Period: _____ Name: KEY

Chapter 7 Assignment – Systems of Equations

/30

Show all of your work.

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

① $2x+y=1$
$2(5)+(-9)=1$
$10-9=1$
$1=1$
✓

② $x^2+y=14$
$(5)^2+(-9)=14$
$25-9=14$
$16 \neq 14$
X

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

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

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

① $y=(x^2-4x)+5$

$y=(x^2-4x+4-4)+5$

$y=(x^2-4x+4)-4+5$

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

vertex $(2,1)$

$\frac{b}{2}=\frac{-4}{2}=-2$ save

$(-2)^2=4$ use

$a=+1$, so... opens up, regular count

② $x-y=1$ $-x$

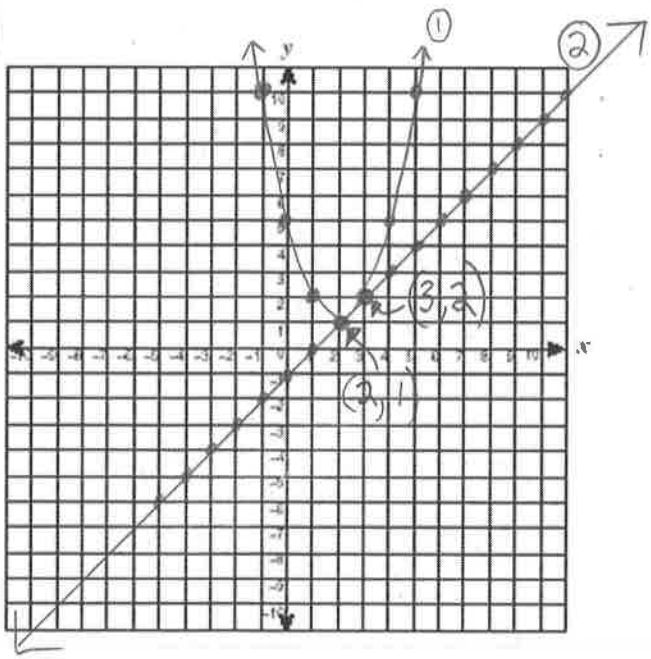
$-y=-x+1$

$\frac{-y}{-1}=\frac{-x}{-1}+\frac{1}{-1}$

$y=x-1$

y-int $=-1$

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



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

① $y = x^2 - 4x + 1$

$y = (x^2 - 4x + 4 - 4) + 1$

$y = (x^2 - 4x + 4) - 4 + 1$

$y = (x-2)^2 - 3$ ... vertex $(2, -3)$

opens up, reg. count

$\frac{b}{2} = \frac{-4}{2} = -2$ save

$(-2)^2 = 4$ use

② $y = -\frac{1}{2}(x-2)^2 + 3$

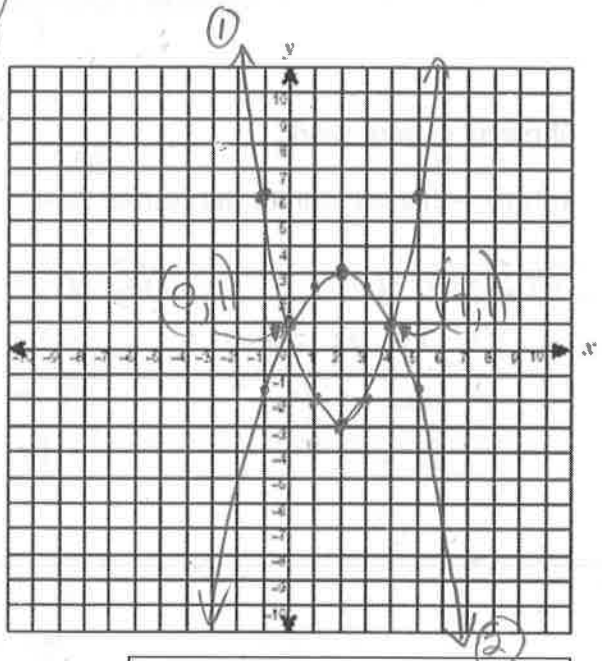
... vertex $(2, 3)$

$a = -\frac{1}{2}$ ... 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) and (4, 1)

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

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

$7x - 7x + y = -9 - 7x$

$y = -7x - 9$

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

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

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

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

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

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

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

$x = 3$

$7x + y = -9$

$7(3) + y = -9$

$21 + y = -9$

$-21 \quad -21$

$y = -30$

$(3, -30)$

$x = -1$

$7x + y = -9$

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

$-7 + y = -9$

$+7 \quad +7$

$y = -2$

$(-1, -2)$

ANSWER(S):

(3, -30) 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 $y \geq x^2 - 2x - 6$

