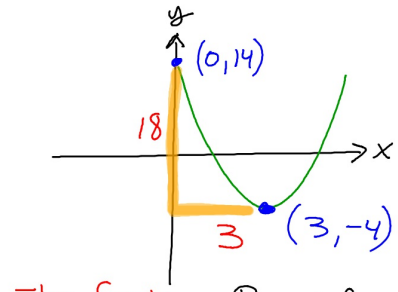
Write the equation of this quadratic:

Vertex is (3,-4) (h, k)

y-intercept is 14 → (0,14)

$y = a(x-3)^2 - 4$

EQ: $y = 2(x-3)^2 - 4$



This function: 18 over 3

Parent func: 9 over 3

This graph is 18/9 = 2 times taller and opens up.

a = 2

Given the Quadratic Eq: $y = a(x - 4)^2 + k$

Determine both a and k given these two points are on the graph:

(1,46) and (-2,181)

Use these two points to create a system of equations by replacing the x and y variables with the coordinates from the two points.

Using (1,46)

$46 = a(1-4)^2 + k$

$46 = a(-3)^2 + k$

$46 = 9a + k$

Using (-2,181)

$181 = a(-2-4)^2 + k$

$181 = a(-6)^2 + k$

$181 = 36a + k$

Now you can use either Elimination or Substitution to solve for a and k.

Using Elimination:

$181 = 36a + k$

$-(46 = 9a + k)$

$135 = 27a$

$5 = a$

Substitute 35 for a in either eq. & Solve for k.

$46 = 9(5) + k$

$46 = 45 + k$

$k = 1$

State the coordinates of the Vertex and the y-intercept of this quadratic.

$y = 3(x + 4)^2 - 9$

Vertex:

(-4, -9)

y-intercept:

The value of y when x=0.

$y = 3(0+4)^2 - 9$

$= 48 - 9 = 39$

y-int = 39

or

y-int is (0,39)

Every Parabola has a Max or a Min.

Does each Parabola have a Max or a Min?

1. $y = -96(x - 43)^2 - 200$

opens down → maximum

2. $y = 0.06(x + 1)^2 + 95$

opens up → minimum

Use this equation: $y = -2(x + 7)^2 - 12$

↑ vertex is a max (-7, -12)

Answer the following:

1. What is the maximum value of this function? (Vertex; y at vertex) $y = -12$
2. When does this maximum occur? (x-coord at vertex; Vertex) $x = -7$

Mariam throws a stone from a bridge into a river below.

While in the air the stone's height (h) (in meters above the water), x seconds after Mariam threw it, is modeled by: $h(x) = -5(x - 1)^2 + 45$

Vertex is a maximum (1, 45); x = Time; y = height

1. What is the domain of this function? (Time can't be negative) $x \geq 0$ $[0, \infty)$
2. How high is the stone after 2.5 seconds? (x) $h(2.5) = 33.75$ ft
3. Find the maximum height of the stone. → y-coord of the vertex → 45 ft
4. How long did it take the stone to reach its maximum height? (Time) → x-coord of the vertex → 1 sec

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A certain company's main source of income is selling socks. The company's annual profit P (in millions of dollars) as a function of the price of a pair of socks x (in dollars) is modeled by:

$P(x) = -3(x - 5)^2 + 12$ Vertex (5,12) is a Maximum

1. What is the domain of this function? $x > 0$ $(0, \infty)$
   a price won't be negative or zero(free).
2. What is the profit if the price of a pair of socks is $2.50?
   P(2.50) = -$6.75 This means they are losing money at this price.
3. What is the maximum profit that the company can earn?
   → y-coordinate of the vertex. y = $12 million
4. What price for a pair of socks will maximize their profit?
   x-coord of the vertex
   $5 a pair will produce a maximum profit.