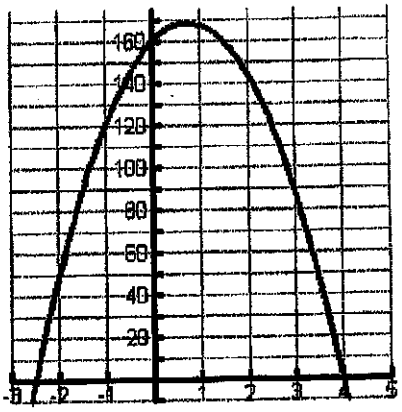
Name: _____ Date: _____

Characteristics of Quadratic Equations

Wil E. Coyote is catapulting a boulder off a cliff to hit the road runner. Let t represent the number of seconds that the boulder catapults off the cliff and h(t) denote the height of the boulder, in feet, above the base of the cliff. Ignoring air resistance, we can use the following formula to express the path of the boulder: $h(t) = -16t^2 + 24t + 160$

1. What does the x axis represent? _____ The y axis? _____
2. What part of the graph is insignificant? Why?



3. What was the height of the boulder before it was launched? _____
   What special point on the graph is associated with this information? _____
4. If Wil E. Coyote simply pushed a boulder off the cliff, how would the graph look different?
5. How long will it take before the boulder reaches the bottom of the cliff? _____
   What special point on the graph is associated with this information? _____
6. After how many seconds does the boulder change direction? _____
   How high is the boulder when it changes direction? _____
   What is this significant point called on the graph? _____
7. How high above the starting point does the boulder begin to change direction?
   _____
8. If Wil E. Coyote changes his mind, how many seconds does he have to stop the boulder from going over the cliff? _____

3. A baker has modeled the monthly operating costs for making wedding cakes by the function $y = 0.5x^2 - 12x + 150$ where y is the total cost in dollars and x is the number of cakes prepared.

   A. Find the **vertex** and **axis of symmetry.** *The vertex would represent (Cakes Prepared, $Cost).*

   B. What is the **minimum** monthly operating **cost**?

   C. How many **cakes** should be prepared each month to yield the minimum operating cost?

   D. What are the baker's costs if he/she makes **no cakes (zero)**?

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4. The path of a soccer ball is modeled by the function $h(x) = -0.005x^2 + 0.25x$, where h is the height in meters and x is the horizontal distance that the ball travels in meters. What is the **maximum height** that the ball reaches? *Hint: start by finding the vertex.*

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5. The function $A(x) = x(10 - x)$ describes the area A of a rectangular flower garden, where x is its width in yards. What is the maximum area of the garden? *Hint: get your equation in standard form 1st and then start finding the vertex.*

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6. A record label uses the following function to model the sales of a new release.

$$a(t) = -90t^2 + 8100t$$

The number of albums sold is a function of time, t, in days. On which **day** were the **most** albums sold? What is the **maximum** number of **albums** sold on that day?

KEY

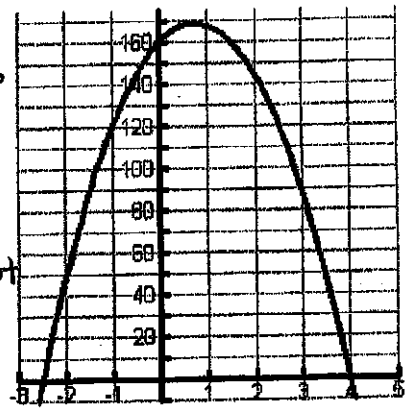
CCGPS Geometry Unit 2c – Graphing Quadratics Practice

Name: _____ Date: _____

Characteristics of Quadratic Equations

Wil E. Coyote is catapulting a boulder off a cliff to hit the road runner. Let t represent the number of seconds that the boulder catapults off the cliff and h(t) denote the height of the boulder, in feet, above the base of the cliff. Ignoring air resistance, we can use the following formula to express the path of the boulder: $h(t) = -16t^2 + 24t + 160$

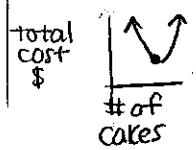
1. What does the x axis represent? time (sec) The y axis? height (ft)
2. What part of the graph is insignificant? Why?
The negative coordinates on the graph because both time and distance are positive.



