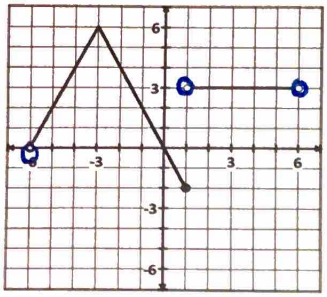
Algebra 2 Unit 2A Test Review
Quadratic Functions and Relations

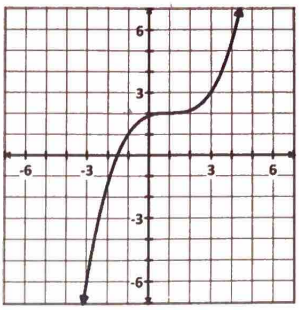
Name: Master E
Date: _____ Block: E

Target 1: State the domain and range of any relation or function in set builder and interval notation.

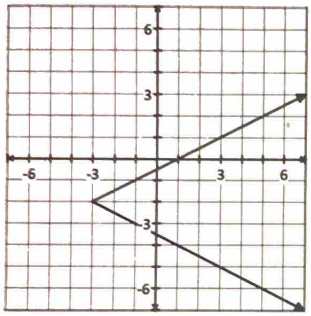
1-6: Determine whether each is the graph of a function then state the domain and range in either notation.

1. 

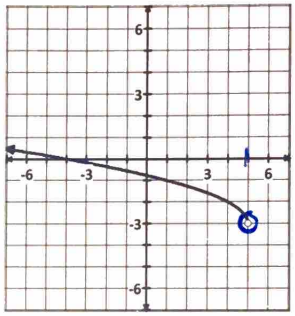
Function? (Yes) No
D: $(-6, 6)$
R: $[-2, 6]$
D: $-6 < x < 6$
R: $-2 \leq y \leq 6$

2. 

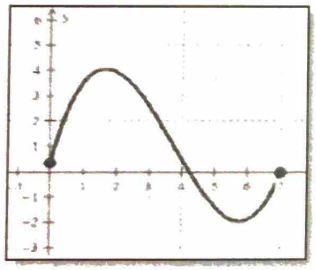
Function? (Yes) No
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
D: $\mathbb{R}$
R: $\mathbb{R}$

3. 

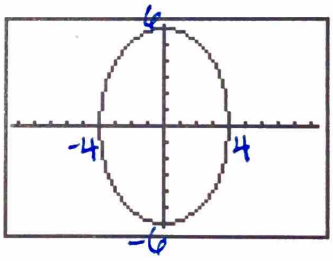
Function? Yes (No)
D: $[-3, \infty)$
R: $(-\infty, \infty)$
D: $x \geq -3$
R: $\mathbb{R}$

4. 

Function? (Yes) No
D: $(-\infty, 5)$
R: $(-3, \infty)$
D: $x < 5$
R: $y > -3$

5. 

Function? (Yes) No
D: $[0, 7]$
R: $[-2, 4]$
D: $0 \leq x \leq 7$
R: $-2 \leq y \leq 4$

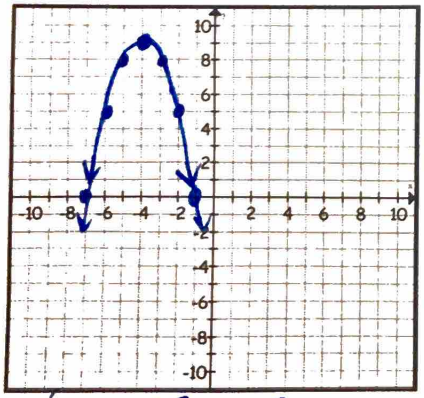
6. 

Function? Yes (No)
D: $[-4, 4]$
R: $[-6, 6]$
D: $-4 \leq x \leq 4$
R: $-6 \leq y \leq 6$

Target 2: I CAN graph a quadratic function, and state all of its parts (vertex, roots/zeros, intercepts, axis of symmetry, domain and range) in any form (standard, vertex, intercept) with and without a graphing calculator

7-9: *Graph each function and fill in the blanks. Express the domain and range using interval notation.*

7. $f(x) = -(x + 4)^2 + 9$



vertex: $(-4, 9)$ roots: $-7, -1$ y-intercept: $(0, -7)$

domain: $(-\infty, \infty)$ range: $(-\infty, 9]$ axis of symmetry: $x = -4$

Does this parabola open **UP** or (**DOWN**?) **circle one**

Circle the equation that does **NOT** have the same **ZEROS** as **f(x)**:

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

$y = -x^2 - 8x - 7$ ✓ $y = -2x^2 - 16x - 14$

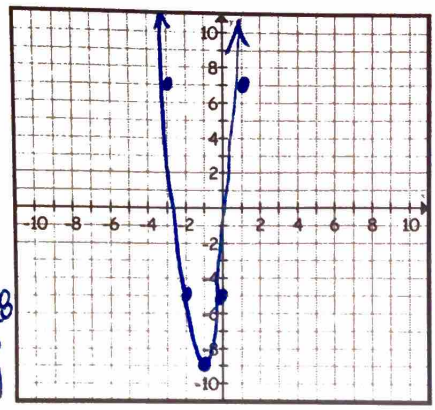
Which equation is the standard form for **f(x)**? $f(x) = -x^2 - 8x - 7$

