

Graphing Quadratic Functions

$f(x) = a(x - h)^2 + k$		$f(x) = ax^2 + bx + c$
If a is positive $\rightarrow \odot$, with a minimum If a is negative $\rightarrow \ominus$, with a maximum	1. Determine which way parabola opens	If a is positive $\rightarrow \odot$, with a minimum If a is negative $\rightarrow \ominus$, with a maximum
Vertex is (h, k) (standard form is subtraction, so the sign of h appears to be the opposite)	2. Find vertex (axis of symmetry is first of ordered pair)	Vertex is $\frac{-b}{2a}$ for x, and then solve for y
Make $x = 0$ and solve	3. Find y-intercept	Make $x = 0$ and solve
Set $f(x) = 0$ and solve for x	3. Find x-intercept(s) – there may be one, two or none	Set equation equal to 0 and solve
	5. Use axis of symmetry to find the point mirroring the y-intercept.	

In word problems:

1. Pay attention to the question: does it ask for a minimum value or a maximum value?

e.g. What is the largest product of two numbers whose sum is 20?

- asking for a maximum

2. Identify equation(s). If there are two equations, combine them into one, using substitution.

e.g. The product of two numbers is xy . The sum is $x + y = 20$. Solve for y : $y = 20 - x$ and substitute: $x(20 - x)$

3. Set the equation equal to 0. *e.g.* $0 = x(20 - x)$, $0 = 20x - x^2$ or $0 = -x^2 + 20x$

4. Solve for $\frac{-b}{2a}$ This will be your minimum or maximum value. Answer the question.

e.g. In $0 = -x^2 + 20x$, the b is 20 and the a is -1. $\frac{-b}{2a}$ is $\frac{-20}{2(-1)}$ or 10. If $x = 10$, then $y = 20 - 10$, or 10. **The largest product is 100.**