

Inverse Trigonometric Functions and Trig Equations

Grade 12 – Precalculus math · Test · Standards: F-TF.B.6, F-TF.B.7

Name: _____ Date: _____ Class: _____

This 45-minute test has 9 questions worth 20 points. It covers exact inverse values, compositions, equations read from graphs, factoring, double angles and a calculator problem. Show every step and keep exact answers unless a decimal is requested.

Standards: F-TF.B.6, F-TF.B.7 · **Level:** Grade 12 Precalculus

Time: 45 minutes · 9 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Exact arcsin and arccos (2 points)

(a) $\arcsin(-\sqrt{2}/2)$ (1 point) (b) $\arccos(-1/2)$ (1 point)

Question 2 arctan and Ranges (2 points)

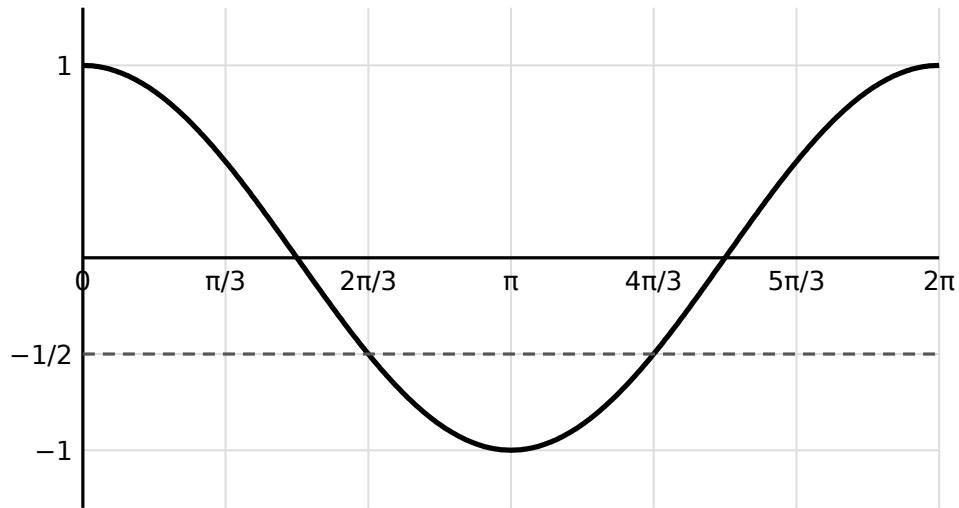
(a) $\arctan \sqrt{3}$ (1 point) (b) State the domain and the range of $y = \arctan x$. (1 point)

Question 3 Compositions (2 points)

(a) $\cos(\arcsin(8/17))$ (1 point) (b) $\arcsin(\sin(4\pi/3))$ (1 point)

Question 4 Read Solutions from a Graph (2 points)

The graph shows $y = \cos x$ and the line $y = -1/2$ on $[0, 2\pi]$.



Cosine and the line $y = -1/2$.

- How many solutions does $\cos x = -1/2$ have on $[0, 2\pi]$? (1 point)
- Find them exactly. (1 point)

Question 5 A Quadratic in Sine (3 points)

Solve $2 \sin^2 x + 3 \sin x + 1 = 0$ on $[0, 2\pi)$.

Question 6 Tangent of a Double Angle (3 points)

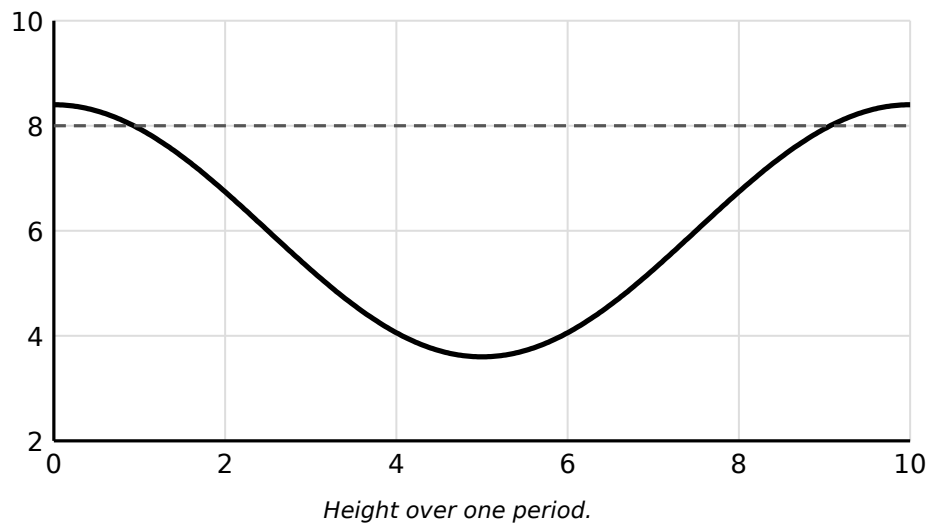
Solve $\tan(2x) = \sqrt{3}$ on $[0, 2\pi)$, then write the general solution.

Question 7 Calculator Solution (2 points)

Solve $4\cos x = 1.8$ on $[0, 2\pi)$. Round to four decimal places.

Question 8 Wave Buoy Height (3 points)

A buoy's height above the sea floor is $h(t) = 6 + 2.4\cos(\pi t/5)$ feet, t in seconds, for one period $0 \leq t \leq 10$.



- Write the equation to solve for the times when the height is 8 feet. (1 point)
- Find the first time, to two decimals. (1 point)
- Find the second time in the period. (1 point)

Question 9 A False Identity (1 point)

Explain why $\arcsin(\sin x) = x$ is false for $x = \pi$.