

Trigonometry up to Transformations

MCQ Test, Set 09

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.

- If $\csc \theta = \frac{41}{40}$ and θ is acute, then $\sec \theta =$
A. $\frac{9}{41}$ **B.** $\frac{40}{41}$ **C.** $\frac{41}{9}$ **D.** $\frac{40}{9}$
- 1440° in radians is
A. 16π **B.** 8π **C.** 6π **D.** 4π
- The sign of $\csc 200^\circ \tan 120^\circ \cos 80^\circ$ is
A. positive **B.** not defined **C.** zero **D.** negative
- $\cos 0^\circ + \sin 90^\circ + \tan 45^\circ =$
A. 0 **B.** 3 **C.** 1 **D.** 2
- $\cos(180^\circ + \theta) =$
A. $-\sin \theta$ **B.** $\cos \theta$
C. $\sin \theta$ **D.** $-\cos \theta$
- $\tan \frac{35\pi}{4} =$
A. 1 **B.** -1 **C.** $\frac{1}{2}$ **D.** $\frac{\sqrt{3}}{2}$
- The greatest value of $3 - 4 \cos x$ is
A. -1 **B.** 4 **C.** 7 **D.** 3
- For the radian angles 4, 5, 6, the cosines satisfy
A. $\cos 4 > \cos 5 > \cos 6$ **B.** $\cos 6 > \cos 4 > \cos 5$
C. $\cos 6 > \cos 5 > \cos 4$ **D.** $\cos 5 > \cos 6 > \cos 4$
- If $A + B = 90^\circ$, then $\sin^2 A + \sin^2 B =$
A. $2 \sin^2 A$ **B.** 0 **C.** $\frac{1}{2}$ **D.** 1
- The value of $\sin^6 \theta + \cos^6 \theta$ at $\theta = 30^\circ$ is
A. $\frac{5}{8}$ **B.** $\frac{7}{16}$ **C.** $\frac{1}{2}$ **D.** 1
- The least value of $9 \sin^2 \theta + \csc^2 \theta$ is
A. 6 **B.** 2 **C.** 3 **D.** 10

12. $\sin 15^\circ + \cos 15^\circ =$

A. 1

B. $\sqrt{2}$

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

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

13. $\frac{\sqrt{3} - \tan 15^\circ}{1 + \sqrt{3} \tan 15^\circ} =$

A. $2 + \sqrt{3}$

B. 1

C. $\frac{1}{\sqrt{3}}$

D. $\sqrt{3}$

14. If $\sin A = \frac{1}{2}$ and $\sin B = \frac{1}{3}$, then $\sin(A + B) \sin(A - B) =$

A. $-\frac{5}{36}$

B. $\frac{5}{36}$

C. $\frac{13}{36}$

D. $\frac{1}{6}$

15. In $\triangle ABC$, if $\cot A = 1$ and $\cot B = 2$, then $\cot C =$

A. $-\frac{1}{3}$

B. 3

C. $\frac{1}{3}$

D. -3

16. $\tan 110^\circ + \tan 115^\circ + \tan 110^\circ \tan 115^\circ =$

A. -1

B. 2

C. 1

D. 0

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

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

B. $\frac{9}{25}$

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

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

18. If $\tan \frac{A}{2} = \frac{1}{3}$, then $\sin A =$

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

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

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

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

19. $\cos 36^\circ \cos 72^\circ =$

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

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

C. $\frac{1}{4}$

D. $\frac{\sqrt{5}}{4}$

20. $\cot x - \tan x - 2 \tan 2x =$

A. $4 \tan 4x$

B. $8 \cot 8x$

C. $4 \cot 4x$

D. $2 \cot 2x$

21. $\cos \frac{2\pi}{5} + \cos \frac{4\pi}{5} =$

A. $-\frac{1}{2}$

B. 0

C. -1

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

22. $\sin 10^\circ \sin 50^\circ \sin 70^\circ =$

A. $\frac{1}{4}$

B. $\frac{1}{16}$

C. $\frac{\sqrt{3}}{8}$

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

23. If $\frac{x}{y} = \frac{\tan A}{\tan B}$, then $\frac{x-y}{x+y} =$

A. $\frac{\sin(A-B)}{\sin(A+B)}$

B. $\frac{\cos(A-B)}{\cos(A+B)}$

C. $\frac{\tan(A-B)}{\tan(A+B)}$

D. $\frac{\sin(A+B)}{\sin(A-B)}$

24. $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ =$

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

B. 1

C. $2 \sin 10^\circ$

D. 0

25. The period of $-3 \sin \frac{x}{2}$ is

A. 2π

B. 6π

C. 4π

D. π

Key sheet

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

Solutions

1. If $\csc \theta = \frac{41}{40}$ and θ is acute, then $\sec \theta =$

$$\csc \theta = \frac{\text{hyp}}{\text{opp}} = \frac{41}{40}: \text{take hyp} = 41, \text{opp} = 40$$

