Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Inverse Trigonometric Functions

Inverse Trigonometric Functions | APPC-U03-P16

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for valid inverse pair and reason for discarding a row, reason proposal fails and a valid restriction, validity and approximate corrected sign, defined or undefined, real-defined or undefined with failed restriction and validity and location of output.

8 PDFs and a README; 67 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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AP Precalculus

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Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Evaluate $\arcsin(-\frac{\sqrt{3}}{2})$ exactly. Identify the compatible unit-circle angle that lies in the principal range $[-\frac{\pi}{2}, \frac{\pi}{2}]$. Bank label: _____	Let $\theta = \arcsin(\frac{5}{13})$. A right triangle for θ has opposite side 5 and hypotenuse 13. Find $\cos\theta$ and explain why its sign is forced by the arcsine branch. Bank label: _____
Evaluate $\arcsin(\sin(5\frac{\pi}{6}))$. Do not cancel the two function names; use a symmetry relation to place the result in the arcsine range. Bank label: _____	Find the exact principal value of $\arccos(-\frac{\sqrt{2}}{2})$. Use the sign of cosine and the required range $[0, \pi]$ to select the angle. Bank label: _____
Set $\theta = \arccos(-\frac{8}{17})$ and represent θ by a point (x, y) on a circle of radius 17 with $x = -8$. Determine $\tan\theta$, including its sign, from the principal arccos range. Bank label: _____	In radian mode, estimate $\arcsin(0.98)$ to the nearest thousandth. Verify that the rounded result lies in the correct principal interval. Bank label: _____
Reduce $\arccos(\cos(7\frac{\pi}{6}))$ to its principal value. Explain the reflection that produces an angle in $[0, \pi]$. Bank label: _____	Evaluate $\sin(\arctan(-\frac{7}{24}))$ exactly. Build a signed coordinate triangle compatible with the inverse-tangent range rather than treating the inner ratio as a sine value. Bank label: _____

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Is $\arccos(\frac{6}{5})$ defined as a real number? Name the restriction that decides the question.

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: $-\frac{\pi}{6}$

Place $13\frac{\pi}{6}$ on the tangent graph and remove enough periods to reach the inverse-tangent branch. Evaluate the composition.

Your response: _____

Incoming: y = arccos *x*.

Both $-\frac{\pi}{6}$ and $5\frac{\pi}{6}$ have tangent $-\frac{\sqrt{3}}{3}$. Which one equals $\arctan(-\frac{\sqrt{3}}{3})$, and why is the other rejected?

Your response: _____

Incoming: $\sqrt{(1-v^2)}$, for $-1 \le v \le 1$

Estimate $\arccos(-0.6)$ to the nearest tenth of a degree. Use the negative input to check the calculator's quadrant.

Your response: _____

Incoming: 126.9 degrees

For $\theta = \arccos(-\frac{3}{5})$, place a point of radius 5 with $x = -3$ in the correct half of the unit-circle model. Find $\sin\theta$.

Your response: _____

Incoming: 0.045 radians

Without finding θ itself, evaluate $\cot(\arctan(-\frac{9}{40}))$. State why this reciprocal is defined.

Your response: _____

Incoming: $\frac{\pi}{3}$

A calculation table records $\arcsin(0.73) = 0.818321$ in radian mode. Report the value to the nearest hundredth and verify its range.

Your response: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A student writes, "$\arccos(\cos(4\frac{\pi}{3})) = 4\frac{\pi}{3}$ because inverse functions cancel." Identify the failed condition and replace the conclusion with the correct principal angle.

A solution interprets $\sin^{-1}(\frac{1}{2})$ as the reciprocal $\frac{1}{\sin(\frac{1}{2})}$. Diagnose the notation error, rewrite the inverse with unambiguous notation, and evaluate it exactly.

A symbolic solution states $\tan(\arcsin u) = \frac{u}{\sqrt{1-u^2}}$ for $-1 \le u \le 1$. Repair the domain and explain what happens at $u = \pm 1$ in the original composition, not just in the formula.

A calculator returns 45 for $\arctan(1)$, and a student reports 45 radians. Diagnose the display and give the correct radian answer.

Inverse Trigonometric Functions

Full Worked Solutions - excerpt

Worked example

Problem. Use radian mode to approximate $\arccos(0.2)$ to three decimal places.

Answer. 1.369 radians

Explanation and check.

The calculator value $1.369438\ldots$ rounds to 1.369 radians.

Worked example

Problem. Find the domain of $G(x) = \arcsin(3 - x)$. Preserve the inequality reversal when isolating x.

Answer. $[2, 4]$

Explanation and check.

Require $-1 \le 3 - x \le 1$. The two bounds give $x \le 4$ and $x \ge 2$, hence $2 \le x \le 4$.