EXPRESSWALA ACADEMY

Maths 1A: Trigonometric Ratios

MCQ Test, Set 07

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 second quadrant, then the point (b, a) lies in the

A. fourth quadrant **B.** third quadrant

C. second quadrant **D.** first quadrant

2. 960° in radians is

A. $\frac{24\pi}{5}$ **B.** $\frac{16\pi}{3}$ **C.** $\frac{3\pi}{16}$ **D.** $\frac{32\pi}{3}$

3. 265^g in degrees is

A. 477° **B.** $\frac{477}{2}^\circ$ **C.** 265° **D.** $\frac{2650}{9}^\circ$

4. In a circle of radius 10 cm, an arc subtends $\frac{7}{6}$ radians at the centre. Its length is

A. $\frac{70}{3}$ cm **B.** $\frac{60}{7}$ cm **C.** $\frac{7}{60}$ cm **D.** $\frac{35}{3}$ cm

5. If the terminal side of θ passes through $(12, -5)$, then $\sin\theta =$

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

6. If $\sin\theta = -\frac{16}{65}$ and θ is in the third quadrant, then $\tan\theta =$

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

7. If $\cos\theta = -\frac{12}{37}$ and θ is in the third quadrant, then $\operatorname{cosec}\theta =$

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

8. If $\operatorname{cosec}\theta + \cot\theta = 4$, then $\cot\theta =$

A. $\frac{17}{8}$ **B.** $\frac{1}{4}$ **C.** $\frac{15}{8}$ **D.** $-\frac{15}{8}$

9. If $\tan\theta = \frac{7}{5}$, then $\sec^2\theta =$

A. $\frac{25}{74}$ **B.** $\frac{74}{25}$ **C.** $-\frac{24}{25}$ **D.** $\frac{24}{25}$

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

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

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

11. $\cot 30^\circ \cdot \sec 45^\circ =$

A. $\sqrt{2} + \sqrt{3}$ **B.** $2\sqrt{6}$ **C.** $\sqrt{6}$ **D.** $\frac{\sqrt{6}}{6}$

12. $\operatorname{cosec}^2 45^\circ + \tan^2 45^\circ =$

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

C. 1 **D.** $1+\sqrt{2}$

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13. $\sec(600^\circ) =$

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

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14. $\cot(960^\circ) =$

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

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15. $\tan(90^\circ+\theta)\cdot\sec(180^\circ-\theta) =$

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

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

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16. $\operatorname{cosec}(270^\circ+\theta)\cdot\tan(270^\circ-\theta) =$

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

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

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17. The equation $\operatorname{cosec} x = \frac{3}{7}$

A. is true for every real x **B.** has exactly one real solution

C. has a real solution **D.** has no real solution

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18. The minimum value of $-6-7\cos x$ is

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

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19. In the interval $\left(\frac{3\pi}{2}, 2\pi\right)$, which of these functions is decreasing?

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

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20. $ABCD$ is a cyclic quadrilateral with $\cos A = \frac{3}{5}$. Then $\cos C =$

A. $\frac{5}{3}$ **B.** $-\frac{3}{5}$ **C.** $\frac{2}{5}$ **D.** $\frac{3}{5}$

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21. If $A+B=90^\circ$ and $\sin A = \frac{12}{13}$, then $\tan B =$

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

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22. The least value of $25\sin^2 x + 16\operatorname{cosec}^2 x$ is

A. 40 **B.** 80 **C.** 41 **D.** 20

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23. If $\sin\theta\cos\theta = \frac{1}{5}$, then $\sin^4\theta + \cos^4\theta =$

A. $\frac{27}{25}$ **B.** $\frac{24}{25}$ **C.** $\frac{22}{25}$ **D.** $\frac{23}{25}$

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

A. $-\tan\theta$ **B.** -1

C. 1 **D.** $\tan\theta$

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25. $\sin\theta + \sin(\pi+\theta) + \cdots + \sin(15\pi+\theta) =$

A. 0

B. $-\sin\theta$

C. $\sin\theta$

D. $16\sin\theta$

Key sheet

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

Solutions

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

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

Ans: (A) fourth quadrant

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2. 960° in radians is

$960^\circ = 960 \times \frac{\pi}{180}$
$= \frac{16\pi}{3}$

Ans: (B) $\frac{16\pi}{3}$

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3. 265^g in degrees is

$1^g = \frac{9}{10}^\circ$
$265^g = \frac{477}{2}^\circ$

Ans: (B) $\frac{477}{2}^\circ$

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4. In a circle of radius 10 cm, an arc subtends $\frac{7}{6}$ radians at the centre. Its length is

$l = r\theta = 10 \times \frac{7}{6} = \frac{35}{3}$ cm

Ans: (D) $\frac{35}{3}$ cm

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5. If the terminal side of θ passes through $(12, -5)$, then $\sin\theta =$

