# Trigonometric Identities

*(Formula Sheet for Quick Revision)*

## Angle Sum and Difference Formulae

1. $\sin(A+B) = \sin A \cos B + \cos A \sin B$
2. $\sin(A-B) = \sin A \cos B - \cos A \sin B$
3. $\cos(A+B) = \cos A \cos B - \sin A \sin B$
4. $\cos(A-B) = \cos A \cos B + \sin A \sin B$

## Double Angle Identities

5. $\cos 2A = \cos^2 A - \sin^2 A$
6. $\cos 2A = 1 - 2\sin^2 A$
7. $\cos 2A = 2\cos^2 A - 1$

## Triple Angle Identities

8. $\sin 3A = 3\sin A - 4\sin^3 A$
9. $\cos 3A = 4\cos^3 A - 3\cos A$

## Product to Sum Formulae

10. $2\sin A \cos B = \sin(A+B) + \sin(A-B)$
11. $2\cos A \sin B = \sin(A+B) - \sin(A-B)$
12. $2\cos A \cos B = \cos(A+B) + \cos(A-B)$
13. $2\sin A \sin B = \cos(A-B) - \cos(A+B)$

## Special Product Identities

14. $\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A$

15. $\cos(A+B)\cos(A-B) = \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$

## Identities in a Triangle

*If $A$, $B$, and $C$ are the angles of $\triangle ABC$, then:*

16. $\sin 2A + \sin 2B + \sin 2C = 4\sin A \sin B \sin C$

17. $\tan A + \tan B + \tan C = \tan A \tan B \tan C$

18. $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \ \tan B}$

19. $\tan(A-B) = \dfrac{\tan A - \tan B}{1 + \tan A \ \tan B}$

20. $\cot(A+B) = \dfrac{\cot A \ \cot B - 1}{\cot A + \cot B}$

21. $\cot(A-B) = \dfrac{\cot A \ \cot B + 1}{\cot B - \cot A}$

22. $\sin 2A = 2\sin A \cos A = \dfrac{2\tan A}{1 + \tan^2 A}$

23. $\cos 2A = \dfrac{1 - \tan^2 A}{1 + \tan^2 A}$

24. $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

25. $\cos A + \cos B = 2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$

26. $\cos A - \cos B = 2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{B-A}{2}\right)$

27. $\sin A + \sin B = 2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$

28. $\sin A - \sin B = 2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$

29. $\cos x = \dfrac{1-\tan^2\left(\frac{x}{2}\right)}{1+\tan^2\left(\frac{x}{2}\right)}$ *(from* $\cos 2\theta$*)*

30. $\sin x = \dfrac{2\tan\left(\frac{x}{2}\right)}{1+\tan^2\left(\frac{x}{2}\right)}$ *(from* $\sin 2\theta$*)*