EXPRESSWALA ACADEMY

Maths 1A: Trigonometric Ratios

MCQ Test, Set 01

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. If $P(a, b)$ lies in the first quadrant, then the point $(-b, a)$ lies in the

A. second quadrant **B.** first quadrant

C. fourth quadrant **D.** third quadrant

2. 285° in radians is

A. $\frac{57\pi}{40}$ **B.** $\frac{19\pi}{12}$ **C.** $\frac{12\pi}{19}$ **D.** $\frac{19\pi}{6}$

3. 105^g in degrees is

A. $\frac{189}{2}^\circ$ **B.** 189° **C.** 105° **D.** $\frac{350}{3}^\circ$

4. In a circle of radius 6 cm, an arc subtends $\frac{7}{3}$ radians at the centre. Its length is

A. $\frac{18}{7}$ cm **B.** 14 cm **C.** 28 cm **D.** $\frac{7}{18}$ cm

5. If the terminal side of θ passes through $(20, -21)$, then $\sec\theta =$

A. $-\frac{29}{21}$ **B.** $\frac{20}{29}$ **C.** $\frac{29}{20}$ **D.** $-\frac{29}{20}$

6. If $\tan\theta = -\frac{12}{35}$ and θ is in the fourth quadrant, then $\sec\theta =$

A. $-\frac{37}{12}$ **B.** $\frac{35}{37}$ **C.** $-\frac{37}{35}$ **D.** $\frac{37}{35}$

7. If $\tan\theta = -\frac{16}{63}$ and θ is in the fourth quadrant, then $\operatorname{cosec}\theta =$

A. $-\frac{16}{65}$ **B.** $\frac{65}{16}$ **C.** $-\frac{65}{16}$ **D.** $\frac{65}{63}$

8. If $\operatorname{cosec}\theta + \cot\theta = 5$, then $\cot\theta =$

A. $\frac{1}{5}$ **B.** $-\frac{12}{5}$ **C.** $\frac{12}{5}$ **D.** $\frac{13}{5}$

9. If $\tan\theta = \frac{1}{3}$, then $\sec^2\theta =$

A. $\frac{9}{10}$ **B.** $\frac{10}{9}$ **C.** $\frac{8}{9}$ **D.** $-\frac{8}{9}$

10. If $\sec\theta < 0$ and $\cot\theta < 0$, then θ lies in the

A. second quadrant **B.** fourth quadrant

C. third quadrant **D.** first quadrant

11. $\operatorname{cosec} 60^\circ \cdot \operatorname{cosec} 30^\circ =$

A. $\frac{\sqrt{3}}{4}$ **B.** $\frac{8\sqrt{3}}{3}$ **C.** $\frac{2\sqrt{3}}{3} + 2$ **D.** $\frac{4\sqrt{3}}{3}$

12. $\sec 60^\circ \cdot \operatorname{cosec} 45^\circ =$

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

13. $\cot(1470^\circ) =$

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

14. $\sin(240^\circ) =$

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

15. $\cos(360^\circ - \theta) \cdot \cot(270^\circ + \theta) =$

A. $\operatorname{cosec}\theta$ **B.** $-\operatorname{cosec}\theta$

C. $\sin\theta$ **D.** $-\sin\theta$

16. $\sin(360^\circ - \theta) \cdot \cos(90^\circ - \theta) =$

A. $-\operatorname{cosec}^2\theta$ **B.** $\sin^2\theta$

C. $\operatorname{cosec}^2\theta$ **D.** $-\sin^2\theta$

17. The maximum value of $7 - 6\cos x$ is

A. 13 **B.** 7 **C.** 1 **D.** 6

18. The domain of the secant function $\sec x$ is

A. $\mathbb{R} - \{n\pi : n \in \mathbb{Z}\}$ **B.** $\mathbb{R}$

C. $\mathbb{R} - \left\{(2n+1)\frac{\pi}{2} : n \in \mathbb{Z}\right\}$ **D.** $\mathbb{R} - \{0\}$

19. In the interval $\left(0, \frac{\pi}{2}\right)$, which of these functions is decreasing?

A. $\cos x$ **B.** $\sec x$ **C.** $\tan x$ **D.** $\sin x$

20. $ABCD$ is a cyclic quadrilateral with $\tan A = \frac{6}{7}$. Then $\tan C =$