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

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

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

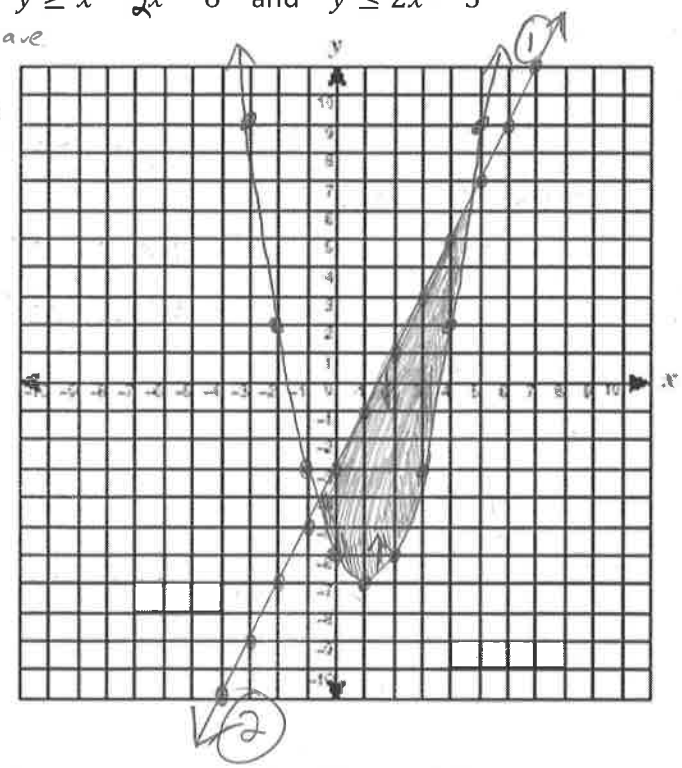
vertex $(1, -7)$, opens up, reg. count

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*

$-4x \quad -45 \qquad -4x \quad -45$

$x^2 \geq 4x + 45$

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

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

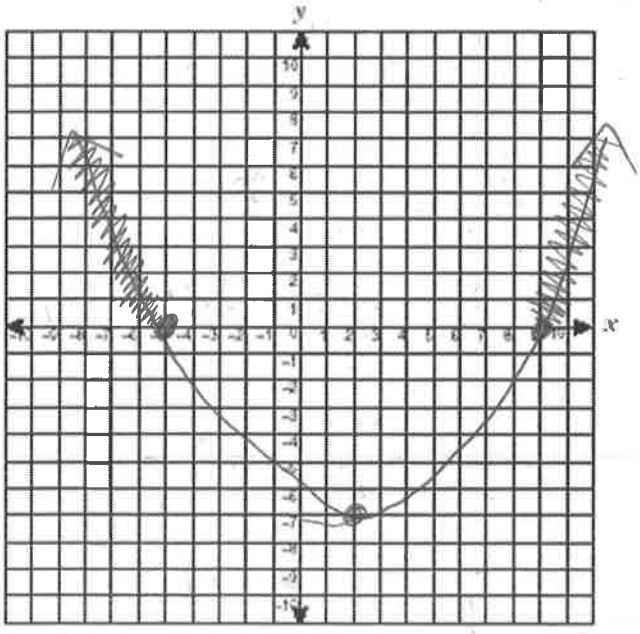
$x = 9, \quad x = -5$

x intercepts!

$\geq$

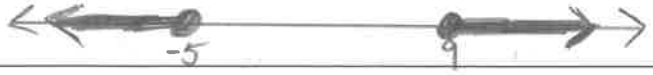
$a = +1$, opens UP, dots are solid,

$\geq$ ... where is parab. ABOVE or ON x-axis?



ANSWER: $x \leq -5, \quad x \geq 9$

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!)*

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

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

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

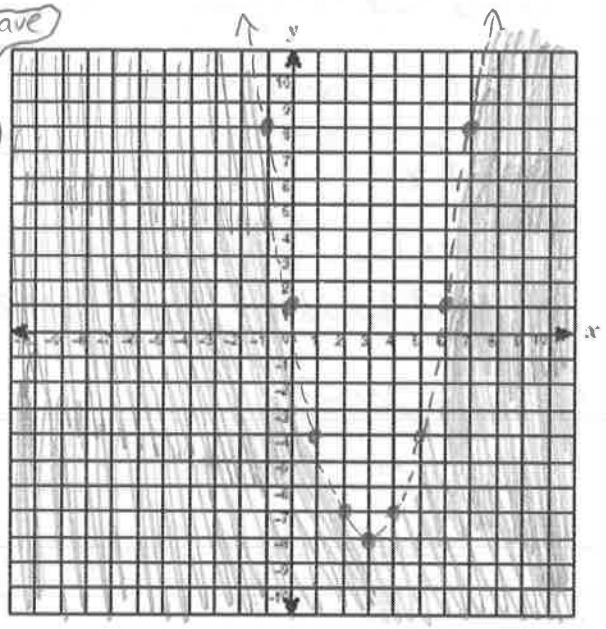
$y < (x-3)^2 - 8$

$\frac{b}{2} = \frac{-6}{2} = -3$ 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!)*

