Trigonometric Function

According To CBSE
Formula

1. If in a circle of radius r, an arc of length l subtends an angle of θ radians, then $l = r\theta$.
2. Radian measure = $\frac{\pi}{180}$ x Degree measure ; Degree measure = $\frac{\pi}{180}$ x Radian measure
3. $\cos^2 x + \sin^2 x = 1$
4. $1 + \tan^2 x = \sec^2 x$
5. $1 + \cot^2 x = \operatorname{cosec}^2 x$
6. $\cos(2n\pi + x) = \cos x$; $\sin(2n\pi + x) = \sin x$
7. $\sin(-x) = -\sin x$
8. $\cos(-x) = \cos x$
9. $\sin(x + y) = \sin x \cos y + \cos x \sin y$
10. $\cos(x + y) = \cos x \cos y + \sin x \sin y$
11. $\sin(x - y) = \sin x \cos y - \cos x \sin y$
12. $\cos(x - y) = \cos x \cos y + \sin x \sin y$
13. $\cos\left(\frac{\pi}{2} - x\right) = \sin x$; $\sin\left(\frac{\pi}{2} - x\right) = \cos x$
14. $\cos\left(\frac{\pi}{2} + x\right) = -\sin x$; $\sin\left(\frac{\pi}{2} + x\right) = \cos x$; $\cos(\pi - x) = -\cos x$; $\sin(\pi - x) = \sin x$;
    $\cos(\pi + x) = -\cos x$; $\sin(\pi + x) = -\sin x$; $\cos(2\pi - x) = \cos x$; $\sin(2\pi - x) = -\sin x$
15. If none of the angles x , y and $(x + y)$ is an odd multiple of $\frac{\pi}{2}$, then
    $$\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y} \;;\; \tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$$
16. If none of the angles x , y and $(x + y)$ is a multiple of π . then
    $$\cot(x + y) = \frac{\cot x \cot y - 1}{\cot x + \cot y} \;;\; \cot(x - y) = \frac{\cot x \cot y + 1}{\cot y - \cot x}$$
17. $\cos 2x = \cos^2 x - \sin^2 x = 2\cos^2 x - 1 = 1 - 2\sin^2 x = \frac{1 - \tan^2 x}{1 + \tan^2 x}$
18. $\sin 2x = 2 \sin x \cos x = \frac{2\tan x}{1 + \tan^2 x}$ $[x \neq n\pi + \frac{\pi}{2}]$, n is an integer.
19. $\tan 2x = \frac{2\tan x}{1 - \tan^2 x}$ if $2x \neq n\pi + \frac{\pi}{2}$, n is a integer.
20. $\sin 3x = 3 \sin x - 4 \sin^3 x$
21. $\cos 3x = 4\cos^3 x - 3\cos x$
22. $\tan 3x = \frac{3\tan x - \tan^3 x}{1 - 3\tan^2 x}$ if $3x \neq n\pi + \frac{\pi}{2}$, where n is an integer.
23. (i) $\cos x + \cos y = 2\cos\frac{x+y}{2}\cos\frac{x-y}{2}$
    (ii) $\cos x - \cos y = -2\sin\frac{x+y}{2}\sin\frac{x-y}{2}$
    (iii) $\sin x + \sin y = 2\sin\frac{x+y}{2}\cos\frac{x-y}{2}$
    (iv) $\sin x - \sin y = 2\cos\frac{x+y}{2}\sin\frac{x-y}{2}$
24. (i) $2\cos x \cos y = \cos(x + y) + \cos(x - y)$
    (ii) $-2\sin x \sin y = \cos(x + y) - \cos(x - y)$
    (iii) $2\sin x \cos y = \sin(x + y) + \sin(x - y)$
    (iv) $2\cos x \sin y = \sin(x + y) - \sin(x - y)$

Trigonometric Equation

1. $\sin x = 0$, implies $x = n\pi$, where $n \in Z$
2. $\cos x = 0$, implies $x = (2n + 1)\frac{\pi}{2}$, where $n \in Z$
3. For any real numbers x and y , $\sin x = \sin y$ implies $x = n\pi + (-1)^n y$, where $n \in Z$
4. For any real numbers x and y , $\cos x = \cos y$ implies $x = 2n\pi \pm y$, where $n \in Z$
5. If x and y are not odd multiple of $\frac{\pi}{2}$, then $\tan x = \tan y$ implies $x = n\pi + y$, where $n \in Z$