

# Mathematics

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## (Chapter 2)(Inverse Trigonometric Functions)

(Class XII)

### (Exemplar Problems)

#### Long Answer (L.A.)


#### Question 16:

Prove that  $\tan^{-1} \frac{1}{4} + \tan^{-1} \frac{2}{9} = \sin^{-1} \frac{1}{\sqrt{5}}$ .

#### Answer 16:

$$\text{LHS} = \tan^{-1} \frac{1}{4} + \tan^{-1} \frac{2}{9}$$

$$= \tan^{-1} \left[ \frac{\frac{1}{4} + \frac{2}{9}}{1 - \frac{1}{4} \times \frac{2}{9}} \right]$$


$$\left[ \text{as } \tan^{-1} x + \tan^{-1} y = \tan^{-1} \left( \frac{x + y}{1 - xy} \right) \right]$$

$$= \tan^{-1} \left[ \frac{\frac{9 + 8}{4 \times 9}}{\frac{4 \times 9 - 1 \times 2}{4 \times 9}} \right]$$

$$= \tan^{-1} \left[ \frac{17}{\frac{36}{34}} \right]$$

$$= \tan^{-1} \frac{17}{34}$$



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## (Chapter 2)(Inverse Trigonometric Functions)

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$$= \tan^{-1} \frac{1}{2}$$

$$= \sin^{-1} \frac{1}{\sqrt{1^2 + 2^2}}$$

$$\left[ \text{as } \tan^{-1} \frac{a}{b} = \sin^{-1} \frac{a}{\sqrt{a^2 + b^2}} \right]$$

$$= \sin^{-1} \frac{1}{\sqrt{5}}$$

= RHS

