

Trigonometry up to Transformations

MCQ Test, Set 10

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.

1. $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} =$

A. 2

B. $\sec^2\theta$ C. $2\csc^2\theta$ D. $2\sec^2\theta$

2. The radian measure of 105° is

A. $\frac{5\pi}{12}$ B. $\frac{7\pi}{12}$ C. $\frac{11\pi}{12}$ D. $\frac{7\pi}{6}$

3. If $\theta = 160^\circ$, which of the following is positive?

A. $\tan\theta$ B. $\cot\theta$ C. $\cos\theta$ D. $\csc\theta$

4. $3\cot^2 60^\circ + \sec^2 45^\circ =$

A. 2

B. 3

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

D. 11

5. $\sec(360^\circ - \theta) =$

A. $\sec\theta$ B. $-\csc\theta$ C. $-\sec\theta$ D. $\csc\theta$

6. $\tan 1260^\circ + \cos 1170^\circ + \sin 1350^\circ =$

A. 1

B. 0

C. -2

D. -1

7. Which of the following is a possible value of $\cos\theta$?

A. $\frac{7}{5}$ B. $-\frac{5}{7}$

C. -2

D. $\sqrt{3}$

8. Between 0 and 2π , the graph of $\cos x$ cuts the x-axis at

A. $\frac{\pi}{2}$ and $\frac{3\pi}{2}$ B. π and 2π C. 0 and π D. $\frac{\pi}{4}$ and $\frac{3\pi}{4}$

9. $\cot 12^\circ \cot 38^\circ \cot 52^\circ \cot 60^\circ \cot 78^\circ =$

A. $\sqrt{3}$

B. 0

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

D. 1

10. If $\sin\theta \cos\theta = \frac{1}{8}$, then $\sin^4\theta + \cos^4\theta =$

A. $\frac{31}{32}$ B. $\frac{61}{64}$ C. $\frac{63}{64}$ D. $\frac{15}{16}$

11. If $x > 0$, the least value of $x + \frac{4}{x}$ is

A. 4

B. 8

C. 2

D. 5

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

A. $\sqrt{2} \cos \theta$

B. $2 \sin \theta$

C. 0

D. $\sqrt{2} \sin \theta$

13. $\tan 80^\circ - \tan 10^\circ =$

A. $2 \cot 70^\circ$

B. $\tan 70^\circ$

C. $2 \tan 70^\circ$

D. $2 \tan 10^\circ$

14. If $\cos A = \frac{3}{4}$ and $\sin B = \frac{1}{2}$, then $\cos(A + B) \cos(A - B) =$

A. $-\frac{3}{16}$

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

C. $\frac{13}{16}$

D. $\frac{5}{16}$

15. If $A + B + C = 90^\circ$, $\cot A = 2$ and $\cot B = 3$, then $\cot C =$

A. 5

B. -1

C. 1

D. $\frac{1}{5}$

16. $(2 + 2 \tan 15^\circ)(1 + \tan 30^\circ) =$

A. 8

B. 4

C. 2

D. 3

17. $8 \sin x \cos x \cos 2x \cos 4x =$

A. $\sin 16x$

B. $8 \sin 8x$

C. $\sin 4x$

D. $\sin 8x$

18. If $\tan \frac{A}{2} = 2$, then $\cos A =$

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

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

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

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

19. $\tan 7\frac{1}{2}^\circ =$

A. $(\sqrt{3} - \sqrt{2})(\sqrt{2} - 1)$

B. $(\sqrt{3} - \sqrt{2})(\sqrt{2} + 1)$

C. $(\sqrt{3} + \sqrt{2})(\sqrt{2} + 1)$

D. $(\sqrt{3} + \sqrt{2})(\sqrt{2} - 1)$

20. $\cos \frac{2\pi}{7} \cos \frac{4\pi}{7} \cos \frac{8\pi}{7} =$

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

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

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

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

21. If $a = \cos \frac{2\pi}{7}$, $b = \cos \frac{4\pi}{7}$, $c = \cos \frac{6\pi}{7}$, then $8abc =$

A. -1

B. 4

C. -4

D. 1

22. $\tan 5^\circ \tan 55^\circ \tan 65^\circ =$

A. $\tan 5^\circ$

B. $2 - \sqrt{3}$

C. $2 + \sqrt{3}$

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

23. $\sqrt{1 + \sin 240^\circ} =$

A. $\frac{\sqrt{3}+1}{2}$

B. $\frac{1-\sqrt{3}}{2}$

C. $\frac{\sqrt{3}-1}{2}$

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

24. If $\sin x + \sin y = \frac{1}{2}$ and $\cos x + \cos y = \frac{1}{3}$, then $\tan \frac{x+y}{2} =$

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

B. $\frac{5}{6}$

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

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

25. The period of $\tan^3 x$ is

A. 2π

B. π

C. 3π

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

Key sheet

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

Solutions

1. $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} =$
 $= \frac{(1-\sin\theta)+(1+\sin\theta)}{1-\sin^2\theta} = \frac{2}{\cos^2\theta} = 2\sec^2\theta$

