# Pre-Calculus 12 Formula Sheet

**Sequences & Series**

$t_n = t_1 + (n-1)d$ $\quad S_n = \frac{n}{2}\,(2t_1 + (n-1)d\,)$ $\quad S_n = \frac{n}{2}\,(t_1 + t_n\,)$

$t_n = t_1(r)^{(n-1)}$ $\quad S_n = \frac{\left(t_1((r)^n - 1)\right)}{((r)-1)}$ $\quad S_n = \frac{((r)t_n - t_1)}{((r)-1)}$ $\quad S_\infty = \frac{t_1}{(1-(r))}$

**Sigma Notation**

$$\sum_{n=1}^{6} 4n$$

**Pythagorean Identities:**

$\boldsymbol{Sin^2\theta + Cos^2\theta = 1}$ $\quad \boldsymbol{1 + Tan^2\theta = Sec^2\theta}$ $\quad \boldsymbol{1 + Cot^2\theta = Csc^2\theta}$

**Reciprocal and Quotient Identities:**

$\boldsymbol{Sec\theta = \frac{1}{Cos\theta}}$ $\quad \boldsymbol{Csc\theta = \frac{1}{Sin\theta}}$ $\quad \boldsymbol{Cot\theta = \frac{1}{Tan\theta}}$

$\boldsymbol{Tan\theta = \frac{Sin\theta}{Cos\theta}}$ $\quad \boldsymbol{Cot\theta = \frac{Cos\theta}{Sin\theta}}$

**Addition Identities:**

$\boldsymbol{Cos(\alpha+\beta) = Cos\alpha Cos\beta - Sin\alpha Sin\beta}$ $\quad \boldsymbol{Sin(\alpha+\beta) = Sin\alpha Cos\beta + Cos\alpha Sin\beta}$

$\boldsymbol{Cos(\alpha-\beta) = Cos\alpha Cos\beta + Sin\alpha Sin\beta}$ $\quad \boldsymbol{Sin(\alpha-\beta) = Sin\alpha Cos\beta - Cos\alpha Sin\beta}$

$Tan(\alpha+\beta) = \frac{Tan\alpha + Tan\beta}{1 - Tan\alpha Tan\beta}$ $\quad Tan(\alpha-\beta) = \frac{Tan\alpha - Tan\beta}{1 + Tan\alpha Tan\beta}$

**Double-Angle Identities:**

$\boldsymbol{Cos2\theta = Cos^2\theta - Sin^2\theta}$ $\quad Sin2\theta = 2Sin\theta Cos\theta$

$\boldsymbol{= 2Cos^2\theta - 1}$ $\quad Tan2\theta = \frac{2Tan\theta}{1 - Tan^2\theta}$

$\boldsymbol{= 1 - 2\,Sin^2\theta}$

**Formulae:** $\boldsymbol{x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$