

Period: _____

Name: KEY

Chapter 7 Assignment – Systems of Equations

/30

Show all of your work.

1) Is $(5, -9)$ a solution to the system $2x + y = 1$ and $x^2 + y = 14$ (1 mark)?

$$\begin{aligned} \textcircled{1} \quad 2x + y &= 1 \\ 2(5) + (-9) &= 1 \\ 10 - 9 &= 1 \\ 1 &= 1 \\ &\checkmark \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad x^2 + y &= 14 \\ (5)^2 + (-9) &= 14 \\ 25 - 9 &= 14 \\ 16 &\neq 14 \end{aligned}$$

so $(5, -9)$ is NOT a solution!

ANSWER: $(5, -9)$ is NOT a solution.

2) Solve the system by graphing (3 marks) $y = x^2 - 4x + 5$ and $x - y = 1$

$$\textcircled{1} \quad y = (x^2 - 4x) + 5$$

$$\begin{aligned} \frac{b}{2} = \frac{-4}{2} &= -2 \quad \text{save} \\ (-2)^2 &= 4 \quad \text{use} \end{aligned}$$

$$\begin{aligned} y &= (x^2 - 4x + 4 - 4) + 5 \\ y &= (x^2 - 4x + 4) - 4 + 5 \\ y &= (x - 2)^2 + 1 \end{aligned}$$

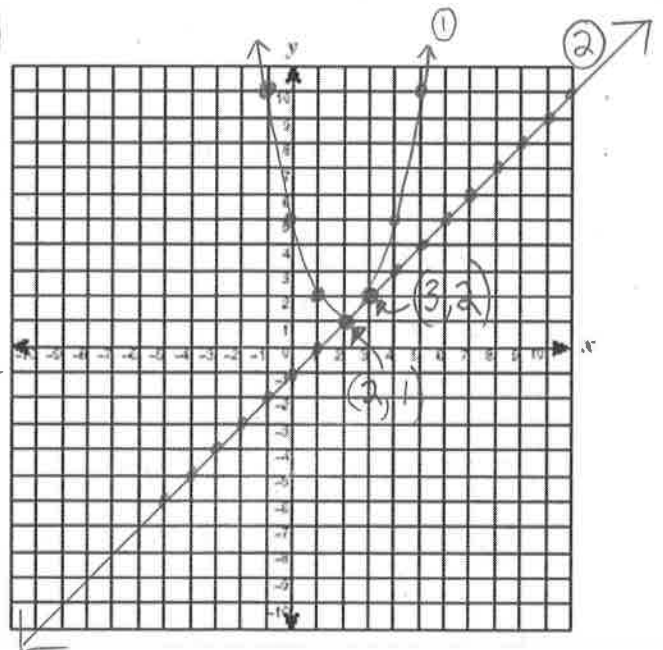
vertex $(2, 1)$ $a = +1$, so... opens up, regular count

$$\begin{aligned} \textcircled{2} \quad x - y &= 1 \\ -y &= -x + 1 \\ \frac{-y}{-1} &= \frac{-x}{-1} + \frac{1}{-1} \end{aligned}$$

$$y = x - 1$$

y-int = -1

slope = $\frac{1}{1}$ "up 1" "right 1"



ANSWER(S): solutions are: $(2, 1)$ and $(3, 2)$

3) Solve the system by graphing (4 marks): ① $y = x^2 - 4x + 1$ and ② $y = -\frac{1}{2}(x-2)^2 + 3$

$$\begin{aligned} \textcircled{1} \quad y &= x^2 - 4x + 1 \\ y &= (x^2 - 4x + 4 - 4) + 1 \\ y &= (x^2 - 4x + 4) - 4 + 1 \\ y &= (x-2)^2 - 3 \end{aligned}$$

$$\begin{aligned} \frac{b}{2} &= \frac{-4}{2} = \textcircled{-2} \text{ save} \\ (-2)^2 &= \textcircled{4} \text{ use} \end{aligned}$$

... vertex (2, -3)
opens up, reg. count

$$\textcircled{2} \quad y = -\frac{1}{2}(x-2)^2 + 3$$

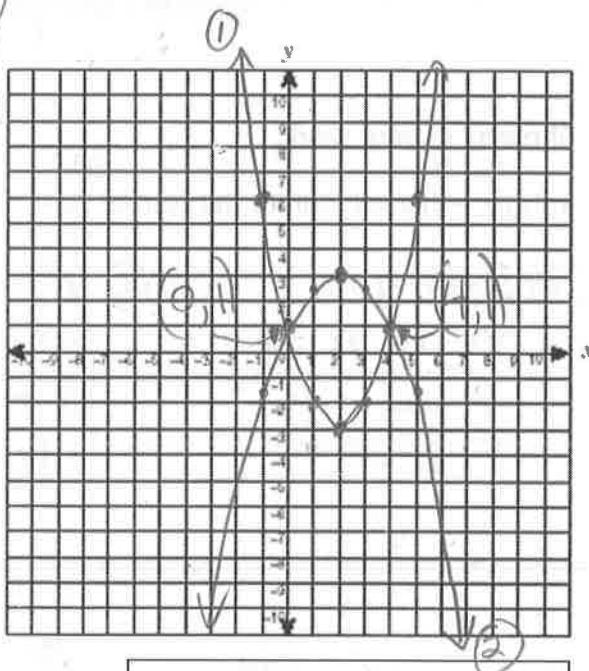
... vertex (2, 3)

