EXPRESSWALA ACADEMY

Maths 1A: Trigonometric Ratios

MCQ Test, Set 02

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. The distance of the point $(-7, -8)$ from the y-axis is

A. -7 **B.** 7 **C.** 8 **D.** $\sqrt{113}$

2. $\frac{23\pi}{18}$ radians in grades is

A. $\frac{4600}{9}^g$ **B.** $\frac{1150}{9}^g$ **C.** $\frac{2300}{9}^g$ **D.** 230^g

3. 600° in radians is

A. $\frac{10\pi}{3}$ **B.** $\frac{20\pi}{3}$ **C.** 3π **D.** $\frac{3\pi}{10}$

4. An arc of length 26 cm in a circle of radius 8 cm subtends at the centre an angle of

A. 585 radians **B.** $\frac{4}{13}$ radians
C. $\frac{13}{4}$ radians **D.** $\frac{13}{8}$ radians

5. If the terminal side of θ passes through $(-15, 8)$, then $\sec\theta =$

A. $-\frac{17}{15}$ **B.** $\frac{17}{8}$ **C.** $\frac{17}{15}$ **D.** $-\frac{15}{17}$

6. If $\cot\theta = -\frac{20}{21}$ and θ is in the second quadrant, then $\tan\theta =$

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

7. If $\sin\theta = -\frac{3}{5}$ and θ is in the fourth quadrant, then $\sec\theta =$

A. $-\frac{5}{3}$ **B.** $\frac{4}{5}$ **C.** $\frac{5}{4}$ **D.** $-\frac{5}{4}$

8. $8(1 - \sin^2\theta)\sec^2\theta =$

A. 0 **B.** 16 **C.** -8 **D.** 8

9. If $\operatorname{cosec}\theta + \cot\theta = 6$, then $\cot\theta =$

A. $\frac{1}{6}$ **B.** $\frac{37}{12}$ **C.** $\frac{35}{12}$ **D.** $-\frac{35}{12}$

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

A. fourth quadrant **B.** first quadrant
C. second quadrant **D.** third quadrant

11. $\operatorname{cosec} 30^\circ \cdot \operatorname{cosec} 45^\circ =$

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

12. $\cos^2 60^\circ + \sec^2 30^\circ =$

A. $-\frac{13}{12}$ **B.** $\left(\frac{1}{2} + \frac{2\sqrt{3}}{3}\right)^2$

C. $\frac{1}{2} + \frac{2\sqrt{3}}{3}$ **D.** $\frac{19}{12}$

13. $\cot(-150^\circ) =$

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

14. $\sin(120^\circ) =$

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

15. $\sin(270^\circ - \theta) \cdot \operatorname{cosec}(360^\circ - \theta) =$

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

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

16. $\cos(270^\circ - \theta) \cdot \sin(180^\circ - \theta) =$

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

C. $\sin^2\theta$ **D.** $-\sin^2\theta$

17. The equation $\sec x = \frac{3}{2}$

A. has no real solution **B.** has a real solution

C. has exactly one real solution **D.** is true for every real x

18. The minimum value of $-5 - 6\cos x$ is

A. 6 **B.** 1 **C.** -11 **D.** -5

19. The vertical asymptotes of the graph of $y = \cot x$ are the lines ($n \in \mathbb{Z}$)

A. $x = n\pi$ **B.** $x = (2n+1)\frac{\pi}{2}$

C. $x = 2n\pi$ **D.** $y = n\pi$

20. $3(\sin^2 24^\circ + \sin^2 66^\circ) =$

A. 6 **B.** 9 **C.** 0 **D.** 3

21. $ABCD$ is a cyclic quadrilateral with $\cos A = \frac{8}{9}$. Then $\cos C =$

A. $-\frac{8}{9}$ **B.** $\frac{8}{9}$ **C.** $\frac{9}{8}$ **D.** $\frac{1}{9}$

22. $\sqrt{1 - \cos^2 285^\circ} =$

A. $1 - \cos 285^\circ$ **B.** $-\sin 285^\circ$

C. $\cos 285^\circ$ **D.** $\sin 285^\circ$

23. If $\sin\theta + \cos\theta = \frac{5}{4}$, then $\sin\theta\cos\theta =$

A. $\frac{9}{32}$ **B.** $\frac{41}{32}$ **C.** $\frac{9}{16}$ **D.** $-\frac{9}{32}$

24. If $11\cos\theta + 9\sin\theta = 10$ and $11\sin\theta - 9\cos\theta = k$, then $k^2 =$

A. -102 **B.** 140 **C.** 302 **D.** 102

25. The solution (x, y) of $-2x + 2y - 8 = 0$ and $4x - 5y + 19 = 0$ is

A. $(3, -1)$ **B.** $(-1, 3)$ **C.** $(1, -3)$ **D.** $(1, 3)$

Key sheet

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

Solutions

1. The distance of the point $(-7, -8)$ from the y-axis is

The distance from the y-axis is $|x|$.

$|-7| = 7$

Ans: (B) 7

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2. $\frac{23\pi}{18}$ radians in grades is

$\pi^c = 200^g$

$\frac{23\pi}{18} = \frac{23}{18} \times 200 = \frac{2300}{9}^g$

Ans: (C) $\frac{2300}{9}^g$

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3. 600° in radians is

$600^\circ = 600 \times \frac{\pi}{180}$

$= \frac{10\pi}{3}$

Ans: (A) $\frac{10\pi}{3}$

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4. An arc of length 26 cm in a circle of radius 8 cm subtends at the centre an angle of

$\theta = \frac{l}{r} = \frac{26}{8} = \frac{13}{4}$

Ans: (C) $\frac{13}{4}$ **radians**

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5. If the terminal side of θ passes through $(-15, 8)$, then $\sec\theta =$

$r = \sqrt{(-15)^2 + (8)^2} = 17$

$\sec\theta = -\frac{17}{15}$

Ans: (A) $-\frac{17}{15}$

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6. If $\cot\theta = -\frac{20}{21}$ and θ is in the second quadrant, then $\tan\theta =$

In the second quadrant: $x = -20$, $y = 21$, $r = 29$.

