CLASS 10 · MATHEMATICS · CHAPTER 8

# Introduction to Trigonometry - Exercise 8.2

Exercise 8.2 with independently verified solutions.

| CHAPTER | RESOURCE | SOURCE |
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| Introduction to Trigonometry | NCERT Exercises | 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 each expression:

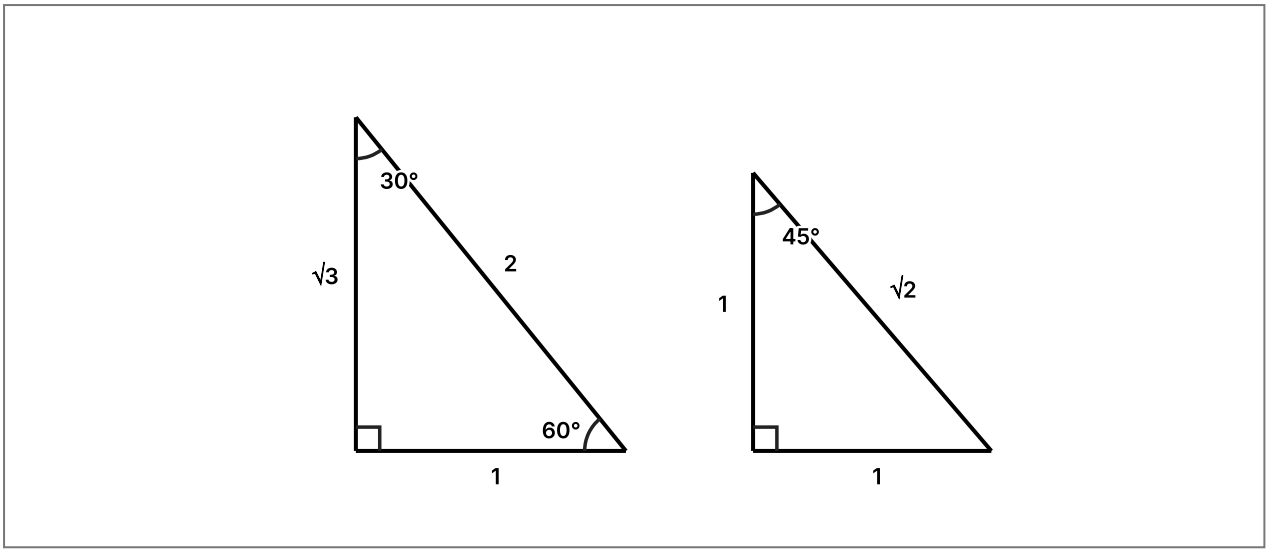
$$\text{(i)}\ \sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$$

$$\text{(ii)}\ 2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$$

$$\text{(iii)}\ \frac{\cos 45^\circ}{\sec 30^\circ + \operatorname{cosec} 30^\circ}$$

$$\text{(iv)}\ \frac{\sin 30^\circ + \tan 45^\circ - \operatorname{cosec} 60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$$

$$\text{(v)}\ \frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$$




Standard angles used in five evaluations — explanatory sketch (not to scale).

## 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)

$$\frac{\cos 45^\circ}{\sec 30^\circ+\operatorname{cosec} 30^\circ}$$

$$=\frac{\frac{1}{\sqrt{2}}}{\frac{2}{\sqrt{3}}+2}=\frac{\sqrt{3}}{2\sqrt{2}(1+\sqrt{3})}$$

(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;

