

Precalculus
Inverse Trig, Equations & Inequalities | 3-Topic Precalculus Bundle

3-topic bundle | 288 problems | Four activity formats

01 Inverse Trigonometric Functions

[View individual product and its full preview](#)

02 Solving Trigonometric Equations

[View individual product and its full preview](#)

03 Trigonometric Inequalities

[View individual product and its full preview](#)

In every topic

Answer Bank Challenge	24 tasks
Grid Rounds	24 tasks
Match & Move	24 cards
Error Analysis & Strategy	24 tasks
Quick Answer Key and Full Worked Solutions	included
Teacher / Parent Use Guide and Terms of Use	included

Product previews

The following preview pages show the cover, all four activity formats, and worked examples for each included resource, in the listed order.

24 PDFs and 3 READMEs; 225 buyer PDF pages across the 3 products.

Preview pages are not included in the buyer page count. Check the list against resources you already own.

This is a fixed collection of the listed products. Purchase includes the existing individual resource files. To open a product's online preview, follow its title link and select View Preview.

AP Precalculus
Inverse Trigonometric Functions

Inverse Trigonometric Functions | APPC-U03-P16
96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
02	Grid Rounds	24 tasks
03	Match & Move	24 cards
04	Error Analysis & Strategy	24 tasks
05	Quick Answer Key	96 answers
06	Full Worked Solutions	96 solutions
07	Teacher / Parent Use Guide	included
08	Terms of Use & License	included

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.

AP Precalculus

Inverse Trigonometric Functions

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: _____

AP Precalculus

Inverse Trigonometric Functions

Name: _____ Date: _____ Class: _____

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.

AP Precalculus

Inverse Trigonometric Functions

Name: _____ Date: _____ Class: _____

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 $-1 \leq u \leq 1$. 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... 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 $-1 \leq 3 - x \leq 1$. The two bounds give $x \leq 4$ and $x \geq 2$, hence $2 \leq x \leq 4$.

AP Precalculus
Solving Trigonometric Equations

Solving Trigonometric Equations | APPC-U03-P17

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
02	Grid Rounds	24 tasks
03	Match & Move	24 cards
04	Error Analysis & Strategy	24 tasks
05	Quick Answer Key	96 answers
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Topic focus

Across 96 tasks this topic asks for count by h-region, count by level case, count for each L, number of distinct solutions for each case, solution count by case and all roots.

8 PDFs and a README; 47 buyer pages.

AP Precalculus

Solving Trigonometric Equations

Name: _____ Date: _____ Class: _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Solve $\sin x = \frac{1}{2}$ for $0 \leq x \leq 2\pi$. Use both unit-circle branches and check the endpoints. _____ Bank label: _____	Solve $\sin(2x) = 0$ on $0 \leq x \leq \pi$. First map the x-interval to the complete $2x$-interval, then divide the enumerated angle values by 2. _____ Bank label: _____
Solve $2 \sin^2 x - 3 \sin x + 1 = 0$ for $0 \leq x \leq 2\pi$. Treat $u = \sin x$, solve both feasible levels, and merge any overlapping angle sets. _____ Bank label: _____	Find every x in $[0, 2\pi)$ satisfying $\sin x \cos x = 0$. Solve the two zero factors separately and combine without duplicating any root. _____ Bank label: _____
Solve $\frac{\sin x}{1 - \cos x} = 0$ on $[0, 2\pi]$. Record denominator exclusions before using numerator-zero logic. _____ Bank label: _____	Using $\sin^2 x = 1 - \cos^2 x$, solve $\sin^2 x = 1 - \cos x$ on $[0, 2\pi)$. Keep every root produced by the resulting factored equation. _____ Bank label: _____
Solve $\cos x = -\frac{\sqrt{2}}{2}$ for $-\pi \leq x < \pi$. Use the signed unit-circle interval rather than converting the final answers to $[0, 2\pi)$. _____ Bank label: _____	Solve $\cos(x - \frac{\pi}{3}) = \frac{1}{2}$ on $[0, 2\pi]$. Enumerate every allowed angle $x - \frac{\pi}{3}$ in the mapped window, including boundary hits. _____ Bank label: _____

AP Precalculus

Solving Trigonometric Equations

Name: _____ Date: _____ Class: _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Solve $2 \sin x + 1 = 2$ for $0 \leq x \leq 2\pi$. Normalize the output before selecting sine branches. 	For $\sin x = c$ on $[0, 2\pi)$, determine the solution count when $c = 1$, when $0 < c < 1$, when $c = -1$, and when $c > 1$. Base the count on intersections with the extrema.
Solve $-3 \cos x + 2 = 5$ on $[0, 2\pi]$. After isolating cosine, use the extreme level to determine multiplicity. 	Solve $\sqrt{1 - \cos x} = \sin x$ on $[0, 2\pi]$. After squaring, substitute every candidate into the original equation to enforce the nonnegative left side.
Solve $\sin x = 2$ on $[0, 2\pi]$. Give the range-based reason for your conclusion. 	Solve $\sin^2 x = \sin x$ on $[0, 2\pi)$. Explain which solutions would disappear if both sides were divided by $\sin x$.