$y = -(0+4)^2 + 9$
$-(16) + 9$
-7

$-2(x^2 + 8x + 7)$

$-(x+4)^2 + 9$
$-(x^2 + 8x + 16) + 9$
$-x^2 - 8x - 16 + 9$
$y = -x^2 - 8x - 7$

8. $f(x) = 4x^2 + 8x - 5$



vertex: $(-1, -9)$ roots: $-\frac{5}{2}, \frac{1}{2}$ y-intercept: $(0, -5)$

domain: $(-\infty, \infty)$ range: $[-9, \infty)$ axis of symmetry: $x = -1$

What form is **f(x)** in? **standard** **vertex** **intercept** **(circle one)**

Write **f(x)** in a different form: $y = (x+1)^2 - 9$

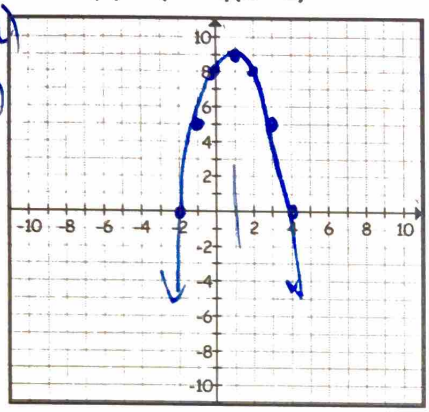
Hint: remember that "a" is the same in all three forms

$4x^2 + 10x - 2x - 5$

$2x(2x+5) - 1(2x+5)$

$(2x+5)(2x-1)$ $y = (2x+5)(2x-1)$

9. $f(x) = -(x-4)(x+2)$



vertex: $(1, 9)$ roots: $-2, 4$ y-intercept: $(0, 8)$

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

domain: $(-\infty, \infty)$ range: $(-\infty, 9]$ axis of symmetry: $x = 1$

What are the coordinates of the x-intercepts of **f(x)**?

$(-2, 0)$ $(4, 0)$

Name two symmetrical points on **f(x)** other than the x-intercepts.

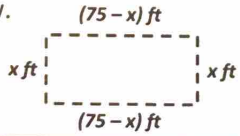
$(-1, 5)$ $(3, 5)$

Target 3: *I CAN apply knowledge of quadratics in real-life contexts (using the graphing calculator and Desmos).*

10-12: Read each problem clearly and use the calculator or Desmos to find each answer.

Round all answers to the nearest hundredth. vertex $(37.5, 1406.25)$

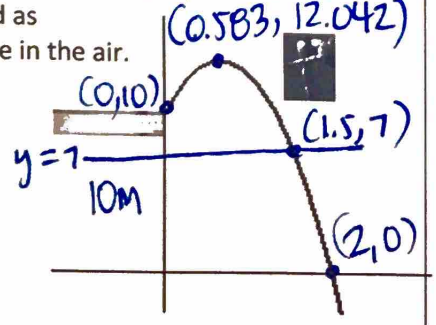
10. Bill is using 150 feet of fencing to enclose a rectangular area for his garden. A diagram of the garden is shown below.



The function $f(x) = x(75 - x)$ represents the area of the enclosure. What is the maximum area that Bill can enclose with the fencing?

$1406.25\ ft^2$

11. Lorryana is a competitive diver. When competing on the 10-meter diving platform, she must jump upward and outward before diving into the pool below. The function $f(x) = -(6x + 5)(x - 2)$ represents her height off the ground as compared to her time in the air.



a. What is the maximum height that Lorryana reaches? 12.04 y coord. of vertex

b. How many seconds is Lorryana in the air when she reaches her maximum height?

$.58$ seconds x coord. of vertex

c. How many seconds after Lorryana leaves the diving board does she enter the water?

2 seconds x-intercept

d. When will she be 7 meters in the air?

1.5 seconds what is x when y = 7?

*a = -.0081968 b = 0.745889 c = 13.4722

12. A study compared the speed x (in miles per hour) and the average fuel economy y (in miles per gallon) for cars. The results are shown in the table below:

Speed, x	Fuel Economy, y
15	22.3
20	25.5
25	27.5
30	29.0
35	28.8
40	30.0
45	29.9
50	30.2
55	30.4
60	28.8
65	27.4
70	25.3

a. Find the best fitting quadratic model for the data and write your equation rounded to the nearest hundredth.

*put in Desmos $y_1 = ax_1^2 + bx_1 + c$

$y = -.0081968$

$y = -.01x^2 + 0.75x + 13.47$

b. What speed maximizes the car's fuel economy?

vertex (45.499, 30.441)

45.50 miles per hour x coord. of vertex

c. Predict what the gas mileage would be if the speed was 63 miles per hour.

what is y when x = 63?

(63, 27.93) 27.93 miles per gallon

Target 4: I CAN factor quadratic expressions.

13-22: Fully factor each expression. Make sure to check for a GCF first.

13. $x^2 + x - 90$

-90 | 1
10 · -9

$(x+10)(x-9)$

14. $x^2 - 6x + 8$

8 | -6
-4 · -2

$(x-4)(x-2)$

15. $3x^2 - 21x - 54$

-18 | -7
-9 · 2

$3(x^2-7x-18)$

$3(x-9)(x+2)$

16. $2x^2 - 3x - 5$

-10 | -3
-5 · 2

$2x^2 - 5x + 2x - 5$

$x(2x-5) + 1(2x-5)$

$(2x-5)(x+1)$

17. $9x^2 - 16$

$(3x+4)(3x-4)$

18. $8x^2 - 14x - 15$

-120 | -14
-12 · 10
-20 · 6

$8x^2 - 20x + 6x - 15$

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

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

19. $2x^2 + 14x - 36$

-10 | 7
9 · -2

$2(x^2+7x-18)$

$2(x+9)(x-2)$

20. $16x^2 - 100$

$4(4x^2-25)$

$4(2x+5)(2x-5)$

21. $x^2 + 12x + 36$

$(x+6)^2$

22. $3x^2 - 27x + 60$

$3(x^2-9x+20)$

20 | -9
-5 · -4

$3(x-5)(x-4)$