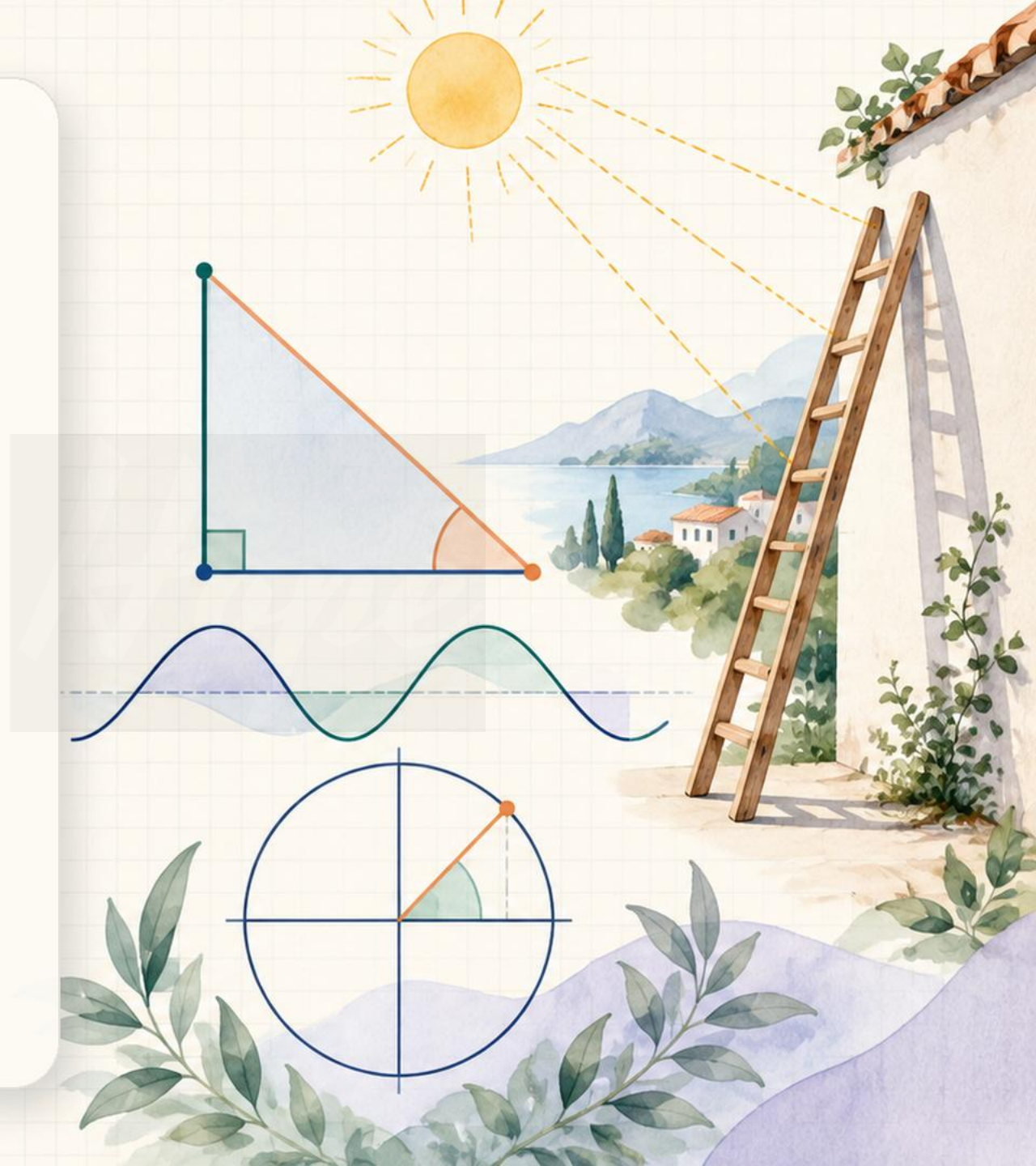


MATHEMATICS • CLASS 10

CHAPTER 8

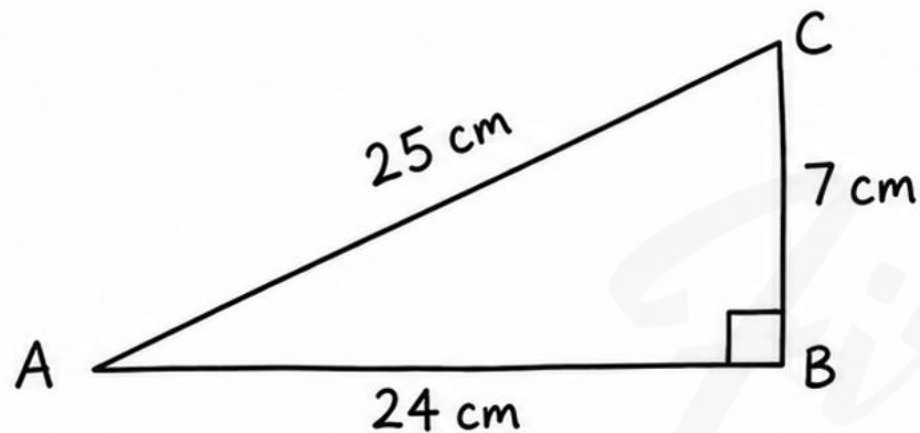
Introduction to Trigonometry

NCERT SOLUTIONS



EXERCISE 8.1 – Q1

Q1. In $\triangle ABC$, right-angled at B, $AB = 24$ cm and $BC = 7$ cm. Find
(i) $\sin A$, $\cos A$ and (ii) $\sin C$, $\cos C$.



First find the hypotenuse:

$$\begin{aligned} AC^2 &= AB^2 + BC^2 = 24^2 + 7^2 \\ &= 576 + 49 = 625 \end{aligned}$$

$$AC = 25 \text{ cm}$$

Not to scale.