$a = -\frac{1}{2}$... opens down, half the down count.

over 1, down $\frac{1}{2}$

over 2, down 2

over 3, down $4\frac{1}{2}$



ANSWER(S): solutions are:

$$(0, 1) \text{ and } (4, 1)$$

4) Solve the system by substitution OR elimination (3 marks):

$$5x^2 + y = 6 + 3x \quad \text{and} \quad 7x + y = -9$$

$$7x + y = -9 \quad \text{subtract } 7x \text{ from both sides}$$

$$y = \textcircled{-7x - 9}$$

$$5x^2 + y = 6 + 3x$$

$$5x^2 + (-7x - 9) = 6 + 3x$$

$$5x^2 - 7x - 9 = 6 + 3x$$

$$5x^2 - 10x - 15 = 0$$

$$5(x^2 - 2x - 3) = 0$$

$$5(x-3)(x+1) = 0$$

$$\downarrow \quad \downarrow$$

$$x = 3, \quad x = -1$$

$$x = 3$$

$$7x + y = -9$$

$$7(3) + y = -9$$

$$21 + y = -9$$

$$y = -30$$

$$(3, -30)$$

$$x = -1$$

$$7x + y = -9$$

$$7(-1) + y = -9$$

$$-7 + y = -9$$

$$y = -2$$

$$(-1, -2)$$

ANSWER(S):

$$(3, -30) \text{ and } (-1, -2)$$

5) Graph the system of inequalities (4 marks): ① $y \geq x^2 - 2x - 6$ and ② $y \leq 2x - 3$

① $y \geq x^2 - 2x - 6$ $\frac{b}{2} = \frac{-2}{2} = -1$ save
 $y \geq (x^2 - 2x + 1 - 1) - 6$ $(-1)^2 = 1$ use

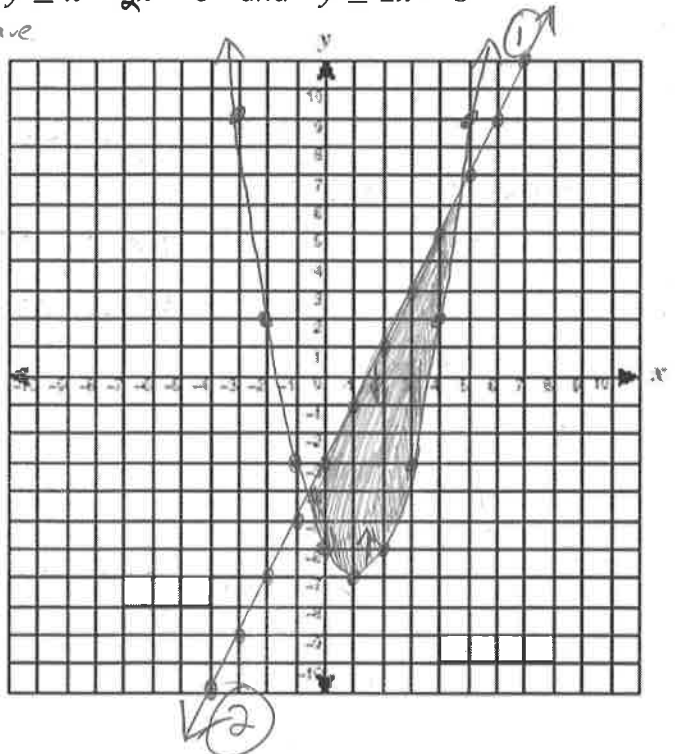
$y \geq (x^2 - 2x + 1) - 1 - 6$

$y \geq (x - 1)^2 - 7$

vertex (1, -7), opens up, reg. count
 solid boundary, shade ABOVE

② $y \leq 2x - 3$

y-int -3, slope $\frac{2}{1} = \frac{\text{up } 2}{\text{right } 1}$
 solid, shade BELOW line



6) Solve $x^2 \geq 4x + 45$ (2.5 marks). Graph the solution on a number line (0.5 marks).