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

$-\frac{4}{2} = -2$ save

$(-2)^2 = 4$ use

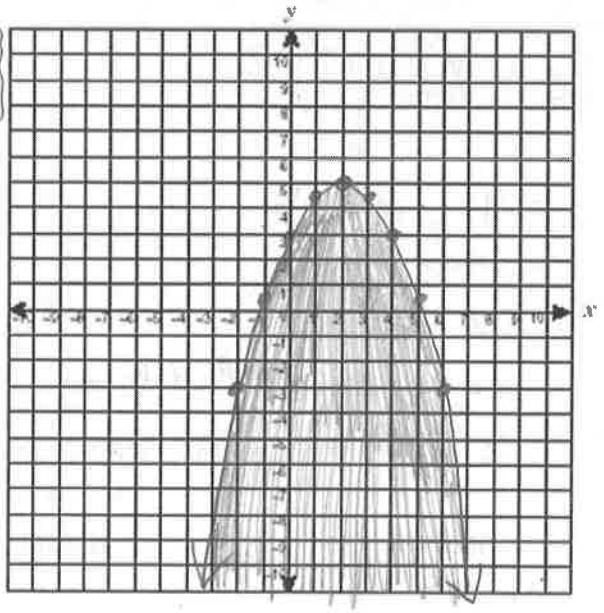
$y \leq -\frac{1}{2}(x^2 - 4x + 4 - 4) + 3$

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

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

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

$-16t^2+64t = d$

$-16t^2+64t > 48$

$-16t^2+64t-48 > 0$

$-16(t^2-4t+3) > 0$

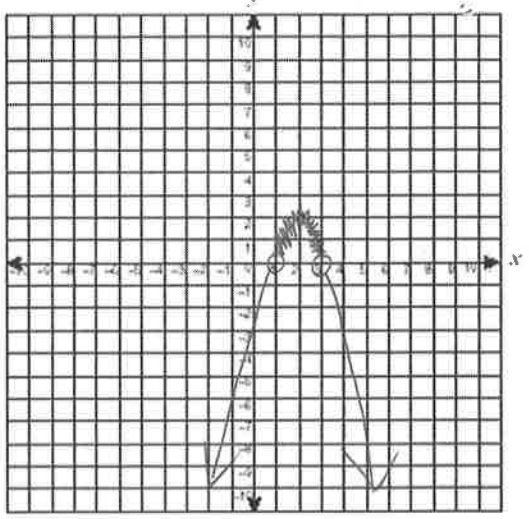
$-16(t-3)(t-1) > 0$

$t=3, \quad t=1$

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

$a=-16$

parab. opens down



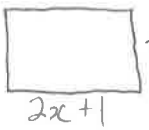
SENTENCE ANSWER:

$1 < t < 3$ ... 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)

≥ 36

*you can use TEST INTERVALS **or** THE GRAPH PROVIDED*



let x = width

then $2x+1$ = length

$lw = \text{Area}$

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

$2x^2+x \geq 36$

$2x^2+x-36 \geq 0$

$2x^2-8x+9x-36 \geq 0$

$2x(x-4)+9(x-4) \geq 0$

$(x-4)(2x+9) \geq 0$

$x = 4, \quad x = \frac{-9}{2} = -4.5$

decomp!

$9 + -8 = 1$

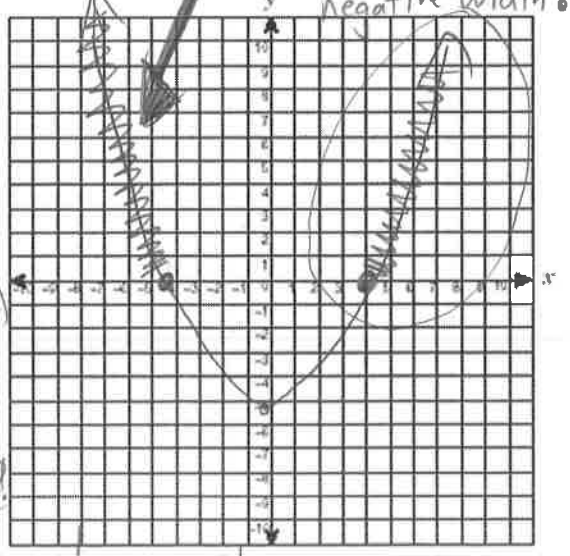
$9 \times -8 = -72$

$(2)(-36)$

$\geq$ means where is parab. above?

$x \leq -4.5$ reject! $x \geq 4$.

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



SENTENCE ANSWER:

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