

Name _____

Date _____

Advanced Algebra

Unit 4: Quadratics

Review #1 for the Unit Test Assignment #22

Foundational (55%)

Solve the following for x.

1) $0=4(x+1)^2-16$

$4(x+1)^2-16=0$
 $(x+1)^2=4$
 $x+1=\pm 2$
 $x=-1\pm 2$
 $x=1$ and -3

2) $605=5x^2+20x+10$

$5x^2+20x+10=605$
 $5x^2+20x-595=0$
 $-20 \pm \sqrt{20^2-4(5)(-595)}$
 10
 9.09
 -13.09

3) $-19(2x-5)(7x+9)=0$

$2x-5=0$ $7x+9=0$
 $x=\frac{5}{2}$ $x=-\frac{9}{7}$

Analyze each of the quadratic equations below and identify the key points:

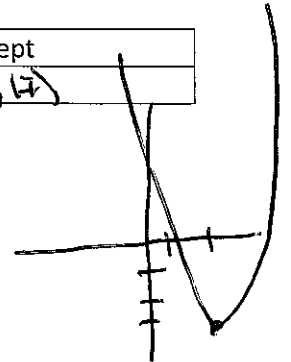
4) $A(x) = 5(x-2)^2 - 3$

$5(x-2)^2-3=0$ $x=2 \pm .7745$

Root 1	Root 2	Vertex	Y- intercept
2.77	1.23	(2, -3)	(0, 4)

The domain of A(x) is: All Real #'s

The range of A(x) is: $y \geq -3$

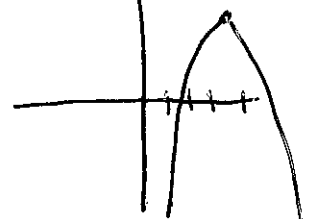


5) $B(x) = -3(x-4)(x-3)$

Root 1	Root 2	Vertex	Y- intercept
4	3	(3.5, .75)	(0, -36)

The domain of B(x) is: All Real

The range of B(x) is: $y \leq .75$



6) $C(x) = x^2-4x+6$

$(x^2-4x+4) - 4 + 6$

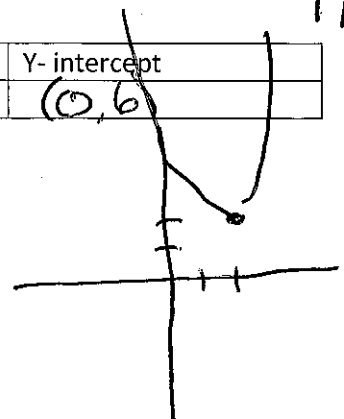
Root 1	Root 2	Vertex	Y- intercept
No Real	No Real	(2, 2)	(0, 6)

The domain of C(x) is:

All Real

The range of C(x) is:

$y \geq 2$



Sketch the graph of each of the parabolas above (4-6)

7) Solve for the roots of $x^2 + 10x + 41 = 0$

$$-10 \pm \frac{\sqrt{100 - 4(1)(41)}}{2}$$

$$-10 \pm \frac{\sqrt{-64}}{2}$$

$$-10 \pm 8i$$

$$\frac{-10 \pm 8i}{2}$$

$$\boxed{-5 \pm 4i}$$

8) Rewrite $3x^2 + 12x - 5$ in factored and in vertex form.

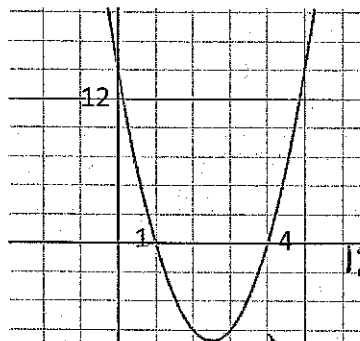
Vertex form final answer

$$3(x+2)^2 - 17$$

Factored form final answer

$$3(x - .3833)(x + 4.3833)$$

For each of the following graphs, write the equation of the parabola in the form $y = ax^2 + bx + c$