$$\text{adj} = \sqrt{41^2 - 40^2} = \sqrt{81} = 9$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}} = \frac{41}{9}$$

Ans: (C) $\frac{41}{9}$

2. 1440° in radians is

$$1440^\circ = 4 \times 360^\circ = 4 \times 2\pi = 8\pi$$

Ans: (B) 8π

3. The sign of $\csc 200^\circ \tan 120^\circ \cos 80^\circ$ is

$$200^\circ \in \text{III}_Q \Rightarrow \csc 200^\circ \text{ is -ve}$$

$$120^\circ \in \text{II}_Q \Rightarrow \tan 120^\circ \text{ is -ve}$$

$$80^\circ \in \text{I}_Q \Rightarrow \cos 80^\circ \text{ is +ve}$$

So the product is positive

Ans: (A) positive

4. $\cos 0^\circ + \sin 90^\circ + \tan 45^\circ =$

$$= 1 + 1 + 1$$

$$= 3$$

Ans: (B) 3

5. $\cos(180^\circ + \theta) =$

$180^\circ + \theta$ is of the form $180^\circ \pm \theta$ or $360^\circ \pm \theta$, so $\cos$ does not change

For acute θ , $180^\circ + \theta \in \text{III}_Q$, where $\cos$ is -ve

$$\therefore \cos(180^\circ + \theta) = -\cos \theta$$

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

6. $\tan \frac{35\pi}{4} =$

$$\frac{35\pi}{4} = 35 \times 45^\circ = 1575^\circ$$

$$\tan 1575^\circ = \tan(1440^\circ + 135^\circ) = \tan 135^\circ$$

$135^\circ \in \text{II}_Q$, where $\tan$ is -ve

$$\tan 135^\circ = \tan(180^\circ - 45^\circ) = -\tan 45^\circ = -1$$

Ans: (B) -1

7. The greatest value of $3 - 4 \cos x$ is

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

$$\Rightarrow -1 \leq 3 - 4 \cos x \leq 7$$

Ans: (C) 7

8. For the radian angles 4, 5, 6, the cosines satisfy

$$\cos 229^\circ = -\cos 49^\circ < 0, \cos 286^\circ = \cos 74^\circ, \cos 343^\circ = \cos 17^\circ$$
$$\cos 17^\circ > \cos 74^\circ > -\cos 49^\circ$$

Ans: (C) $\cos 6 > \cos 5 > \cos 4$

9. If $A + B = 90^\circ$, then $\sin^2 A + \sin^2 B =$

$$\sin B = \sin(90^\circ - A) = \cos A$$
$$\sin^2 A + \cos^2 A = 1$$

Ans: (D) 1

10. The value of $\sin^6 \theta + \cos^6 \theta$ at $\theta = 30^\circ$ is

$$= 1 - 3 \sin^2 30^\circ \cos^2 30^\circ = 1 - 3 \cdot \frac{1}{4} \cdot \frac{3}{4} = 1 - \frac{9}{16} = \frac{7}{16}$$

Ans: (B) $\frac{7}{16}$

11. The least value of $9 \sin^2 \theta + \csc^2 \theta$ is

Consider $9 \sin^2 \theta$ and $\csc^2 \theta$; both are +ve

$$\text{A.M} \geq \text{G.M: } \frac{9 \sin^2 \theta + \csc^2 \theta}{2} \geq \sqrt{9 \sin^2 \theta \cdot \csc^2 \theta} = \sqrt{9} = 3$$
$$\Rightarrow 9 \sin^2 \theta + \csc^2 \theta \geq 6; \text{equality when } \sin^2 \theta = \frac{1}{3}$$

