Algebraic Formulae

1. $a^0 = 1$
2. $(a+b)^2 = a^2 + 2ab + b^2$
3. $(a-b)^2 = a^2 - 2ab + b^2$
4. $a^2 - b^2 = (a+b)(a-b)$
5. $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
6. $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$
7. $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
8. $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Trigonometric formulae

1. $\sin^2\theta + \cos^2\theta = 1$
2. $1 + \tan^2\theta = \sec^2\theta$
3. $1 + \cot^2\theta = \operatorname{cosec}^2\theta$
4. $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{1}{\cot\theta}$
5. $\cot\theta = \frac{\cos\theta}{\sin\theta} = \frac{1}{\tan\theta}$
6. $\sec\theta = \frac{1}{\cos\theta}$
7. $\operatorname{cosec}\theta = \frac{1}{\sin\theta}$
8. $\sin2\theta = 2\sin\theta\cos\theta = \frac{2\tan\theta}{(1+\tan^2\theta)}$
9. $\cos2\theta = \cos^2\theta - \sin^2\theta$

   $= 2\cos^2\theta - 1$

   $= 1 - 2\sin^2\theta$

   $= \frac{1-\tan^2\theta}{1+\tan^2\theta}$
10. $\tan2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$
11. $\sin3\theta = 3\sin\theta - 4\sin^3\theta$
12. $\cos3\theta = 4\cos^3\theta - 3\cos\theta$
13. $\tan3\theta = \frac{3\tan\theta - \tan^3\theta}{1-3\tan^2\theta}$
14. $1 + \cos2\theta = 2\cos^2\theta$
15. $1 - \cos2\theta = 2\sin^2\theta$
16. $1 + \sin2\theta = (\cos\theta + \sin\theta)^2$
17. $1 - \sin2\theta = (\cos\theta - \sin\theta)^2$
18. $\sin(a+b) = \sin a\cos b + \cos a\sin b$
19. $\sin(a-b) = \sin a\cos b - \cos a\sin b$
20. $\cos(a+b) = \cos a\cos b - \sin a\sin b$
21. $\cos(a-b) = \cos a\cos b + \sin a\sin b$
22. $\sin\theta = \frac{1}{\operatorname{cosec}\theta}$
23. $\cos\theta = \frac{1}{\sec\theta}$

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1. $\sin A + \sin B = 2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$
2. $\sin A - \sin B = 2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$
3. $\cos A + \cos B = 2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$
4. $\cos A - \cos B = -2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$
5. $\sin A\cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$
6. $\cos A\sin B = \frac{1}{2}[\sin(A+B) - \sin(A-B)]$
7. $\cos A\cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$
8. $\sin A\sin B = -\frac{1}{2}[\cos(A+B) - \cos(A-B)]$