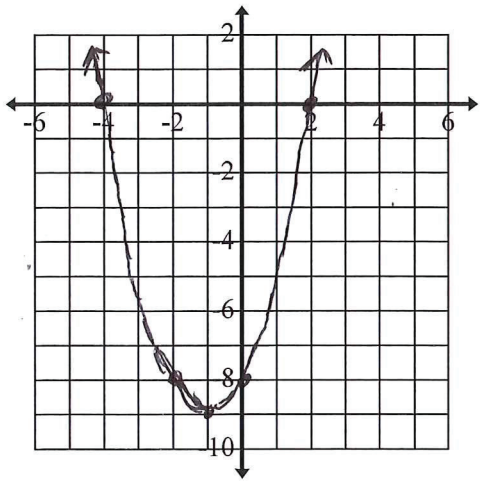
Name _____ Period _____

5.4B *Solving Quadratic Inequalities*

1. Graph $f(x) = x^2 + 2x - 8$



a) On what interval(s) is $x^2 + 2x - 8 > 0$?

$(x+4)(x-2) = 0$

$x = -4, x = 2$

when $x < -4$ or $x > 2$

b) On what interval(s) is $x^2 + 2x - 8 < 0$?

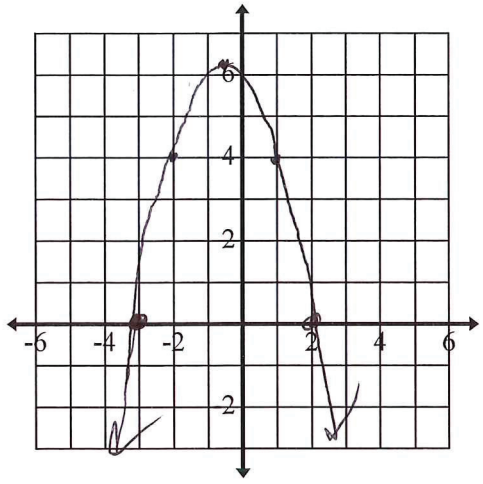
$-4 < x < 2$

2. Graph $f(x) = -x^2 - x + 6$

$-(x^2 + x - 6) = 0$

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

$x = -3$ or $x = 2$



a) On what interval(s) is $-x^2 - x + 6 > 0$?

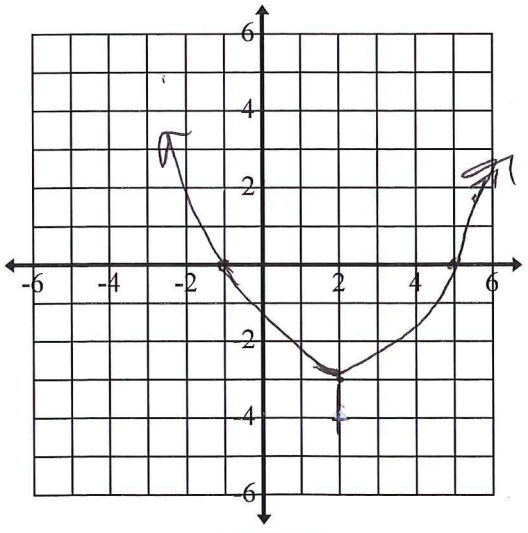
$-3 < x < 2$

b) On what interval(s) is $-x^2 - x + 6 < 0$?

$x < -3$ or $x > 2$

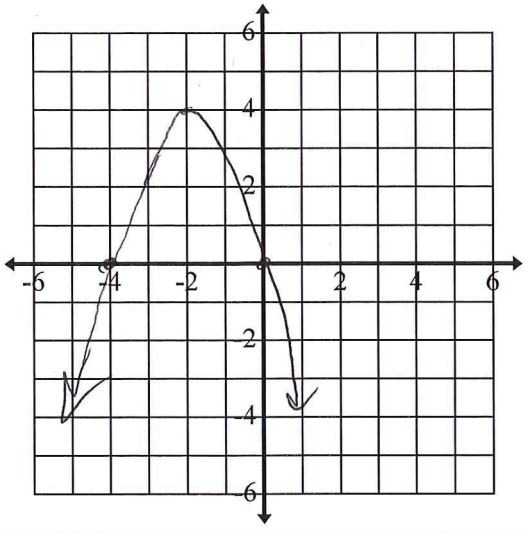
3. Draw a quadratic function that is:

