

Trigonometric Functions — Assignment 1

Class 11 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Angles and Degree–Radian Conversion

MCQ Questions (choose the correct option)

- 180° is equal to
 - π radians
 - 2π radians
 - $\pi/2$ radians
 - $\pi/4$ radians
- 1 radian is approximately equal to
 - $57^\circ 16'$
 - 90°
 - 45°
 - 60°
- The radian measure of 45° is
 - $\pi/4$
 - $\pi/3$
 - $\pi/6$
 - $\pi/2$
- The degree measure of $\pi/3$ radians is
 - 60°
 - 30°
 - 90°
 - 45°

1 Mark Questions

- Convert 180° into radians.
- Convert $\pi/6$ radians into degrees.
- How many degrees is 1 radian approximately?

2 Mark Questions

- Convert $40^\circ 20'$ into radian measure.
- Convert 2 radians into degree measure (use $\pi = 22/7$).

3 Mark Questions

- Convert (i) 1000° and (ii) $-47^\circ 30'$ into radian measure.
- Convert (i) $11\pi/6$ and (ii) -4 radians into degree measure.

The Six Ratios and Quadrant Signs

MCQ Questions (choose the correct option)

- The value of $\sin 30^\circ$ is
 - $1/2$
 - $\sqrt{3}/2$
 - 1
 - $1/\sqrt{2}$
- In the second quadrant, which ratios are positive?
 - $\sin$ and cosec
 - $\cos$ and $\sec$
 - $\tan$ and $\cot$
 - all
- The value of $\cos 60^\circ$ is
 - $1/2$
 - $\sqrt{3}/2$
 - 0
 - 1
- The value of $\tan 45^\circ$ is
 - 1
 - 0
 - $\sqrt{3}$
 - $1/\sqrt{3}$

1 Mark Questions

- Find the value of $\sin 30^\circ$.
- Which trigonometric ratios are positive in the second quadrant?
- Find the value of $\tan 45^\circ$.

2 Mark Questions

- Find the values of $\sin 45^\circ$, $\cos 45^\circ$ and $\tan 45^\circ$.
- State the signs of the trigonometric functions in the four quadrants.

3 Mark Questions

- State the signs of all six trigonometric functions in the four quadrants, with a quick way to remember them.
- Find the values of $\sin 150^\circ$, $\cos 210^\circ$ and $\tan 300^\circ$.

Basic Trigonometric Identities

MCQ Questions (choose the correct option)

- The identity $\sin^2 x + \cos^2 x$ equals
 - 1
 - 0
 - 2
 - $\tan^2 x$
- $1 + \tan^2 x$ is equal to

- (A) $\sec^2 x$
 (B) $\operatorname{cosec}^2 x$
 (C) $\cot^2 x$
 (D) $\cos^2 x$
3. $1 + \cot^2 x$ is equal to
 (A) $\operatorname{cosec}^2 x$
 (B) $\sec^2 x$
 (C) $\tan^2 x$
 (D) $\sin^2 x$
4. If $\sin x = 3/5$, then $\cos x$ (in the first quadrant) is
 (A) $4/5$
 (B) $3/4$
 (C) $5/4$
 (D) $1/5$

1 Mark Questions

- State the identity $\sin^2 x + \cos^2 x = 1$.
- What is the value of $1 + \tan^2 x$?
- If $\sin x = 3/5$, find $\cos x$.

2 Mark Questions

- Prove that $\sin^2 x + \cos^2 x = 1$ using a right triangle.
- If $\tan x = 3/4$, find $\sin x$ and $\cos x$.

3 Mark Questions

- Prove the three Pythagorean identities: $\sin^2 x + \cos^2 x = 1$, $1 + \tan^2 x = \sec^2 x$, and $1 + \cot^2 x = \operatorname{cosec}^2 x$.
- Prove that $(1 + \tan x)/(1 + \cot x) = \tan x$, for $x \neq 0$.

Compound, Double and Half-Angle Formulas

MCQ Questions (choose the correct option)

- $\sin(A + B)$ is equal to
 (A) $\sin A \cos B + \cos A \sin B$
 (B) $\sin A \cos B - \cos A \sin B$
 (C) $\cos A \cos B + \sin A \sin B$
 (D) $\cos A \cos B - \sin A \sin B$
- $\cos(A - B)$ is equal to
 (A) $\cos A \cos B + \sin A \sin B$
 (B) $\cos A \cos B - \sin A \sin B$
 (C) $\sin A \cos B + \cos A \sin B$
 (D) $\sin A \sin B$
- $\sin 2A$ is equal to
 (A) $2 \sin A \cos A$
 (B) $\sin^2 A - \cos^2 A$
 (C) $1 - 2\sin^2 A$

- (D) $2\cos^2 A - 1$
4. $\cos 2A$ is equal to
- (A) $\cos^2 A - \sin^2 A$
- (B) $2 \sin A \cos A$
- (C) $\sin^2 A - \cos^2 A$
- (D) $2 \sin A$

1 Mark Questions

- Write the formula for $\sin(A + B)$.
- Write the formula for $\tan 2A$.
- Express $\sin 75^\circ$ using a compound angle.

