TRIGNOMETERIC IDENTITIES

1. Prove the following identities:
   a) $1-\sin^2\theta - \cos^2\theta = 0$
   b) $\cos A \cdot \tan A = \sin A$
   c) $\sin^2\theta (1+ \cot^2\theta) = 1$
   d) $\cos^2\theta (1 + \tan^2\theta) = 1$.
2. Prove that
   a) $\cos^4 A - \sin^4 A = \cos^2 A - \sin^2 A$
   b) $(1+ \tan A)^2 + (1- \tan A)^2 = 2 \sec^2 A$
   c) $\sqrt{sec^2A + cosec^2A} = secA \cdot cosec\ A$
   d) $\frac{sec^2A-1}{sec^2\ A} = sin^2A$
   e) $\tan^2\theta - \sin^2\theta = \tan^2\theta \cdot \sin^2\theta$
   f) $\cot^2\theta - \frac{1}{sin^2\ \theta} = -1$
   g) $\cos^4 A + \sin^4 A - 2\cos^2 A \cdot \sin^2 A = (2\cos^2 A-1)^2$
   h) $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$.
3. Prove that
   a) $\frac{1}{1-sin\ \theta} + \frac{1}{1+sin\theta} = 2\sec^2\theta$
   b) $\frac{cos\theta}{1-sin\ \theta} + \frac{1+sin\theta}{cos\theta}$
   c) $\frac{sin\theta}{1+cos\ \theta} + \frac{1+cos\theta}{sin\theta} = 2\ \mathrm{cosec}\theta$
   d) $\frac{\sin A+cosA}{sin\ A-cosA} + \frac{\sin A-\cos A}{sinA+cosA} = \frac{2}{sin^2A-cos^2A} = \frac{2}{1-2cos^2A}$
   e) $\frac{sin\theta-2\ sin^3\theta}{2cos^3\theta-cos\theta} = \tan\theta$
   f) $\frac{cos^2\theta}{1-tan\theta} + \frac{sin^3\theta}{sin\theta-cos\theta} = 1 + sin\theta - cos\theta.$
4. Prove that
   a) $\frac{\tan A+tanB}{\cot A+\cot B} = \tan A \tan B$
   b) $\sqrt{\frac{1-sin\theta}{1+sin\theta}} = \sec\theta - \tan\theta$
   c) $\frac{1+cos\theta}{1-cos\theta} = (cosec\ \theta + cot\theta)^2$
5. prove that:
   a) $\frac{1}{cosec\ A-\cot A} - \frac{1}{sinA} = \frac{1}{sinA} - \frac{1}{cosecA+cotA}$
   b) $(\sin\theta + \mathrm{cpsec}\ \theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$
   c) $\frac{tan\theta+sec\theta-1}{tan\theta-sec\theta+1}\ sec\theta + tan\theta = \frac{1+sin\theta}{cos\theta}$
6. If $\cos\theta + \sin\theta = \sqrt{2}\ \cos\theta$, prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$
7. If $\sec\theta + \tan\theta = m$ and $\sec\theta - \tan\theta = n$, find the value of $\sqrt{mn}$.
8. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, show that $(m^2 - n^2) = 4\sqrt{mn}$.
9. If $x = a\cos\theta - b\sin\theta$ and $y = a\sin\theta + b\cos\theta$, prove that $x^{2+} + y^2 = a^2 + b^2$.

10. Find (i) sin 23° (ii) cos 21° 17', (iii) tan 37° 50'.
11. Find the angle θ, if sin θ = 0.5616.
12. Find the angle θ, if cos θ = 0.7733.
13. Solve the right – angled triangle in which ∠A = 30° and c = 10, ∠B = 90°.
14. Solve the triangle PQR, right-angled at Q when ∠QPR = 41° 16', PR = 60.2.

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1. Prove the identity: tan A + cot A = sec A . cosec A
2. Prove that :
   i. $\cos^4 A - \sin^4 A = 2\cos^2 A - 1$
   ii. $(1 + \cot A)^2 + (1 - \cot A)^2 = 2\,\text{cosec}^2 A$
   iii. $\tan^4 A + \tan^2 A = \sec^4 A - \sec^2 A$
3. Prove that :
   i. $\frac{\sin A}{1+\cos A} + \frac{1+\cos A}{\sin A} = 2\,cosec\,A$
   ii. $\frac{1+\cos A}{1-\cos A} = (\text{cosec A} + \cot A)^2$
   iii. $\frac{\cot A + tanB}{\cot B + \tan A} = \cot A \tan B.$
   iv. $\frac{\cos A \cot A}{1-\sin A} = 1 + \text{cosec A}$
4. Prove that: $\frac{\sec A - tanA}{cosec\,A + \cot A} = \frac{cosec\,A - \cot A}{\sec A + \tan A}$
5. Prove that:
   i. $\sqrt{\frac{1-\sin A}{1+\sin A}} = \sec A - \tan A$
   ii. $\frac{\tan A + \sec A - 1}{tan\,A - \sec A + 1} = \frac{1+sinA}{cosA}$
6. Prove that:
   i. $\frac{cosA}{1-\tan A} + \frac{\sin A}{1-cotA} = \cos A + sinA$
   ii. $(1 + \tan^2 A) + (1 + \frac{1}{tan^2 A}) = \frac{1}{sin^2 A - sin^2 A}$
7. If tan A + sin A = m and tan A – sin A = n; Prove that : $m^2 - n^2 = 4\sqrt{mn}$.
8. If x = a sec A cos B , y =b sec A sin B and z = c tan A; show that : $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$
9. Find the value of x, if: $\cos x = \cos 60° \cos 30° + \sin 60° \sin 30°$.
10. Given $\cos 38° \sec(90° - 2A) = 1$; find the value of angle A.
11. Find : sin 36° 51'.
12. Find : tan 53° 38'.
13. Find : cos 62° 27'.
14. Find θ; if sin θ = 0.5798
15. Use tables to find, θ if :
    i. Cos θ = 0.4457.
    ii. tan θ = 0.8516

TRIGONOMETRICAL IDENTITIES