EXPRESSWALA ACADEMY

Trigonometry up to Transformations

MCQ Test, Set 08

Time: 30 minutes | Maximum marks: 25

Name: _____ Class: _____ Date: _____

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

1. $\frac{\tan\theta}{\sec\theta} =$

A. $\sin\theta$ **B.** $\cos\theta$ **C.** $\cot\theta$ **D.** $\csc\theta$

2. $\frac{7\pi}{4}$ radians in degrees is

A. 225° **B.** 315° **C.** 135° **D.** 330°

3. If $\tan\theta < 0$ and $\sec\theta > 0$, then θ lies in

A. I_Q **B.** II_Q **C.** III_Q **D.** IV_Q

4. $4\cos^2 45^\circ - \csc^2 45^\circ =$

A. 1 **B.** -2 **C.** 0 **D.** 2

5. $\csc(270^\circ + \theta) =$

A. $-\csc\theta$ **B.** $\sec\theta$

C. $\csc\theta$ **D.** $-\sec\theta$

6. $\sec\frac{23\pi}{3} =$

A. $\frac{2}{\sqrt{3}}$ **B.** $-\frac{2}{\sqrt{3}}$ **C.** 2 **D.** -2

7. The function $\csc x$ is defined for all real x except

A. $x = 2n\pi, n \in Z$ **B.** $x = n\pi, n \in Z$

C. $x = (2n+1)\frac{\pi}{2}, n \in Z$ **D.** $x = \frac{n\pi}{4}, n \in Z$

8. If $x = \cos 3$ and $y = \cos 3^\circ$, then

A. $x = -y$ **B.** $x < y$ **C.** $x = y$ **D.** $x > y$

9. $\tan 15^\circ \tan 35^\circ \tan 55^\circ \tan 75^\circ =$

A. 1 **B.** $\sqrt{3}$ **C.** 0 **D.** $\frac{1}{\sqrt{3}}$

10. If $\sin\theta\cos\theta = \frac{3}{7}$, then $\sin^2\theta + \cos^4\theta =$

A. $\frac{31}{49}$ **B.** $\frac{9}{49}$ **C.** $\frac{22}{49}$ **D.** $\frac{40}{49}$

11. $\sqrt{1-\sin^2 20^\circ} =$

A. $-\cos 20^\circ$ **B.** $\cos 20^\circ$

C. $-\sin 20^\circ$ **D.** $\sin 20^\circ$

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12. $\cos 80^\circ \cos 20^\circ + \sin 80^\circ \sin 20^\circ =$

A. $\cos 100^\circ$ **B.** $-\frac{1}{2}$

C. $\frac{1}{2}$ **D.** $\frac{\sqrt{3}}{2}$

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13. $\frac{1-\tan 20^\circ}{1+\tan 20^\circ} =$

A. $\tan 25^\circ$ **B.** $\tan 70^\circ$

C. $\tan 65^\circ$ **D.** $\tan 20^\circ$

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14. $\cos^2(30^\circ+\theta) - \sin^2(30^\circ-\theta) =$

A. $\cos 2\theta$ **B.** $\frac{1}{2}\sin 2\theta$

C. $\frac{1}{2}\cos 2\theta$ **D.** $\frac{\sqrt{3}}{2}\cos 2\theta$

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

A. $\cot A \cot B \cot C$ **B.** $-\cot A \cot B \cot C$

C. 0 **D.** 1

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16. $(\cot 10^\circ - 1)(\cot 35^\circ - 1) =$

A. 1 **B.** 2 **C.** 0 **D.** -2

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17. If $\sin A = \frac{2}{5}$, then $\cos 2A =$

A. $\frac{17}{25}$ **B.** $\frac{1}{5}$ **C.** $\frac{21}{25}$ **D.** $-\frac{17}{25}$

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18. If $\cos A = \frac{1}{9}$ and A is acute, then $\sin \frac{A}{2} =$

A. $\frac{4}{9}$ **B.** $\frac{\sqrt{5}}{3}$ **C.** $\frac{2}{3}$ **D.** $\frac{1}{3}$

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19. $\sin 18^\circ + \cos 36^\circ =$

A. 1 **B.** $\frac{1}{2}$ **C.** $\frac{\sqrt{5}}{2}$ **D.** $\frac{\sqrt{5}}{4}$

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20. $\cos 10^\circ \cos 20^\circ \cos 40^\circ =$