2 Mark Questions

- Find the value of $\sin 75^\circ$ using $\sin(A + B)$.
- Find the value of $\cos 15^\circ$ using a compound angle formula.

3 Mark Questions

- Prove that $\sin 75^\circ = (\sqrt{6} + \sqrt{2})/4$ using compound-angle formulas.
- Prove that $\sin 2A = 2 \tan A / (1 + \tan^2 A)$ and $\cos 2A = (1 - \tan^2 A) / (1 + \tan^2 A)$.

Sum-to-Product and Product-to-Sum

MCQ Questions (choose the correct option)

- $\sin C + \sin D$ is equal to
 - $2 \sin((C+D)/2) \cos((C-D)/2)$
 - $2 \cos((C+D)/2) \sin((C-D)/2)$
 - $2 \sin((C+D)/2) \sin((C-D)/2)$
 - $2 \cos C \cos D$
- $\cos C - \cos D$ is equal to
 - $-2 \sin((C+D)/2) \sin((C-D)/2)$
 - $2 \sin((C+D)/2) \sin((C-D)/2)$
 - $2 \cos((C+D)/2) \cos((C-D)/2)$
 - $-2 \cos C \cos D$
- $2 \sin A \cos B$ is equal to
 - $\sin(A + B) + \sin(A - B)$
 - $\sin(A + B) - \sin(A - B)$
 - $\cos(A + B) + \cos(A - B)$
 - $\cos(A - B) - \cos(A + B)$
- $2 \cos A \cos B$ is equal to
 - $\cos(A + B) + \cos(A - B)$
 - $\cos(A - B) - \cos(A + B)$
 - $\sin(A + B) + \sin(A - B)$
 - $\sin(A - B) - \sin(A + B)$

1 Mark Questions

1. Express $\sin C + \sin D$ as a product.
2. Express $\cos C - \cos D$ as a product.
3. Write $2 \sin A \cos B$ as a sum.

2 Mark Questions

1. Express $\sin 5x + \sin 3x$ as a product.
2. Express $\cos 4x - \cos 2x$ as a product.

3 Mark Questions

1. Prove that $(\sin 5x + \sin 3x)/(\cos 5x + \cos 3x) = \tan 4x$.
2. Prove that $\sin 3x + \sin x = 2 \sin 2x \cos x$ using sum-to-product formulas.

Trigonometric Equations and General Solutions

MCQ Questions (choose the correct option)

1. The general solution of $\sin x = 0$ is
 - (A) $x = n\pi, n \in \mathbb{Z}$
 - (B) $x = (2n+1)\pi/2$
 - (C) $x = n\pi/2$
 - (D) $x = 2n\pi$
2. The general solution of $\cos x = 0$ is
 - (A) $x = (2n+1)\pi/2, n \in \mathbb{Z}$
 - (B) $x = n\pi$
 - (C) $x = 2n\pi$
 - (D) $x = n\pi/2$
3. The general solution of $\tan x = 0$ is
 - (A) $x = n\pi, n \in \mathbb{Z}$
 - (B) $x = (2n+1)\pi/2$
 - (C) $x = 2n\pi$
 - (D) $x = n\pi/2$
4. The general solution of $\sin x = \sin y$ is
 - (A) $x = n\pi + (-1)^n y, n \in \mathbb{Z}$
 - (B) $x = 2n\pi + y$
 - (C) $x = n\pi + y$
 - (D) $x = n\pi - y$

1 Mark Questions

1. Write the general solution of $\sin x = 0$.
2. Write the general solution of $\cos x = 0$.
3. Write the general solution of $\tan x = 0$.

2 Mark Questions

1. Find the general solution of $\sin x = 1/2$.
2. Find the general solution of $\cos x = -1/2$.

3 Mark Questions

1. Find the general solution of $2 \cos^2 x + 3 \sin x = 0$.
2. Find the general solution of $\sin 2x - \sin 4x + \sin 6x = 0$.