Trigonometric Tables

Solution - 01:-

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

To find the value of $\sin 53^\circ 34'$ we read the table of natural sines in the horizontal line which begins with 35° and lies 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.

$\sin 35^\circ 18' = 0.5779.$

Mean difference for $4' = 10$

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

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

Since $\sin 71^\circ 31' = \sin(71^\circ 30' + 1')$

$\sin 71^\circ 30' = .9483$ (From Tables)

Mean difference for $1'$ is $= 1$

$\therefore \sin 71^\circ 31' = .9483 + 0.0001$

$= 0.9484.$

Solution 1 (iii) :-

$\sin 65^\circ 20'$

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

$\sin 65^\circ 18' = 0.9085$ (From Tables)

Mean difference for $2'$ is = 2.

$\sin 65^\circ 20' = 0.9085 + 0.0002$

$= 0.9087$

Solution 1 (iv) :-

Given that, $\sin 23^\circ 56'$

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

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

Mean difference of $2'$ is $= 0.0005$

$\sin 23^\circ 56' = 0.4051 + 0.0005$

$= 0.4056$.

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

$\cos 62^\circ 27'$

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

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

Mean difference of $3'$ is = 5

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

Solution-2(ii):

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

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

$\cos 3^\circ 6' = .9985$ (from tables)

Mean difference of $5'$ is $= 1$

$\therefore \cos 3^\circ 11' = 0.9985 - 0.0001$

$= 0.9984$

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

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

$\cos 86^\circ 36' = 0.0593$ (from tables)

Mean difference of $4'$ is $= 12$.

$\therefore \cos 86^\circ 40' = 0.0593 - 0.0012$

$= 0.0581$.

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

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

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

Mean difference of $4'$ is $= 0.0008$

$\therefore \cos 45^\circ 58' = 0.6959 - 0.0008$

$= 0.6951$.

Solution-03

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

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

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

Mean difference for $2'$ is 6

$\therefore \tan 15^\circ 2' = 0.2679 + 0.0006$

$= 0.2685$.

Solution -03 (ii) :-

Tan $53^\circ 14'$

since Tan $53^\circ 14'$ = Tan $(53^\circ 12' + 2')$

Tan $53^\circ 12'$ = 1.3367 (from tables)

Mean difference of $2'$ = 16

$\therefore$ Tan $53^\circ 14'$ = 1.3367 + 0.0016

= 1.3383

Solution -03 (iii) :-

Tan $82^\circ 18'$

since Tan $82^\circ 18'$ = 7.3962.

Solution -03 (iv)

Tan $6^\circ 9'$.

since Tan $6^\circ 9'$ = Tan $(6^\circ 6' + 3')$

Tan $6^\circ 6'$ = 0.1069

Mean difference of $3'$ is = 9.

$\therefore$ Tan $6^\circ 9'$ = 0.1069 + 0.0009

= 0.1078

Solution -04 :

(i) Sin θ = 0.5789.

In the table of natural sines, look for value (≤ 0.5789) which is sufficiently close to 0.5779 we find that the value 0.5779 occurs in the horizontal line begining 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 18 in the column headed by 4', so we get the value of $\sin\theta = \sin 35°18' + 4' = 35°22'$

Thus the value θ is obtained as under:

Given $\sin\theta = 0.5789$

$\sin 35°18' = 0.5779$ (from tables)

Difference = 0.0010

Mean difference of 4' is = 0.0010

$\therefore \theta = 35°18' + 4' = 35°22'$

Solution 4(ii):

$\sin\theta = 0.9484$

$\sin 71°30' = 0.9483$ (from tables)

Difference = 0.0001

Mean difference of 1' is = 0.0001

$\therefore \theta = 71°30' + 1' = 71°31'$

Solution 4(iii):

$\sin\theta = 0.2357$

$\sin 13°36' = 0.2351$ (from tables)

Difference = 0.0006

Mean difference of 2' is = 0.0006

$\therefore \theta = 13°36' + 2' = 13°38'$

solution 4(iv):

$\sin\theta = 0.6371$

$\sin 39°30' = 0.6361$

Difference of = 0.0010.

Mean difference of 4' is = 9

$\therefore \theta = 39°30' + 4' = 39°4'$.

Solution-05:-

(i) $\cos\theta = 0.4625$

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

Mean difference $= 0.0008$

$\therefore$ Cos Mean difference of $8'$ 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

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

$= 70^\circ 3'$

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:-

Given that $\sin A = 0.1822$

from Tables $A = 10^\circ 30'$

Solution-08:-

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

Given that

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

$\therefore 2\sin 35^\circ - \cos 35^\circ = 2(0.5736) - 0.8192$ (from tables)

$= 1.1472 - 0.8192$

$= 0.3280$

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

$\theta = 15^\circ$ (from tables)

$\therefore 2\sin 15^\circ - \cos 15^\circ = 2(0.2588) - 0.9659$

$= -0.4483.$

Solution-09:-

G/T $\sin x^\circ = 0.67$

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

(i) $\cos 42^\circ 4' = 0.7423$ (from tables $42^\circ 0' + 4'$ Mean diff = 8 $0.7431 - 0.0008 = 0.7423$)

(ii) $\cos 42^\circ 4' + \tan 42^\circ 4' = 0.7423 + \tan 42^\circ 4'$

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

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

$= 1.6448.$

Solution 10:-

G|T

$\cos\theta = 0.7258$.

$\therefore$ (i) $\theta = ?$

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

Mean difference of $4'$ is 0.0008

$\therefore \theta = 43^\circ 24' + 4'$

$= 43' 28'$

(ii) $2\tan\theta - \sin\theta = ?$

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

$\sin 43^\circ 28' = \sin(43^\circ 24' + 4')$ from table

$= 0.6871 + 0.0008$

$= 0.6879$.

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

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

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

$= 1.2079$.