High School Algebra Playlist: Completing the Square to Write a Quadratic Expression in Vertex Form

Aligns with CCSS.Math.Content.HSA.SSE.B.3.b: Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

Related Standards

- CCSS.Math.Content.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*

- CCSS.Math.Content.HSA.SSE.B.3.a: Factor a quadratic expression to reveal the zeros of the function it defines.

- CCSS.Math.Content.HSA.REI.B.4: Solve quadratic equations in one variable.

Objectives

In this module, you will learn and practice the following skills:

- complete the square to convert a quadratic function in standard form to vertex form

- use the vertex form of a quadratic function to determine its minimum or maximum

Let's get started!

Key Terms

- The **vertex** of the graph of a parabola is the "tip" of the curve, where the graph of a quadratic function intersects its axis of symmetry.

- The **vertex form** of a quadratic function is $y = a(x - h)^2 + k$, where (h, k) is the vertex.

- **Completing the square** is the process of converting an expression, such as a quadratic expression, into a perfect square by adding and subtracting a constant term.

Connections

- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 2.5.3, about page 179

- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 5.1.1, about page 477

- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 5.1.2, about page 479