

# Trigonometric functions of Sum and difference of two angles:

(a) (i)  $\sin(-\theta) = -\sin\theta$  (ii)  $\cos(-\theta) = \cos\theta$   
(iii)  $\tan(-\theta) = -\tan\theta$  (iv)  $\operatorname{cosec}(-\theta) = -\operatorname{cosec}\theta$   
(v)  $\sec(-\theta) = -\sec\theta$  (vi)  $\cot(-\theta) = -\cot\theta$

(b) (i)  $\sin(A+B) = \sin A \cos B + \cos A \sin B$   
(ii)  $\sin(A-B) = \sin A \cos B - \cos A \sin B$   
(iii)  $\cos(A+B) = \cos A \cos B - \sin A \sin B$   
(iv)  $\cos(A-B) = \cos A \cos B + \sin A \sin B$   
(v)  $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$   
(vi)  $\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$   
(vii)  $\cot(A \pm B) = \frac{\cot A \cot B \mp 1}{\cot A \pm \cot B}$

(c) (i)  $\sin^2 A + \sin^2 B = \sin(A+B) \sin(A-B)$   
(ii)  $\cos^2 A - \sin^2 B = \cos(A+B) \cos(A-B)$   
(iii)  $2 \sin A \cos B = \sin(A+B) + \sin(A-B)$   
(iv)  $2 \cos A \sin B = \sin(A+B) - \sin(A-B)$   
(v)  $2 \cos A \cos B = \cos(A+B) + \cos(A-B)$   
(vi)  $2 \sin A \sin B = \cos(A-B) - \cos(A+B)$



काजिए।

8. सिद्ध कीजिए कि  $\sec^2 \theta + \cos^2 \theta$  का मान कभी-भी 2 से कम नहीं हो सकता।

### एक महत्वपूर्ण सारणी

कोण→ त्रिकोणमितीय $\theta \downarrow$ अनुपात	0°	30°	45°	60°	90°	120°	135°	150°	180°
sine	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
cosine	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	-1
tangent	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$\infty$	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0
cotangent	$\infty$	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	$-\frac{1}{\sqrt{3}}$	-1	$-\sqrt{3}$	$\infty$
secant	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	$\infty$	-2	$-\sqrt{2}$	$-\frac{2}{\sqrt{3}}$	-1
cosecant	$\infty$	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	$\infty$

निदर्शी उदाहरण (ILLUSTRATIVE EXAMPLES)



$$\sin \theta \times \operatorname{cosec} \theta = 1$$

$$\sin \theta = \frac{1}{\operatorname{cosec} \theta}$$

$$\operatorname{cosec} \theta = \frac{1}{\sin \theta}$$

$$\tan \theta \times \cot \theta = 1$$

$$\tan \theta = \frac{1}{\cot \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

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

$$\sin \theta = \sqrt{1 - \cos^2 \theta}$$

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

$$\cos \theta = \sqrt{1 - \sin^2 \theta}$$

$$\operatorname{cosec}^2 \theta = \cot^2 \theta + 1$$

$$\operatorname{cosec} \theta = \sqrt{\cot^2 \theta + 1}$$

$$\cot^2 \theta = \operatorname{cosec}^2 \theta - 1$$

$$\cot \theta = \sqrt{\operatorname{cosec}^2 \theta - 1}$$

$$\cos \theta \times \sec \theta = 1$$

$$\cos \theta = \frac{1}{\sec \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$\tan^2 \theta = \sec^2 \theta - 1$$

$$\tan \theta = \sqrt{\sec^2 \theta - 1}$$

$$\sec \theta = \sqrt{1 + \tan^2 \theta}$$

$$\sin \theta = n\pi \pm (-1)^n \theta$$

$$\cos \theta = 2n\pi \pm \theta$$

$$\tan \theta = n\pi \pm \theta$$

$$\sin^{-1} \theta = n\pi + (-1)^n \sin^{-1} \theta$$

$$\cos^{-1} \theta = 2n\pi \pm \cos^{-1} \theta$$

$$\tan^{-1} \theta = n\pi \pm \tan^{-1} \theta$$

$$\sin(90^\circ - \theta) = \cos \theta$$

$$\cos(90^\circ - \theta) = \sin \theta$$

$$\tan(90^\circ - \theta) = \cot \theta$$

$$\cot(90^\circ - \theta) = \tan \theta$$

$$\sec(90^\circ - \theta) = \operatorname{cosec} \theta$$

$$\operatorname{cosec}(90^\circ - \theta) = \sec \theta$$

$$\sin(90^\circ + \theta) = \cos \theta$$

$$\cos(90^\circ + \theta) = -\sin \theta$$

$$\tan(90^\circ + \theta) = -\cot \theta$$

$$\cot(90^\circ + \theta) = -\tan \theta$$

$$\operatorname{cosec}(90^\circ + \theta) = \sec \theta$$

$$\sec(90^\circ + \theta) = -\operatorname{cosec} \theta$$

$$\sin(180^\circ - \theta) = \sin \theta$$

$$\cos(180^\circ - \theta) = -\cos \theta$$

$$\tan(180^\circ - \theta) = -\tan \theta$$

$$\cot(180^\circ - \theta) = -\cot \theta$$

$$\sec(180^\circ - \theta) = -\sec \theta$$

$$\operatorname{cosec}(180^\circ - \theta) = \operatorname{cosec} \theta$$

$$\sin(180^\circ + \theta) = -\sin \theta$$

$$\cos(180^\circ + \theta) = -\cos \theta$$

$$\tan(180^\circ + \theta) = \tan \theta$$

$$\cot(180^\circ + \theta) = \cot \theta$$

$$\sec(180^\circ + \theta) = -\sec \theta$$

$$\operatorname{cosec}(180^\circ + \theta) = -\operatorname{cosec} \theta$$

$$\sin(270^\circ - \theta) = -\cos \theta$$

$$\cos(270^\circ - \theta) = -\sin \theta$$

$$\tan(270^\circ - \theta) = \cot \theta$$

$$\cot(270^\circ - \theta) = \tan \theta$$

$$\sec(270^\circ - \theta) = -\sec \theta$$

$$\operatorname{cosec}(270^\circ - \theta) = -\operatorname{cosec} \theta$$

$$\sin(270^\circ + \theta) = -\cos \theta$$

$$\cos(270^\circ + \theta) = \sin \theta$$

$$\tan(270^\circ + \theta) = -\cot \theta$$

$$\cot(270^\circ + \theta) = -\tan \theta$$

$$\sec(270^\circ + \theta) = -\sec \theta$$

$$\operatorname{cosec}(270^\circ + \theta) = -\operatorname{cosec} \theta$$

$$\sin(360^\circ - \theta) = -\sin \theta$$

$$\cos(360^\circ - \theta) = \cos \theta$$

$$\tan(360^\circ - \theta) = -\tan \theta$$

$$\cot(360^\circ - \theta) = -\cot \theta$$

$$\sec(360^\circ - \theta) = -\sec \theta$$

$$\operatorname{cosec}(360^\circ - \theta) = -\operatorname{cosec} \theta$$

$$\sin(360^\circ + \theta) = \sin \theta$$

$$\cos(360^\circ + \theta) = \cos \theta$$

$$\tan(360^\circ + \theta) = \tan \theta$$

$$\cot(360^\circ + \theta) = \cot \theta$$

$$\sec(360^\circ + \theta) = \sec \theta$$

$$\operatorname{cosec}(360^\circ + \theta) = \operatorname{cosec} \theta$$



$$\cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}$$