EXPRESSWALA ACADEMY

Maths 1A: Trigonometric Ratios

MCQ Test, Set 03

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 fourth quadrant, then the point $(a, -b)$ lies in the

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

2. 215^g in degrees is

A. $\frac{2150}{9}^\circ$ **B.** 215° **C.** $\frac{387}{2}^\circ$ **D.** 387°

3. $\frac{17\pi}{15}$ radians in grades is

A. $\frac{340}{3}^g$ **B.** $\frac{1360}{3}^g$ **C.** 204^g **D.** $\frac{680}{3}^g$

4. In a circle of radius 20 cm, an arc subtends $\frac{3}{2}$ radians at the centre. Its length is

A. $\frac{40}{3}$ cm **B.** 60 cm **C.** $\frac{3}{40}$ cm **D.** 30 cm

5. If the terminal side of θ passes through $(-56, 33)$, then $\sec\theta =$

A. $-\frac{65}{56}$ **B.** $\frac{65}{33}$ **C.** $\frac{65}{56}$ **D.** $-\frac{56}{65}$

6. If $\cos\theta = -\frac{8}{17}$ and θ is in the second quadrant, then $\operatorname{cosec}\theta =$

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

7. If $\operatorname{cosec}\theta = -\frac{41}{9}$ and θ is in the third quadrant, then $\sin\theta =$

A. $-\frac{9}{41}$ **B.** $\frac{9}{41}$ **C.** $-\frac{40}{41}$ **D.** $-\frac{41}{9}$

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

A. $-\frac{24}{49}$ **B.** $\frac{24}{49}$ **C.** $\frac{49}{74}$ **D.** $\frac{74}{49}$

9. $5(1 - \sin^2\theta)\sec^2\theta =$

A. -5 **B.** 5 **C.** 10 **D.** 0

10. If $\operatorname{cosec}\theta < 0$ and $\cot\theta > 0$, then θ lies in the

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

11. $\sec^2 0^\circ + \cos^2 30^\circ =$

A. $\frac{7}{4}$ **B.** $\frac{1}{4}$

C. $\frac{\sqrt{3}}{2} + 1$ **D.** $\left(\frac{\sqrt{3}}{2} + 1\right)^2$

12. $\cot 45^\circ \cdot \sec 0^\circ =$

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

13. $\sec(150^\circ) =$

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

14. $\operatorname{cosec}(240^\circ) =$

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

15. $\operatorname{cosec}(180^\circ + \theta) \cdot \sin(90^\circ + \theta) =$

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

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

16. $\sec(180^\circ - \theta) \cdot \tan(270^\circ - \theta) =$

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

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

17. The equation $\cos x = \frac{7}{8}$

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

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

18. The minimum value of $3 - 8\cos x$ is

A. 3 **B.** 11 **C.** -5 **D.** 8

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

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

20. If $A + B = 90^\circ$ and $\sin A = \frac{24}{25}$, then $\tan B =$

A. $\frac{7}{25}$ **B.** $\frac{24}{25}$ **C.** $\frac{7}{24}$ **D.** $\frac{24}{7}$

21. $7(\sin^2 67^\circ + \sin^2 23^\circ) =$

A. 7 **B.** 14 **C.** 0 **D.** 49

22. The least value of $8\tan^2 x + 49\cot^2 x$ is

A. $14\sqrt{2}$ **B.** $28\sqrt{2}$ **C.** $56\sqrt{2}$ **D.** 57

23. If $\sin\theta\cos\theta = \frac{1}{2}$, then $\sin^4\theta + \cos^4\theta =$

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

24. If $\frac{a}{b} = \frac{c}{d} = \frac{7}{3}$, then $\dfrac{-a+3c}{-b+3d} =$

A. $\frac{14}{3}$ **B.** $\frac{3}{7}$ **C.** $\frac{7}{3}$ **D.** $\frac{10}{3}$

25. $\sin\theta + \sin(\pi+\theta) + \cdots + \sin(8\pi+\theta) =$

A. 0 **B.** $9\sin\theta$

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

Key sheet

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

Solutions

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

In the fourth quadrant $a > 0$, $b < 0$.

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

Ans: (C) first quadrant

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2. 215^g in degrees is

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

$215^g = \frac{387}{2}^\circ$

Ans: (C) $\frac{387}{2}^\circ$

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3. $\frac{17\pi}{15}$ radians in grades is

$\pi^c = 200^g$

$\frac{17\pi}{15} = \frac{17}{15} \times 200 = \frac{680}{3}^g$

Ans: (D) $\frac{680}{3}^g$

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4. In a circle of radius 20 cm, an arc subtends $\frac{3}{2}$ radians at the centre. Its length is

$l = r\theta = 20 \times \frac{3}{2} = 30$ cm

Ans: (D) 30 cm

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5. If the terminal side of θ passes through $(-56, 33)$, then $\sec\theta =$

$r = \sqrt{(-56)^2 + (33)^2} = 65$

$\sec\theta = -\frac{65}{56}$

Ans: (A) $-\frac{65}{56}$

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6. If $\cos\theta = -\frac{8}{17}$ and θ is in the second quadrant, then $\operatorname{cosec}\theta =$

In the second quadrant: $x = -8$, $y = 15$, $r = 17$.