Ans: (D) $2\sec^2\theta$

2. The radian measure of 105° is

$$105^\circ = 105 \times \frac{\pi}{180} = \frac{7\pi}{12}$$

Ans: (B) $\frac{7\pi}{12}$

3. If $\theta = 160^\circ$, which of the following is positive?

$160^\circ \in \text{II}_Q$, where only $\sin$, $\csc$ are +ve

Ans: (D) $\csc\theta$

4. $3\cot^2 60^\circ + \sec^2 45^\circ =$
 $= 3\left(\frac{1}{3}\right) + (\sqrt{2})^2 = 1 + 2$
 $= 3$

Ans: (B) 3

5. $\sec(360^\circ - \theta) =$

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

For acute θ , $360^\circ - \theta \in \text{IV}_Q$, where $\sec$ is +ve

$$\therefore \sec(360^\circ - \theta) = \sec\theta$$

Ans: (A) $\sec\theta$

6. $\tan 1260^\circ + \cos 1170^\circ + \sin 1350^\circ =$

$$\tan 1260^\circ = \tan(1080^\circ + 180^\circ) = \tan 180^\circ = 0$$

$$\cos 1170^\circ = \cos(1080^\circ + 90^\circ) = \cos 90^\circ = 0$$

$$\sin 1350^\circ = \sin(1080^\circ + 270^\circ) = \sin 270^\circ = -1$$

$$0 + 0 + (-1)$$

$$= -1$$

Ans: (D) -1

7. Which of the following is a possible value of $\cos\theta$?

$$-1 \leq \cos\theta \leq 1$$

Only $-\frac{5}{7}$ lies in $[-1, 1]$

Ans: (B) $-\frac{5}{7}$

8. Between 0 and 2π , the graph of $\cos x$ cuts the x-axis at

$$\cos x = 0 \Rightarrow x = (2n+1)\frac{\pi}{2}$$

$$\text{In } (0, 2\pi): x = \frac{\pi}{2}, \frac{3\pi}{2}$$

Ans: (A) $\frac{\pi}{2}$ and $\frac{3\pi}{2}$

9. $\cot 12^\circ \cot 38^\circ \cot 52^\circ \cot 60^\circ \cot 78^\circ =$

$$\cot 12^\circ \cot 78^\circ = 1, \cot 38^\circ \cot 52^\circ = 1$$

$$\text{G.E} = \cot 60^\circ = \frac{1}{\sqrt{3}}$$

Ans: (C) $\frac{1}{\sqrt{3}}$

10. If $\sin \theta \cos \theta = \frac{1}{8}$, then $\sin^4 \theta + \cos^4 \theta =$

$$\begin{aligned} \sin^4 \theta + \cos^4 \theta &= (\sin^2 \theta + \cos^2 \theta)^2 - 2 \sin^2 \theta \cos^2 \theta = 1 - 2(\sin \theta \cos \theta)^2 \\ &= 1 - 2\left(\frac{1}{8}\right)^2 = 1 - \frac{1}{32} = \frac{31}{32} \end{aligned}$$

Ans: (A) $\frac{31}{32}$

11. If $x > 0$, the least value of $x + \frac{4}{x}$ is

$$\text{A.M} \geq \text{G.M: } \frac{x + \frac{4}{x}}{2} \geq \sqrt{x \cdot \frac{4}{x}} = 2$$

$$\Rightarrow x + \frac{4}{x} \geq 4 \text{ (equality at } x = 2)$$

Ans: (A) 4

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

$$\sin(45^\circ + \theta) = \frac{1}{\sqrt{2}}(\cos \theta + \sin \theta)$$

$$\cos(45^\circ - \theta) = \frac{1}{\sqrt{2}}(\cos \theta + \sin \theta)$$

$$\text{Difference} = 0$$

Ans: (C) 0

13. $\tan 80^\circ - \tan 10^\circ =$

$$\tan 70^\circ = \tan(80^\circ - 10^\circ) = \frac{\tan 80^\circ - \tan 10^\circ}{1 + \tan 80^\circ \tan 10^\circ}$$

$$\tan 80^\circ \tan 10^\circ = 1, \text{ so } \tan 80^\circ - \tan 10^\circ = 2 \tan 70^\circ$$

