Name: _____ *Key* _____ Class Period: _____

Math 2: Unit 3 Review Sheet

Part 1. Solve the systems to find the solution(s).

1. $y = 3x + 1$
   $4x - 3y = -13$ *Substitution*

   $4x - 3(3x+1) = -13$
   $4x - 9x - 3 = -13$
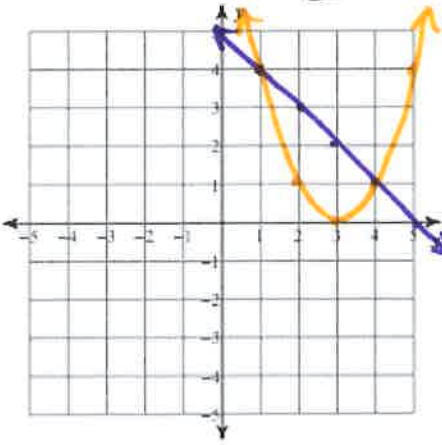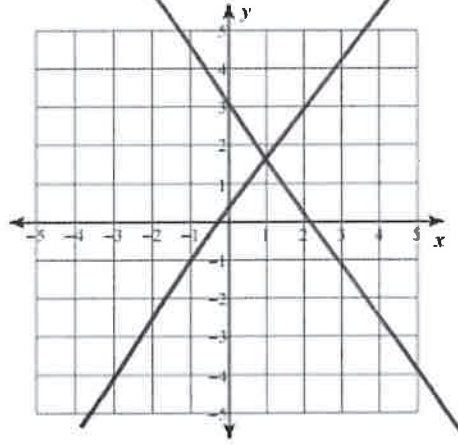 $-5x - 3 = -13$
   $-5x = -10$
   $x = 2$

   $y = 3(2) + 1 = 7$

   $(2, 7)$

2. $3x + y = 10$
   $4x - 2y = 30$ *elimination*

   $6x + 2y = 20$
   $4x - 2y = 30$
   ―――――――――
   $10x = 50$
   $x = 5$

   $3(5) + y = 10$
   $15 + y = 10$
   $y = -5$

   $(5, -5)$

3. $y = x^2 - 3$
   $y = x - 1$ *substitution*

   $x^2 - 3 = x - 1$
   $x^2 - x - 2 = 0$
   $(x-2)(x+1) = 0$
   $x - 2 = 0 \quad x + 1 = 0$
   $x = 2 \qquad x = -1$
   $\downarrow \qquad\qquad \downarrow$
   $y = 2-1 = 1 \quad y = -1-1 = -2$

   $(2, 1)$
   $(-1, -2)$

4. $x^2 + y^2 = 490$
   $y = 3x$ *substitution*

   $x^2 + (3x)^2 = 490$
   $x^2 + 9x^2 = 490$
   $10x^2 = 490$
   $x^2 = 49$
   $x = \pm 7$

   $x = 7 \qquad x = -7$
   $y = 3(7) \quad y = 3(-7)$
   $y = 21 \qquad y = -21$

   $(7, 21)$
   $(-7, -21)$

Part 2: Graph the systems to find the intersection.
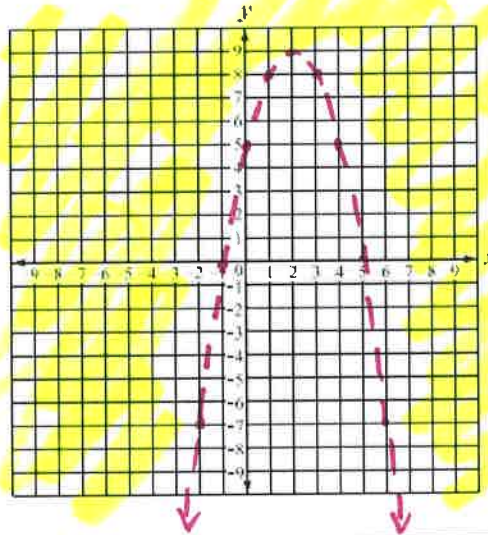
5. $y = -\frac{3}{2}x + 1$
   $y = \frac{1}{2}x - 3$

