

Trigonometric Tables

Solution-01:-

(i) $\sin 35^\circ 22'$

To find the value of $\sin 35^\circ 22'$ we read the table of natural sines in the horizontal line which begins with 35° and in the vertical column headed by $18'$ ($\because 22' = 18' + 4'$). The value that we find is 5779. Now read, in the same horizontal line, the value written in the mean difference column headed by $4'$; it is found to be 10. On adding these two column numbers we get $5779 + 10 = 5789$, and so $\sin 35^\circ 22' = .5789$

Thus the value of $\sin 35^\circ 22'$ is obtained as under.

$$\sin 35^\circ 22' = 0.5789.$$

Mean difference for $4' = 10$

$$\sin 35^\circ 22' = 0.5789.$$

(ii) $\sin 71^\circ 31'$

$$\text{since } \sin 71^\circ 31' = \sin (71^\circ 30' + 1')$$

$$\sin 71^\circ 30' = 9483 \quad (\text{From Tables})$$

Mean difference for $1'$ is = 1

$$\begin{aligned} \therefore \sin 71^\circ 31' &= .9483 + 0.0001 \\ &= 0.9484. \end{aligned}$$

Solution (iii):-

$$\sin 65^{\circ} 20'$$

$$\text{Since } \sin 65^{\circ} 20' = \sin (65^{\circ} 18' + 2')$$

$$\sin 65^{\circ} 18' = 0.9085 \quad (\text{From Tables})$$

Mean difference for $2'$ is = 2.

$$\begin{aligned}\sin 65^{\circ} 20' &= 0.9085 + 0.0002 \\ &= 0.9087\end{aligned}$$

Solution (iv):-

$$\text{Given that, } \sin 23^{\circ} 56'$$

$$\text{Since } \sin 23^{\circ} 56' = \sin (23^{\circ} 54' + 2')$$

$$\sin 23^{\circ} 54' = 0.4051$$

Mean difference of $2'$ is = 0.0005

$$\begin{aligned}\sin 23^{\circ} 56' &= 0.4051 + 0.0005 \\ &= 0.4056.\end{aligned}$$

Solution-02 (i):-

$$(i) \cos 62^{\circ} 27'$$

We know that as θ increases, the value of θ decreases. therefore, the numbers in the mean difference columns are to be subtracted

$$\cos 62^{\circ} 27'$$

$$\cos 62^{\circ} 27' = \cos (62^{\circ} 24' + 3')$$

$$\cos 62^{\circ} 24' = 0.4633 \quad (\text{from tables})$$

Mean difference of $3'$ is = 5

$$\therefore \cos 62^{\circ} 27' = 0.4633 - 0.0005 = 0.4628.$$

Solution-2(iii):

(i) $\cos 3^{\circ} 11'$

Since $\cos 3^{\circ} 11' = \cos(3^{\circ} 6' + 5')$

$$\cos 3^{\circ} 6' = .9985 \quad (\text{from tables})$$

Mean difference of $5'$ is = \pm

$$\begin{aligned} \therefore \cos 3^{\circ} 11' &= 0.9985 - 0.0001 \\ &= 0.9984. \end{aligned}$$

(ii) $\cos 86^{\circ} 40'$

Since $\cos 86^{\circ} 40' = \cos(86^{\circ} 36' + 4')$

$$\cos 86^{\circ} 36' = 0.0593 \quad (\text{from tables})$$

Mean difference of $4'$ is = 12 .

$$\begin{aligned} \therefore \cos 86^{\circ} 40' &= 0.0593 - 0.0012 \\ &= 0.0581. \end{aligned}$$

(iv) $\cos 45^{\circ} 58'$

Since $\cos 45^{\circ} 58' = \cos(45^{\circ} 54' + 4')$

$$\cos 45^{\circ} 54' = 0.6959 \quad (\text{from tables})$$

Mean difference of $4'$ is = 0.0008

$$\begin{aligned} \therefore \cos 45^{\circ} 58' &= 0.6959 - 0.0008 \\ &= 0.6951. \end{aligned}$$