$\tan\theta = -\frac{21}{20}$

Ans: (D) $-\frac{21}{20}$

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7. If $\sin\theta = -\frac{3}{5}$ and θ is in the fourth quadrant, then $\sec\theta =$

In the fourth quadrant: $x = 4$, $y = -3$, $r = 5$.

$\sec\theta = \frac{5}{4}$

Ans: (C) $\frac{5}{4}$

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8. $8(1 - \sin^2\theta)\sec^2\theta =$

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

and $\cos^2\theta \cdot \sec^2\theta = 1$, so the value is 8.

Ans: (D) 8

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9. If $\operatorname{cosec}\theta + \cot\theta = 6$, then $\cot\theta =$

$\operatorname{cosec}\theta - \cot\theta = \frac{1}{6}$

$\cot\theta = \frac{35}{12}$

Ans: (C) $\frac{35}{12}$

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10. If $\sec\theta < 0$ and $\sin\theta > 0$, 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: (C) second quadrant

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11. $\operatorname{cosec} 30^\circ \cdot \operatorname{cosec} 45^\circ =$

$\operatorname{cosec} 30^\circ = 2,\ \operatorname{cosec} 45^\circ = \sqrt{2}$

Value $= 2\sqrt{2}$

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

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12. $\cos^2 60^\circ + \sec^2 30^\circ =$

$\cos 60^\circ = \frac{1}{2},\ \sec 30^\circ = \frac{2\sqrt{3}}{3}$

Value $= \frac{19}{12}$

Ans: (D) $\frac{19}{12}$

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13. $\cot(-150^\circ) =$

$\cot(-150^\circ) = -\cot 150^\circ$

$\cot 150^\circ = \cot(180^\circ - 30^\circ) = -\cot 30^\circ = -\sqrt{3}$

$\therefore \cot(-150^\circ) = \sqrt{3}$

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

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14. $\sin(120^\circ) =$

$\sin 120^\circ = \sin(180^\circ - 60^\circ) = \sin 60^\circ = \frac{\sqrt{3}}{2}$

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

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15. $\sin(270^\circ - \theta) \cdot \operatorname{cosec}(360^\circ - \theta) =$

$\sin(270^\circ - \theta) = -\cos\theta,\ \operatorname{cosec}(360^\circ - \theta) = -\operatorname{cosec}\theta$

Product $= \cot\theta$

Ans: (B) $\cot\theta$

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16. $\cos(270^\circ - \theta) \cdot \sin(180^\circ - \theta) =$

$\cos(270^\circ - \theta) = -\sin\theta,\ \sin(180^\circ - \theta) = \sin\theta$

Product $= -\sin^2\theta$

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

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17. The equation $\sec x = \frac{3}{2}$

The range of $\sec x$ is $(-\infty, -1] \cup [1, \infty)$.

$\frac{3}{2}$ is in this range.

Ans: (B) has a real solution

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18. The minimum value of $-5 - 6\cos x$ is

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

So $-5 - 6\cos x$ runs from -11 to 1.

Ans: (C) -11

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19. The vertical asymptotes of the graph of $y = \cot x$ are the lines ($n \in \mathbb{Z}$)

The graph has an asymptote wherever $\cot x$ is undefined.

That is at $x = n\pi$.

Ans: (A) $x = n\pi$

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20. $3(\sin^2 24^\circ + \sin^2 66^\circ) =$

$24^\circ + 66^\circ = 90^\circ$

So $\sin^2 24^\circ + \sin^2 66^\circ = 1$ and the value is 3.

Ans: (D) 3

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21. $ABCD$ is a cyclic quadrilateral with $\cos A = \frac{8}{9}$. Then $\cos C =$

$A + C = 180^\circ$

$\cos C = \cos(180^\circ - A) = -\frac{8}{9}$

Ans: (A) $-\frac{8}{9}$

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22. $\sqrt{1 - \cos^2 285^\circ} =$

$\sqrt{1 - \cos^2 285^\circ} = \sqrt{\sin^2 285^\circ} = |\sin 285^\circ|$

$\sin 285^\circ < 0$, so this is $-\sin 285^\circ$.

Ans: (B) $-\sin 285^\circ$

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23. If $\sin\theta + \cos\theta = \frac{5}{4}$, then $\sin\theta\cos\theta =$

$1 + 2\sin\theta\cos\theta = \frac{25}{16}$

$\sin\theta\cos\theta = \frac{9}{32}$

Ans: (A) $\frac{9}{32}$

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24. If $11\cos\theta + 9\sin\theta = 10$ and $11\sin\theta - 9\cos\theta = k$, then $k^2 =$

Squaring and adding: $11^2 + 9^2 = 10^2 + k^2$.

$k^2 = 121 + 81 - 100 = 102$

Ans: (D) 102

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25. The solution (x, y) of $-2x + 2y - 8 = 0$ and $4x - 5y + 19 = 0$ is

$x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} = \frac{-2}{2}$, $y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1} = \frac{6}{2}$

So $(x, y) = (-1, 3)$.

Ans: (B) $(-1, 3)$