AP Precalculus

Solving Trigonometric Equations

Name: _____ Date: _____ Class: _____

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 reports only $x = \frac{\pi}{3}$ for $\sin x = \frac{\sqrt{3}}{2}$ on $[0, 2\pi]$. Identify the missing branch and give the corrected complete set.

A student uses $a2\pi$ repeat and lists $\{-2\pi, 0, 2\pi\}$ for $\tan x = 0$ on $[-2\pi, 2\pi]$. Repair the period and include every missing root.

A solution lists both 0 and 2π for $\cos x = 1$ on $[0, 2\pi)$. Repair the set by applying the interval notation.

A solution factors $\sin^2 x + \sin x - 2 = 0$ but tries to include an angle for $\sin x = -2$. Remove the impossible auxiliary level and finish the solution on $[0, 2\pi]$.

Solving Trigonometric Equations

Full Worked Solutions - excerpt

Worked example

Problem. Solve $\cos x = -1$ on $-2\pi \leq x \leq 2\pi$. Filter the extreme-value family $\pi + 2k\pi$ through the symmetric interval.

Answer. $\{-\pi, \pi\}$

Explanation and check.

The family $x = \pi + 2k\pi$ yields $-\pi$ for $k = -1$ and π for $k = 0$. Adjacent values lie outside the interval.

Worked example

Problem. Solve $5 \tan x + 2 = 2$ on $[-\pi, \pi]$. Apply tangent's π -spaced zero family to the closed endpoints.

Answer. $\{-\pi, 0, \pi\}$

Explanation and check.

The equation reduces to $\tan x = 0$, whose zeros $x = k\pi$ in the interval are $-\pi, 0, \pi$.

AP Precalculus
Trigonometric Inequalities

Trigonometric Inequalities | APPC-U03-P18

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for closed interval to tolerance, interval to tolerance, interval union to tolerance, correct intersection and counterexample, correct interval and boundary counterexample and correct set and boundary counterexample.

8 PDFs and a README; 111 buyer pages.

AP Precalculus

Trigonometric Inequalities

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.

Certified numerical evidence locates the crossings of $\sin x$ and $0.2x + 0.1$ at 0.125411 and 2.498473 on $[0, 4]$. Solve the nonstrict inequality to the nearest thousandth.

Certified numerical evidence locates the crossings of $\sin x$ and $0.2x + 0.1$ at 0.125411 and 2.498473 on $[0, 4]$. Solve the nonstrict inequality to the nearest thousandth.

Supplied evidence	Value
equality points	0.125410601 2.498473192

Condition or evidence	Supplied value
Original inequality	$\sin x \geq 0.2x + 0.1$
Requested precision	nearest thousandth
Given shape evidence	the difference is nonnegative exactly between the crossings
Given window	$[0, 4]$

Bank label: _____

Solve $-\sin(2x - \frac{\pi}{2}) \geq 0$ on $[0, \pi]$. Track the output reversal before mapping the inner-angle intervals.

Solve $-\sin(2x - \frac{\pi}{2}) \geq 0$ on $[0, \pi]$. Track the output reversal before mapping the inner-angle intervals.

Condition or evidence	Supplied value
Original inequality	$-\sin(2x - \pi/2) \geq 0$
Input interval	$[0, \pi]$

Bank label: _____

Solve $-2 \cos x + 1 \leq 0$ on $[0, 2\pi)$. Show the order reversal caused by division by -2 .

Solve $-2 \cos x + 1 \leq 0$ on $[0, 2\pi)$. Show the order reversal caused by division by -2 .

Condition or evidence	Supplied value
Original inequality	$-2 \cos x + 1 \leq 0$
Input interval	$[0, 2\pi)$

Bank label: _____

Solve $\sin x(1 + \cos x) \geq 0$ on $[0, 2\pi]$. Use that $1 + \cos x$ never becomes negative but does vanish at π .

Solve $\sin x(1 + \cos x) \geq 0$ on $[0, 2\pi]$. Use that $1 + \cos x$ never becomes negative but does vanish at π .

Condition or evidence	Supplied value
Original inequality	$\sin x(1 + \cos x) \geq 0$
Input interval	$[0, 2\pi]$

Bank label: _____

AP Precalculus

Trigonometric Inequalities

Name: _____ Date: _____ Class: _____

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.