Solution-03

(i) $\tan 15^{\circ} 2'$

Since $\tan 15^{\circ} 2' = \tan(15^{\circ} 0' + 2')$

$$\tan 15^{\circ} 0' = 0.2679 \quad (\text{from tables})$$

Mean difference for $2'$ is 6

$$\begin{aligned} \therefore \tan 15^{\circ} 2' &= 0.2679 + 0.0006 \\ &= 0.2685. \end{aligned}$$

Solution -03 (ii) :-

$$\tan 53^\circ 14'$$

$$\text{since } \tan 53^\circ 14' = \tan (53^\circ 12' + 2')$$

$$\tan 53^\circ 12' = 1.3367 \quad (\text{from tables})$$

$$\text{Mean difference of } 2' = 16$$

$$\begin{aligned} \therefore \tan 53^\circ 14' &= 1.3367 + 0.0016 \\ &= 1.3383 \end{aligned}$$

Solution -03 (iii) :-

$$\tan 82^\circ 18'$$

$$\text{since } \tan 82^\circ 18' = 7.3962.$$

Solution -03 (iv)

$$\tan 6^\circ 9'$$

$$\text{since } \tan 6^\circ 9' = \tan (6^\circ 6' + 3')$$

$$\tan 6^\circ 6' = 0.1069$$

$$\text{Mean difference of } 3' \text{ is } = 9.$$

$$\begin{aligned} \therefore \tan 6^\circ 9' &= 0.1069 + 0.0009 \\ &= 0.1078 \end{aligned}$$

Solution -04 :

$$(i) \sin \theta = 0.5789.$$

In the table of natural sines, look for value (≤ 0.57896) which is sufficiently close to 0.5779 we find that the value 0.5779 occurs in the horizontal line beginning with 35° and in the column headed by $18'$. Then we look for the number 4 ($= 5789 - 5779$) in the same horizontal line and in the mean difference column, we find.

the number θ in the column headed by $4'$, so we get the value of $\sin \theta = \sin 35^\circ 18' + 4' = 35^\circ 22'$

Thus the value θ is obtained as under:

$$\text{Given } \sin \theta = 0.5789$$

$$\sin 35^\circ 18' = 0.5779 \quad (\text{from Tables})$$

$$\text{Difference} = 0.0010$$

$$\text{Mean difference of } 4' \text{ is} = 0.0010$$

$$\therefore \theta = 35^\circ 18' + 4' = 35^\circ 22'$$

Solution 4(ii):

$$\sin \theta = 0.9484$$

$$\sin 71^\circ 30' = 0.9483 \quad (\text{from tables})$$

$$\text{Difference} = 0.0001$$

$$\text{Mean difference of } 1' \text{ is} = 0.0001$$

$$\therefore \theta = 71^\circ 30' + 1' = 71^\circ 31'$$

Solution 4(iii):

$$\sin \theta = 0.2357$$

$$\sin 13^\circ 36' = 0.2351 \quad (\text{from tables})$$

$$\text{Difference} = 0.0006$$

$$\text{Mean difference of } 2' \text{ is} = 0.0006$$

$$\therefore \theta = 13^\circ 36' + 2' = 13^\circ 38'$$

Solution 4(iv):

$$\sin \theta = 0.6371$$

$$\sin 39^\circ 30' = 0.6361$$

$$\text{Difference of } \theta = 0.0010$$

$$\text{Mean difference of } 4' \text{ is} = 9$$

$$\therefore \theta = 39^\circ 30' + 4' = 39^\circ 4'$$

Solution-05:-

(i) $\cos \theta = 0.4625$

$\cos 62^\circ 24' = 0.4633$ (from tables)

Mean difference = 0.0008

$\therefore \cos$ Mean difference of $3'$ is = 0.0008

$\cos(62^\circ 24' + 3') = \cos(\theta)$

$\theta = 62^\circ 27'$

(ii) $\cos \theta = 0.9906$

$\cos 7^\circ 48' = 0.9907$ (from tables)

Mean difference = 0.0001

Mean difference of $1'$ is 0.0001

$\cos 7^\circ 49' = 0.9906$

(iii) $\cos \theta = 0.6951$

$\cos 45^\circ 54' = 0.6959$ (from tables)