(hint: look at 7.4B notes!) you can use TEST INTERVALS or THE GRAPH PROVIDED

$-4x - 45$
 $x^2 \geq 4x + 45$

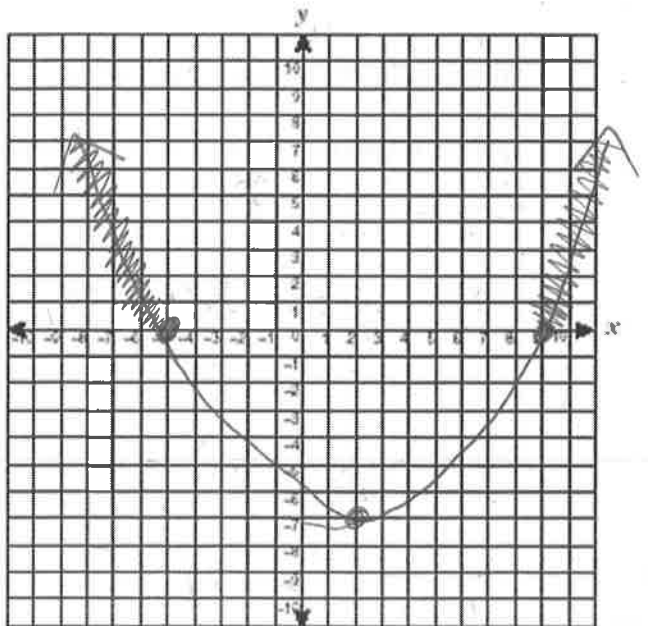
$x^2 - 4x - 45 \geq 0$

$(x - 9)(x + 5) \geq 0$

\downarrow \downarrow
 $x = 9, x = -5$

x intercepts!

$a = +1$, opens UP, dots are solid,
 $\geq \dots$ where is parab. ABOVE or ON
 x-axis?



ANSWER:

$x \leq -5, x \geq 9$

NUMBER LINE:



7) Solve the inequality by graphing (3 marks): $y < x^2 - 6x + 1$

(hint: the **solution** to this is the correct boundary and shading!)

$$y < x^2 - 6x + 1$$

$$y < (x^2 - 6x + 9 - 9) + 1$$

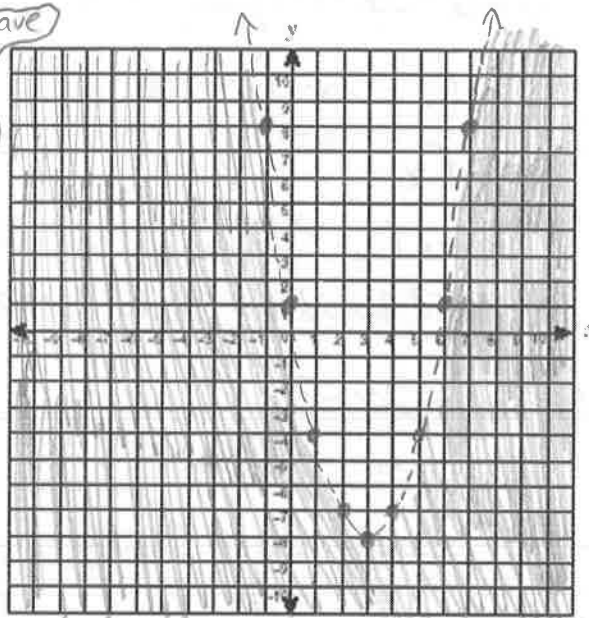
$$y < (x^2 - 6x + 9) - 9 + 1$$

$$y < (x - 3)^2 - 8$$

$\frac{b}{2} = \frac{-6}{2} = -3$ save
 $(-3)^2 = 9$ use

vertex $(3, -8)$, opens up,
 reg. count

dotted boundary, "less than"
 means shade
 BELOW!



8) Solve the inequality by graphing (3 marks): $y \leq -\frac{1}{2}x^2 + 2x + 3$

(hint: the **solution** to this is the correct boundary and shading!)

$$y \leq -\frac{1}{2}x^2 + 2x + 3$$

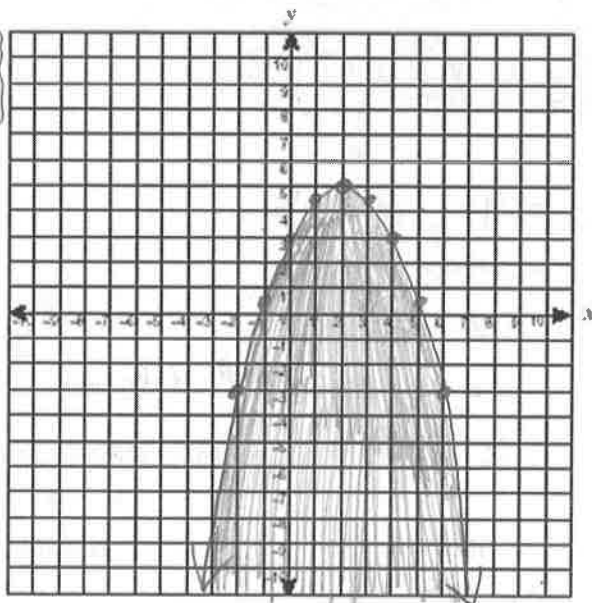
$$y \leq -\frac{1}{2}(x^2 - 4x + 4 - 4) + 3$$

