|  |  |
| --- | --- |
|  | **Parabola**: a U-shaped curve.   * All quadratic functions form parabolas.   **Standard Form of a Quadratic**:   * is the quadratic term. * is the linear term. * is the constant term. |
| Intercepts | **X-intercepts:** the x-coordinates of the points where the graph intersects the x-axis.   * X-intercepts can be found by factoring and solving the equation for x. * Not all quadratic functions have x-intercepts.   **Y-intercept:** the y-coordinate of the point where the graph intersects the y-axis. All quadratic functions have exactly 1 y-intercept.   * **In standard form, is the y-intercept.** |
| The Discriminant | The **discriminant** helps us know whether a function has x-intercepts.   * Discriminant formula:   + If it’s negative, there are no x-intercepts. |
|  | The graph of is shown below.   * The y-intercept is , or -4. |
| Vertex and Axis of Symmetry | The **vertex** of a parabola is the point where the graph changes direction.  The **axis of symmetry** is the line through the vertex of a parabola. The parabola is symmetric about this line.   * Axis of symmetry formula:     In the graph above, the equation of the axis of symmetry is because the vertical line through 1 is the line that cuts the parabola in half. |
| The vertex **always** lies on the axis of symmetry.  **To find the vertex from the equation,**   1. Use the formula to find the x-coordinate. 2. Substitute that number into the equation for x and solve for y to find the y-coordinate. |
| Maximum and Minimum | **The y-coordinate of the vertex is the maximum or minimum value.**   * Maximum: the greatest y-value of a function * Minimum: the least y-value of a function   In standard form, you can tell whether a function has a maximum or minimum by the sign of   * If , the parabola opens up and has a minimum value. * If , the parabola opens down and has a maximum value. |
| Guided Practice | 1. Find the y-intercept and vertex of the function . Determine whether the vertex is a minimum or maximum point on the graph. |
| 1. is a quadratic function. Determine the direction in which the function opens, the coordinates of the vertex, the axis of symmetry, the x-intercepts (if any), and the y-intercept. |
|  | 1. is a quadratic function. Determine the direction in which the function opens, the coordinates of the vertex, the axis of symmetry, the x-intercepts (if any), and the y-intercept. |
|  | 1. is a quadratic function. Determine the direction in which the function opens, the coordinates of the vertex, the axis of symmetry, the x-intercepts (if any), and the y-intercept. |