A. $\frac{6}{7}$ **B.** $\frac{1}{7}$ **C.** $-\frac{6}{7}$ **D.** $\frac{7}{6}$

21. If $A + B = 90^\circ$ and $\sin A = \frac{5}{13}$, then $\tan B =$

A. $\frac{5}{12}$ **B.** $\frac{5}{13}$ **C.** $\frac{12}{13}$ **D.** $\frac{12}{5}$

22. The least value of $16\cos^2 x + 16\sec^2 x$ is

A. 32 **B.** 128 **C.** 16 **D.** 64

23. If $\sin\theta\cos\theta = \frac{1}{9}$, then $\sin^4\theta + \cos^4\theta =$

A. $\frac{83}{81}$ **B.** $\frac{80}{81}$ **C.** $\frac{26}{27}$ **D.** $\frac{79}{81}$

24. $\operatorname{cosec}\theta \cdot \tan\theta \cdot \sec\theta =$

A. $\cos^2\theta$ **B.** $\sec^2\theta$

C. $-\sec^2\theta$ **D.** $-\cos^2\theta$

25. $\cos\theta + \cos(\pi+\theta) + \cdots + \cos(16\pi+\theta) =$

A. $-\cos\theta$

B. $\cos\theta$

C. $17\cos\theta$

D. 0

Key sheet

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

Solutions

1. If $P(a, b)$ lies in the first quadrant, then the point $(-b, a)$ lies in the

In the first quadrant $a > 0$, $b > 0$.
So $(-b, a)$ has $x < 0$, $y > 0$: the second quadrant.

Ans: (A) second quadrant

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2. 285° in radians is

$285^\circ = 285 \times \frac{\pi}{180}$
$= \frac{19\pi}{12}$

Ans: (B) $\frac{19\pi}{12}$

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3. 105^g in degrees is

$1^g = \frac{9}{10}^\circ$
$105^g = \frac{189}{2}^\circ$

Ans: (A) $\frac{189}{2}^\circ$

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4. In a circle of radius 6 cm, an arc subtends $\frac{7}{3}$ radians at the centre. Its length is

$l = r\theta = 6 \times \frac{7}{3} = 14$ cm

Ans: (B) 14 cm

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5. If the terminal side of θ passes through $(20, -21)$, then $\sec\theta =$

$r = \sqrt{(20)^2 + (-21)^2} = 29$
$\sec\theta = \frac{29}{20}$

Ans: (C) $\frac{29}{20}$

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6. If $\tan\theta = -\frac{12}{35}$ and θ is in the fourth quadrant, then $\sec\theta =$

In the fourth quadrant: $x = 35$, $y = -12$, $r = 37$.
$\sec\theta = \frac{37}{35}$

Ans: (D) $\frac{37}{35}$

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7. If $\tan\theta = -\frac{16}{63}$ and θ is in the fourth quadrant, then $\operatorname{cosec}\theta =$

In the fourth quadrant: $x = 189$, $y = -48$, $r = 195$.
$\operatorname{cosec}\theta = -\frac{65}{16}$

Ans: (C) $-\frac{65}{16}$

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8. If $\operatorname{cosec}\theta + \cot\theta = 5$, then $\cot\theta =$

$\operatorname{cosec}\theta - \cot\theta = \frac{1}{5}$
$\cot\theta = \frac{12}{5}$

Ans: (C) $\frac{12}{5}$

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9. If $\tan\theta = \frac{1}{3}$, then $\sec^2\theta =$

$\sec^2\theta = 1 + \tan^2\theta = 1 + \frac{1}{9} = \frac{10}{9}$

Ans: (B) $\frac{10}{9}$

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10. If $\sec\theta < 0$ and $\cot\theta < 0$, then θ lies in the

All, Silver, Tea, Cups gives the positive ratios in quadrants I to IV.

Both signs fit only the second quadrant.

