

Trigonometry up to Transformations

MCQ Test, Set 06

Time: 30 minutes

Maximum marks: 25

Name: _____ Class: _____ Date: _____

- There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
- Each correct answer carries 1 mark. There is no negative marking.
- The key sheet and worked solutions are at the end of this test.

- $\cot^2 \theta - \csc^2 \theta =$
A. 0 **B.** 1 **C.** -1 **D.** 2
- $\frac{3\pi}{4}$ radians in grades is
A. 150^g **B.** 135^g **C.** 75^g **D.** 300^g
- The sign of $\sec 250^\circ \cot 340^\circ$ is
A. positive **B.** zero **C.** not defined **D.** negative
- $\sin^2 45^\circ + \cos^2 60^\circ =$
A. 1 **B.** $\frac{3}{4}$ **C.** $\frac{1}{2}$ **D.** $\frac{5}{4}$
- $\sec(270^\circ - \theta) =$
A. $\csc \theta$ **B.** $\sec \theta$
C. $-\sec \theta$ **D.** $-\csc \theta$
- $\cot \frac{29\pi}{4} =$
A. $\frac{1}{2}$ **B.** -1 **C.** 1 **D.** $\frac{\sqrt{3}}{2}$
- The range of $4 \cos x$ is
A. $[0, 4]$ **B.** $[-4, 0]$ **C.** $[-1, 1]$ **D.** $[-4, 4]$
- The graph of $\sec x$ repeats after every
A. 2π **B.** π **C.** $\frac{\pi}{2}$ **D.** $\frac{3\pi}{2}$
- If $ABCD$ is a cyclic quadrilateral, then $\sec B + \sec D =$
A. -1 **B.** 0 **C.** 1 **D.** $2 \sec B$
- If $\sin \theta \cos \theta = \frac{1}{6}$, then $\sin^6 \theta + \cos^6 \theta =$
A. $\frac{17}{18}$ **B.** $\frac{1}{12}$ **C.** $\frac{35}{36}$ **D.** $\frac{11}{12}$
- $\sqrt{1 - \cos^2 250^\circ} =$
A. $-\cos 250^\circ$ **B.** $-\sin 250^\circ$
C. $\sin 250^\circ$ **D.** $\cos 250^\circ$