- Positive when $x < -1$ and $x > 5$
- Negative when $-1 < x < 5$



4. Draw a quadratic function that is:

- Positive when $-4 < x < 0$
- Negative when $x < -4$ and $x > 0$

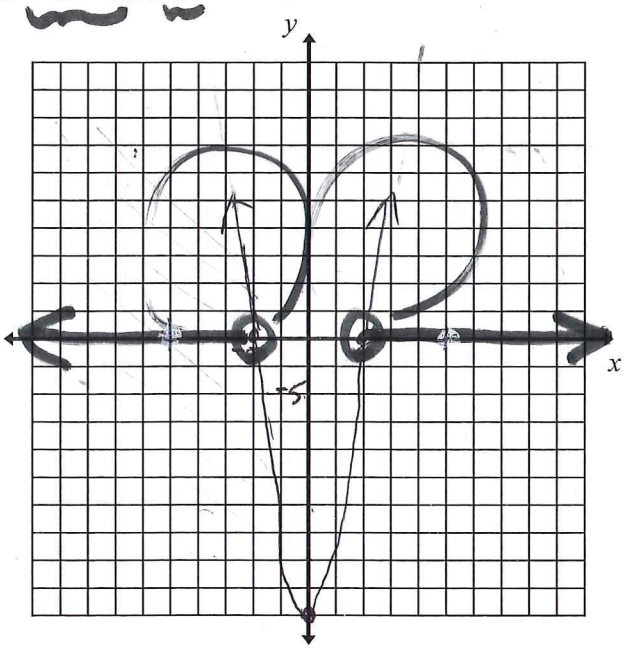


Name _____ Period _____

5.4B *Solving Quadratic Inequalities*

#5 – 12: Use a graph to find the solution for the following inequalities. $x(x-4)=0$