$\operatorname{cosec}\theta = \frac{17}{15}$

Ans: (B) $\frac{17}{15}$

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7. If $\operatorname{cosec}\theta = -\frac{41}{9}$ and θ is in the third quadrant, then $\sin\theta =$

In the third quadrant: $x = -120$, $y = -27$, $r = 123$.

$\sin\theta = -\frac{9}{41}$

Ans: (A) $-\frac{9}{41}$

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

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

Ans: (D) $\frac{74}{49}$

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9. $5(1 - \sin^2\theta)\sec^2\theta =$

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

and $\cos^2\theta \cdot \sec^2\theta = 1$, so the value is 5.

Ans: (B) 5

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10. If $\operatorname{cosec}\theta < 0$ 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 third quadrant.

Ans: (C) third quadrant

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11. $\sec^2 0^\circ + \cos^2 30^\circ =$

$\sec 0^\circ = 1,\ \cos 30^\circ = \frac{\sqrt{3}}{2}$

Value $= \frac{7}{4}$

Ans: (A) $\frac{7}{4}$

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12. $\cot 45^\circ \cdot \sec 0^\circ =$

$\cot 45^\circ = 1,\ \sec 0^\circ = 1$

Value $= 1$

Ans: (B) 1

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13. $\sec(150^\circ) =$

$\sec 150^\circ = \sec(180^\circ - 30^\circ) = -\sec 30^\circ = -\frac{2\sqrt{3}}{3}$

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

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14. $\operatorname{cosec}(240^\circ) =$

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

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

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15. $\operatorname{cosec}(180^\circ + \theta) \cdot \sin(90^\circ + \theta) =$

$\operatorname{cosec}(180^\circ + \theta) = -\operatorname{cosec}\theta,\ \sin(90^\circ + \theta) = \cos\theta$

Product $= -\cot\theta$

Ans: (B) $-\cot\theta$

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16. $\sec(180^\circ - \theta) \cdot \tan(270^\circ - \theta) =$

$\sec(180^\circ - \theta) = -\sec\theta,\ \tan(270^\circ - \theta) = \cot\theta$

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

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

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17. The equation $\cos x = \frac{7}{8}$

The range of $\cos x$ is $[-1, 1]$.

$\frac{7}{8}$ is in this range.

Ans: (D) has a real solution

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18. The minimum value of $3 - 8\cos x$ is

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

So $3 - 8\cos x$ runs from -5 to 11.

Ans: (C) -5

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

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

There the increasing functions are $\tan$, $\sec$, cosec.

Ans: (B) $\sec x$

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20. If $A + B = 90^\circ$ and $\sin A = \frac{24}{25}$, then $\tan B =$

$\cos A = \frac{7}{25},\ \tan B = \cot A$

$\cot A = \frac{7}{24}$

Ans: (C) $\frac{7}{24}$

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21. $7(\sin^2 67^\circ + \sin^2 23^\circ) =$

$67^\circ + 23^\circ = 90^\circ$

So $\sin^2 67^\circ + \sin^2 23^\circ = 1$ and the value is 7.

Ans: (A) 7

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22. The least value of $8\tan^2 x + 49\cot^2 x$ is

By A.M. $\geq$ G.M., $8\tan^2 x + 49\cot^2 x \geq 2\sqrt{8 \cdot 49} = 28\sqrt{2}$

Equality is possible here, so the least value is $28\sqrt{2}$.

Ans: (B) $28\sqrt{2}$

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23. If $\sin\theta\cos\theta = \frac{1}{2}$, then $\sin^4\theta + \cos^4\theta =$

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

$= 1 - 2 \cdot \frac{1}{4} = \frac{1}{2}$

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

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24. If $\frac{a}{b} = \frac{c}{d} = \frac{7}{3}$, then $\dfrac{-a + 3c}{-b + 3d} =$

$a = \frac{7}{3}b,\ c = \frac{7}{3}d$

So the combination has the same ratio $\frac{7}{3}$.

Ans: (C) $\frac{7}{3}$

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25. $\sin\theta + \sin(\pi + \theta) + \cdots + \sin(8\pi + \theta) =$

Consecutive terms are $\sin\theta$ and $-\sin\theta$; there are 9 terms.

Sum $= \sin\theta$

Ans: (D) $\sin\theta$