$$y = a(x-1)(x-4)$$

$$(0, 12)$$

$$12 = a(0-1)(0-4)$$

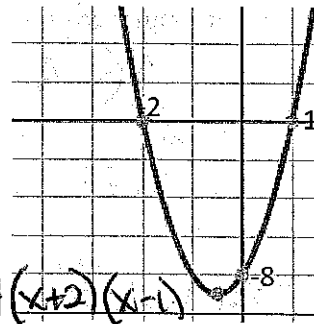
$$12 = 4a$$

$$a = 3$$

$$y = 3(x-1)(x-4)$$

$$y = 3(x^2 - 5x + 4)$$

$$\boxed{3x^2 - 15x + 12}$$



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

$$(0, -8)$$

$$-8 = a(0+2)(0-1)$$

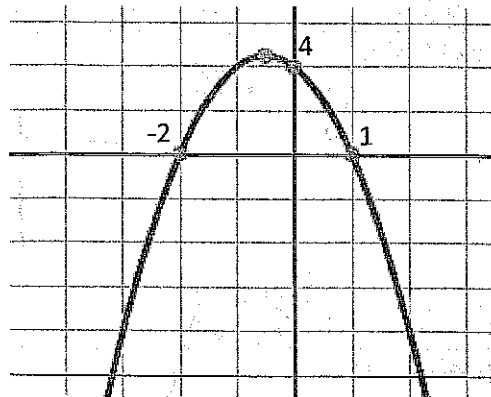
$$-8 = -2a$$

$$a = 4$$

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

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

$$\boxed{4x^2 + 4x - 8}$$



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

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

$$\boxed{-2x^2 - 2x + 4}$$

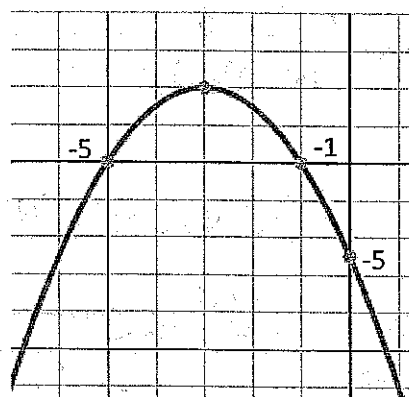
$$y = a(x+2)(x-1)$$

$$(0, 4)$$

$$4 = a(0+2)(0-1)$$

$$-2a = 4$$

$$a = -2$$



$$y = -1(x^2 + 6x + 5)$$

$$\boxed{-x^2 - 6x - 5}$$

$$y = a(x+5)(x+1)$$

$$(0, -5)$$

$$-5 = a(0+5)(0+1)$$

$$5a = -5$$

$$\boxed{a = -1}$$

Moderate (36%)

10) An object is launched from the ground directly upward at 39.2m/s which produces the following equation: $h(t) = -4.9t^2 + 39.2t$ where $h(t)$ is the height in meters after t seconds.

a) What is the height of the object after 1 second?

$$h(1) = -4.9(1)^2 + 39.2(1)$$

$$\boxed{34.3 \text{ meters}}$$

b) When will the object hit the ground?

$$\boxed{8 \text{ seconds}}$$

$$\frac{-39.2 \pm \sqrt{39.2^2 - 4(-4.9)(0)}}{2}$$

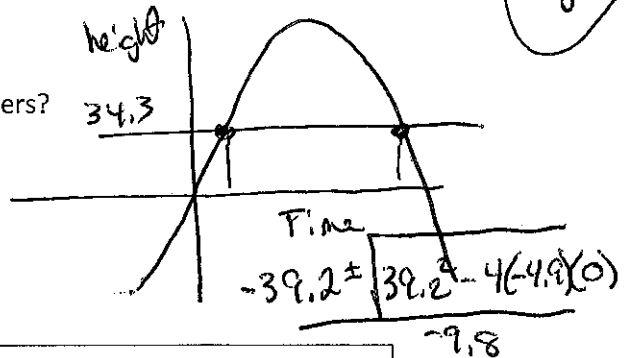
$$\frac{-39 \pm 39.2}{-9.8}$$

c) What is the maximum height reached?

$$\frac{-39.2}{-9.8} \quad (4, 78.4)$$

d) For how long is the object at or above a height of 34.3 meters?

$$\begin{aligned} -4.9t^2 + 39.2t &= 34.3 \\ -4.9t^2 + 39.2t - 34.3 &= 0 \end{aligned}$$



11) Find the sum and the product of $(4+3i)$ and $(4-3i)$

Sum

$$\boxed{8}$$

Product

$$\boxed{25}$$

$$\begin{array}{r} 4 \quad 3i \\ \hline 16 \quad 12i \\ \hline -12i \quad -9i^2 \\ \hline 16+9 \end{array}$$

$$\frac{-39.2 \pm 29.4}{-9.8}$$

$$\boxed{\text{See or 7}}$$

12) Remembering that $-b$ = sum of the roots and c = the product of the roots, write the equation of the parabola that produced the roots in problem #11

$$\begin{aligned} -b &= 8 \\ b &= -8 \\ c &= 25 \end{aligned}$$

Final Equation in general form

$$y = x^2 - 8x + 25$$

9) The curve $y=a(x+b)^2 + c$ has a minimum point at (3,6) and passes through the point (1,14).

