## DAY 2 (T − Ratios)

In last section, we have discussed about T ratios and their relationship with sides of right angled triangle. In this section, we shall discuss examples on that.

**1. Fill in the blanks:**

**i)** $\tan\theta = \frac{\sin\theta}{\ldots\ldots}$ **ii)** $\operatorname{cosec}\theta = \frac{1}{\ldots\ldots}$ **iii)** $\cot\theta = \frac{1}{\ldots\ldots}$

**Sol:- i)** $\tan\theta = \frac{\sin\theta}{\cos\theta}$

**ii)** $\operatorname{cosec}\theta = \frac{1}{\sin\theta}$

**iii)** $\cot\theta = \frac{1}{\tan\theta}$

**2. If $\sin A = \frac{3}{5}$, then find other T- ratios of A.**

**Sol :-** Given $\sin A = \frac{3}{5} = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$

$\therefore$ Perpendicular(P) $= 3$ and Hypotenuse(H) $= 5$

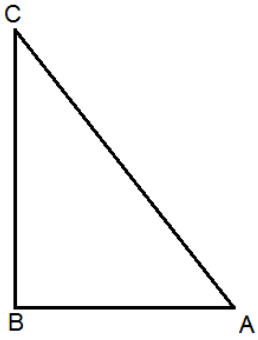
{ Here Due to T ratios, actually Perpendicular(P) $= 3x$ and Hypotenuse(H) $= 5x$
But in answer, again we have to find T − Ratios in which $x$ will be cancelled, so for the convenience of students $x$ can be neglected }

By Pythagoras Theorem, we have

$H^2 = P^2 + B^2 \Rightarrow 5^2 = 3^2 + B^2$

$\Rightarrow 5 \times 5 = 3 \times 3 + B^2 \Rightarrow 25 = 9 + B^2$

$\Rightarrow B^2 = 25 - 9 = 16 = 4^2 \Rightarrow \mathbf{B = 4}$




**Now** $\cos A = \frac{B}{H} = \frac{4}{5}$ $\sec A = \frac{1}{\cos A} = \frac{5}{4}$

$\tan A = \frac{P}{B} = \frac{3}{4}$ $\cot A = \frac{1}{\tan A} = \frac{4}{3}$

$\operatorname{cosec} A = \frac{1}{\sin A} = \frac{5}{3}$

**3. If n $\theta = \frac{5}{12}$, then find other T- ratios of θ.**

**Sol :-** Given $\tan\theta = \frac{5}{12} = \frac{\text{Perpendicular}}{\text{Base}}$

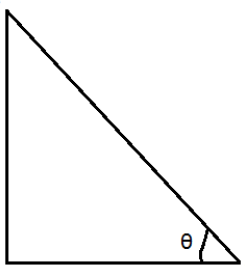
$\therefore$ Perpendicular(P) $= 5$ and Base(B) $= 12$

By Pythagoras Theorem, we have

$H^2 = P^2 + B^2 \Rightarrow H^2 = 5^2 + 12^2$

$\Rightarrow H^2 = 5 \times 5 + 12 \times 12 \Rightarrow H^2 = 25 + 144 =$

$169 = 13^2$



$\Rightarrow$ **H = 13**

**Now** $\sin\theta = \frac{P}{H} = \frac{5}{13}$ $\quad$ $\operatorname{cosec}\theta = \frac{1}{\sin\theta} = \frac{13}{5}$

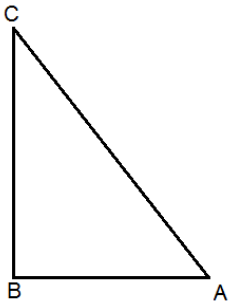
$\cos\theta = \frac{B}{H} = \frac{12}{13}$ $\quad$ $\sec\theta = \frac{1}{\cos\theta} = \frac{13}{12}$

$\cot\theta = \frac{1}{\tan\theta} = \frac{12}{5}$

**4. If $\cot A = 8$ , then find other T-Ratios of A.**

**Sol:-** Given $15\cot A = 8$ $\quad \Rightarrow \cot A = \frac{8}{15} = \frac{\textbf{B}ase}{\textbf{P}erpendicular}$

$\therefore$ Base(B) $= 8$ and Perpendicular(P) $= 15$




By Pythagoras Theorem, we have

$H^2 = P^2 + B^2$ $\quad \Rightarrow H^2 = 15^2 + 8^2$

$\Rightarrow H^2 = 15 \times 15 + 8 \times 8$ $\quad \Rightarrow H^2 = 225 + 64 = 289 = 17^2$

$\Rightarrow$ **H = 17**

**Now** $\sin A = \frac{P}{H} = \frac{15}{17}$ $\quad$ $\operatorname{cosec} A = \frac{1}{\sin A} = \frac{17}{15}$

$\cos A = \frac{B}{H} = \frac{8}{17}$ $\quad$ $\sec A = \frac{1}{\cos A} = \frac{17}{8}$

$\tan A = \frac{P}{B} = \frac{15}{8}$

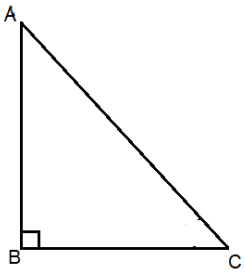


**5. In $\Delta ABC$, $\angle B = 90^0$, AB = 24 *cm* and BC = 7*cm* then find sin A and cos A.**

**Sol:-** In $\Delta ABC$, $\angle B = 90^0$

$\therefore$ $AC^2 = AB^2 + BC^2$

$= 24^2 + 7^2 = 24 \times 24 + 7 \times 7 = 576 + 49 = 625 = 25^2$




$\Rightarrow$ AC $= 25\ cm$

**Now** $\sin A = \frac{BC}{AC} = \frac{7}{25}$ and $\cos A = \frac{AB}{AC} = \frac{24}{25}$

## EXERCISE

**1.** Fill in the blanks:

i) $\cot\theta = \frac{\cos\theta}{\ldots\ldots}$ ii) $\sec\theta = \frac{1}{\ldots\ldots}$ iii) $\tan\theta = \frac{1}{\ldots\ldots}$

**2.** If $\cos A = \frac{12}{13}$, then find other T- ratios of A.

**3.** If $\tan\theta = \frac{4}{3}$, then find other T- ratios of $\theta$.

**4.** If $7\tan A = 24$, then find other T- ratios of A.

**5.** If $\sec A = \frac{13}{5}$, then find sin A and tan A.

**6.** If $\sin A = \frac{7}{25}$, then find cos A and cot A.