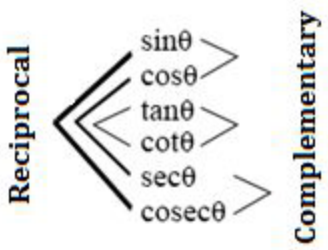
DAY 6

TRIGONOMETRIC RATIOS OF COMPLEMENTARY ANGLES

Two angles are called complementary if the sum of their measures is 90^0. Similarly in Trigonometry, we've complementary angles **sin⇔ cos, tan ⇔ cot, sec ⇔ cosec**

- $\sin\theta = \cos(90 - \theta)$
- $\cos\theta = \sin(90 - \theta)$
- $\tan\theta = \cot(90 - \theta)$
- $\cot\theta = \tan(90 - \theta)$
- $\sec\theta = \operatorname{cosec}(90 - \theta)$
- $\operatorname{cosec}\theta = \sec(90 - \theta)$



1. Find complementary angles of the following:

i) $\sin 40^0$ **ii) $\sec 67^0$** **iii) $\tan 32^0$**

Sol: – **i)** $\sin 40^0 = \cos(90^0 - 40^0) = \cos 50^0$

ii) $\sec 67^0 = \operatorname{cosec}(90^0 - 67^0) = \operatorname{cosec} 23^0$

iii) $\tan 32^0 = \cot(90^0 - 32^0) = \cot 58^0$

2. Express $\cot 85^0 + \cos 75^0$ in terms of T ratios of angles between 0^0 and 45^0.

Sol: $-\cot 85^0 + \cos 75^0 = \tan(90^0 - 85^0) + \sin(90^0 - 75^0) = \tan 5^0 + \sin 15^0$

3. Evaluate the following:-

i) $\dfrac{\tan 40^0}{\cot 50^0}$ **ii)** $\dfrac{\sin 67^0}{\cos 23^0}$ **iii)** $\dfrac{\sec 42^0}{\operatorname{cosec} 48^0}$

iv) $\tan 18^0 - \cot 72^0$ **v) $\sec 20^0 - \operatorname{cosec} 70^0$**

Sol :- i) $\dfrac{\tan 40^0}{\cot 50^0}$

{Here $40^0 + 50^0 = 90^0$ are complementary each other, So Change only one **T Ratio**}

$$= \frac{\cot\left(90^0 - 40^0\right)}{\cot 50^0} = \frac{\cot 50^0}{\cot 50^0} = 1$$

ii) $\dfrac{\sin 67^0}{\cos 23^0}$

{Here $67^0 + 23^0 = 90^0$ are complementary each other, So Change only one **T Ratio**}

$$= \frac{\cos\left(90^0 - 67^0\right)}{\cos 23^0} = \frac{\cos 23^0}{\cos 23^0} = 1$$

iii) $\frac{\sec 42^0}{\operatorname{cosec} 48^0}$

{Here $42^0 + 48^0 = 90^0$ are complementary each other, So Change only one **T Ratio**}

$$= \frac{\sec 42^0}{\sec\left(90^0 - 48^0\right)} = \frac{\sec 42^0}{\sec 42^0} = 1$$

iv) $\tan 18^0 - \cot 72^0 = \cot(90^0 - 18^0) - \cot 72^0 = \cot 72^0 - \cot 72^0 = 0$

v) $\sec 20^0 - \operatorname{cosec} 70^0 = \operatorname{cosec}(90^0 - 20^0) - \operatorname{cosec} 70^0 = \operatorname{cosec} 70^0 - \operatorname{cosec} 70^0 = 0$

EXERCISE

1. Find complementary angles of the following:

i) $\tan 44^0$ ii) $\sin 72^0$ iii) $\operatorname{cosec} 56^0$ iv) $\cos 18^0$ v) $\sec 33^0$

2. Express the following in terms of T ratios of angles between 0^0 and 45^0.

i) $\sin 72^0 + \operatorname{cosec} 65^0$ ii) $\cot 88^0 + \cos 55^0$ iii) $\tan 76^0 + \sec 67^0$

3. Evaluate the following:-

i) $\frac{\sin 20^0}{\cos 70^0}$ ii) $\frac{\tan 18^0}{\cot 72^0}$ iii) $\frac{\sec 26^0}{\operatorname{cosec} 64^0}$

iv) $\cos 48^0 - \sin 42^0$ v) $\operatorname{cosec} 31^0 - \sec 59^0$