a) Write the equation of this parabola

$$y = 2(x-3)^2 + 6$$

b) Write down the values of b and c

Final answer for b

-12

Final answer for c

24

So the Minimum point is (3,6)

So I can use Vertex form to write my parabola. I still need to find a

$$y = a(x-3)^2 + 6$$

$$14 = a(1-3)^2 + 6$$

$$14 = 4a + 6$$

$$8 = 4a$$

$$a = 2$$

$$y = 2(x-3)^2 + 6$$

$$2(x^2 - 6x + 9) + 6$$

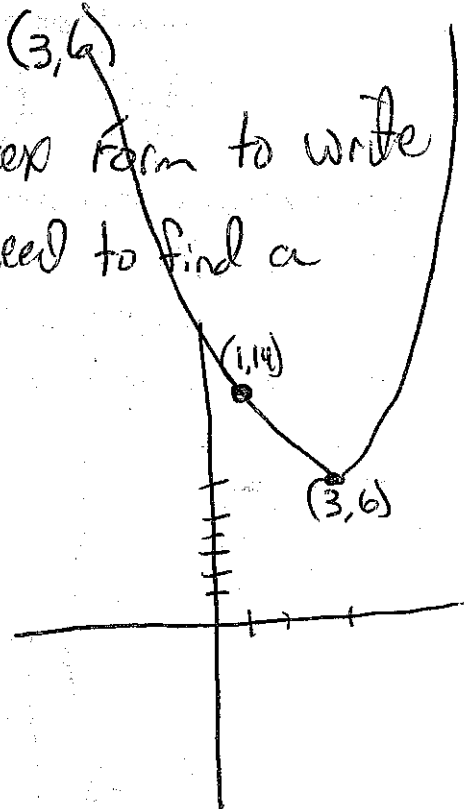
$$2x^2 - 12x + 18 + 6$$

$$2x^2 - 12x + 24$$

a

b

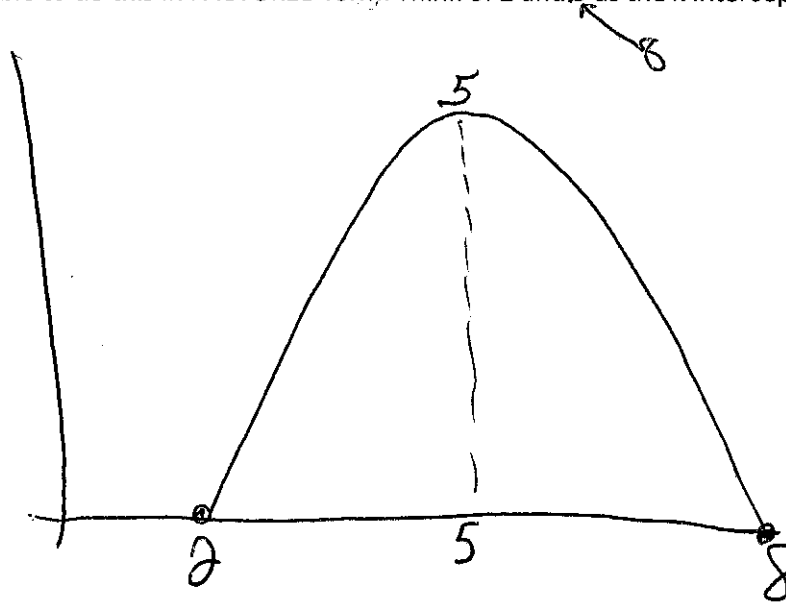
c



The football team is having a water balloon contest to raise money. A student releases a balloon from the 2 yard line. It reaches a max height of 5 yards and lands at the 8 yard line.

13) Draw a sketch of the water balloon scenario. Showing the path leaving the 2 yard line and landing on the 8 yard line

14) Write a quadratic equation that represents the balloon's vertical height (y) with respect to its horizontal distance (x). Don't forget to find the "a" value for your equation to be totally correct. You should easily be able to do this in FACTORED form. Think of 2 and 8 as the x intercepts.



Vertex
 $\frac{8+2}{2} = (5, 5)$

$y = a(x-2)(x-8)$ My point to substitute is $(5, 5)$

$$5 = a(5-2)(5-8)$$

$$5 = -9a$$

$$-\frac{5}{9} = a$$

$$y = -\frac{5}{9}(x-2)(x-8)$$