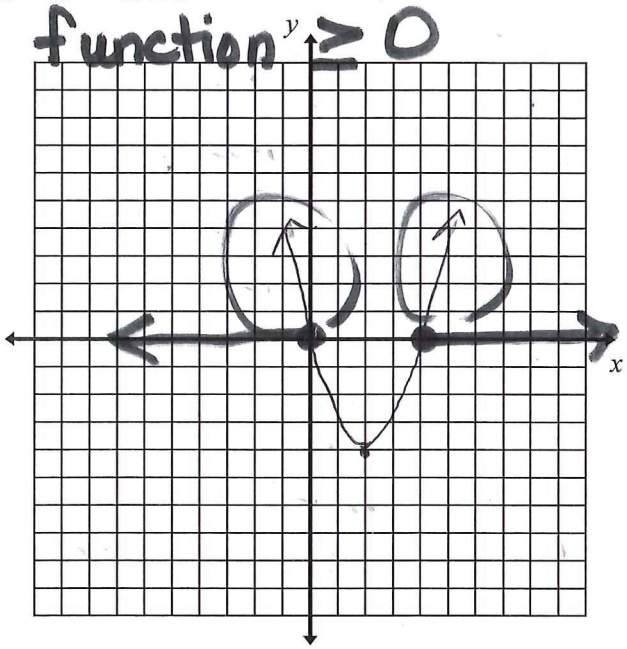
5. $x^2-25>0$ $x^2=25$ $x=\pm 5$



Solution: $x<-5$ or $x>5$

6. $x^2-4x\geq 0$ $x=0$ $x=4$

function ≥ 0



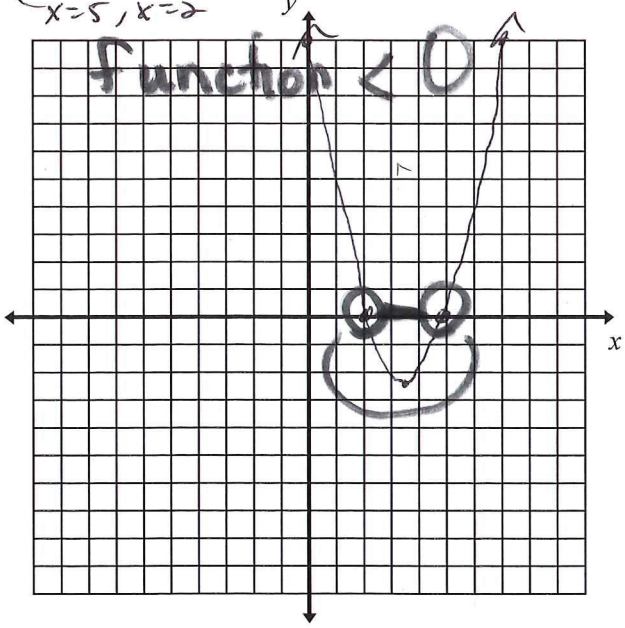
Solution: $x\leq 0$ or $x\geq 4$

7. $x^2-7x+10<0$

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

$x=5, x=2$

function < 0



Solution: $2<x<5$

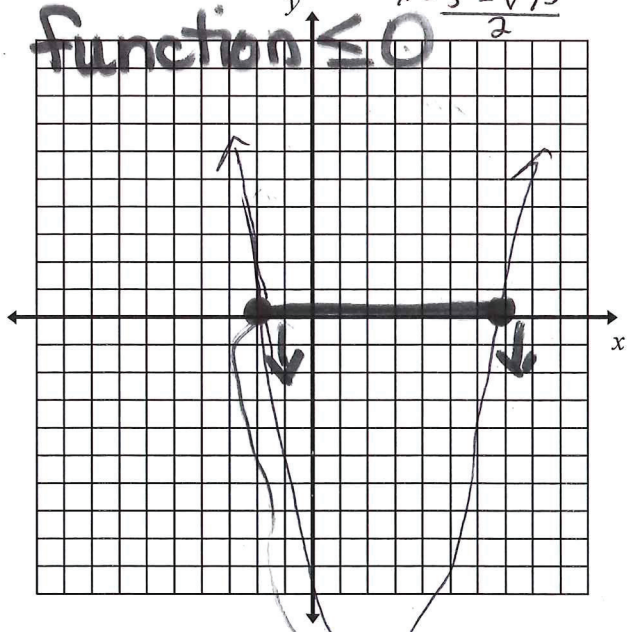
8. $x^2-5x-12\leq 0$

$a=1$ $b=-5$ $c=-12$

