

Introduction to Trigonometry - Exercise 8.2

Exercise 8.2 with independently verified solutions.

CHAPTER

Introduction to Trigonometry

RESOURCE

NCERT Exercises

SOURCE

NCERT Mathematics, Reprint 2026-27

PART 1

Verified NCERT questions and solutions

Verified NCERT questions and solutions

Solutions are checked independently and follow the supplied NCERT chapter edition.

QUESTION

Question 1

special angles · evaluation

Evaluate: (i) $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$; (ii) $2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$; (iii) $[\cos 45^\circ \sin 30^\circ + \tan 45^\circ]/[\sec 30^\circ + \operatorname{cosec} 30^\circ]$; (iv) $[\sin 30^\circ + \tan 45^\circ - \operatorname{cosec} 60^\circ]/[\sec 30^\circ + \cos 60^\circ + \cot 45^\circ]$; (v) $[5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ]/[\sin^2 30^\circ + \cos^2 30^\circ]$.

Solution

Board-exam working:

(i)

$$\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{1}{2} \cdot \frac{1}{2} = \frac{3}{4} + \frac{1}{4} = 1$$

(ii)

$$2(1)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2 = 2$$

(iii)

$$\frac{\frac{1}{\sqrt{2}} \cdot \frac{1}{2} + 1}{\frac{2}{\sqrt{3}} + 2} = \frac{\frac{1}{2\sqrt{2}} + 1}{\frac{2}{\sqrt{3}} + 2}$$

(iv)

$$\frac{\frac{1}{2} + 1 - \frac{2}{\sqrt{3}}}{\frac{2}{\sqrt{3}} + \frac{1}{2} + 1} = \frac{3\sqrt{3} - 4}{3\sqrt{3} + 4}$$

(v)

$$\frac{5\left(\frac{1}{2}\right)^2 + 4\left(\frac{2}{\sqrt{3}}\right)^2 - 1}{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2}$$

$$= \frac{\frac{5}{4} + \frac{16}{3} - 1}{1} = \frac{67}{12}$$

Final answer

(i) 1; (ii) 2;

$$(iii) \frac{\frac{1}{2\sqrt{2}} + 1}{\frac{2}{\sqrt{3}} + 2}; \quad (iv) \frac{3\sqrt{3} - 4}{3\sqrt{3} + 4}; \quad (v) \frac{67}{12}$$

QUESTION

Question 2

multiple choice · special angles

Choose the correct option and justify: (i) $2\tan 30^\circ/(1 + \tan^2 30^\circ)$; (ii) $(1 - \tan^2 45^\circ)/(1 + \tan^2 45^\circ)$; (iii) $\sin 2A = 2 \sin A$ is true when A is 0° , 30° , 45° or 60° ; (iv) $2\tan 30^\circ/(1 - \tan^2 30^\circ)$.

Solution

Board-exam working:

(i)

$$\frac{2 \cdot \frac{1}{\sqrt{3}}}{1 + \frac{1}{3}} = \frac{\sqrt{3}}{2} = \sin 60^\circ$$

Option A.

(ii)

$$\frac{1 - 1}{1 + 1} = 0$$

Option D.

(iii) Test A = 0°:

$$\sin(2 \cdot 0^\circ) = 0 = 2 \sin 0^\circ$$

Option A.

(iv)

$$\frac{2 \cdot \frac{1}{\sqrt{3}}}{1 - \frac{1}{3}} = \sqrt{3} = \tan 60^\circ$$

Option C.

Final answer

(i) A; (ii) D; (iii) A; (iv) C.

QUESTION

Question 3

tan values · simultaneous equations

If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = 1/\sqrt{3}$, where $0^\circ < A + B \leq 90^\circ$ and $A > B$, find A and B.

Solution

Board-exam working:

$$\tan(A + B) = \sqrt{3} \Rightarrow A + B = 60^\circ$$

$$\tan(A - B) = \frac{1}{\sqrt{3}} \Rightarrow A - B = 30^\circ$$

Adding:

$$2A = 90^\circ \Rightarrow A = 45^\circ$$

Subtracting:

$$2B = 30^\circ \Rightarrow B = 15^\circ$$

Final answer

$A = 45^\circ$ and $B = 15^\circ$.

QUESTION

Question 4

true or false · special angles

State true or false and justify: (i) $\sin(A + B) = \sin A + \sin B$; (ii) $\sin \theta$ increases as θ increases; (iii) $\cos \theta$ increases as θ increases; (iv) $\sin \theta = \cos \theta$ for all θ ; (v) $\cot A$ is not defined for $A = 0^\circ$.

Solution

Board-exam working:

(i) False. Take $A = B = 30^\circ$.

$$\sin 60^\circ = \frac{\sqrt{3}}{2} \neq 1 = \sin 30^\circ + \sin 30^\circ$$

(ii) True for $0^\circ \leq \theta \leq 90^\circ$, as shown by the standard-value table.

(iii) False. $\cos \theta$ decreases from 1 to 0 as θ increases from 0° to 90° .

(iv) False. Equality holds at 45° , but not for every angle.

(v) True.

$$\cot 0^\circ = \frac{\cos 0^\circ}{\sin 0^\circ} = \frac{1}{0}$$

Division by zero is undefined.

Final answer

(i) False; (ii) True; (iii) False; (iv) False; (v) True.