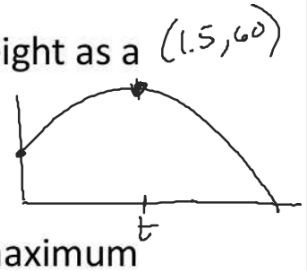
Bill and Ted are throwing snowballs into the parking lot from their third story balcony with initial height of 24 feet and upward velocity of 48 feet per second.

Write a function rule that will represent the given scenario for height as a function of time. $h(t) = h_0 + V_0 t - 16t^2$

$a = -16$
$b = 48$
$c = 24$

$h(t) = 24 + 48t - 16t^2$



Without graphing, find the time when the snowball reaches its maximum height? $t = \frac{-b}{2a} = \frac{-48}{2(-16)} = \frac{-48}{-32} = 1.5$ sec

What is the maximum height?

$h(1.5) = 24 + 48(1.5) - 16(1.5)^2$

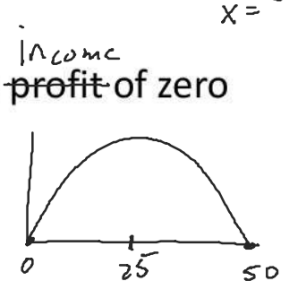
$= 60$ ft

Mike owns his own Bungee Jump Business. He has calculated the Income for his company by the following function $I(p) = 50p - p^2$. The following graph shows income as function of price for Mike's business where ***p*** is the ticket price and ***I*** is the income.

$I(p) = bx - ax^2 \qquad x(b - ax)$

Zeros = $x = 0$

$x = -\frac{b}{a}$



Without graphing, find the price of the ticket that will yield a ~~profit~~ of zero dollars?

$I(p) = p(50 - p)$

price = \$0, \$50

$p = 0 \qquad 50 - p = 0$

$50 = p$

What price should Mike charge to maximize his ~~profit?~~ income

$p = \$25$

Based on this model what is Mike's maximum ~~profit?~~ income

$I(25) = 50(25) - (25)^2$

$= \$625$

Alex hit a baseball 5 feet off the ground. After 5 seconds the ball had a height of 240 feet. Find the initial upward velocity of the baseball. Write an equation for the path of the baseball over time.

$(5, 240)$

$t \quad h(t)$

$h(t) = 5 + V_0 t - 16t^2$

$240 = 5 + V_0(5) - 16(5)^2$

$240 = 5 + V_0(5) - 400$

$240 = V_0(5) - 395$

$\frac{635}{5} = \frac{V_0(5)}{5}$

$V_0 = 127$

$h(t) = 5 + 127t - 16t^2$

Without using graphing technology, sketch the pattern of graphs you would expect for the next set of quadratics functions. Justify your reasoning.

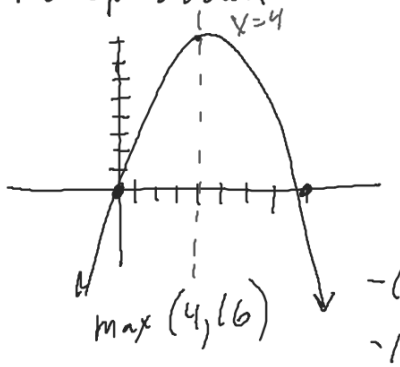
$$y = -x^2 + 8x$$

y-intercept @ zero

x-intercept @ $x = 0$

$x = \frac{-b}{a} = \frac{-8}{-1} = 8$

$a < 0$ opens down



$-(4)^2 + 8(4)$

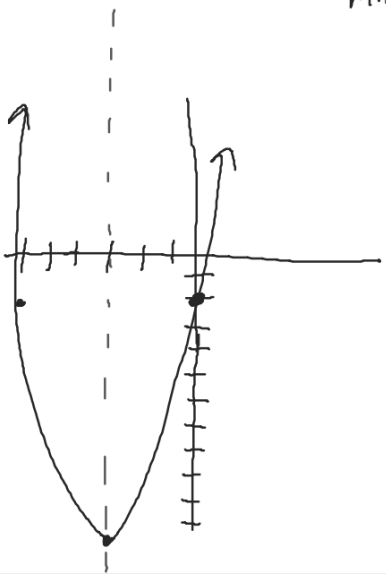
$-16 + 32$

$$y = x^2 + 6x - 2$$

y-intercept @ $y = -2$

open up $a > 0$

Shift Left



min $\rightarrow x = \frac{-b}{2a}$

$= \frac{-6}{2(1)}$

$= -3$

$(-3)^2 + 6(-3) - 2$

$9 - 18 - 2$

$-9 - 2$

-11

Match the equation to the graph and be prepared to explain your answer.

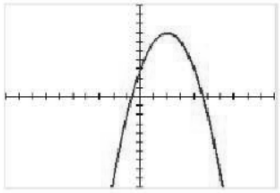
Rule I $y = x^2 - 4x$

Rule II $y = x^2 + 3x - 1$

Rule III $y = -x^2 + 4x + 3$

Rule IV $y = -4x^2 + 2x + 3$

Graph A



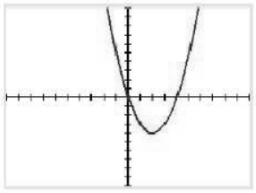
Rule $y = -x^2 + 4x + 3$

Explain

a<0 opens down

y-intercept of 3

Graph B



Rule $y = x^2 - 4x$

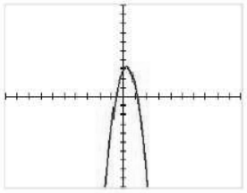
Explain a>0 opens up

y-intercept of zero

x-intercepts zero

x=4

Graph C



Rule $y = -4x^2 + 2x + 3$

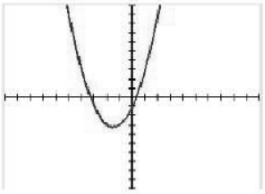
Explain

a<0 opens down

y-intercept of 3

a=4 Skinnier

Graph D



Rule $y = x^2 + 3x - 1$

Explain a>0 open up

y-intercept -1

For each function, explain what you can learn about the shape and location of its graph by looking at the coefficients and constant term in the rule.

$h = 15 - 16t^2$

$h = 2 + 40t - 16t^2$

$h = 0.004x^2 - x + 80$

$h = 0.05s^2 + 1.1s$