Find the largest angle on the interval \([0, 2\pi]\) which satisfies \(4\sin x \cos x = \sqrt{3}\).

\[
4\sin x \cos x = 3.
\]

Answer : ________________________
Round    1    2    3    4    5

Answer : ________________________
Round    1    2    3    4    5
Simplify: \[ \tan \frac{\pi}{4} \sin \frac{11\pi}{4} \cot \frac{18\pi}{4} + \sec \frac{5\pi}{6} \cos \frac{7\pi}{6}. \]
\[ \sin A = \frac{5}{13} \quad \text{and} \quad \cos A = \frac{12}{13} \]

Find \( \cos \frac{1}{2} A \).
Find the perimeter of a sector of a circle whose central angle is 3 radians and whose radius is 6.

Answer: ____________________

Round  1  2  3  4  5

Find the perimeter of a sector of a circle whose central angle is 3 radians and whose radius is 6.

Answer: ____________________

Round  1  2  3  4  5
Find the smallest positive value of $x$ for which $\sin(3x+10) = \cos(4x+3)$.

Answer: ________________

Round 1 2 3 4 5

Find the smallest positive value of $x$ for which $\sin(3x+10) = \cos(4x+3)$.

Answer: ________________

Round 1 2 3 4 5
Evaluate \[2 \left( \cos \frac{\pi}{6} + i \sin \frac{\pi}{6} \right)^3.\]
Find the sum of the solutions of
\[2\sin^2 x - 2\sin^2 x\cos x \sin x\cos x + \sin x = 0\]
over the interval \([0, 4\pi]\).

Answer: _________________
Round 1 2 3 4 5

Answer: _________________
Round 1 2 3 4 5
Using the interval \( [0, 4] \), find the equation of the rightmost vertical asymptote on the graph of \( y = \tan \left(3x + \frac{7}{8} \right)\).

Answer: ________________________

Round 1 2 3 4 5

Using the interval \( [0, 4] \), find the equation of the rightmost vertical asymptote on the graph of \( y = \tan \left(3x + \frac{7}{8} \right)\).

Answer: ________________________

Round 1 2 3 4 5
Evaluate \( \lim_{{q \to 0}} \frac{1 - \cos q}{2 \sin^2 q} \).

Answer: ________________

Round 1 2 3 4 5

Answer: ________________

Round 1 2 3 4 5
Evaluate \( \sin^2 1^\circ + \sin^2 2^\circ + \sin^2 3^\circ + \sin^2 4^\circ + \ldots + \sin^2 360^\circ \).
For how many values of $x$ does $x^2 \sin x + 1 = 0$?

Answer: ________________

Round 1 2 3 4 5
Find the exact value of \( \sin \left( \cos^{-1} \left( \frac{2}{3} \right) \right) \).

Answer: ________________________

Round 1 2 3 4 5

Find the exact value of \( \sin \left( \cos^{-1} \left( \frac{2}{3} \right) \right) \).

Answer: ________________________

Round 1 2 3 4 5
Find the degree measure of the angle between the hour hand and minute hand of a clock at 4:15.

Answer: __________________
Round 1 2 3 4 5

Find the degree measure of the angle between the hour hand and minute hand of a clock at 4:15.

Answer: __________________
Round 1 2 3 4 5
Evaluate \( \lim_{q \to 0} \frac{\sin 2q}{q} \)

Answer: ________________________

Round 1  2  3  4  5

Answer: ________________________

Round 1  2  3  4  5
Find the amplitude of \( y = \sqrt{1 - \cos(2x)} + \sqrt{1 + \cos(2x)} \).

Answer: ________________________

Round 1 2 3 4 5

Find the amplitude of \( y = \sqrt{1 - \cos(2x)} + \sqrt{1 + \cos(2x)} \).

Answer: ________________________

Round 1 2 3 4 5
If \( \tan^{-1} \frac{5}{12} + 2\tan^{-1} a = 0 \), what is the value of \( a \)?

Answer: ________________________

Round 1 2 3 4 5

If \( \tan^{-1} \frac{5}{12} + 2\tan^{-1} a = 0 \), what is the value of \( a \)?

Answer: ________________________

Round 1 2 3 4 5
Find the product of the three complex cube roots of 8.

Answer: ________________________
Round 1 2 3 4 5

Find the product of the three complex cube roots of 8.

Answer: ________________________
Round 1 2 3 4 5
The domain of \( f(x) = \ln\left(\sin\left(2x - \frac{\pi}{4}\right)\right) \) on the interval \((0, 2\pi)\) is \((A, B) (C, D)\). Find the value of \(A + B + C + D\).

Answer: ________________________

Round 1 2 3 4 5

The domain of \( f(x) = \ln\left(\sin\left(2x - \frac{\pi}{4}\right)\right) \) on the interval \((0, 2\pi)\) is \((A, B) (C, D)\). Find the value of \(A + B + C + D\).

Answer: ________________________

Round 1 2 3 4 5
Find the sum of the periods of \( f(x) = 3\cot \frac{2}{3}x, \)
\( g(x) = |\sin 4x|, \) and \( h(x) = \frac{1}{2}\sec \frac{3}{4}x. \)

Answer: ____________________
Round 1 2 3 4 5
Find the area enclosed by triangle $ABC$ where $a=12, b=24,$ and $C = 135^\circ$.

Answer: ________________________

Round 1 2 3 4 5

Find the area enclosed by triangle $ABC$ where $a=12, b=24,$ and $C = 135^\circ$.

Answer: ________________________

Round 1 2 3 4 5
Find the exact value of \( \tan \left[ 2\arcsin \left( \frac{15}{17} \right) \right] \).

Answer: ____________________
Round 1 2 3 4 5

Find the exact value of \( \tan \left[ 2\arcsin \left( \frac{15}{17} \right) \right] \).

Answer: ____________________
Round 1 2 3 4 5
An angle $x$ is chosen at random between 0 and $2\pi$. What is the probability that $\sin x < 0.5$?

Answer: ________________________

Round 1 2 3 4 5

An angle $x$ is chosen at random between 0 and $2\pi$. What is the probability that $\sin x < 0.5$?

Answer: ________________________

Round 1 2 3 4 5
Find the number of solutions to $2 \sin^2 x = 4 \cos x$ on the interval $[-4, 4]$.

Answer: ________________

Round 1 2 3 4 5

Find the number of solutions to $2 \sin^2 x = 4 \cos x$ on the interval $[-4, 4]$.

Answer: ________________

Round 1 2 3 4 5
For $0^\circ < 180^\circ$, \( \frac{\cos q}{1 + \sin q} \) is a root of \( x^2 + 4x + 1 = 0 \). What is the value of \( q \)?
Evaluate without using trigonometric or inverse trigonometric functions, where $k > 0$:
\[ \sin \left( 2 \arctan \frac{k}{3} \right) \].