12. $\sin 70^\circ \cos 25^\circ - \cos 70^\circ \sin 25^\circ =$

A. $\sin 95^\circ$

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. $\frac{\sqrt{3}}{2}$

13. If $\cot A = 4$ and $\cot B = 3$, then $\cot(A + B) =$

A. $\frac{13}{7}$

B. $\frac{7}{11}$

C. -13

D. $\frac{11}{7}$

14. $\cos(45^\circ + \theta) \cos(45^\circ - \theta) =$

A. $\frac{1}{2} - \cos^2 \theta$

B. $\frac{1}{2} + \sin^2 \theta$

C. $\frac{1}{2} - \sin^2 \theta$

D. $1 - \sin^2 \theta$

15. $\sin(A + B + C) =$

A. $\Sigma \cos A \sin B \sin C - \Pi \sin A$

B. $\Sigma \sin A \cos B \cos C - \Pi \sin A$

C. $\Sigma \sin A \cos B \cos C + \Pi \sin A$

D. $\Pi \cos A - \Sigma \cos A \sin B \sin C$

16. $(1 + \cot 15^\circ)(1 + \cot 30^\circ) =$

A. $3 + 2\sqrt{3}$

B. $6 + 4\sqrt{3}$

C. 2

D. 4

17. If $\tan A = \frac{1}{3}$, then $\cos 2A =$

A. $\frac{3}{5}$

B. $\frac{8}{9}$

C. $\frac{4}{5}$

D. $\frac{3}{4}$

18. If $\cos A = \frac{7}{25}$ and A is acute, then $\tan \frac{A}{2} =$

A. $\frac{4}{3}$

B. $\frac{3}{4}$

C. $\frac{9}{16}$

D. $\frac{3}{5}$

19. $\sin 126^\circ =$

A. $\frac{\sqrt{5}+1}{4}$

B. $-\frac{\sqrt{5}+1}{4}$

C. $\frac{\sqrt{5}-1}{4}$

D. $\frac{\sqrt{10-2\sqrt{5}}}{4}$

20. $\cot A - \tan A =$

A. $2 \tan 2A$

B. $2 \csc 2A$

C. $2 \cot 2A$

D. $\cot 2A$

21. $\cos \theta + \cos 3\theta + \cos 5\theta + \cos 7\theta =$

A. $\frac{\sin 8\theta}{2 \sin \theta}$

B. $\frac{\sin 4\theta}{2 \sin \theta}$

C. $4 \cos 4\theta$

D. $\frac{\sin 8\theta}{\sin \theta}$

22. $\cos^3 20^\circ + \cos^3 140^\circ + \cos^3 100^\circ =$

A. $\frac{3}{4}$

B. 0

C. $\frac{1}{8}$

D. $\frac{3}{8}$

23. $\sqrt{1 - \sin 20^\circ} =$

A. $\cos 10^\circ - \sin 10^\circ$

B. $\cos 20^\circ - \sin 20^\circ$

C. $\cos 10^\circ + \sin 10^\circ$

D. $\sin 10^\circ - \cos 10^\circ$

24. $2 \cos 52\frac{1}{2}^\circ \cos 7\frac{1}{2}^\circ =$

A. $\frac{\sqrt{3}+\sqrt{2}}{2}$

C. $\frac{1}{2}$

B. $\frac{\sqrt{2}-1}{2}$

D. $\frac{1+\sqrt{2}}{2}$

25. The period of $\tan 2x + \sin 4x$ is

A. 2π

B. π

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Key sheet

1. C	2. A	3. A	4. B	5. D
6. C	7. D	8. A	9. B	10. D
11. B	12. C	13. D	14. C	15. B
16. B	17. C	18. B	19. A	20. C
21. A	22. D	23. A	24. D	25. D

Solutions

1. $\cot^2 \theta - \csc^2 \theta =$

$$\csc^2 \theta - \cot^2 \theta = 1$$

$$\therefore \cot^2 \theta - \csc^2 \theta = -1$$

Ans: (C) -1

2. $\frac{3\pi}{4}$ radians in grades is

$$\pi = 200^g$$

$$\frac{3\pi}{4} = \frac{3}{4} \times 200^g = 150^g$$

Ans: (A) 150^g

3. The sign of $\sec 250^\circ \cot 340^\circ$ is

$$250^\circ \in \text{III}_Q \Rightarrow \sec 250^\circ \text{ is -ve}$$

$$340^\circ \in \text{IV}_Q \Rightarrow \cot 340^\circ \text{ is -ve}$$

So the product is positive

Ans: (A) positive

4. $\sin^2 45^\circ + \cos^2 60^\circ =$

$$= \frac{1}{2} + \frac{1}{4}$$

$$= \frac{3}{4}$$

Ans: (B) $\frac{3}{4}$

5. $\sec(270^\circ - \theta) =$

$270^\circ - \theta$ is of the form $90^\circ \pm \theta$ or $270^\circ \pm \theta$, so $\sec$ changes to $\csc$

For acute θ , $270^\circ - \theta \in \text{III}_Q$, where $\sec$ is -ve

$$\therefore \sec(270^\circ - \theta) = -\csc \theta$$

Ans: (D) $-\csc \theta$

6. $\cot \frac{29\pi}{4} =$

$$\frac{29\pi}{4} = 29 \times 45^\circ = 1305^\circ$$

$$\cot 1305^\circ = \cot(1080^\circ + 225^\circ) = \cot 225^\circ$$

$225^\circ \in \text{III}_Q$, where $\cot$ is +ve

$$\cot 225^\circ = \cot(180^\circ + 45^\circ) = +\cot 45^\circ = 1$$

Ans: (C) 1

7. The range of $4 \cos x$ is

$$-1 \leq \cos x \leq 1 \Rightarrow -4 \leq 4 \cos x \leq 4$$

Ans: (D) $[-4, 4]$

8. The graph of $\sec x$ repeats after every

$\sec x = \frac{1}{\cos x}$ and $\cos x$ has period 2π , so the graph of $\sec x$ repeats after 2π

Ans: (A) 2π

9. If $ABCD$ is a cyclic quadrilateral, then $\sec B + \sec D =$
 $B + D = 180^\circ \Rightarrow \sec D = \sec(180^\circ - B) = -\sec B$
 $\sec B + \sec D = 0$
Ans: (B) 0
-

10. If $\sin \theta \cos \theta = \frac{1}{6}$, then $\sin^6 \theta + \cos^6 \theta =$
 $\sin^6 \theta + \cos^6 \theta = (\sin^2 \theta + \cos^2 \theta)^3 - 3 \sin^2 \theta \cos^2 \theta (\sin^2 \theta + \cos^2 \theta) = 1 - 3(\sin \theta \cos \theta)^2$
 $= 1 - 3\left(\frac{1}{6}\right)^2 = 1 - \frac{1}{12} = \frac{11}{12}$
Ans: (D) $\frac{11}{12}$
-

11. $\sqrt{1 - \cos^2 250^\circ} =$
 $= \sqrt{\sin^2 250^\circ} = |\sin 250^\circ|$
 $250^\circ \in \text{III}_Q \Rightarrow \sin 250^\circ < 0$, so $= -\sin 250^\circ$
Ans: (B) $-\sin 250^\circ$
-

12. $\sin 70^\circ \cos 25^\circ - \cos 70^\circ \sin 25^\circ =$
 $= \sin(70^\circ - 25^\circ) = \sin 45^\circ = \frac{1}{\sqrt{2}}$
Ans: (C) $\frac{1}{\sqrt{2}}$
-

