CHAPTER 6.2

Trigonometric Functions of Real Numbers

Multiple-Choice Old Exam Questions

22 questions • 3 topics • options A–E • two questions per page

Topic 1 | Ratios from a Ratio, a Point or a Figure

Using a given ratio and the quadrant, a point on the terminal side, or a diagram to find other trigonometric values • Questions 1–6

Q 1

If $\cos\alpha = \frac{12}{13}$ and $\frac{3\pi}{2} < \alpha < 2\pi$, then $\frac{\sec\alpha - \tan\alpha}{\sin\alpha} =$

A) $-\frac{39}{10}$

B) $\frac{28}{15}$

C) $-\frac{18}{5}$

D) $-\frac{8}{5}$

E) $\frac{29}{5}$

Q 2

If $\tan\theta = -\frac{5}{3}$ and θ is in the second quadrant, then $\frac{\csc\theta - \cot\theta}{\cos\theta} =$

A) $-\frac{34+3\sqrt{34}}{15}$

B) $\frac{3+\sqrt{34}}{15}$

C) $-\frac{\sqrt{34}}{15}$

D) $\frac{3\sqrt{34}-34}{34}$

E) $\frac{34}{9} - \frac{\sqrt{34}}{5}$

Q
3

If $\left(a, -\frac{3}{4}\right)$ is a point on a unit circle on the terminal side of an angle θ, in standard position, in quadrant III, then $\cos\theta =$

A) $-\frac{\sqrt{7}}{4}$

B) $-\frac{\sqrt{7}}{2}$

C) $-\frac{a}{4}$

D) $-\frac{a}{2}$

E) $-\frac{5}{4}$

Q
4

If the point $(-2, y)$ lies on the terminal side of an angle θ in standard position, and $\cot\theta = \frac{2}{3}$, then the value of y is

A) -3

B) $-\frac{5}{3}$

C) $-\frac{4}{3}$

D) $-\frac{1}{3}$

E) -2

Q
5

In the figure below, if $\sin\alpha = -\frac{4}{5}$, then the value of t is

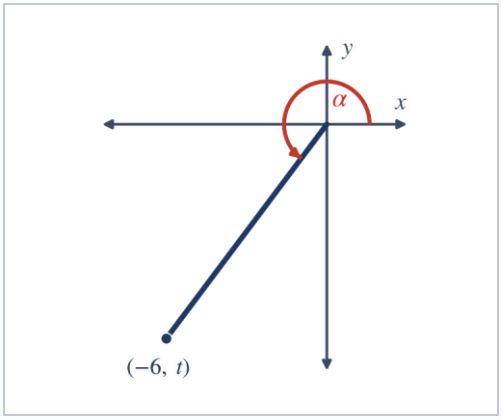
A) -8

B) -6

C) -4

D) -3

E) -2



Q
6

For the angle θ shown in the adjacent diagram, $\csc\theta + \cot\theta$ is equal to

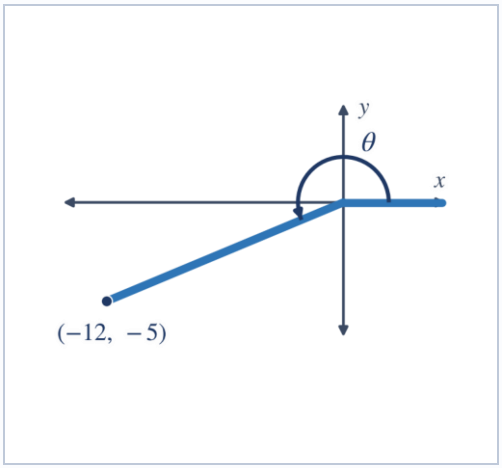
A) $-\frac{1}{5}$

B) -5

C) $-\frac{13}{5}$

D) $-\frac{3}{20}$

E) -3



Topic 2 | Exact Values of Trigonometric Expressions

Evaluating expressions at angles in degrees and radians by using reference angles • Questions 7–14

Q **7**

$$\tan\left(-\frac{7\pi}{4}\right) - \sin^2(-135°) =$$

A) $\frac{1}{2}$

B) $\frac{8}{3}$

C) $2+\sqrt{3}$

D) $-\frac{8}{3}$

E) $-\frac{3}{2}$

Q **8**

$$\tan(-150°) + \csc\left(\frac{5\pi}{3}\right) =$$

A) $-\frac{\sqrt{3}}{3}$

B) $\frac{\sqrt{3}}{3}$

C) $\frac{2\sqrt{3}}{3}$

D) $2\sqrt{3}$

E) $-3\sqrt{3}$

Q
9

$$\sin\left(\frac{2\pi}{3}\right)\cos\left(\frac{5\pi}{6}\right)+\tan\left(\frac{11\pi}{4}\right)=$$

A) $-\frac{7}{4}$

B) $\frac{1}{4}$

C) $-\frac{1}{4}$

D) $\frac{5}{4}$

E) $-\frac{5}{4}$

Q
10

The exact value of $12\csc\left(\frac{35\pi}{3}\right)+\tan\left(-\frac{2\pi}{3}\right)$ is equal to

A) $-7\sqrt{3}$

B) $\frac{10\sqrt{3}}{3}$

C) $-3\sqrt{3}$

D) $4\sqrt{3}$

E) $-5\sqrt{3}$

Q
11

$$\tan\left(\frac{23\pi}{6}\right) + \csc\left(\frac{11\pi}{6}\right) =$$

A) $\frac{-\sqrt{3}-6}{3}$

B) $\frac{-\sqrt{3}+6}{3}$

C) $\frac{-2\sqrt{3}-3}{6}$

D) $\frac{\sqrt{3}+2}{3}$

E) $\frac{\sqrt{3}-2}{3}$

Q
12

The value of $\cot\left(-\frac{17\pi}{3}\right) + \sin\left(\frac{11\pi}{6}\right) =$

