

# quadratics notes

- Quadratic equation standard form:  $ax^2 + bx + c = 0$  This is the standard form for any quadratic equation, where  $a$ ,  $b$ , and  $c$  are constants. It can be used to find the roots or zeros of the equation by using the quadratic formula.
- Quadratic formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  This formula is used to find the roots (x-intercepts) of a quadratic equation in standard form. It gives the two possible values for  $x$  when the equation is equal to zero.
- Axis of symmetry:  $x = -b / 2a$  This formula is used to find the vertical line that divides the parabola into two symmetrical halves. It can help in graphing the quadratic function and finding the vertex.
- Vertex form:  $y = a(x - h)^2 + k$  This form is useful for easily identifying the vertex of a quadratic equation, where  $(h, k)$  is the vertex point. It can be used to graph the parabola or find the maximum/minimum value.
- Completing the square:  $x^2 + bx + c = a(x - h)^2 + k$  This method is used to convert a quadratic equation from standard form to vertex form. It involves adding and subtracting a constant term to make the left side a perfect square trinomial.
- Discriminant:  $\Delta = b^2 - 4ac$  The discriminant is used to determine the nature of the roots of a quadratic equation. It can help predict whether the equation has real or complex roots and how many distinct solutions it has.

- Factored form:  $y = a(x - p)(x - q)$  This form is useful for quickly identifying the roots of a quadratic equation, where  $p$  and  $q$  are the  $x$ -intercepts. It can also be used to find the factors of the quadratic equation.
- Parabola focus:  $F(h, k + 1/4a)$  The focus is a point that defines the geometric property of a parabola. It can be used to find the directrix and derive the equation of a parabola from its geometric definition.
- Parabola directrix:  $y = k - 1/4a$  The directrix is a horizontal line that is equidistant from the focus and vertex of the parabola. It can be used in the geometric definition of a parabola and to find its equation from given points.

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