(i) For angle A:

Opposite side = BC; adjacent side = AB.

$$\sin A = \frac{BC}{AC} = \frac{7}{25}$$

$$\cos A = \frac{AB}{AC} = \frac{24}{25}$$

(ii) For angle C:

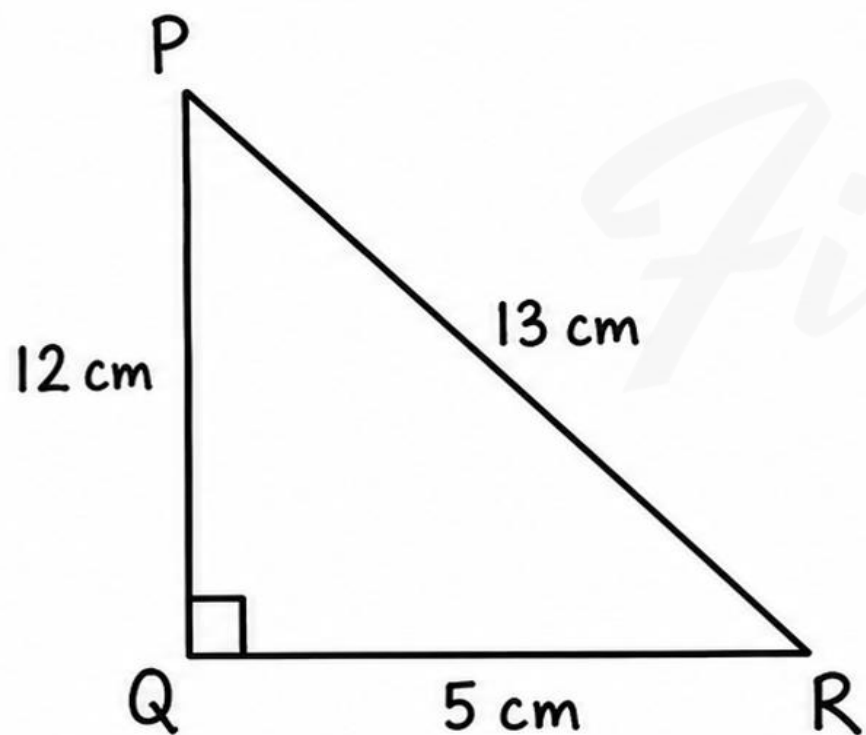
Opposite side = AB; adjacent side = BC.

$$\sin C = \frac{AB}{AC} = \frac{24}{25}$$

$$\cos C = \frac{BC}{AC} = \frac{7}{25}$$

EXERCISE 8.1 – Q2

Q2. In the given right triangle PQR, $\angle Q = 90^\circ$, $PQ = 12$ cm and $PR = 13$ cm. Find $\tan P - \cot R$.