3. What was the height of the boulder before it was launched? 160 ft.
   What special point on the graph is associated with this information? (0, 160) is the y-intercept
4. If Wil E. Coyote simply pushed a boulder off the cliff, how would the graph look different?
It would be a linear function instead of a quadratic function.
5. How long will it take before the boulder reaches the bottom of the cliff? 4 seconds
   What special point on the graph is associated with this information? x-intercept
6. After how many seconds does the boulder change direction? 0.75 sec
   How high is the boulder when it changes direction? 170 ft
   What is this significant point called on the graph? vertex (0.75, 170)
7. How ~~high above~~ the starting point does the boulder begin to change direction?
170 − 160 = 10 ft
8. If Wil E. Coyote changes his mind, how many seconds does he have to stop the boulder from going over the cliff? 1.5 seconds

KEY

3. A baker has modeled the monthly operating costs for making wedding cakes by the function $y = 0.5x^2 - 12x + 150$ where y is the total cost in dollars and x is the number of cakes prepared. $a = 0.5$ $b = -12$ $c = 150$



A. Find the **vertex** and **axis of symmetry**. *The vertex would represent (Cakes Prepared, $Cost).*

$x = \frac{--12}{2(0.5)}$

$x = 12$

$y = 0.5(12)^2 - 12(12) + 150$

$y = 78$

Axis of Symmetry $\boxed{x = 12}$

vertex: $\boxed{(12, 78)}$

B. What is the **minimum** monthly operating **cost**?

$\boxed{\$78.00}$

C. How many **cakes** should be prepared each month to yield the minimum operating cost?

$\boxed{12 \text{ cakes}}$

D. What are the baker's costs if he/she makes **no cakes (zero)**?

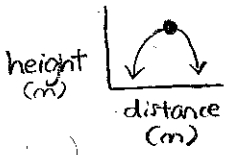
$y = 0.5(0)^2 - 12(0) + 150$

$y = 150$

$\boxed{\$150.00}$

---

4. The path of a soccer ball is modeled by the function $h(x) = -0.005x^2 + 0.25x$, where h is the height in meters and x is the horizontal distance that the ball travels in meters. What is the **maximum height** that the ball reaches? *Hint: start by finding the vertex.* $a = -0.005$ $b = 0.25$ $c = 0$



$x = \frac{-0.25}{2(-0.005)}$

$x = 25$

$y = -0.005(25)^2 + 0.25(25)$

$y = 3.125$

vertex: $(\overset{x}{25}, \overset{y}{3.125})$

$\boxed{3.125 \text{ meters}}$

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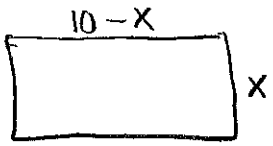
5. The function $A(x) = x(10 - x)$ describes the area A of a rectangular flower garden, where x is its width in yards. What is the maximum area of the garden? *Hint: get your equation in standard form 1st and then start finding the vertex.* $a = -1$ $b = 10$ $c = 0$



$A(x) = x(10 - x)$

$A(x) = 10x - x^2$

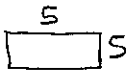
$A(x) = -x^2 + 10x$

$x = \frac{-10}{2(-1)}$

$x = 5$

width: 5

length: 10 – 5 = 5



$(5)(5)$

$\boxed{25 \text{ yd.}^2}$

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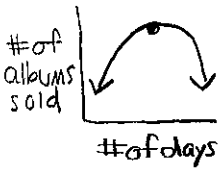
6. A record label uses the following function to model the sales of a new release.

$$a(t) = -90t^2 + 8100t$$

The number of albums sold is a function of time, t, in days. On which **day** were the **most** albums sold? What is the **maximum** number of **albums** sold on that day?



$a = -90$ $b = 8100$ $c = 0$

$x = \frac{-8100}{2(-90)}$

$x = 45$

$y = -90(45)^2 + 8100(45)$

$y = 182,250$

On the 45th day after album release, 182,250 albums sold.