Ans: (A) second quadrant

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11. $\operatorname{cosec} 60^\circ \cdot \operatorname{cosec} 30^\circ =$

$\operatorname{cosec} 60^\circ = \frac{2\sqrt{3}}{3},\ \operatorname{cosec} 30^\circ = 2$

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

Ans: (D) $\frac{4\sqrt{3}}{3}$

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12. $\sec 60^\circ \cdot \operatorname{cosec} 45^\circ =$

$\sec 60^\circ = 2,\ \operatorname{cosec} 45^\circ = \sqrt{2}$

Value $= 2\sqrt{2}$

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

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13. $\cot(1470^\circ) =$

$1470^\circ = 4 \times 360^\circ + 30^\circ$, so $\cot 1470^\circ = \cot 30^\circ$.

$\cot 30^\circ = \sqrt{3}$

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

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14. $\sin(240^\circ) =$

$\sin 240^\circ = \sin(180^\circ + 60^\circ) = -\sin 60^\circ = -\frac{\sqrt{3}}{2}$

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

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15. $\cos(360^\circ - \theta) \cdot \cot(270^\circ + \theta) =$

$\cos(360^\circ - \theta) = \cos\theta,\ \cot(270^\circ + \theta) = -\tan\theta$

Product $= -\sin\theta$

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

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16. $\sin(360^\circ - \theta) \cdot \cos(90^\circ - \theta) =$

$\sin(360^\circ - \theta) = -\sin\theta,\ \cos(90^\circ - \theta) = \sin\theta$

Product $= -\sin^2\theta$

Ans: (D) $-\sin^2\theta$

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17. The maximum value of $7 - 6\cos x$ is

$\cos x$ runs from -1 to 1.

So $7 - 6\cos x$ runs from 1 to 13.

Ans: (A) 13

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18. The domain of the secant function $\sec x$ is

$\sec x$ is undefined where $\cos x = 0$.

So the domain is $\mathbb{R} - \left\{(2n+1)\frac{\pi}{2} : n \in \mathbb{Z}\right\}$.

Ans: (C) $\mathbb{R} - \left\{(2n+1)\frac{\pi}{2} : n \in \mathbb{Z}\right\}$

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19. In the interval $\left(0, \frac{\pi}{2}\right)$, which of these functions is decreasing?

$\left(0, \frac{\pi}{2}\right)$ is quadrant I.

There the decreasing functions are $\cos$, $\cot$, cosec.

Ans: (A) $\cos x$

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20. $ABCD$ is a cyclic quadrilateral with $\tan A = \frac{6}{7}$. Then $\tan C =$

$A + C = 180^\circ$

$\tan C = \tan(180^\circ - A) = -\frac{6}{7}$

Ans: (C) $-\frac{6}{7}$

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21. If $A + B = 90^\circ$ and $\sin A = \frac{5}{13}$, then $\tan B =$

$\cos A = \frac{12}{13},\ \tan B = \cot A$

$\cot A = \frac{12}{5}$

Ans: (D) $\frac{12}{5}$

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22. The least value of $16\cos^2 x + 16\sec^2 x$ is

By A.M. $\geq$ G.M., $16\cos^2 x + 16\sec^2 x \geq 2\sqrt{16 \cdot 16} = 32$

Equality is possible here, so the least value is 32.

Ans: (A) 32

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23. If $\sin\theta\cos\theta = \frac{1}{9}$, then $\sin^4\theta + \cos^4\theta =$

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

$= 1 - 2 \cdot \frac{1}{81} = \frac{79}{81}$

Ans: (D) $\frac{79}{81}$

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24. $\operatorname{cosec}\theta \cdot \tan\theta \cdot \sec\theta =$

$\operatorname{cosec}\theta \cdot \tan\theta = \sec\theta$

Then multiply by $\sec\theta$: the product is $\sec^2\theta$.

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

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25. $\cos\theta + \cos(\pi + \theta) + \cdots + \cos(16\pi + \theta) =$

Consecutive terms are $\cos\theta$ and $-\cos\theta$; there are 17 terms.

Sum $= \cos\theta$

Ans: (B) $\cos\theta$