Solve $\sin x < 0$ OR $\cos x \leq 0$ on $[0, 2\pi)$. Decide which boundaries are contributed by only one condition.

Solve $\sin x < 0$ OR $\cos x \leq 0$ on $[0, 2\pi)$. Decide which boundaries are contributed by only one condition.

Condition or evidence	Supplied value
Given conditions	$\sin x < 0$
	$\cos x \leq 0$
Logical connective	OR
Input interval	$[0, 2\pi)$

During $0 \leq t \leq 12$ hours, a temperature follows $T(t) = 50 + 10 \sin(\pi \frac{t}{6})$. When is $T > 55$, and for how many total hours?

During $0 \leq t \leq 12$ hours, a temperature follows $T(t) = 50 + 10 \sin(\pi \frac{t}{6})$. When is $T > 55$, and for how many total hours?

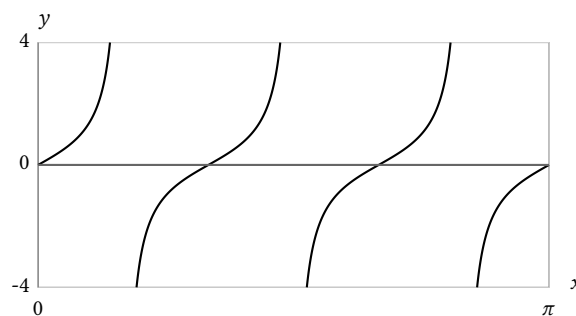
Condition or evidence	Supplied value
Required condition	$T > 55$
Given model	$T(t) = 50 + 10 \sin(\pi \frac{t}{6})$
Time interval	$[0, 12]$ hours

For $0 \leq t \leq 10$, $V(t) = 12 + 4 \cos(\pi \frac{t}{5})$. When is $V \leq 8$, and what is the total duration?

For $0 \leq t \leq 10$, $V(t) = 12 + 4 \cos(\pi \frac{t}{5})$. When is $V \leq 8$, and what is the total duration?

Condition or evidence	Supplied value
Required condition	$V \leq 8$
Given model	$V(t) = 12 + 4 \cos(\pi \frac{t}{5})$
Time interval	$[0, 10]$ hours

Solve $\tan(3x) < 0$ on $[0, \pi]$, marking the three scaled poles before reading signs.



Condition or evidence	Supplied value
Original inequality	$\tan(3x) < 0$
Input interval	$[0, \pi]$

AP Precalculus

Trigonometric Inequalities

Name: _____ Date: _____ Class: _____

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: $[0, 0.125] \cup [2.498, 4]$

Solve $\tan x \geq -\sqrt{3}$ on $[0, \pi)$, treating the two sides of $\frac{\pi}{2}$ as separate branches.

Solve $\tan x \geq -\sqrt{3}$ on $[0, \pi)$, treating the two sides of $\frac{\pi}{2}$ as separate branches.

Condition or evidence	Supplied value
Original inequality	$\tan x \geq -\sqrt{3}$
Input interval	$[0, \pi)$

Your response: _____

Incoming: $[-2\pi, \pi]$

Let $\alpha = \arccos(0.2)$. Solve $\cos x \leq 0.2$ on $[0, 2\pi)$ in terms of α .

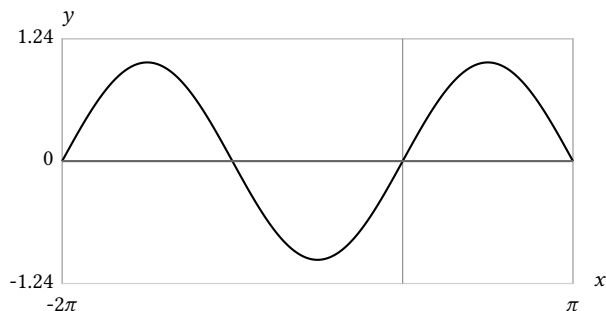
Let $\alpha = \arccos(0.2)$. Solve $\cos x \leq 0.2$ on $[0, 2\pi)$ in terms of α .

Condition or evidence	Supplied value
Original inequality	$\cos x \leq 0.2$
Input interval	$[0, 2\pi)$

Your response: _____

Incoming: $(\frac{\pi}{2}, \pi)$

Solve $\sin x \geq 0$ on $[-2\pi, \pi]$, using signed cycles and all equality zeros.