13. If $\cot A = 4$ and $\cot B = 3$, then $\cot(A + B) =$
 $\cot(A + B) = \frac{\cot A \cot B - 1}{\cot B + \cot A} = \frac{12 - 1}{3 + 4} = \frac{11}{7}$
Ans: (D) $\frac{11}{7}$
-

14. $\cos(45^\circ + \theta) \cos(45^\circ - \theta) =$
 $= \cos^2 45^\circ - \sin^2 \theta = \frac{1}{2} - \sin^2 \theta$
Ans: (C) $\frac{1}{2} - \sin^2 \theta$
-

15. $\sin(A + B + C) =$
 $\sin[(A + B) + C] = \sin(A + B) \cos C + \cos(A + B) \sin C$
 $= \sin A \cos B \cos C + \cos A \sin B \cos C + \cos A \cos B \sin C - \sin A \sin B \sin C$
Ans: (B) $\Sigma \sin A \cos B \cos C - \Pi \sin A$
-

16. $(1 + \cot 15^\circ)(1 + \cot 30^\circ) =$
 $15^\circ + 30^\circ = 45^\circ \Rightarrow (1 + \cot A)(1 + \cot B) = 2 \cot A \cot B$
 $= 2(2 + \sqrt{3})\sqrt{3} = 6 + 4\sqrt{3}$
Ans: (B) $6 + 4\sqrt{3}$
-

17. If $\tan A = \frac{1}{3}$, then $\cos 2A =$
 $\cos 2A = \frac{1 - \tan^2 A}{1 + \tan^2 A} = \frac{1 - \frac{1}{9}}{1 + \frac{1}{9}} = \frac{8}{10} = \frac{4}{5}$
Ans: (C) $\frac{4}{5}$
-

18. If $\cos A = \frac{7}{25}$ and A is acute, then $\tan \frac{A}{2} =$

$$\tan \frac{A}{2} = \sqrt{\frac{1-\cos A}{1+\cos A}} = \sqrt{\frac{18/25}{32/25}} = \sqrt{\frac{9}{16}} = \frac{3}{4}$$

Ans: (B) $\frac{3}{4}$

19. $\sin 126^\circ =$

$$\sin 126^\circ = \sin(180^\circ - 54^\circ) = \sin 54^\circ = \cos 36^\circ = \frac{\sqrt{5}+1}{4}$$

Ans: (A) $\frac{\sqrt{5}+1}{4}$

20. $\cot A - \tan A =$

$$\frac{\cos A}{\sin A} - \frac{\sin A}{\cos A} = \frac{\cos^2 A - \sin^2 A}{\sin A \cos A} = \frac{\cos 2A}{\frac{1}{2} \sin 2A} = 2 \cot 2A$$

Ans: (C) $2 \cot 2A$

21. $\cos \theta + \cos 3\theta + \cos 5\theta + \cos 7\theta =$

$$a_1 = \theta, a_n = 7\theta, d = 2\theta, n = 4$$

$$\text{Sum} = \frac{\cos 4\theta \sin 4\theta}{\sin \theta} = \frac{\sin 8\theta}{2 \sin \theta}$$

Ans: (A) $\frac{\sin 8\theta}{2 \sin \theta}$

22. $\cos^3 20^\circ + \cos^3 140^\circ + \cos^3 100^\circ =$

$$\begin{aligned} \cos^3 \theta + \cos^3(120^\circ + \theta) + \cos^3(120^\circ - \theta) &= \frac{3}{4} \cos 3\theta \text{ with } \theta = 20^\circ \\ &= \frac{3}{4} \cos 60^\circ = \frac{3}{8} \end{aligned}$$

Ans: (D) $\frac{3}{8}$

23. $\sqrt{1 - \sin 20^\circ} =$

$$\sqrt{1 - \sin 2A} = |\cos A - \sin A| \text{ with } A = 10^\circ$$

$$\cos 10^\circ > \sin 10^\circ, \text{ so } = \cos 10^\circ - \sin 10^\circ$$

Ans: (A) $\cos 10^\circ - \sin 10^\circ$

24. $2 \cos 52\frac{1}{2}^\circ \cos 7\frac{1}{2}^\circ =$

$$2 \cos A \cos B = \cos(A+B) + \cos(A-B)$$

$$= \cos 60^\circ + \cos 45^\circ = \frac{1}{2} + \frac{1}{\sqrt{2}} = \frac{1+\sqrt{2}}{2}$$

Ans: (D) $\frac{1+\sqrt{2}}{2}$

25. The period of $\tan 2x + \sin 4x$ is

$$\text{Periods: } \tan 2x \rightarrow \frac{\pi}{2}, \sin 4x \rightarrow \frac{\pi}{2}; \text{ L.C.M} = \frac{\pi}{2}$$

Ans: (D) $\frac{\pi}{2}$
