

### 1. Important Power Rules

$$x^m \cdot x^n = x^{m+n}, \quad \frac{x^m}{x^n} = x^{m-n}, \quad (x^m)^n = x^{mn}, \quad (xy)^p = x^p y^p, \quad x^{-m} = \frac{1}{x^m}$$

### 2. Linear equations $y = mx + b$ , or $Ax + By = C$ (Standard Form $A, B \in \mathbb{Z}, A > 0$ )

$$\text{slope}(m) = \frac{y_2 - y_1}{x_2 - x_1}, \quad \text{y-int} = (0, b), \quad y - y_1 = m(x - x_1), \quad \text{perpendicular: } m \perp = -\frac{1}{m}$$

### 3. Quadratics: If $f(x) = ax^2 + bx + c$ ,

$$\text{vertex} = \left( \frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right), \quad \text{x-intercepts(zeros): } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

### 4. Complex Numbers

$$\sqrt{-1} = i, \quad i^2 = -1, \quad i^3 = -i, \quad i^4 = 1, \quad \text{Complex Conjugate} \rightarrow (a + bi)(a - bi) = a^2 + b^2$$

### 5. % Increase & Decrease

$$\% \text{ Inc/Dec} = \frac{\text{final} - \text{initial}}{\text{initial}} \quad \text{also} \quad \text{initial} \pm (\% \cdot \text{initial}) = \text{final}$$

### 6. Circles

$$\text{Equation of a Circle} = (x - h)^2 + (y - k)^2 = r^2; \quad \text{Center} = (h, k), \quad \text{Radius} = r$$

$$\text{Arc Length} = 2\pi r \cdot \frac{\theta}{360^\circ \text{ (or } 2\pi)} \quad \text{Area of a Sector} = \pi r^2 \cdot \frac{\theta}{360^\circ \text{ (or } 2\pi)}$$

### 7. Right Triangles (SOH CAH TOA)

$$a^2 + b^2 = c^2; \quad \sin \theta = \frac{\text{opp}}{\text{hyp}}, \quad \cos \theta = \frac{\text{adj}}{\text{hyp}}, \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

### 8. More Equations

$$\text{Difference of squares: } a^2 - b^2 = (a+b)(a-b) \quad | \quad \text{Difference of cubes: } a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

$$\text{Do note: } (a + b)^2 = a^2 + 2ab + b^2, \quad (a - b)^2 = a^2 - 2ab + b^2$$