Suitable trigonometric equations on a stated interval

6 questions | 15 marks

Equivalent correct methods earn the corresponding marks.

1. Solve $\sin x = \frac{\sqrt{3}}{2}$ for $0^\circ \le x \le 360^\circ$. [2 marks]

Reference angle is 60°; sine is positive in I and II.

Answer: 60°, 120°.

2. Solve $\cos x = -\frac{1}{2}$ for $0^\circ \le x \le 360^\circ$. [2 marks]

Reference angle is 60°; cosine is negative in II and III.

Answer: 120°, 240°.

3. Solve $\tan x = 1$ for $0^\circ \le x \le 360^\circ$. [2 marks]

Tangent has period 180° and is positive in I and III.

Answer: 45°, 225°.

4. Solve $\sin(2x) = 0$ for $0^\circ \le x \le 360^\circ$. [3 marks]

For $0^\circ \le 2x \le 720^\circ$, zeros are 0°, 180°, 360°, 540° and 720°.

Divide by 2.

Answer: 0°, 90°, 180°, 270°, 360°.

5. Solve $2\cos x + 1 = 0$ for $0^\circ \le x \le 360^\circ$. [3 marks]

$\cos x = -\frac{1}{2}$.

Cosine is $-\frac{1}{2}$ at 120° and 240°.

Answer: 120°, 240°.

6. A student solves $\sin x = -\frac{1}{2}$ on $0^\circ \le x \le 360^\circ$ and gives only 330°. Find the missing solution and explain. [3 marks]

Negative sine occurs in quadrants III and IV.

The reference angle is 30°, so $180^\circ + 30^\circ = 210^\circ$.

Answer: 210° is also a solution.