
Applications of the Vertex

Words that Indicate Finding Vertex of a Quadratic	Quadratics (so far)
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- Minimum/Maximum
- Minimize/Maximize
- Least/Greatest
- Smallest/Largest

Standard Form: $y = ax^2 + bx + c$, y-int: $(0, c)$
Vertex Form: $y = a(x - h)^2 + k$, vertex: $(-h, k)$
Vertex: $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

1. 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 costs in dollars and x is the number of cakes prepared.

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

b. What is the minimum monthly operating cost?

2. The arch of a bridge forms a parabola modeled by the function $y = -0.2(x - 40)^2 + 25$, where x is the horizontal distance (in feet) from the arch's left end and y is the corresponding vertical distance (in feet) from the base of the arch. How tall is the arch?

3. Suppose the flight of a launched bottle rocket can be modeled by the equation $y = -x^2 + 6x$, where y measures the rocket's height above the ground in meters and x represents the rocket's horizontal distance in meters from the launching spot at $x = 0$. How far has the bottle rocket traveled horizontally when it reaches its maximum height? What is the maximum height the bottle rocket reaches?

b. How far does the bottle rocket travel in the horizontal direction from launch to landing?