Important Trigonometric Formula

1. $\sin^2\theta + \cos^2\theta = 1$
   - $\sin^2\theta = 1 - \cos^2\theta$
   - $\cos^2\theta = 1 - \sin^2\theta$
2. $\sec^2\theta - \tan^2\theta = 1$
   - $\sec^2\theta = 1 + \tan^2\theta$
   - $\sec^2\theta - 1 = \tan^2\theta$
3. $\operatorname{cosec}^2\theta - \cot^2\theta = 1$
   - $\operatorname{cosec}^2\theta = 1 + \cot^2\theta$
   - $\operatorname{cosec}^2\theta - 1 = \cot^2\theta$
4. $\sin(A+B) = \sin A\cos B + \cos A\sin B$
5. $\sin(A-B) = \sin A\cos B - \cos A\sin B$
6. $\cos(A+B) = \cos A\cos B - \sin A\sin B$
7. $\cos(A-B) = \cos A\cos B + \sin A\sin B$
8. $\sin(A+B) + \sin(A-B) = 2\sin A\cos B$
9. $\sin(A+B) - \sin(A-B) = 2\cos A\sin B$
10. $\sin C + \sin D = 2\sin\frac{C+D}{2}\cos\frac{C-D}{2}$
11. $\sin C - \sin D = 2\cos\frac{C+D}{2}\sin\frac{C-D}{2}$
12. $\cos(A+B) + \cos(A-B) = 2\cos A\cos B$
13. $\cos(A-B) - \cos(A+B) = 2\sin A\sin B$
14. $\cos C + \cos D = 2\cos\frac{C+D}{2}\cos\frac{C-D}{2}$
15. $\cos D - \cos C = 2\sin\frac{C+D}{2}\sin\frac{C-D}{2}$
16. $\sin 2A = 2\sin A\cos A$
17. $\sin 2A = \frac{2\tan A}{1+\tan^2 A}$
18. $\sin 3A = 3\sin A - 4\sin^3 A$
19. $\sin A = 2\sin\frac{A}{2}\cos\frac{A}{2}$
20. $\sin A = \frac{2\tan\frac{A}{2}}{1+\tan^2\frac{A}{2}}$
21. $\cos 2A = \cos^2 A - \sin^2 A$
22. $2\cos^2 A = 1 + \cos 2A$
23. $2\sin^2 A = 1 - \cos 2A$
24. $\cos 2A = \frac{1-\tan^2 A}{1+\tan^2 A}$
25. $\cos 3A = 4\cos^3 A - 3\cos A$
26. $\cos A = \cos^2\frac{A}{2} - \sin^2\frac{A}{2}$
27. $2\cos^2\frac{A}{2} = 1 + \cos A$
28. $2\sin^2\frac{A}{2} = 1 - \cos A$
29. $\cos A = \frac{1-\tan^2\frac{A}{2}}{1+\tan^2\frac{A}{2}}$
30. $\tan(A+B) = \frac{\tan A+\tan B}{1-\tan A\tan B}$
31. $\tan(A-B) = \frac{\tan A-\tan B}{1+\tan A\tan B}$
32. $\tan 2A = \frac{2\tan A}{1-\tan^2 A}$
33. $\tan 3A = \frac{3\tan A-\tan^3 A}{1-3\tan^2 A}$
34. $\tan A = \frac{2\tan\frac{A}{2}}{1-\tan^2\frac{A}{2}}$
35. $\cot(A+B) = \frac{\cot A\cot B-1}{\cot A+\cot B}$
36. $\cot(A-B) = \frac{\cot A\cot B+1}{\cot B-\cot A}$
37. $\sin^{-1}x + \sin^{-1}y = \sin^{-1}\{x\sqrt{1-y^2} + y\sqrt{1-x^2}\}$
38. $\sin^{-1}x - \sin^{-1}y = \sin^{-1}\{x\sqrt{1-y^2} - y\sqrt{1-x^2}\}$
39. $\cos^{-1}x + \cos^{-1}y = \cos^{-1}\{xy - \sqrt{(1-x^2)(1-y^2)}\}$
40. $\cos^{-1}x - \cos^{-1}y = \cos^{-1}\{xy + \sqrt{(1-x^2)(1-y^2)}\}$
41. $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\frac{x+y}{1-xy}$
42. $\tan^{-1}x - \tan^{-1}y = \tan^{-1}\frac{x-y}{1+xy}$
43. $2\tan^{-1}x = \sin^{-1}\frac{2x}{1+x^2}$
44. $2\tan^{-1}x = \tan^{-1}\frac{2x}{1-x^2}$
45. $2\tan^{-1}x = \sin^{-1}\frac{1-x^2}{1+x^2}$
46. $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$
47. $\tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}$
48. $\sec^{-1}x + \operatorname{cosec}^{-1}x = \frac{\pi}{2}$
49. $\cos A = \frac{b^2+c^2-a^2}{2bc}$
50. $\cos B = \frac{a^2+c^2-b^2}{2ac}$
51. $\cos C = \frac{a^2+b^2-c^2}{2ab}$
52. $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$
53. $a = b\cos C + c\cos B$
54. $b = c\cos A + a\cos C$
55. $c = a\cos B + b\cos A$

Trigonometric Functions	
Even Functions $f(-x) = f(x)$	Odd Functions $f(-x) = -f(x)$
$\cos(-x) = \cos x$ $\sec(-x) = \sec x$	$\sin(-x) = -\sin x$ $\csc(-x) = -\csc x$ $\tan(-x) = -\tan x$ $\cot(-x) = -\cot x$