Find the missing side:

$$\begin{aligned} QR^2 &= PR^2 - PQ^2 \\ &= 13^2 - 12^2 = 169 - 144 = 25 \\ QR &= 5 \text{ cm} \end{aligned}$$

For angle P: $\tan P = \frac{QR}{PQ} = \frac{5}{12}$

For angle R: $\cot R = \frac{QR}{PQ} = \frac{5}{12}$

Therefore $\tan P - \cot R = \frac{5}{12} - \frac{5}{12}$

Answer: 0

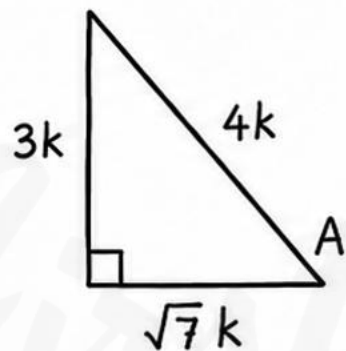
EXERCISE 8.1 — Q3

Q3. If $\sin A = \frac{3}{4}$, calculate $\cos A$ and $\tan A$.

1. Build side lengths

Since $\sin A = \frac{\text{opposite side}}{\text{hypotenuse}}$, take:

Opposite side = $3k$; hypotenuse = $4k$,
where $k > 0$.



$$\begin{aligned}\text{Adjacent side}^2 &= (4k)^2 - (3k)^2 \\ &= 16k^2 - 9k^2 = 7k^2\end{aligned}$$

$$\text{Adjacent side} = \sqrt{7}k$$

2. Now find the ratios:

$$\begin{aligned}\cos A &= \frac{\text{adjacent side}}{\text{hypotenuse}} \\ &= \frac{\sqrt{7}k}{4k}\end{aligned}$$

$$\text{Answer: } \cos A = \frac{\sqrt{7}}{4}$$

$$\begin{aligned}\tan A &= \frac{\text{opposite side}}{\text{adjacent side}} \\ &= \frac{3k}{\sqrt{7}k} = \frac{3}{\sqrt{7}}\end{aligned}$$

Multiply numerator and denominator by $\sqrt{7}$:

$$= \frac{3}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$$

$$\text{Answer: } \tan A = \frac{3\sqrt{7}}{7}$$

EXERCISE 8.1 — Q4

Q4. Given $15 \cot A = 8$, find $\sin A$ and $\sec A$.

$$15 \cot A = 8$$

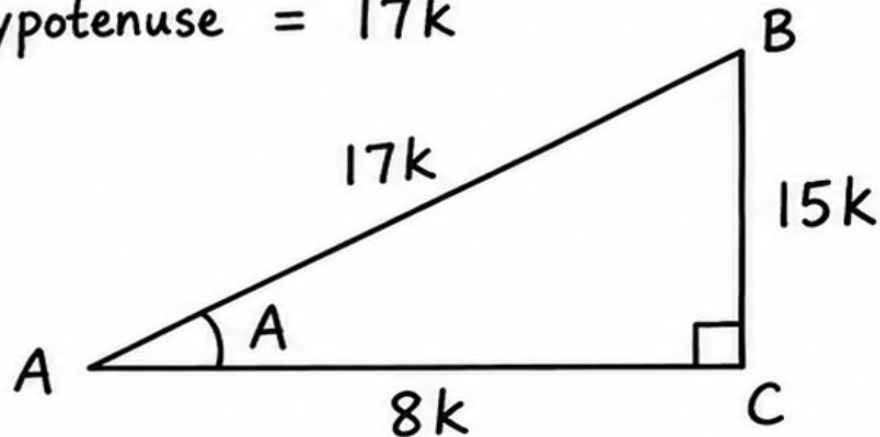
$$\cot A = \frac{8}{15} = \frac{\text{adjacent side}}{\text{opposite side}}$$

Take adjacent side = $8k$ and opposite side = $15k$.

By Pythagoras:

$$\begin{aligned}\text{Hypotenuse}^2 &= (8k)^2 + (15k)^2 \\ &= 64k^2 + 225k^2 = 289k^2\end{aligned}$$

$$\text{Hypotenuse} = 17k$$



$$\begin{aligned}\sin A &= \frac{\text{opposite side}}{\text{hypotenuse}} \\ &= \frac{15k}{17k}\end{aligned}$$

Answer: $\sin A = \frac{15}{17}$

$$\begin{aligned}\sec A &= \frac{\text{hypotenuse}}{\text{adjacent side}} \\ &= \frac{17k}{8k}\end{aligned}$$

Answer: $\sec A = \frac{17}{8}$



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