$x=\frac{5\pm\sqrt{(-5)^2-4(1)(-12)}}{2(1)}$

$x=\frac{5\pm\sqrt{73}}{2}$

function ≤ 0



Solution: $\frac{5-\sqrt{73}}{2}\leq x\leq\frac{5+\sqrt{73}}{2}$

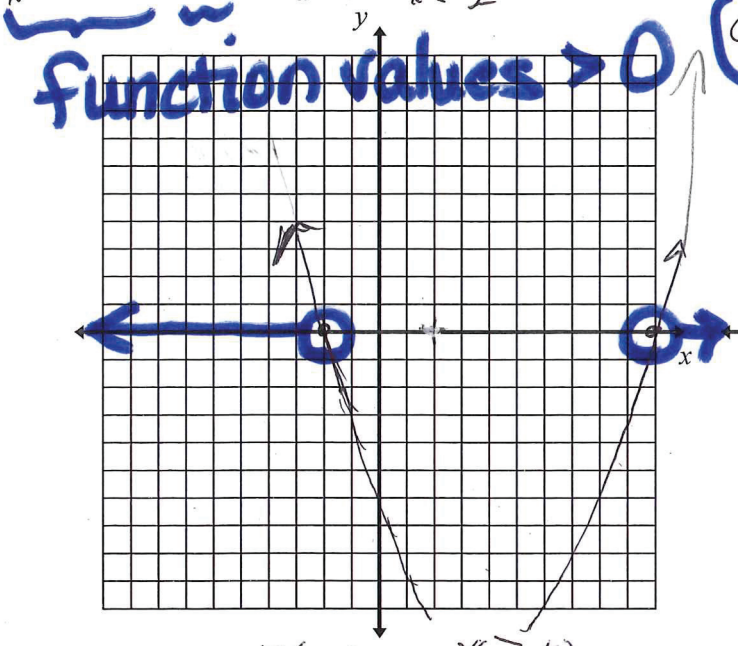
Name _____ Period _____

5.4B *Solving Quadratic Inequalities*

#5 – 12 (continued): Use a graph to find the solution for the following inequalities.

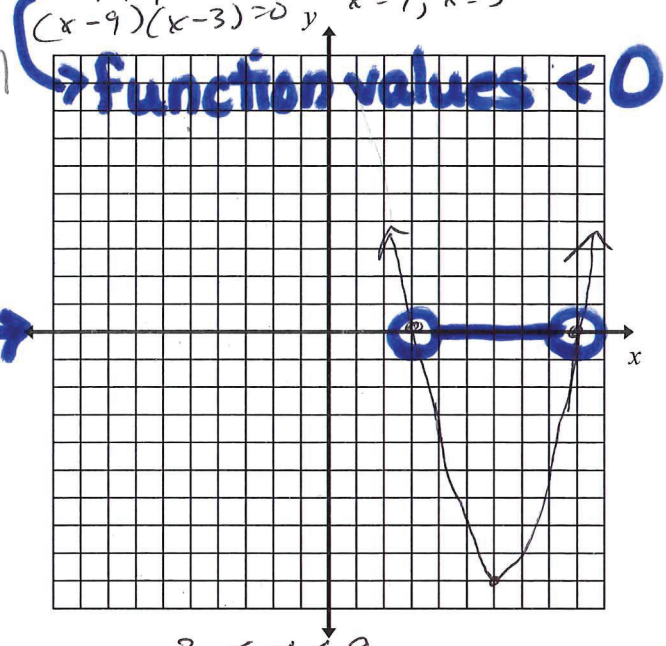
9. $x^2 > 8x + 20$ $x^2 - 8x - 20 = 0$ $(x-10)(x+2) = 0$ $x = 10$ $x = -2$

