EXPRESSWALA ACADEMY

Maths 1A: Trigonometric Ratios

MCQ Test, Set 05

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 $(a, -b)$ lies in the

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

2. $\frac{19\pi}{10}$ radians in grades is

A. 380^g **B.** 760^g **C.** 190^g **D.** 342^g

3. 675° in radians is

A. $\frac{15\pi}{2}$ **B.** $\frac{4\pi}{15}$ **C.** $\frac{15\pi}{4}$ **D.** $\frac{27\pi}{8}$

4. In a circle of radius 23 cm, an arc subtends $\frac{5}{2}$ radians at the centre. Its length is

A. $\frac{46}{5}$ cm **B.** $\frac{115}{2}$ cm **C.** $\frac{5}{46}$ cm **D.** 115 cm

5. If the terminal side of θ passes through $(-48, -55)$, then $\sec\theta =$

A. $\frac{73}{48}$ **B.** $-\frac{48}{73}$ **C.** $-\frac{73}{48}$ **D.** $-\frac{73}{55}$

6. If $\sec\theta = -\frac{41}{9}$ and θ is in the second quadrant, then $\cos\theta =$

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

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

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

8. $7(1 - \sin^2\theta)\sec^2\theta =$

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

9. If $\operatorname{cosec}\theta + \cot\theta = \frac{11}{2}$, then $\operatorname{cosec}\theta =$

A. $-\frac{125}{44}$ **B.** $\frac{2}{11}$ **C.** $\frac{117}{44}$ **D.** $\frac{125}{44}$

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

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

11. $\sin^2 60^\circ + \tan^2 45^\circ =$

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

C. $\frac{7}{4}$ **D.** $-\frac{1}{4}$

12. $\sec^2 45^\circ + \cos^2 45^\circ =$

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

13. $\tan(330^\circ) =$

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

14. $\cot(-1020^\circ) =$

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

15. $\sin(-\theta) \cdot \sec(270^\circ + \theta) =$

A. 1 **B.** -1

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

16. $\cos(270^\circ - \theta) \cdot \operatorname{cosec}(90^\circ - \theta) =$

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

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

17. The minimum value of $-3 - 5\sin x$ is

A. -8 **B.** 5 **C.** 2 **D.** -3

18. The equation $\sec x = \frac{9}{4}$

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

C. has exactly one real solution **D.** has no real solution

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

A. $\cot x$ **B.** $\operatorname{cosec} x$ **C.** $\sec x$ **D.** $\tan x$

20. $6(\sin^2 45^\circ + \sin^2 45^\circ) =$

A. 12 **B.** 6 **C.** 36 **D.** 0

21. $ABCD$ is a cyclic quadrilateral with $\sin A = \frac{5}{6}$. Then $\sin C =$

A. $\frac{6}{5}$ **B.** $\frac{1}{6}$ **C.** $-\frac{5}{6}$ **D.** $\frac{5}{6}$

22. The least value of $18\cos^2 x + 1\sec^2 x$ is

A. $12\sqrt{2}$ **B.** $3\sqrt{2}$ **C.** 19 **D.** $6\sqrt{2}$

23. If $\sin\theta\cos\theta = \frac{3}{8}$, then $\sin^4\theta + \cos^4\theta =$

A. $\frac{55}{64}$ **B.** $\frac{23}{32}$ **C.** $\frac{41}{32}$ **D.** $\frac{37}{64}$

24. If $10\cos\theta + 5\sin\theta = 5$ and $10\sin\theta - 5\cos\theta = k$, then $k^2 =$

A. 100 **B.** 150 **C.** -100 **D.** 200

25. $\sin\theta + \sin(\pi+\theta) + \cdots + \sin(4\pi+\theta) =$

A. $\sin\theta$

B. 0

C. $5\sin\theta$

D. $-\sin\theta$

Key sheet

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

Solutions

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

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

Ans: (C) third quadrant

---

2. $\frac{19\pi}{10}$ radians in grades is

$\pi^c = 200^g$
$\frac{19\pi}{10} = \frac{19}{10} \times 200 = 380^g$

Ans: (A) 380^g

---

3. 675° in radians is

$675^\circ = 675 \times \frac{\pi}{180}$
$= \frac{15\pi}{4}$

Ans: (C) $\frac{15\pi}{4}$

---

4. In a circle of radius 23 cm, an arc subtends $\frac{5}{2}$ radians at the centre. Its length is

$l = r\theta = 23 \times \frac{5}{2} = \frac{115}{2}$ cm

Ans: (B) $\frac{115}{2}$ **cm**

---

5. If the terminal side of θ passes through $(-48, -55)$, then $\sec\theta =$

$r = \sqrt{(-48)^2 + (-55)^2} = 73$
$\sec\theta = -\frac{73}{48}$

Ans: (C) $-\frac{73}{48}$

---

6. If $\sec\theta = -\frac{41}{9}$ and θ is in the second quadrant, then $\cos\theta =$

In the second quadrant: $x = -9$, $y = 40$, $r = 41$.
$\cos\theta = -\frac{9}{41}$

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

---

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

In the second quadrant: $x = -126$, $y = 32$, $r = 130$.
$\sec\theta = -\frac{65}{63}$

Ans: (D) $-\frac{65}{63}$

---

8. $7(1 - \sin^2\theta)\sec^2\theta =$

$1 - \sin^2\theta = \cos^2\theta$
and $\cos^2\theta \cdot \sec^2\theta = 1$, so the value is 7.