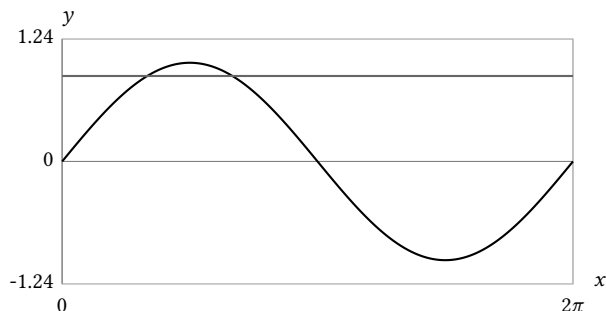


Condition or evidence	Supplied value
Original inequality	$\sin x \geq 0$
Input interval	$[-2\pi, \pi]$

Your response: _____

Incoming: $[-2, 2]$

Solve $\sin x > \frac{\sqrt{3}}{2}$ on $[0, 2\pi]$.



Condition or evidence	Supplied value
Original inequality	$\sin x > \frac{\sqrt{3}}{2}$
Input interval	$[0, 2\pi]$

Your response: _____

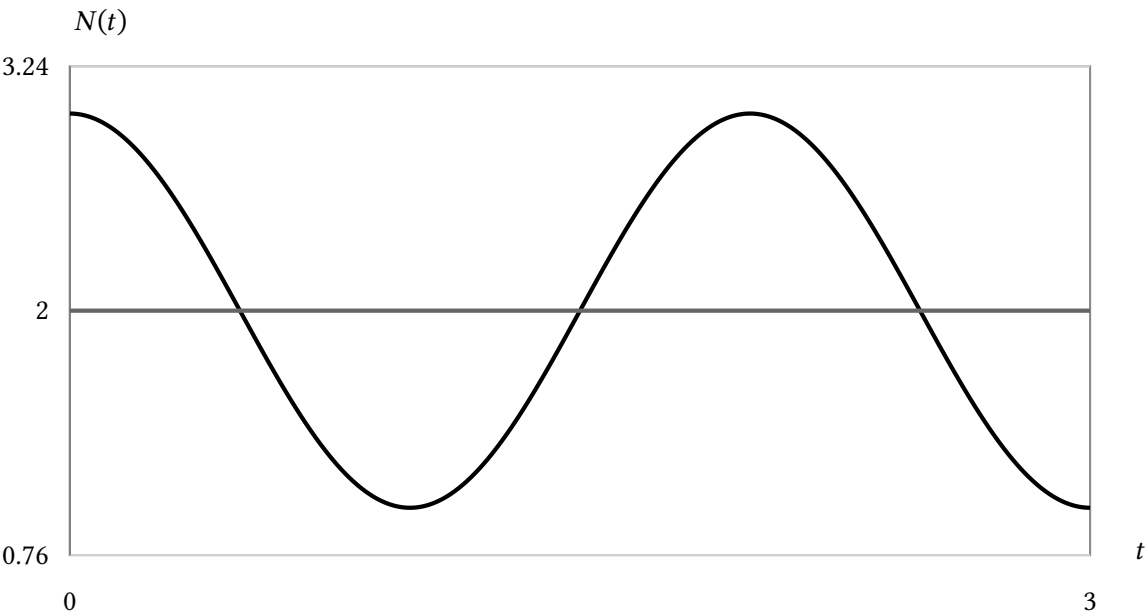
AP Precalculus

Trigonometric Inequalities

Name: _____ Date: _____ Class: _____

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.

For $0 \leq t \leq 3, N(t) = 2 + \cos(\pi t)$. Find when $N > 2$ and add the unequal visible window lengths. First choose and justify a valid method. Method A: Add the actual lengths of the two admitted time windows. Method B: Multiply the number of windows by a common assumed length.



Condition or evidence	Supplied value
Required condition	$N > 2$
Given model	$N(t) = 2 + \cos(\pi t)$
Time interval	$[0, 3]$ hours

Trigonometric Inequalities

Full Worked Solutions - excerpt

Worked example

Problem. Determine the solution set of $\cos x > 1$ on $[0, 2\pi]$ without solving an equality first.

Determine the solution set of $\cos x > 1$ on $[0, 2\pi]$ without solving an equality first.

Condition or evidence	Supplied value
Original inequality	$\cos x > 1$
Input interval	$[0, 2\pi]$

Answer. $\emptyset$

Explanation and check.

Cosine's maximum value is 1, so it can never be strictly greater than 1. The solution set is empty.

Worked example

Problem. Solve $-3 \sin x + 2 < -1$ on $[0, 2\pi]$, reversing the inequality when the sine term is isolated.

Solve $-3 \sin x + 2 < -1$ on $[0, 2\pi]$, reversing the inequality when the sine term is isolated.

Condition or evidence	Supplied value
Original inequality	$-3 \sin x + 2 < -1$
Input interval	$[0, 2\pi]$

Answer. $\emptyset$

Explanation and check.

Isolation gives $\sin x > 1$. Since the upper endpoint of sine's range is 1, the strict inequality is impossible.