$x^2 - 8x - 20 > 0$



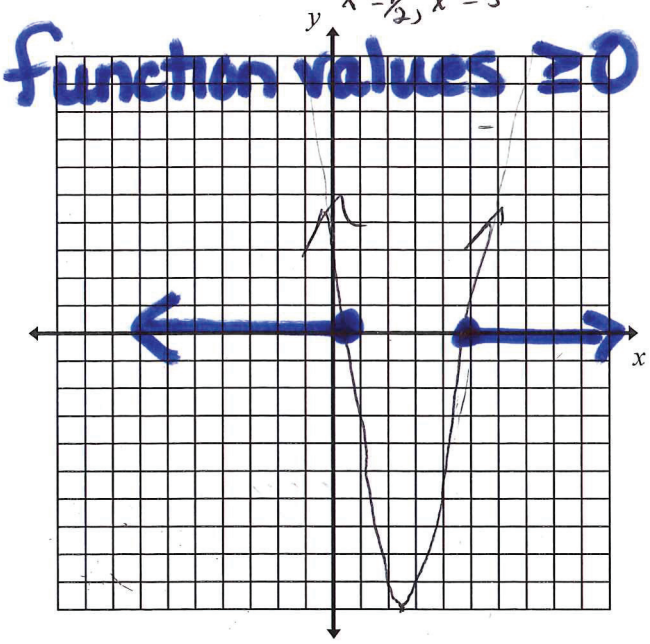
Solution: $x < -2$ or $x > 10$

10. $x^2 + 27 < 12x$ $x^2 - 12x + 27 < 0$ $(x-9)(x-3) = 0$ $x = 9, x = 3$



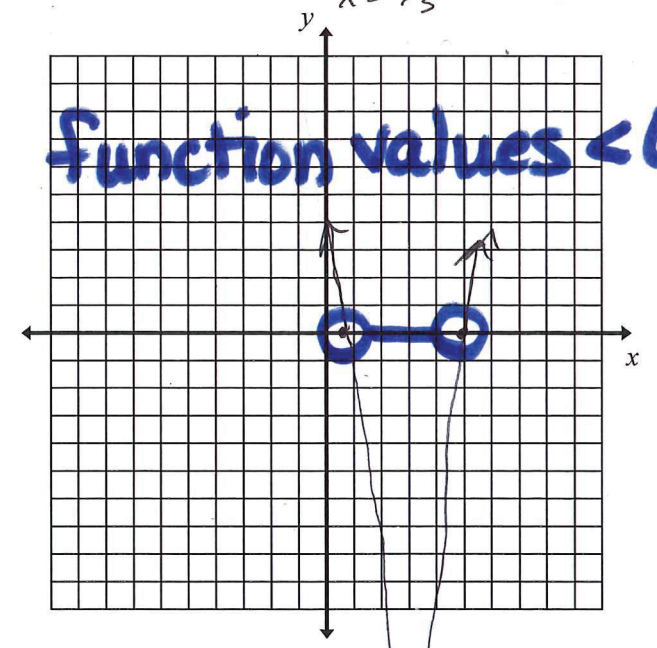
Solution: $3 < x < 9$

11. $2x^2 - 11x + 5 \geq 0$ $(2x-1)(x-5)$ $x = \frac{1}{2}, x = 5$



Solution: $x \leq \frac{1}{2}$ or $x \geq 5$

12. $3x^2 - 17x + 10 < 0$ $(3x-2)(x-5)$ $x = \frac{2}{3}$ or $x = 5$



Solution: $\frac{2}{3} < x < 5$

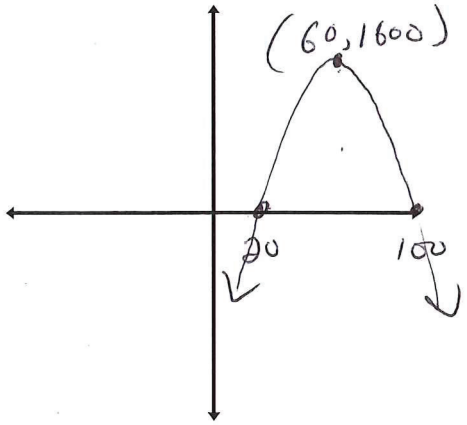
Name _____ Period _____

5.4B *Solving Quadratic Inequalities*

#13 – 17: Use your graphing calculator to solve the following problems. Sketch the graph and label the *x*-intercepts and vertex.

13. The profit a coat manufacturer makes each day is modeled by the equation $P = -x^2 + 120x - 2000$, where P is the profit and x is the price for each coat sold. For what values of x does the company make a profit?

$20 < x < 100$



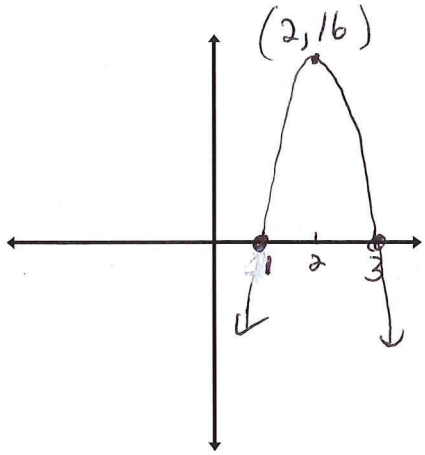
14. When a baseball is hit by a batter, the height of the ball, h, at time t, is determined by the equation $h(t) = -16t^2 + 64t + 4$. For which interval of time is the height of the ball greater than or equal to 52 feet?