A) $\frac{2\sqrt{3}-3}{6}$

B) $\frac{2\sqrt{3}+1}{3}$

C) $\frac{\sqrt{3}-3}{3}$

D) $\frac{2\sqrt{3}-1}{6}$

E) $\frac{\sqrt{3}+2}{2}$

Q
13

$$\sec\left(-\frac{23\pi}{6}\right)\cot\left(\frac{16\pi}{3}\right) =$$

A) $\frac{2}{3}$

B) $-\frac{2}{3}$

C) 2

D) $-\frac{3}{2}$

E) -3

Q
14

$$\sec\left(-\frac{23\pi}{6}\right) + \tan\left(\frac{17\pi}{3}\right) =$$

A) $-\frac{\sqrt{3}}{3}$

B) $\frac{\sqrt{3}}{3}$

C) $-\sqrt{3}$

D) $\sqrt{3}$

E) $\frac{5\sqrt{3}}{3}$

Topic 3 | Identities, Parity and True/False Statements

Simplifying with identities, using trigonometric values of a real number, and recognising true, false or impossible statements • Questions 15–22

Q **15**

If $\frac{2\sin x\cos(-x)-2\sin(-x)+2\cos(-x)+2}{1+2\cos x+\cos^2 x-\sin^2 x}=\frac{a+b\sin x}{\cos x}$, then $a+b=$

A) 2

B) -2

C) 0

D) 1

E) -1

Q **16**

If $\theta = 12$ rad, then $\csc\theta =$

A) $-\csc(4\pi-12)$

B) $\csc\left(\frac{\pi}{2}-12\right)$

C) $\csc\left(12-\frac{\pi}{2}\right)$

D) $\csc\left(12-\frac{7\pi}{3}\right)$

E) $\csc(4\pi-12)$

Q
17

Which ONE of the following statements is IMPOSSIBLE?

A) $\cot^2\theta - \csc^2\theta = 1$

B) $\tan\theta = \frac{22}{7}$

C) $\cot\theta = -100$

D) $\cos\theta = -\frac{4}{7}$ and $\sec\theta = -\frac{7}{4}$

E) $\sin\theta = \frac{1}{5}$ and $\csc\theta = 5$

Q
18

If $f(x) = \frac{x^2 \sin x}{\sec^3 x}$ and $g(x) = \cot x$, then

A) f is an odd function and g is an odd function

B) f is an even function and g is an even function

C) f is an even function and g is an odd function

D) f is an odd function and g is an even function

E) f is an even function and g is neither an odd nor an even function

Q
19

Which one of the following is FALSE?

A) $f(x) = |x| \tan(\sin x)$ is an even function

B) $f(x) = |x| \cot x - \sin x$ is an odd function

C) $f(x) = \csc x \tan x$ is an even function

D) $f(x) = x^2 \cos x \sin^3 2x$ is an odd function

E) $f(x) = x^3 + \sec x$ is neither even nor odd function

Q
20

If $f(x) = 3 + \cos x$ and $g(x) = x \sin^2 x$, then

A) f is an even function and g is an odd function.

B) f is an even function and g is an even function.

C) f is an odd function and g is an odd function.

D) f is an odd function and g is an even function.

E) both functions f and g are neither odd nor even functions.

Q
21

Which one of the following statements is FALSE?

A) $f(x) = \sin(\cos x)$ is an odd function

B) If $\sin\theta > 0$ and $\cos\theta < 0$, then θ is in quadrant II

C) $\csc\pi$ is undefined

D) $\log_5(\cos 0) = 0$

E) $f(x) = x\sin x$ is an even function

Q
22

Which one of the following statements is FALSE?

A) If $\tan\theta = \frac{2}{3}$, then $\sin\theta = 2$ and $\cos\theta = 3$

B) $f(x) = x\sin^2 x$ is an odd function

C) $f(x) = \tan(\cos x)$ is an even function

D) $f(x) = \log(\sin x)$ is neither even nor odd function

E) $\tan^2 x - \sec^2 x = -1$

Answer Key

"Original" shows the question number in the source worksheet.

Q	Original	Ans.	Value
1	1	**A**	$-\frac{39}{10}$
2	6	**A**	$-\frac{34+3\sqrt{34}}{15}$
3	3	**A**	$-\frac{\sqrt{7}}{4}$
4	4	**A**	-3
5	20	**A**	-8
6	21	**A**	$-\frac{1}{5}$
7	7	**A**	$\frac{1}{2}$
8	8	**A**	$-\frac{\sqrt{3}}{3}$
9	9	**A**	$-\frac{7}{4}$
10	10	**A**	$-7\sqrt{3}$
11	16	**A**	$\frac{-\sqrt{3}-6}{3}$
12	17	**A**	$\frac{2\sqrt{3}-3}{6}$
13	18	**A**	$\frac{2}{3}$
14	19	**A**	$-\frac{\sqrt{3}}{3}$
15	2	**A**	2
16	5	**A**	$-\csc(4\pi-12)$
17	11	**A**	$\cot^2\theta-\csc^2\theta=1$
18	12	**A**	f is an odd function and g is an odd function
19	13	**A**	$f(x)=\lvert x\rvert\tan(\sin x)$ is an even function
20	14	**A**	f is an even function and g is an odd function.
21	15	**A**	$f(x)=\sin(\cos x)$ is an odd function
22	22	**A**	If $\tan\theta=\frac{2}{3}$, then $\sin\theta=2$ and $\cos\theta=3$