Mean difference = 0.0008

Mean difference of $4'$ is 8

$\theta = 45^\circ 54' + 4'$

$= 45^\circ 58'$

(iv) $\cos \theta = 0.3412$

$\cos 70^\circ 0' = 0.3420$ (from tables)

Mean difference = 0.0008

Mean difference of $3'$ is 8

$\theta = 70^\circ 0' + 3'$

$= \underline{70^\circ 3'}$

Solution-06

(i) $\tan \theta = 0.2685$

$\tan 15^\circ 0' = 0.2679$ (from tables)

Mean difference = 0.0006

Mean difference of 2' is 0.0006

$$\theta = 15^\circ 0' + 2'$$

$$= 15^\circ 2'$$

(ii) $\tan \theta = 1.7451$

$\tan 60^\circ 6' = 1.7391$

Mean difference = 0.0060

Mean difference of 5' is 0.0060

$$\theta = 60^\circ 6' + 5'$$

$$= 60^\circ 11'$$

(iii) $\tan \theta = 3.1749$

$\tan 72^\circ 30' = 3.1716$

Mean difference = 0.0033

Mean difference of 1' = 0.0032

$$\theta = 72^\circ 30' + 1'$$

$$= 72^\circ 31'$$

(iv) $\tan \theta = 0.9347$

$\tan 43^\circ 0' = 0.9325$

Mean difference = 0.0022

Mean difference of 4' is 0.0022

$$\theta = 43^\circ 0' + 4'$$

$$= 43^\circ 4'$$

Solution-07:-

$$\text{Given that } \sin A = 0.1822$$

$$\text{from Tables } A = 10^{\circ} 30'$$

Solution-08:-

$$2 \sin \theta - \cos \theta$$

Given that

$$(i) \theta = 35^{\circ}$$

$$\begin{aligned} \therefore 2 \sin 35^{\circ} - \cos 35^{\circ} &= 2(0.5736) - 0.8192 \quad (\text{from tables}) \\ &= 1.1472 - 0.8192 \\ &= 0.3280 \end{aligned}$$

$$(ii) \tan \theta = 0.2679.$$

$$\theta = 15^{\circ} \quad (\text{from tables})$$

$$\begin{aligned} \therefore 2 \sin 15^{\circ} - \cos 15^{\circ} &= 2(0.2598) - 0.9659 \\ &= -0.4463. \end{aligned}$$

Solution-09:-

$$\text{GIVEN } \sin x^{\circ} = 0.67$$

$$x^{\circ} = 42^{\circ} 4'$$

$$(i) \cos 42^{\circ} 4' = 0.7423 \quad (\text{from tables } 42^{\circ} 0' + 4' \text{ Mean diff} = 8)$$

$$(ii) \cos 42^{\circ} 4' + \tan 42^{\circ} 4' = 0.7423 + \tan 42^{\circ} 4' \quad (0.7431 - 0.0008 = 0.7423)$$

$$= 0.7423 + \frac{\sin 42^{\circ} 4'}{\cos 42^{\circ} 4'}$$

$$= \frac{(0.7423)(0.7423) + 0.67}{0.7423}$$

$$= 1.6448.$$

Solution 10:-

Q17

$$\cos \theta = 0.7258.$$

$$\therefore \text{(i)} \quad \theta = ?$$

$$\cos 43^\circ 24' = 0.7266$$

Mean difference of $4'$ is 0.0008

$$\begin{aligned} \therefore \theta &= 43^\circ 24' + 4' \\ &= 43^\circ 28' \end{aligned}$$

$$\text{(ii)} \quad 2 \tan \theta - \sin \theta = ?$$

$$2 \tan 43^\circ 28' - \sin 43^\circ 28'$$

$$\begin{aligned} \sin 43^\circ 28' &= \sin(43^\circ 24' + \sin 4') \text{ from table} \\ &= 0.6871 + 0.0008 \\ &= 0.6879. \end{aligned}$$

$$\therefore 2 \tan \theta - \sin \theta = 2 \frac{\sin \theta}{\cos \theta} - \sin \theta$$

$$= \frac{2(0.6879)}{0.7258} - 0.6879$$

$$= \frac{1.3758 - (0.6879)(0.7258)}{0.7258}.$$

$$= 1.2079.$$