Ans: (C) $2 \tan 70^\circ$

14. If $\cos A = \frac{3}{4}$ and $\sin B = \frac{1}{2}$, then $\cos(A + B) \cos(A - B) =$

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

$$= \frac{9}{16} - \frac{1}{4} = \frac{5}{16}$$

Ans: (D) $\frac{5}{16}$

15. If $A + B + C = 90^\circ$, $\cot A = 2$ and $\cot B = 3$, then $\cot C =$

$$\Sigma \cot A = \Pi \cot A: 2 + 3 + \cot C = 6 \cot C$$

$$5 \cot C = 5 \Rightarrow \cot C = 1$$

Ans: (C) 1

16. $(2 + 2 \tan 15^\circ)(1 + \tan 30^\circ) =$

$$= 2(1 + \tan 15^\circ)(1 + \tan 30^\circ) \text{ and } 15^\circ + 30^\circ = 45^\circ$$

$$= 2 \times 2 = 4$$

Ans: (B) 4

17. $8 \sin x \cos x \cos 2x \cos 4x =$

$$= 4 \sin 2x \cos 2x \cos 4x = 2 \sin 4x \cos 4x = \sin 8x$$

Ans: (D) $\sin 8x$

18. If $\tan \frac{A}{2} = 2$, then $\cos A =$

$$\cos A = \frac{1 - \tan^2 \frac{A}{2}}{1 + \tan^2 \frac{A}{2}} = \frac{1 - 4}{1 + 4} = -\frac{3}{5}$$

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

19. $\tan 7\frac{1}{2}^\circ =$

$$\tan 7\frac{1}{2}^\circ = \frac{1 - \cos 15^\circ}{\sin 15^\circ}$$

Simplifying gives $(\sqrt{3} - \sqrt{2})(\sqrt{2} - 1)$ (standard result)

Ans: (A) $(\sqrt{3} - \sqrt{2})(\sqrt{2} - 1)$

20. $\cos \frac{2\pi}{7} \cos \frac{4\pi}{7} \cos \frac{8\pi}{7} =$

$$= \frac{\sin \frac{16\pi}{7}}{8 \sin \frac{2\pi}{7}}$$

$$\sin \frac{16\pi}{7} = \sin \left(2\pi + \frac{2\pi}{7}\right) = \sin \frac{2\pi}{7}$$

$$\text{G.E} = \frac{1}{8}$$

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

21. If $a = \cos \frac{2\pi}{7}$, $b = \cos \frac{4\pi}{7}$, $c = \cos \frac{6\pi}{7}$, then $8abc =$

$$abc = -\cos \frac{\pi}{7} \cos \frac{2\pi}{7} \cos \frac{4\pi}{7} = -\frac{\sin \frac{8\pi}{7}}{8 \sin \frac{\pi}{7}} = \frac{1}{8}$$

$$8abc = 1$$

Ans: (D) 1

22. $\tan 5^\circ \tan 55^\circ \tan 65^\circ =$

$$\theta = 5^\circ: \tan 15^\circ = 2 - \sqrt{3}$$

Ans: (B) $2 - \sqrt{3}$

23. $\sqrt{1 + \sin 240^\circ} =$

$$\sqrt{1 + \sin 2A} = |\cos A + \sin A| \text{ with } A = 120^\circ$$

$$= \left| -\frac{1}{2} + \frac{\sqrt{3}}{2} \right| = \frac{\sqrt{3}-1}{2}$$

Ans: (C) $\frac{\sqrt{3}-1}{2}$

24. If $\sin x + \sin y = \frac{1}{2}$ and $\cos x + \cos y = \frac{1}{3}$, then $\tan \frac{x+y}{2} =$

$$\frac{\sin x + \sin y}{\cos x + \cos y} = \frac{2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}}{2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}} = \tan \frac{x+y}{2}$$

$$= \frac{1/2}{1/3} = \frac{3}{2}$$

Ans: (C) $\frac{3}{2}$

25. The period of $\tan^3 x$ is

$\tan^n x$ has period π for every n

Ans: (B) π