   $(2, -2)$

6. $y = x^2 - 6x + 9$
   $y = -x + 5$

   $(1, 4)$
   $(4, 1)$

7. $x^2 + y^2 = 9$
   $y = -x + 3$

   SKIP

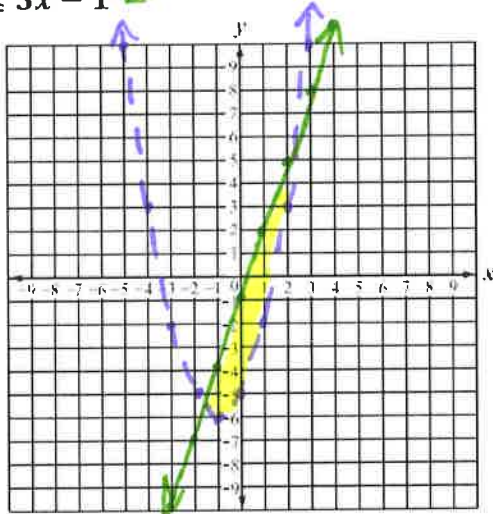**Part 3: Graph the inequalities and systems of inequalities. Remember to shade!**
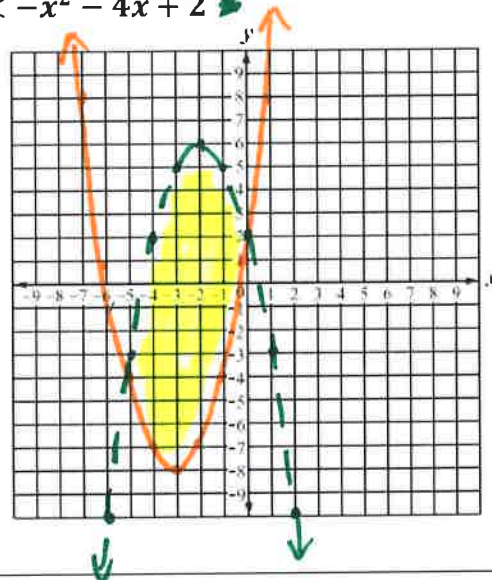
8. $y \geq 2x^2 - 5$
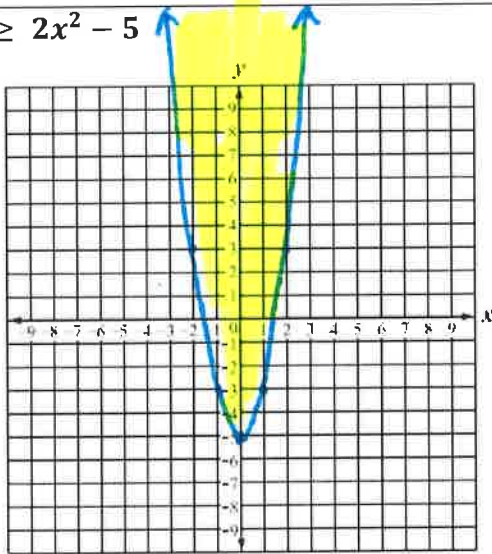
9. $y > -x^2 + 4x + 5$

10. $y > x^2 + 2x - 5$
    $y \leq 3x - 1$

11. $y \geq x^2 + 6x + 1$
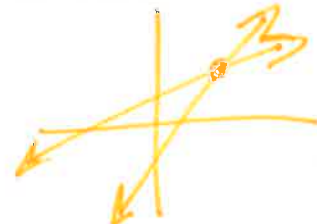 $y < -x^2 - 4x + 2$

Part 4: Word Problems

12. 2 cars are driving is turning on a path modeled by $y = 3t - 2$. A car crossing the railroad can be modeled by $y = t + 5$, where t represents time in hours.

    a. Do the 2 cars collide? **yes**

    b. How many hours into the car's drive would they collide? **3.5 hours**

13. A pumpkin is launched from the ground and follows a parabolic path represented by the equation $y = -x^2 + 10x + 5$. At the same time, an arrow is launched from a height of 10 feet and follows a straight path represented by the equation $y = \frac{1}{2}x + 15$.
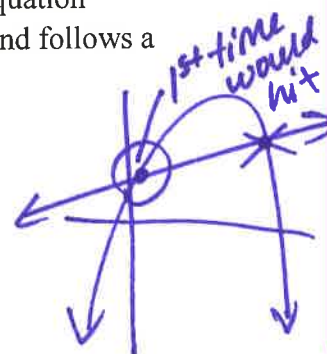
make time be measured in seconds

    a. How long after the launch do the pumpkin and the arrow hit? **≈1.21 sec.**

    b. How high off the ground are the pumpkin and the arrow when they hit each other? **≈15.06 feet**

1st time would hit

14. If a baseball leaves the pitching machine based on the quadratic model $y = -\frac{2}{3}x^2 + 2x + 3$, then find the following:

units: feet & sec.

   a. What is the maximum height of the baseball? **4.5 feet**

   b. When does the baseball reach its maximum height? **1.5 sec.**

   c. From what height does the baseball leave the pitching machine? **3 feet**

   d. When will the baseball hit the ground according to this model? **≈ 4.10 sec.**

Part 5: Quadratic Functions and their characteristics

$-2(x-5)(x-5)+10$
$-2(x^2-5x-5x+25)+10$
$-2x^2+10x+10x-50+10$
$-2x^2+20x-40$

15. $y = 3x^2 + 2x - 4$	16. $y = -2(x-5)^2 + 10$
a) minimum or maximum? **minimum**	a) minimum or maximum? **maximum**
b) y-intercept: **$(0, -4)$**	c) Axis of Symmetry: **$x=5$**
c) Axis of Symmetry: **$x = -\frac{1}{3}$ or $x = -.33$**	d) Vertex: **$(5, 10)$**
d) Vertex: **$(-\frac{1}{3}, -\frac{4}{3})$ or $(-.33, -4.33)$**	e) Zeros/Roots: **≈ 2.76** and **≈ 7.24**
e) Zeros/Roots: **≈ -1.54** and **$\approx .87$**	f) Standard Form: **$y = -2x^2 + 20x - 40$**
f) Vertex Form: **$y = 3(x+\frac{1}{3})^2 - \frac{4}{3}$**	

Part 6: Transformations: State all the transformations from the parent function $y = x^2$.

14. $y = \frac{1}{4}(x-2)^2$ **vertical shrink of $\frac{1}{4}$, right 2**

15. $y = 3(x+7)^2 + 2$ **vertical stretch of 3, left 7, up 2**

16. $y = -x^2 + 18$ **reflect over x-axis, up 18**

17. $y = -2x^2 - 12$ **reflect over x-axis, vertical stretch of 2, down 12**

18. $y = 3(x+5)^2$ **vertical stretch of 3, left 5**

19. $y = -\frac{5}{8}(x+2)^2 - 7$ **reflect over x-axis, vertical shrink of $\frac{5}{8}$, left 2, down 7**

20. $y = -(x-1)^2$ **reflect over x-axis, right 1**