$$y \leq -\frac{1}{2}(x^2 - 4x + 4) + 2 + 3$$

$$y \leq -\frac{1}{2}(x - 2)^2 + 5$$

$-\frac{4}{2} = -2$ save
 $(-2)^2 = 4$ use

vertex $(2, 5)$ opens down, half the down
 count,
 solid boundary, shade BELOW



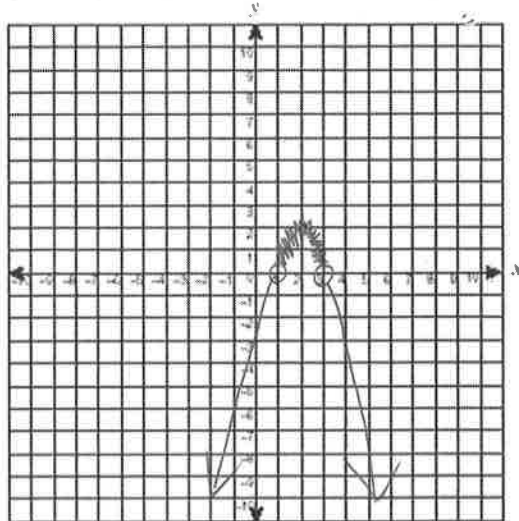
9) A baseball player hits a fly ball with trajectory $d = 64t - 16t^2$, with d , the distance above ground in feet at time t , in seconds. During what time interval is the ball above 48 feet in the air? (3 marks) *you can use TEST INTERVALS or THE GRAPH PROVIDED* > 48

$$\begin{aligned}
 -16t^2 + 64t &= d \\
 -16t^2 + 64t &> 48 \\
 -16t^2 + 64t - 48 &> 0 \\
 -16(t^2 - 4t + 3) &> 0 \\
 -16(t-3)(t-1) &> 0
 \end{aligned}$$

$$t = 3 \quad t = 1$$

x -ints... open circles!...

$a = -16$
parab. opens down



SENTENCE ANSWER:

$1 < t < 3 \dots$ the ball is above 48 feet between 1 and 3 seconds

10) The length of a rectangle is 1cm more than twice the width. If the area of the rectangle is AT LEAST 36cm^2 , what are its possible widths? (3 marks)

you can use TEST INTERVALS or THE GRAPH PROVIDED



let $x = \text{width}$
then $2x+1 = \text{length}$

$$lw = \text{Area}$$

$$x(2x+1) \geq 36$$

$$2x^2 + x \geq 36$$

$$\begin{aligned}
 2x^2 + x - 36 &\geq 0 \\
 2x^2 - 8x + 9x - 36 &\geq 0 \\
 2x(x-4) + 9(x-4) &\geq 0 \\
 (x-4)(2x+9) &\geq 0 \\
 x = 4, x = -\frac{9}{2} = -4.5
 \end{aligned}$$

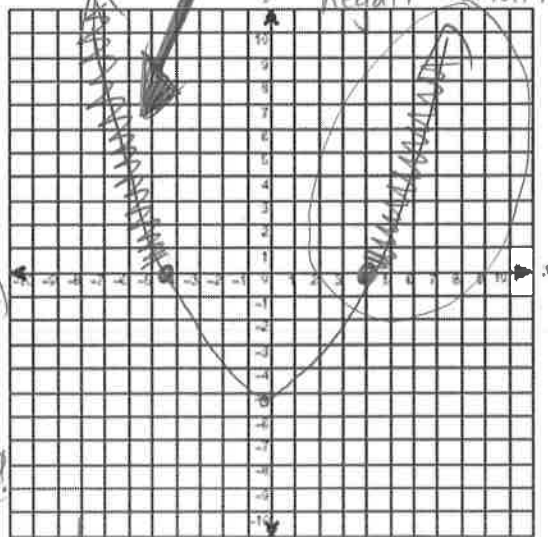
decomp!

$$\begin{array}{r}
 9 \quad +8 = 1 \\
 \underline{9 \quad x-8 = -72} \\
 (2)(-36)
 \end{array}$$

\geq means where is parab. above?

$$x \leq -4.5 \text{ reject! } x \geq 4$$

reject... can't have a negative width!



SENTENCE ANSWER:

$x \geq 4 \dots$ The width is at least 4 cm (greater than or equal to 4 cm)

