EXPRESSWALA ACADEMY

# Maths 1A: Trigonometric Ratios

## MCQ Test, Set 09

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

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

**2.** $225^g$ in degrees is

**A.** $250^\circ$ **B.** $\frac{405}{2}^\circ$ **C.** $225^\circ$ **D.** $405^\circ$

**3.** $\frac{5\pi}{9}$ radians in grades is

**A.** $100^g$ **B.** $\frac{1000}{9}^g$ **C.** $\frac{2000}{9}^g$ **D.** $\frac{500}{9}^g$

**4.** In a circle of radius $17$ cm, an arc subtends $\frac{10}{7}$ radians at the centre. Its length is

**A.** $\frac{119}{10}$ cm **B.** $\frac{340}{7}$ cm **C.** $\frac{10}{119}$ cm **D.** $\frac{170}{7}$ cm

**5.** If the terminal side of $\theta$ passes through $(11, 60)$, then $\cos\theta =$

**A.** $\frac{60}{61}$ **B.** $\frac{61}{11}$ **C.** $\frac{11}{61}$ **D.** $-\frac{11}{61}$

**6.** If $\tan\theta = -\frac{48}{55}$ and $\theta$ is in the second quadrant, then $\sin\theta =$

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

**7.** If $\sec\theta = -\frac{65}{63}$ and $\theta$ is in the third quadrant, then $\cos\theta =$

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

**8.** If $\tan\theta = \frac{3}{5}$, then $\sec^2\theta =$

**A.** $\frac{34}{25}$ **B.** $\frac{16}{25}$ **C.** $-\frac{16}{25}$ **D.** $\frac{25}{34}$

**9.** $4(1 - \sin^2\theta)\sec^2\theta =$

**A.** $8$ **B.** $0$ **C.** $4$ **D.** $-4$

**10.** If $\cos\theta < 0$ and $\operatorname{cosec}\theta < 0$, then $\theta$ lies in the

**A.** second quadrant **B.** third quadrant

**C.** first quadrant **D.** fourth quadrant

**11.** $\sec 60^\circ \cdot \cos 30^\circ =$

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

**12.** $\cos 45^\circ \cdot \operatorname{cosec} 45^\circ =$

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

**13.** $\sec(765^\circ) =$

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

**14.** $\cot(300^\circ) =$

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

**15.** $\sin(180^\circ + \theta) \cdot \sec(180^\circ - \theta) =$

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

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

**16.** $\cot(-\theta) \cdot \cot(180^\circ - \theta) =$

**A.** $-\cot^2\theta$ **B.** $-\tan^2\theta$

**C.** $\cot^2\theta$ **D.** $\tan^2\theta$

**17.** The domain of the cotangent function $\cot x$ is

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

**C.** $\mathbb{R} - \{0\}$ **D.** $\mathbb{R}$

**18.** The equation $\sin x = \frac{5}{3}$

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

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

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

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

**20.** If $A + B = 90^\circ$ and $\sin A = \frac{16}{65}$, then $\tan B =$

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

**21.** $7(\cos^2 64^\circ + \cos^2 26^\circ) =$

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

**22.** The least value of $18\cos^2 x + 16\sec^2 x$ is

**A.** $34$ **B.** $12\sqrt{2}$ **C.** $48\sqrt{2}$ **D.** $24\sqrt{2}$

**23.** If $\sin\theta\cos\theta = \frac{2}{5}$, then $\sin^4\theta + \cos^4\theta =$

**A.** $\frac{21}{25}$ **B.** $\frac{17}{25}$ **C.** $\frac{13}{25}$ **D.** $\frac{33}{25}$

**24.** If $\frac{a}{b} = \frac{c}{d} = \frac{7}{3}$, then $\dfrac{a+4c}{b+4d} =$

**A.** $\frac{35}{3}$ **B.** $\frac{10}{3}$ **C.** $\frac{3}{7}$ **D.** $\frac{7}{3}$

**25.** $\cos\theta + \cos(\pi+\theta) + \cdots + \cos(3\pi+\theta) =$

**A.** $\cos\theta$

**B.** $4\cos\theta$

**C.** $0$

**D.** $-\cos\theta$

## Key sheet

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

## 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 second quadrant.

**Ans: (A) second quadrant**

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**2.** $225^g$ in degrees is

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

$225^g = \frac{405}{2}^\circ$

**Ans: (B)** $\frac{405}{2}^\circ$

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**3.** $\frac{5\pi}{9}$ radians in grades is

$\pi^c = 200^g$

$\frac{5\pi}{9} = \frac{5}{9} \times 200 = \frac{1000}{9}^g$

**Ans: (B)** $\frac{1000}{9}^g$

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**4.** In a circle of radius 17 cm, an arc subtends $\frac{10}{7}$ radians at the centre. Its length is

$l = r\theta = 17 \times \frac{10}{7} = \frac{170}{7}$ cm

**Ans: (D)** $\frac{170}{7}$ **cm**

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**5.** If the terminal side of $\theta$ passes through $(11, 60)$, then $\cos\theta =$

$r = \sqrt{(11)^2 + (60)^2} = 61$

$\cos\theta = \frac{11}{61}$

**Ans: (C)** $\frac{11}{61}$

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**6.** If $\tan\theta = -\frac{48}{55}$ and $\theta$ is in the second quadrant, then $\sin\theta =$

In the second quadrant: $x = -165$, $y = 144$, $r = 219$.

