Trigonometric Identities Reference Sheet

Below are the Trigonometric Identities listed in the order we will reference them in the activity.

- Pythagorean Identities

  (1) $\sin^2\theta + \cos^2\theta = 1$

  (2) $\tan^2\theta + 1 = \sec^2\theta$

  (3) $1 + \cot^2\theta = \csc^2\theta$

- Sum Identity for Cosine

  (4) $\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

- Double-Angle Identities for Cosine

  (5) $\cos(2\alpha) = \cos^2\alpha - \sin^2\alpha$

  (6) $\cos(2\alpha) = 2\cos^2\alpha - 1$

  (7) $\cos(2\alpha) = 1 - 2\sin^2\alpha$

- Sum Identity for Sine

  (8) $\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

- Double-Angle Identity for Sine

  (9) $\sin(2\alpha) = 2\sin\alpha\cos\alpha$

- Half-Angle Identities for Sine and Cosine

  (10) $\cos\left(\frac{\alpha}{2}\right) = \pm\sqrt{\frac{1+\cos\alpha}{2}}$

  (11) $\sin\left(\frac{\alpha}{2}\right) = \pm\sqrt{\frac{1-\cos\alpha}{2}}$

- Difference Identities for Cosine and Sine

  (12) $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

  (13) $\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

- Product-to-Sum Identities

  (14) $\cos\alpha\cos\beta = \frac{1}{2}\left[\cos(\alpha + \beta) + \cos(\alpha - \beta)\right]$

  (15) $\sin\alpha\sin\beta = \frac{1}{2}\left[\cos(\alpha - \beta) - \cos(\alpha + \beta)\right]$

  (16) $\sin\alpha\cos\beta = \frac{1}{2}\left[\sin(\alpha + \beta) + \sin(\alpha - \beta)\right]$