A. $\frac{1}{8}$ **B.** $\frac{1}{8}\tan 10^\circ$

C. $\frac{1}{4}\cot 10^\circ$ **D.** $\frac{1}{8}\cot 10^\circ$

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21. $1 + \cos\frac{2\pi}{7} + \cos\frac{4\pi}{7} + \cos\frac{6\pi}{7} =$

A. $\frac{1}{2}$ **B.** 1 **C.** $-\frac{1}{2}$ **D.** $\frac{3}{2}$

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22. $\cot 80^\circ \cot 40^\circ + \cot 40^\circ \cot 20^\circ - \cot 20^\circ \cot 80^\circ =$

A. -3 **B.** 3 **C.** 1 **D.** $\sqrt{3}$

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23. If $\frac{x}{y} = \frac{\sin 90^\circ}{\sin 30^\circ}$, then $\frac{x+y}{x-y} =$

A. $\frac{1}{3}$ **B.** $\sqrt{3}$ **C.** 2 **D.** 3

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24. In $\triangle ABC$, $\sin 2A + \sin 2B + \sin 2C =$

A. $4 \sin A \sin B \cos C$

B. $1 + 4 \sin A \sin B \sin C$

C. $4 \cos A \cos B \cos C$

D. $4 \sin A \sin B \sin C$

25. The period of $\sin^5 x$ is

A. $\frac{2\pi}{5}$

B. π

C. 2π

D. 10π

Key sheet

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

Solutions

1. $\frac{\tan\theta}{\sec\theta} =$

$\frac{\tan\theta}{\sec\theta} = \frac{\sin\theta}{\cos\theta} \times \cos\theta = \sin\theta$

Ans: (A) $\sin\theta$

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2. $\frac{7\pi}{4}$ radians in degrees is

$\frac{7\pi}{4} = 7 \times 45^\circ = 315^\circ$

Ans: (B) 315°

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3. If $\tan\theta < 0$ and $\sec\theta > 0$, then θ lies in

$\tan$ is -ve and $\sec$ is +ve only in IV_Q

Ans: (D) IV_Q

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4. $4\cos^2 45^\circ - \csc^2 45^\circ =$

$= 4\left(\frac{1}{2}\right) - (\sqrt{2})^2 = 2 - 2$

$= 0$

Ans: (C) 0

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5. $\csc(270^\circ + \theta) =$

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

For acute θ, $270^\circ + \theta \in \text{IV}_Q$, where $\csc$ is -ve

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

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

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6. $\sec\frac{23\pi}{3} =$

$\frac{23\pi}{3} = 23 \times 60^\circ = 1380^\circ$

$\sec 1380^\circ = \sec(1080^\circ + 300^\circ) = \sec 300^\circ$

$300^\circ \in \text{IV}_Q$, where $\sec$ is +ve

$\sec 300^\circ = \sec(360^\circ - 60^\circ) = +\sec 60^\circ = 2$

Ans: (C) 2

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7. The function $\csc x$ is defined for all real x except

$\csc x = \frac{1}{\sin x}$ needs $\sin x \neq 0$

$\sin x = 0 \Rightarrow x = n\pi$

Ans: (B) $x = n\pi, n \in Z$

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8. If $x = \cos 3$ and $y = \cos 3^\circ$, then

$3 \approx 171^\circ \in \text{II}_Q$, so $x = \cos 3 < 0$

$y = \cos 3^\circ > 0$, so $x < y$

Ans: (B) $x < y$

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9. $\tan 15^\circ \tan 35^\circ \tan 55^\circ \tan 75^\circ =$

$\tan 15^\circ \tan 75^\circ = 1$ and $\tan 35^\circ \tan 55^\circ = 1$ (complementary pairs)

Ans: (A) 1

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10. If $\sin\theta\cos\theta = \frac{3}{7}$, then $\sin^2\theta + \cos^4\theta =$

$\sin^2\theta + \cos^4\theta = \sin^2\theta + \cos^2\theta(1 - \sin^2\theta) = 1 - \sin^2\theta\cos^2\theta$

$= 1 - \left(\frac{3}{7}\right)^2 = 1 - \frac{9}{49} = \frac{40}{49}$

Ans: (D) $\frac{40}{49}$

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11. $\sqrt{1 - \sin^2 20^\circ} =$