$-16t^2 + 64t + 4 = 52$

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

$t = 1$ or $t = 3$

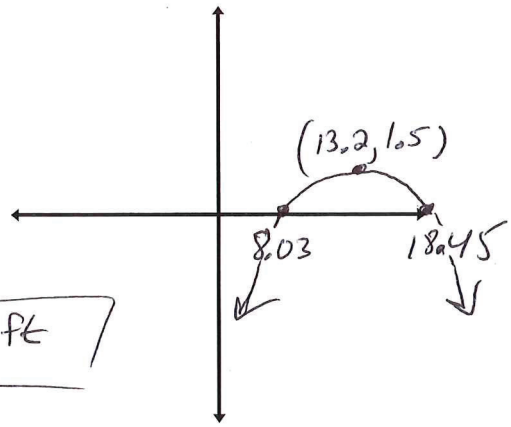
$1 \le t \le 3$ seconds



15. The path of a soccer ball kicked from the ground can be modeled by $y = -0.0540x^2 + 1.43x$ where x is the horizontal distance (in feet) from where the ball was kicked and y is the corresponding height (in feet).

a) A soccer goal is 8 feet high. Write and solve an inequality to find at what values of x the ball is low enough to go into the goal. $-0.0540x^2 + 1.43x - 8 < 0$

when $0 \le x \le 8.03$ ft and $x \ge 18.45$ ft



b) A soccer player kicks the ball toward the goal from a distance of 15 feet away. No one is blocking the goal. Will the player score a goal? Explain your reasoning.

No! From 15 feet away, the height of the ball would be 9.3 ft. So the ball would go over the top of the net. Also, from the graph and algebraic solution inequalities above, 15 is not in the correct ranges.

Name _____ Period _____

5.4B *Solving Quadratic Inequalities*

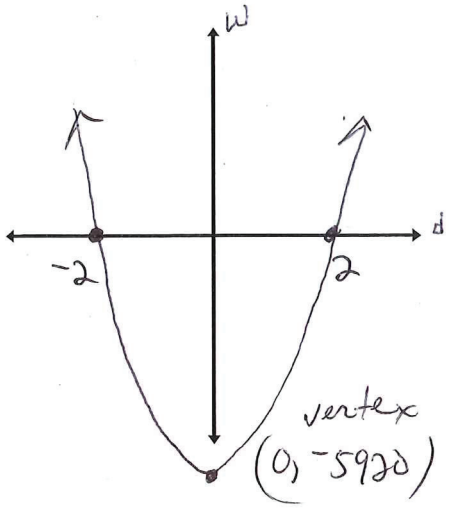
#13 – 17 (continued): Use your graphing calculator to solve the following problems. Sketch the graph and label the *x*-intercepts and vertex.

16. A manilla rope used for rappelling down a cliff can safely support a weight W (in pounds) modeled by the inequality $W \leq 1480d^2$ where d is the rope's diameter (in inches). What diameter of rope would be needed to support a weight of at least 5920 pounds?

~~$d \leq -2$~~ extraneous

$d \geq 2$ inches

$1480d^2 - 5920 \geq 0$



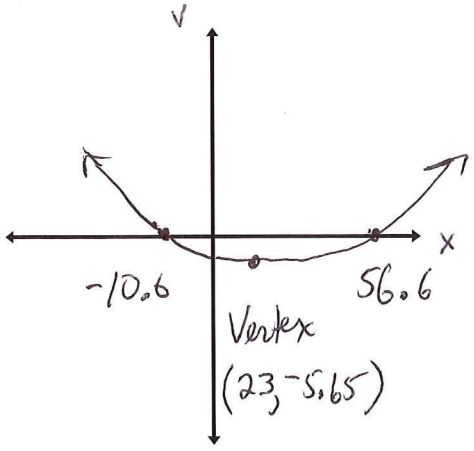
17. For a driver aged x years, a study found that the driver's reaction time v (in milliseconds) to a visual stimulus such as a traffic light can be modeled by $v = 0.005x^2 - 0.23x + 22$ when $16 \leq x \leq 70$.

At what age does a driver's reaction time tend to be greater than 25 milliseconds?

$.005x^2 - .23x + 22 > 25$

$.005x^2 - .23x - 3 > 0$

given age restrictions above, driver's age should be $56.6 < x \leq 70$



Name _____ Period _____

5.4B *Solving Quadratic Inequalities*

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Section 5.4B