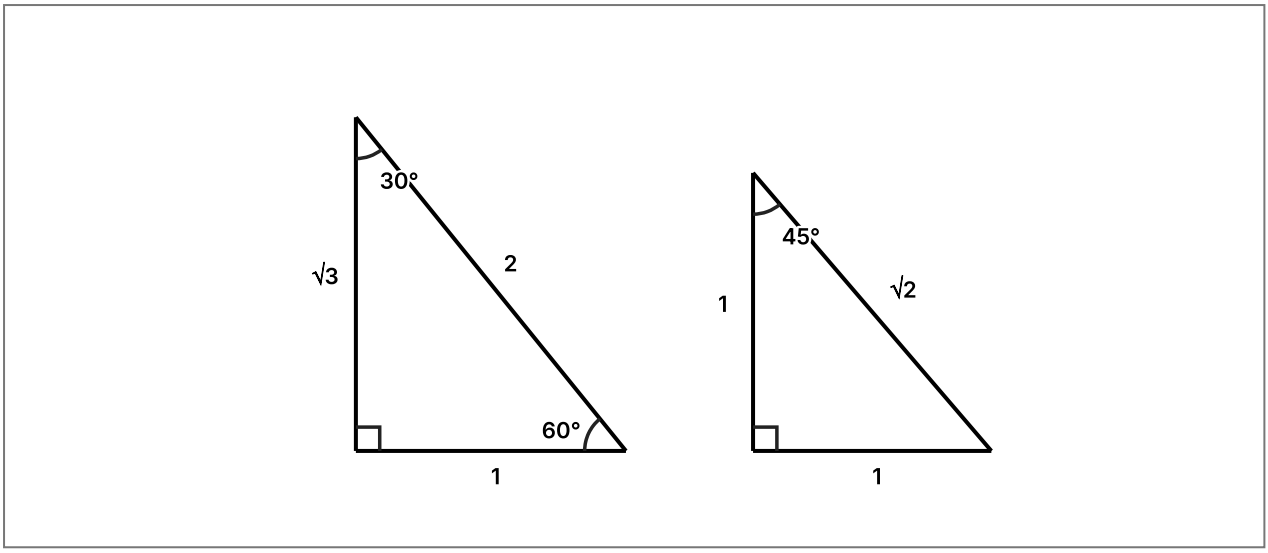
$$\text{(iii)}\ \frac{\sqrt{3}}{2\sqrt{2}(1+\sqrt{3})};\quad \text{(iv)}\ \frac{3\sqrt{3}-4}{3\sqrt{3}+4};\quad \text{(v)}\ \frac{67}{12}$$

QUESTION

# Question 2

multiple choice · special angles

Choose the correct option and justify: (i) 2tan30°/(1 + tan²30°); (ii) (1 – tan²45°)/(1 + tan²45°); (iii) sin 2A = 2 sin A is true when A is 0°, 30°, 45° or 60°; (iv) 2tan30°/(1 – tan²30°).




Standard angles used in four multiple-choice parts — explanatory sketch (not to scale).

## 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.

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### (iii) Test A = 0°:

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

Option A.

(iv)

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

Option C.

## Final answer

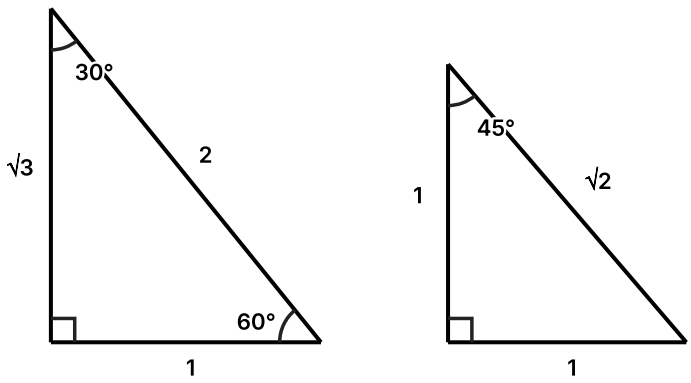
(i) A; (ii) D; (iii) A; (iv) C.

QUESTION

# Question 3

tan values · simultaneous equations

If tan(A + B) = √3 and tan(A − B) = 1/√3, where 0° < A + B ≤ 90° and A > B, find A and B.




Angles A + B and A − B — explanatory sketch (not to scale).

## 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

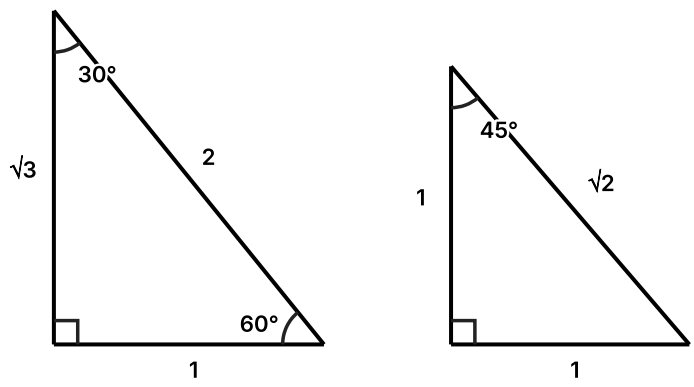
A = 45° and B = 15°.

QUESTION

## Question 4

true or false · special angles

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




How sine and cosine change with angle — explanatory sketch (not to scale).

## Solution

Board-exam working:

**(i) False. Take A = B = 30°.**

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

**(ii) True for 0° ≤ θ ≤ 90°, as shown by the standard-value table.**

**(iii) False. cos θ 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.