Ans: (A) 6

12. $\sin 15^\circ + \cos 15^\circ =$

$$\sin 15^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}}, \cos 15^\circ = \frac{\sqrt{3}+1}{2\sqrt{2}}$$
$$\text{Sum} = \frac{2\sqrt{3}}{2\sqrt{2}} = \frac{\sqrt{3}}{\sqrt{2}}$$

Ans: (D) $\frac{\sqrt{3}}{\sqrt{2}}$

13. $\frac{\sqrt{3}-\tan 15^\circ}{1+\sqrt{3}\tan 15^\circ} =$

$$\sqrt{3} = \tan 60^\circ: \text{G.E} = \tan(60^\circ - 15^\circ) = \tan 45^\circ = 1$$

Ans: (B) 1

14. If $\sin A = \frac{1}{2}$ and $\sin B = \frac{1}{3}$, then $\sin(A+B)\sin(A-B) =$

$$\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B$$
$$= \frac{1}{4} - \frac{1}{9} = \frac{5}{36}$$

Ans: (B) $\frac{5}{36}$

15. In $\triangle ABC$, if $\cot A = 1$ and $\cot B = 2$, then $\cot C =$

$$\Sigma \cot A \cot B = 1: 2 + 3 \cot C = 1$$

$$\cot C = -\frac{1}{3}$$

Ans: (A) $-\frac{1}{3}$

16. $\tan 110^\circ + \tan 115^\circ + \tan 110^\circ \tan 115^\circ =$

$$110^\circ + 115^\circ = 225^\circ, \tan 225^\circ = 1$$

$$\Rightarrow \tan A + \tan B + \tan A \tan B = 1$$

Ans: (C) 1

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

$$\sin^2 A = \frac{1 - \cos 2A}{2} = \frac{1 - \frac{7}{25}}{2} = \frac{9}{25}$$

$$\sin A = \frac{3}{5} \text{ (A acute)}$$

Ans: (D) $\frac{3}{5}$

18. If $\tan \frac{A}{2} = \frac{1}{3}$, then $\sin A =$

$$\sin A = \frac{2 \tan \frac{A}{2}}{1 + \tan^2 \frac{A}{2}} = \frac{2/3}{10/9} = \frac{3}{5}$$

Ans: (A) $\frac{3}{5}$

19. $\cos 36^\circ \cos 72^\circ =$

$$\cos 72^\circ = \sin 18^\circ$$

$$\frac{\sqrt{5}+1}{4} \cdot \frac{\sqrt{5}-1}{4} = \frac{5-1}{16} = \frac{1}{4}$$

Ans: (C) $\frac{1}{4}$

20. $\cot x - \tan x - 2 \tan 2x =$

$$\cot x - \tan x = 2 \cot 2x$$

$$2(\cot 2x - \tan 2x) = 2 \cdot 2 \cot 4x = 4 \cot 4x$$

Ans: (C) $4 \cot 4x$

21. $\cos \frac{2\pi}{5} + \cos \frac{4\pi}{5} =$

$$n = 2, d = \frac{2\pi}{5}: \text{sum} = \frac{\cos \frac{3\pi}{5} \sin \frac{2\pi}{5}}{\sin \frac{\pi}{5}} = -\frac{\sin \frac{4\pi}{5}}{2 \sin \frac{\pi}{5}} = -\frac{1}{2}$$

Ans: (A) $-\frac{1}{2}$

22. $\sin 10^\circ \sin 50^\circ \sin 70^\circ =$

$$\theta = 10^\circ: = \frac{1}{4} \sin 30^\circ = \frac{1}{8}$$

Ans: (D) $\frac{1}{8}$

23. If $\frac{x}{y} = \frac{\tan A}{\tan B}$, then $\frac{x-y}{x+y} =$

$$\frac{x-y}{x+y} = \frac{\tan A - \tan B}{\tan A + \tan B} = \frac{\sin A \cos B - \cos A \sin B}{\sin A \cos B + \cos A \sin B} = \frac{\sin(A-B)}{\sin(A+B)}$$

Ans: (A) $\frac{\sin(A-B)}{\sin(A+B)}$

24. $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ =$

$$\sin 50^\circ + \sin 10^\circ = 2 \sin 30^\circ \cos 20^\circ = \cos 20^\circ = \sin 70^\circ$$

So G.E = 0

Ans: (D) 0

25. The period of $-3 \sin \frac{x}{2}$ is

$$-f \text{ has the same period as } f: \frac{2\pi}{1/2} = 4\pi$$

Ans: (C) 4π