$\sin\theta = \frac{48}{73}$

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

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**7.** If $\sec\theta = -\frac{65}{63}$ and $\theta$ is in the third quadrant, then $\cos\theta =$

In the third quadrant: $x = -126$, $y = -32$, $r = 130$.

$\cos\theta = -\frac{63}{65}$

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

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**8.** If $\tan\theta = \frac{3}{5}$, then $\sec^2\theta =$

$\sec^2\theta = 1 + \tan^2\theta = 1 + \frac{9}{25} = \frac{34}{25}$

**Ans: (A)** $\frac{34}{25}$

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**9.** $4(1 - \sin^2\theta)\sec^2\theta =$

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

and $\cos^2\theta \cdot \sec^2\theta = 1$, so the value is $4$.

**Ans: (C)** $4$

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**10.** If $\cos\theta < 0$ and $\operatorname{cosec}\theta < 0$, then $\theta$ lies in the

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

Both signs fit only the third quadrant.

**Ans: (B) third quadrant**

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**11.** $\sec 60^\circ \cdot \cos 30^\circ =$

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

Value $= \sqrt{3}$

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

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**12.** $\cos 45^\circ \cdot \operatorname{cosec} 45^\circ =$

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

Value $= 1$

**Ans: (A)** $1$

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**13.** $\sec(765^\circ) =$

$765^\circ = 2 \times 360^\circ + 45^\circ$, so $\sec 765^\circ = \sec 45^\circ$.

$\sec 45^\circ = \sqrt{2}$

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

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**14.** $\cot(300^\circ) =$

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

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

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**15.** $\sin(180^\circ + \theta) \cdot \sec(180^\circ - \theta) =$

$\sin(180^\circ + \theta) = -\sin\theta,\ \sec(180^\circ - \theta) = -\sec\theta$

Product $= \tan\theta$

**Ans: (D)** $\tan\theta$

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**16.** $\cot(-\theta) \cdot \cot(180^\circ - \theta) =$

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

Product $= \cot^2\theta$

**Ans: (C)** $\cot^2\theta$

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**17.** The domain of the cotangent function $\cot x$ is

$\cot x$ is undefined where $\sin x = 0$.

So the domain is $\mathbb{R} - \{n\pi : n \in \mathbb{Z}\}$.

**Ans: (A)** $\mathbb{R} - \{n\pi : n \in \mathbb{Z}\}$

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**18.** The equation $\sin x = \frac{5}{3}$

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

$\frac{5}{3}$ is not in this range.

**Ans: (D) has no real solution**

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

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

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

**Ans: (A)** $\sec x$

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**20.** If $A + B = 90^\circ$ and $\sin A = \frac{16}{65}$, then $\tan B =$

$\cos A = \frac{63}{65},\ \tan B = \cot A$

$\cot A = \frac{63}{16}$

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

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**21.** $7(\cos^2 64^\circ + \cos^2 26^\circ) =$

$64^\circ + 26^\circ = 90^\circ$

So $\cos^2 64^\circ + \cos^2 26^\circ = 1$ and the value is $7$.

**Ans: (D)** $7$

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**22.** The least value of $18\cos^2 x + 16\sec^2 x$ is

By A.M. $\geq$ G.M., $18\cos^2 x + 16\sec^2 x \geq 2\sqrt{18 \cdot 16} = 24\sqrt{2}$

Equality is possible here, so the least value is $24\sqrt{2}$.

**Ans: (D)** $24\sqrt{2}$

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**23.** If $\sin\theta\cos\theta = \frac{2}{5}$, then $\sin^4\theta + \cos^4\theta =$

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

$= 1 - 2 \cdot \frac{4}{25} = \frac{17}{25}$

**Ans: (B)** $\frac{17}{25}$

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**24.** If $\frac{a}{b} = \frac{c}{d} = \frac{7}{3}$, then $\frac{a + 4c}{b + 4d} =$

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

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

**Ans: (D)** $\frac{7}{3}$

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**25.** $\cos\theta + \cos(\pi + \theta) + \cdots + \cos(3\pi + \theta) =$

Consecutive terms are $\cos\theta$ and $-\cos\theta$; there are $4$ terms.

Sum $= 0$

**Ans: (C)** $0$

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