Ans: (A) 7

---

9. If $\operatorname{cosec}\theta + \cot\theta = \frac{11}{2}$, then $\operatorname{cosec}\theta =$

$\operatorname{cosec}\theta - \cot\theta = \frac{2}{11}$

$\operatorname{cosec}\theta = \frac{125}{44}$

Ans: (D) $\frac{125}{44}$

---

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

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

Both signs fit only the fourth quadrant.

Ans: (C) fourth quadrant

---

11. $\sin^2 60^\circ + \tan^2 45^\circ =$

$\sin 60^\circ = \frac{\sqrt{3}}{2},\ \tan 45^\circ = 1$

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

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

---

12. $\sec^2 45^\circ + \cos^2 45^\circ =$

$\sec 45^\circ = \sqrt{2},\ \cos 45^\circ = \frac{\sqrt{2}}{2}$

Value $= \frac{5}{2}$

Ans: (B) $\frac{5}{2}$

---

13. $\tan(330^\circ) =$

$\tan 330^\circ = \tan(360^\circ - 30^\circ) = -\tan 30^\circ = -\frac{\sqrt{3}}{3}$

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

---

14. $\cot(-1020^\circ) =$

$\cot(-1020^\circ) = -\cot 1020^\circ$

$1020^\circ = 2 \times 360^\circ + 300^\circ$, so $\cot 1020^\circ = \cot 300^\circ$.

$\cot 300^\circ = \cot(360^\circ - 60^\circ) = -\cot 60^\circ = -\frac{\sqrt{3}}{3}$

$\therefore \cot(-1020^\circ) = \frac{\sqrt{3}}{3}$

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

---

15. $\sin(-\theta) \cdot \sec(270^\circ + \theta) =$

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

Product $= -1$

Ans: (B) -1

---

16. $\cos(270^\circ - \theta) \cdot \operatorname{cosec}(90^\circ - \theta) =$

$\cos(270^\circ - \theta) = -\sin\theta,\ \operatorname{cosec}(90^\circ - \theta) = \sec\theta$

Product $= -\tan\theta$

Ans: (A) $-\tan\theta$

---

17. The minimum value of $-3 - 5\sin x$ is

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

So $-3 - 5\sin x$ runs from -8 to 2.

Ans: (A) -8

---

18. The equation $\sec x = \frac{9}{4}$

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

$\frac{9}{4}$ is in this range.

Ans: (B) has a real solution

---

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

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

There the increasing functions are $\sin$, $\cos$, $\tan$.

Ans: (D) $\tan x$

---

20. $6(\sin^2 45^\circ + \sin^2 45^\circ) =$

$45^\circ + 45^\circ = 90^\circ$

So $\sin^2 45^\circ + \sin^2 45^\circ = 1$ and the value is 6.

Ans: (B) 6

---

21. $ABCD$ is a cyclic quadrilateral with $\sin A = \frac{5}{6}$. Then $\sin C =$

$A + C = 180^\circ$

$\sin C = \sin(180^\circ - A) = \frac{5}{6}$

Ans: (D) $\frac{5}{6}$

---

22. The least value of $18\cos^2 x + 1\sec^2 x$ is

By A.M. $\geq$ G.M., $18\cos^2 x + 1\sec^2 x \geq 2\sqrt{18 \cdot 1} = 6\sqrt{2}$

Equality is possible here, so the least value is $6\sqrt{2}$.

Ans: (D) $6\sqrt{2}$

---

23. If $\sin\theta\cos\theta = \frac{3}{8}$, then $\sin^4\theta + \cos^4\theta =$

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

$= 1 - 2 \cdot \frac{9}{64} = \frac{23}{32}$

Ans: (B) $\frac{23}{32}$

---

24. If $10\cos\theta + 5\sin\theta = 5$ and $10\sin\theta - 5\cos\theta = k$, then $k^2 =$

Squaring and adding: $10^2 + 5^2 = 5^2 + k^2$.

$k^2 = 100 + 25 - 25 = 100$

Ans: (A) 100

---

25. $\sin\theta + \sin(\pi+\theta) + \cdots + \sin(4\pi+\theta) =$

Consecutive terms are $\sin\theta$ and $-\sin\theta$; there are 5 terms.

Sum $= \sin\theta$

Ans: (A) $\sin\theta$