$r = \sqrt{(12)^2 + (-5)^2} = 13$
$\sin\theta = -\frac{5}{13}$

Ans: (D) $-\frac{5}{13}$

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6. If $\sin\theta = -\frac{16}{65}$ and θ is in the third quadrant, then $\tan\theta =$

In the third quadrant: $x = -63$, $y = -16$, $r = 65$.
$\tan\theta = \frac{16}{63}$

Ans: (B) $\frac{16}{63}$

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7. If $\cos\theta = -\frac{12}{37}$ and θ is in the third quadrant, then $\operatorname{cosec}\theta =$

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

Ans: (C) $-\frac{37}{35}$

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8. If $\operatorname{cosec}\theta + \cot\theta = 4$, then $\cot\theta =$

$\operatorname{cosec}\theta - \cot\theta = \frac{1}{4}$
$\cot\theta = \frac{15}{8}$

Ans: (C) $\frac{15}{8}$

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9. If $\tan\theta = \frac{7}{5}$, then $\sec^2\theta =$

$\sec^2\theta = 1 + \tan^2\theta = 1 + \frac{49}{25} = \frac{74}{25}$

Ans: (B) $\frac{74}{25}$

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10. If $\cot\theta < 0$ and $\cos\theta < 0$, 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: (B) second quadrant

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11. $\cot 30^\circ \cdot \sec 45^\circ =$

$\cot 30^\circ = \sqrt{3},\ \sec 45^\circ = \sqrt{2}$

Value $= \sqrt{6}$

Ans: (C) $\sqrt{6}$

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12. $\operatorname{cosec}^2 45^\circ + \tan^2 45^\circ =$

$\operatorname{cosec} 45^\circ = \sqrt{2},\ \tan 45^\circ = 1$

Value $= 3$

Ans: (A) 3

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13. $\sec(600^\circ) =$

$600^\circ = 1 \times 360^\circ + 240^\circ$, so $\sec 600^\circ = \sec 240^\circ$.

$\sec 240^\circ = \sec(180^\circ + 60^\circ) = -\sec 60^\circ = -2$

Ans: (A) -2

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14. $\cot(960^\circ) =$

$960^\circ = 2 \times 360^\circ + 240^\circ$, so $\cot 960^\circ = \cot 240^\circ$.

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

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

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15. $\tan(90^\circ + \theta) \cdot \sec(180^\circ - \theta) =$

$\tan(90^\circ + \theta) = -\cot\theta,\ \sec(180^\circ - \theta) = -\sec\theta$

Product $= \operatorname{cosec}\theta$

Ans: (A) $\operatorname{cosec}\theta$

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16. $\operatorname{cosec}(270^\circ + \theta) \cdot \tan(270^\circ - \theta) =$

$\operatorname{cosec}(270^\circ + \theta) = -\sec\theta,\ \tan(270^\circ - \theta) = \cot\theta$

Product $= -\operatorname{cosec}\theta$

Ans: (C) $-\operatorname{cosec}\theta$

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17. The equation $\operatorname{cosec} x = \frac{3}{7}$

The range of $\operatorname{cosec} x$ is $(-\infty, -1] \cup [1, \infty)$.

$\frac{3}{7}$ is not in this range.

Ans: (D) has no real solution

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18. The minimum value of $-6 - 7\cos x$ is

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

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

Ans: (C) -13

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19. In the interval $\left(\frac{3\pi}{2}, 2\pi\right)$, which of these functions is decreasing?

$\left(\frac{3\pi}{2}, 2\pi\right)$ is quadrant IV.

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

Ans: (B) $\cot x$

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20. $ABCD$ is a cyclic quadrilateral with $\cos A = \frac{3}{5}$. Then $\cos C =$

$A + C = 180^\circ$

$\cos C = \cos(180^\circ - A) = -\frac{3}{5}$

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

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21. If $A + B = 90^\circ$ and $\sin A = \frac{12}{13}$, then $\tan B =$

$\cos A = \frac{5}{13},\ \tan B = \cot A$

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

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

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22. The least value of $25\sin^2 x + 16\operatorname{cosec}^2 x$ is

By A.M. $\geq$ G.M., $25\sin^2 x + 16\operatorname{cosec}^2 x \geq 2\sqrt{25 \cdot 16} = 40$

Equality is possible here, so the least value is 40.

Ans: (A) 40

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23. If $\sin\theta\cos\theta = \frac{1}{5}$, then $\sin^4\theta + \cos^4\theta =$

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

$= 1 - 2 \cdot \frac{1}{25} = \frac{23}{25}$

Ans: (D) $\frac{23}{25}$

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

$\cos\theta \cdot \operatorname{cosec}\theta = \cot\theta$

Then multiply by $\tan\theta$: the product is 1.

Ans: (C) 1

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25. $\sin\theta + \sin(\pi + \theta) + \cdots + \sin(15\pi + \theta) =$

Consecutive terms are $\sin\theta$ and $-\sin\theta$; there are 16 terms.

Sum $= 0$

Ans: (A) 0
