### Functions

**Standard Form of Quadratic Equation**

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

**Quadratic Formula**

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

\[ a \neq 0 \]

**Factoring by Guessing and Checking**

\[ 2x^2 + 11x - 15 = 0 \]

1. Find integers \( r \) and \( s \) such that
   \[ rs = (\text{coef. of } x^2) (\text{constant term}) = ac = (2)(15) \]
   \[ r + s = \text{coef. of } x = b = 11 \]
   \[ r = 6, s = 5 \]

2. Rewrite \( bx \) as \( rs + sx \)
   \[ 2x^2 + 11x + 15 = 2x^2 + 6x + 5x + 15 \]

3. Factor by grouping
   \[ 2x^2 + 6x + 5x + 15 = 2x(x + 3) + 5(x + 3) = (2x + 5)(x + 3) \]

**Solving the Quadratic Equation Completing the Square**

\[ 3x^2 + 6x - 15 = 0 \]

1. Divide by the coefficient of \( x^2 \)
   \[ x^2 + 2x - 5 = 0 \]

2. Move the constant to the other side
   \[ x^2 + 2x = 5 \]

3. Half the coefficient of \( x \), square it, and add it to both sides
   \[ x^2 + 2x + \left(\frac{2}{2}\right)^2 = 5 + \left(\frac{2}{2}\right)^2 \]

4. Factor the left side
   \[ x^2 + 2x + 1 = 6 \]
   \[ (x + 1)^2 = 6 \]

5. Use Square Root Property
   \[ x + 1 = \sqrt{6} \]

6. Use Absolute Value Property
   \[ x + 1 = \pm \sqrt{6} \]

7. Solve for \( x \)
   \[ x = -1 \pm \sqrt{6} \]

### Arithmetic Operations

\[ ab + ac = a(b + c) \]

\[ a \left(\frac{b}{c}\right) = \frac{ab}{c} \]

\[ \frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd} \]

\[ \frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd} \]

\[ \frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd} \]

\[ \frac{ac}{bd} = \frac{ad}{bc} \]

### Exponent Properties

\[ a^n a^m = a^{n + m} \]

\[ \frac{a^n}{a^m} = a^{n - m} = \frac{1}{a^{m-n}} \]

\[ (a^n)^m = a^{nm} \]

\[ a^0 = 1, a \neq 0 \]

\[ (ab)^n = a^n b^n \]

\[ \left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \]

\[ a^{-n} = \frac{1}{a^n} \]

\[ \frac{1}{a^{-n}} = a^n \]

### Logarithmic Properties

\[ y = \log_b x \text{ is equivalent } x = b^y \]

\[ \log_b b^x = x \]

\[ b \log_b x = x \]

\[ \log_b(1) = 0 \]

\[ \log_b(x^y) = y \cdot \log_b(x) \]

\[ \log_b(xy) = \log_b x + \log_b y \]

\[ \log_b \left(\frac{x}{y}\right) = \log_b x - \log_b y \]

### Absolute Value Properties

\[ |a| = a \text{ if } a \geq 0 \]

\[ |a| = -a \text{ if } a \leq 0 \]

\[ |a| = |a| \]

\[ |a| = |a| \]

\[ |a| = |a| \]

\[ |a + b| \leq |a| + |b| \] (Triangle Inequality)

### Properties of Radicals

\[ \sqrt[n]{a} = a^{\frac{1}{n}} \]

\[ \sqrt[n]{ab} = \sqrt[n]{a} \sqrt[n]{b} \]

\[ \sqrt[n]{\sqrt[m]{a}} = \sqrt[m]{\sqrt[n]{a}} \]

\[ \sqrt[n]{a^n} = a, \text{ if } n \text{ is odd} \]

\[ \sqrt[n]{a^n} = |a|, \text{ if } n \text{ is even} \]

### Inverse Functions

**Composition of Functions**

\[ (f \circ g)(x) = f(g(x)) \]

\[ (g \circ f)(x) = g(f(x)) \]

\[ f \circ f^{-1}(x) = x \]

### Algebra of Functions

\[ (f + g)(x) = f(x) + g(x) \]

\[ (f - g)(x) = f(x) - g(x) \]

\[ (f \cdot g)(x) = f(x) \cdot g(x) \]

\[ \left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, g(x) \neq 0 \]