



A Level Maths

Topic: Trigonometric Identities and Equations

Instructions

Answer all questions. Show complete working. Use trigonometric identities wherever appropriate.

Practice Questions

1. Prove the following identities:

(i) $\frac{1 - \sin^2 x}{\cos x} = \cos x$

(ii) $\tan^2 x + 1 = \sec^2 x$

(iii) $\cos^2 x - \sin^2 x = \cos 2x$

(iv) $1 + \tan^2 x = \sec^2 x$

2. Simplify the following expressions:

(i) $\frac{1 - \cos 2x}{\sin x}$

(ii) $\frac{1 + \cos x}{\sin x}$

(iii) $\frac{1 - \cos^2 x}{\sin x}$

(iv) $\frac{1 + \sin x}{\cos x}$

3. Solve the following equations for x where $0^\circ \leq x < 360^\circ$:

(i) $2 \sin x - \sqrt{3} = 0$

(ii) $\cos x = -\frac{1}{2}$

(iii) $2 \cos x + 1 = 0$

(iv) $\sin 2x = 1$

4. Prove the following identities:

(i) $\tan^2 x + 1 = \sec^2 x$

(ii) $\sin^2 x + \cos^2 x = 1$

(iii) $\cos 2x = 1 - 2\sin^2 x$

(iv) $1 + \sin^2 x = \cos^2 x + \sin^2 x$

5. Solve the following trigonometric equations for x where $0^\circ \leq x < 360^\circ$:

(i) $\sin x = \frac{\sqrt{3}}{2}$

(ii) $\cos x = \frac{1}{2}$

(iii) $\tan x = 1$

(iv) $\cos x = 0$

6. Use the identity $\sin 2x = 2 \sin x \cos x$ to solve the following:

(i) $2 \sin x \cos x = 1$

(ii) $\sin 2x = 0$

(iii) $2 \sin x \cos x = \sin x$

(iv) $2 \sin 2x = 1$

7. Simplify the following expressions:

(i) $\frac{1 - \cos x}{\sin x}$

(ii) $\frac{\sin x}{1 + \cos x}$

(iii) $\frac{\cos x + 1}{\sin x}$

(iv) $\frac{\sin^2 x}{\cos^2 x}$

8. Prove the following identity:

(i) $\frac{1 + \sin x}{\cos x} = \sec x + \tan x$

(ii) $\sec^2 x - \tan^2 x = 1$

(iii) $\frac{1 - \sin x}{\cos x} = \sec x - \tan x$

(iv) $\cos^2 x + \sin^2 x = 1$

Multiple-Choice Questions

1. Which of the following is the correct trigonometric identity for $\cos 2x$?
 - A. $\cos^2 x - \sin^2 x$
 - B. $2 \cos^2 x - 1$
 - C. $1 - 2 \sin^2 x$
 - D. All of the above
2. The value of $\sin 30^\circ$ is:
 - A. 0
 - B. $\frac{1}{2}$
 - C. $\frac{\sqrt{3}}{2}$
 - D. 1
3. Which of the following is the simplified form of $\frac{1-\cos^2 x}{\sin x}$?
 - A. $\sin x$
 - B. $\cos x$
 - C. $\frac{1}{\cos x}$
 - D. $\tan x$
4. The solution to the equation $\sin x = 0$ for $0^\circ \leq x < 360^\circ$ is:
 - A. 0°
 - B. 90°
 - C. 180°
 - D. 270°
5. The value of $\tan 45^\circ$ is:
 - A. 0
 - B. 1
 - C. ∞
 - D. $\frac{1}{\sqrt{2}}$

Visit our website: [Mathaversity.com](https://www.mathaversity.com)