**LINEAR EQUATIONS**

**Standard Form**

\[ Ax + By = C \quad \text{A, B, C are integers} \]

**Slope-Intercept Form**

\[ y = mx + b \quad \text{Slope is m and y-intercept (0, b)} \]

**Point-Slope Form**

\[ y - y_1 = m(x - x_1) \quad \text{Slope is m. Line passes through } (x_1, y_1) \]

**Horizontal Line**

\[ y = b \]

Slope is zero and y-intercept (0, b)

**Vertical Line**

\[ x = a \]

Slope is undefined and x-intercept (a, 0)

---

**COORDINATE GEOMETRY**

Let \((x_1, y_1)\) and \((x_2, y_2)\) be two order pairs

**Slope**

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \quad x_2 \neq x_1 \]

**Midpoint**

\[ \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \]

**Distance**

\[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]

---

**Distance Travel**

\[ d = rt \quad \text{distance} = \text{rate} \times \text{time} \]

---

**Pythagorean Theorem**

\[ a^2 + b^2 = c^2 \]
**QUADRATIC EQUATIONS**

**Standard Form**

\[ f(x) = ax^2 + bx + c \]

**Vertex Form**

\[ f(x) = a(x - h)^2 + k \]

\[ \left( \frac{-b}{2a}, f \left( \frac{-b}{2a} \right) \right) \quad \text{vertex} \]

\[ x = \frac{-b}{2a} \quad \text{axis of symmetry} \]

Find the y-intercept by evaluating \( f(0) \)

\[ (0, f(0)) \quad \text{y-intercept} \]

If \( a \) is positive the graph opens up \( \uparrow \)

If \( a \) is negative the graph opens down \( \downarrow \)

**x-intercepts/zeroes/roots/solutions**

Find the x-intercepts by factoring or using the quadratic formula

\[ ax^2 + bx + c = 0 \]

**Quadratic Formula**

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

**Special Factoring**

**Difference of Squares**

\[ A^2 - B^2 = (A + B)(A - B) \]

**Perfect Square Trinomials**

\[ A^2 + 2AB + B^2 = (A + B)^2 \]

\[ A^2 - 2AB + B^2 = (A - B)^2 \]

**Difference of Cubes**

\[ A^3 - B^3 = (A - B)(A^2 + AB + B^2) \]

**Sum of Cubes**

\[ A^3 + B^3 = (A + B)(A^2 - AB + B^2) \]