$= \sqrt{\cos^2 20^\circ} = |\cos 20^\circ|$

$20^\circ \in \mathrm{I}_Q \Rightarrow \cos 20^\circ > 0$, so $= \cos 20^\circ$

Ans: (B) $\cos 20^\circ$

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12. $\cos 80^\circ \cos 20^\circ + \sin 80^\circ \sin 20^\circ =$

$= \cos(80^\circ - 20^\circ) = \cos 60^\circ = \frac{1}{2}$

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

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13. $\frac{1-\tan 20^\circ}{1+\tan 20^\circ} =$

$\frac{1-\tan\theta}{1+\tan\theta} = \tan(45^\circ - \theta)$

$= \tan 25^\circ$

Ans: (A) $\tan 25^\circ$

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14. $\cos^2(30^\circ + \theta) - \sin^2(30^\circ - \theta) =$

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

$= \cos 60^\circ \cos 2\theta = \frac{1}{2}\cos 2\theta$

Ans: (C) $\frac{1}{2}\cos 2\theta$

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

$A + B = 90^\circ - C \Rightarrow \cot(A + B) = \tan C = \frac{1}{\cot C}$

$\frac{\cot A \cot B - 1}{\cot A + \cot B} = \frac{1}{\cot C} \Rightarrow \Sigma \cot A = \Pi \cot A$

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

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16. $(\cot 10^\circ - 1)(\cot 35^\circ - 1) =$

$= (1 - \cot 10^\circ)(1 - \cot 35^\circ)$ and $10^\circ + 35^\circ = 45^\circ$

Value $= 2$

Ans: (B) 2

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17. If $\sin A = \frac{2}{5}$, then $\cos 2A =$

$\cos 2A = 1 - 2\sin^2 A = 1 - \frac{8}{25} = \frac{17}{25}$

Ans: (A) $\frac{17}{25}$

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18. If $\cos A = \frac{1}{9}$ and A is acute, then $\sin\frac{A}{2} =$

$\sin\frac{A}{2} = \sqrt{\frac{1-\cos A}{2}} = \sqrt{\frac{8/9}{2}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$

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

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19. $\sin 18^\circ + \cos 36^\circ =$

$= \frac{(\sqrt{5}-1)+(\sqrt{5}+1)}{4} = \frac{2\sqrt{5}}{4} = \frac{\sqrt{5}}{2}$

Ans: (C) $\frac{\sqrt{5}}{2}$

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20. $\cos 10^\circ \cos 20^\circ \cos 40^\circ =$

$= \frac{\sin 80^\circ}{8\sin 10^\circ} = \frac{\cos 10^\circ}{8\sin 10^\circ} = \frac{1}{8}\cot 10^\circ$

Ans: (D) $\frac{1}{8}\cot 10^\circ$

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21. $1 + \cos\frac{2\pi}{7} + \cos\frac{4\pi}{7} + \cos\frac{6\pi}{7} =$

$\cos\frac{2\pi}{7} + \cos\frac{4\pi}{7} + \cos\frac{6\pi}{7} = -\frac{1}{2}$

G.E $= 1 - \frac{1}{2} = \frac{1}{2}$

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

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22. $\cot 80^\circ \cot 40^\circ + \cot 40^\circ \cot 20^\circ - \cot 20^\circ \cot 80^\circ =$

$\cot(60^\circ+\theta)\cot(60^\circ-\theta) + \cot(60^\circ-\theta)\cot\theta - \cot\theta\cot(60^\circ+\theta) = 3$ with $\theta = 20^\circ$

Ans: (B) 3

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23. If $\frac{x}{y} = \frac{\sin 90^\circ}{\sin 30^\circ}$, then $\frac{x+y}{x-y} =$

$\frac{x+y}{x-y} = \frac{\tan 60^\circ}{\tan 30^\circ} = \frac{\sqrt{3}}{1/\sqrt{3}} = 3$

Ans: (D) 3

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24. In $\triangle ABC$, $\sin 2A + \sin 2B + \sin 2C =$

$= 2\sin(A+B)\cos(A-B) + 2\sin C\cos C = 2\sin C[\cos(A-B) - \cos(A+B)]$

$= 2\sin C \cdot 2\sin A\sin B = 4\sin A\sin B\sin C$

Ans: (D) $4\sin A\sin B\sin C$

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25. The period of $\sin^5 x$ is

$\sin^n x$ with n odd has period 2π

Ans: (C) 2π