Advanced Algebra Name Key

Block ______

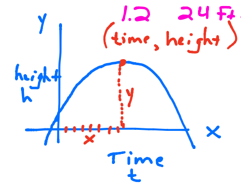
1. Suppose you are tossing an apple up to a friend on a third-story balcony. After t seconds, the height of the apple in feet is given by $h = -16t^2 + 38.4t + 0.96$. Your friend catches the apple just as it reaches its highest point. How long does the apple take to reach your friend, and at what height above the ground does your friend catch it?

$a = -16$
$b = 38.4$
$c = .96$

Vertex

t $x = \frac{-b}{2a} = \frac{-38.4}{2(-16)} = \frac{-38.4}{-32} = 1.2$ seconds

h $f(1.2) = -16(1.2)^2 + 38.4(1.2) + 0.96$
$= 24$ ft. above ground after 1.2 seconds



2. The barber's profit p each week depends on his charge c per haircut. It is modeled by the equation $p = -200c^2 + 2400c - 4700$. Sketch the graph of the equation. What price should he charge for the largest profit?

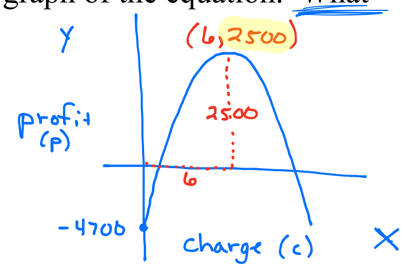
$a = -200$
$b = 2400$
$c = -4700$

"p" y-coordinate

Vertex

c $x = \frac{-b}{2a} = \frac{-2400}{2(-200)} = \frac{-2400}{-400} = \$6$ charge

p $f(6) = -200(6)^2 + 2400(6) - 4700$
$= \$2500$ profit @ \$6 haircut charge



3. A skating rink manager finds the revenue R based on an hourly fee F for skating is represented by the function $R = -480F^2 + 3120F$. What hourly fee will produce maximum revenues?

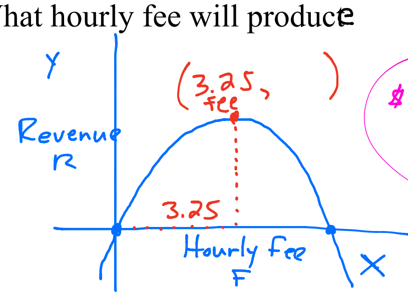
$a = -480$
$b = 3120$

a b $c = 0$

Vertex

F $x = \frac{-b}{2a} = \frac{-3120}{2(-480)} = \frac{-3120}{-960} = \$3.25$ fee

R $f(3.25) = -480(3.25)^2 + 3120(3.25)$
$= \$5070$ Max Revenue



\$3.25 hourly fee

4. The path of a baseball after it has been hit is modeled by the function $h = -.0032d^2 + d + 3$, where h is the height in feet of the baseball and d is the distance in feet the baseball is from home plate. What is the maximum height reached by the baseball? How far is the baseball from home plate when it reaches it's maximum height?

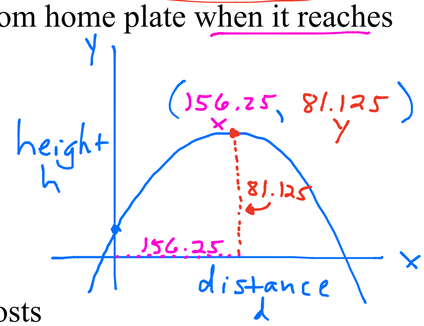
$a = -.0032$
$b = 1$
$c = 3$

Vertex (y-coord.)

x-coordinate of vertex

d $x = \frac{-b}{2a} = \frac{-(1)}{2(-.0032)} = \frac{-1}{-.0064} = 156.25$ ft. away from home plate

h $f(156.25) = -.0032(156.25)^2 + (156.25) + 3$
$= 81.125$ ft. high @ 156.25 ft. away.



5. A lighting fixture manufacturer has daily productions costs of $C = 0.25n^2 - 10n + 800$, where C is the total daily cost in dollars and n is the number of light fixtures produced. How many fixtures should be produced to yield a minimum cost?

$a = .25$
$b = -10$
$c = 800$

Vertex

n $x = \frac{-b}{2a} = \frac{-(-10)}{2(.25)} = \frac{10}{.5} = 20$ fixtures

C $f(20) = \$700$ min. cost if producing 20 fixtures