 + 9$

AOS:  $x = -1$

Vertex:  $(-1, 9)$

Minimum or Maximum: Maximum at  $y = 9$

y-intercept:  $(0, 6)$

