

AP Precalculus

Exact Trig Values at Special Angles

Exact Trig Values at Special Angles | APPC-U03-P04

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
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Topic focus

Across 96 tasks this topic asks for correct equality and approximation, mode diagnosis and exact value, valid exact and approximate relations, exact equality groups and ordering, all permitted angle labels and completed exact row.

8 PDFs and a README; 128 buyer pages.

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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.

A special-angle table row has $(\sin \theta, \cos \theta) = (1, 0)$ but its angle label is missing. Find every label allowed by $[0, 2\pi)$; treat included endpoints as distinct labels when appropriate.

Required response

Angle	$\sin \theta$	$\cos \theta$
_____	1	0

Bank label: _____

On the finite one-turn window $[0, 2\pi)$, locate every special-angle ray satisfying $\cos \theta = \frac{1}{2}$. Use the unit-circle line intersection and check both endpoint flags.

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. Give the whole requested response, including any reasoning the question asks for.

The pair at $\frac{\pi}{3}$ is $(\frac{\sqrt{3}}{2}, \frac{1}{2})$. The target ray $\frac{\pi}{6}$ is related by reverse complementary transfer. Track coordinate exchange and any signs to infer its exact pair.

Audit this special-angle table row: $\theta = \frac{\pi}{3}, \sin \theta = \frac{1}{2}, \cos \theta = \frac{1}{2}$. Identify the earliest exact inconsistency and replace the row with the correct pair.

Required response

Angle	sin θ	cos θ
$\frac{\pi}{3}$	$\frac{1}{2}$	$\frac{1}{2}$

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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.

START A unit-circle table row for $\theta = 7\frac{\pi}{6}$ shows $\cos \theta$ missing and the other coordinate equal to $-\frac{1}{2}$. Complete the row exactly and use the angle's location to justify the square-root sign. Required response <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 33%;">Angle</th> <th style="width: 33%;">sin θ</th> <th style="width: 33%;">cos θ</th> </tr> </thead> <tbody> <tr> <td>$7\frac{\pi}{6}$</td> <td>$-\frac{1}{2}$</td> <td>_____</td> </tr> </tbody> </table> Your response: _____	Angle	sin θ	cos θ	$7\frac{\pi}{6}$	$-\frac{1}{2}$	_____	Incoming: $\sin \theta = -\frac{1}{2}, \cos \theta = -\frac{\sqrt{3}}{2}$ A special-angle table row has $(\sin \theta, \cos \theta) = (\frac{1}{2}, \frac{\sqrt{3}}{2})$ but its angle label is missing. Find every label allowed by $[0, 2\pi)$; treat included endpoints as distinct labels when appropriate. Required response <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 33%;">Angle</th> <th style="width: 33%;">sin θ</th> <th style="width: 33%;">cos θ</th> </tr> </thead> <tbody> <tr> <td>_____</td> <td>$\frac{1}{2}$</td> <td>$\frac{\sqrt{3}}{2}$</td> </tr> </tbody> </table> Your response: _____	Angle	sin θ	cos θ	_____	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
Angle	sin θ	cos θ											
$7\frac{\pi}{6}$	$-\frac{1}{2}$	_____											
Angle	sin θ	cos θ											
_____	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$											
Incoming: $\theta = \frac{\pi}{6}$ On the finite one-turn window $(-\pi, \pi]$, locate every special-angle ray satisfying $\cos \theta = 1$. Use the unit-circle line intersection and check both endpoint flags. Your response: _____	Incoming: $\theta = 0$ On the finite one-turn window $[0, 2\pi)$, locate every special-angle ray satisfying $\cos \theta = -1$. Use the unit-circle line intersection and check both endpoint flags. 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 calculator in degree mode evaluates the radian expression $\cos(\frac{\pi}{3})$ and displays 0.9998. Diagnose the mode error, give the correct exact value, and explain why the display is not evidence of equality.

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Full Worked Solutions - excerpt

Worked example

Problem. Locate the terminal ray of $\theta = \frac{\pi}{3}$ on the unit circle and evaluate the ordered pair $(\sin \theta, \cos \theta)$ exactly.

Answer. $(\frac{\sqrt{3}}{2}, \frac{1}{2})$

Explanation and check.

The terminal point at $\frac{\pi}{3}$ has $x = \frac{1}{2}$ and $y = \frac{\sqrt{3}}{2}$. Therefore $(\sin \theta, \cos \theta) = (\frac{\sqrt{3}}{2}, \frac{1}{2})$.

Worked example

Problem. Locate the terminal ray of $\theta = \frac{\pi}{6}$ on the unit circle and evaluate the ordered pair $(\sin \theta, \cos \theta)$ exactly.

Answer. $(\frac{1}{2}, \frac{\sqrt{3}}{2})$

Explanation and check.

The terminal point at $\frac{\pi}{6}$ has $x = \frac{\sqrt{3}}{2}$ and $y = \frac{1}{2}$. Therefore $(\sin \theta, \cos \theta) = (\frac{1}{2}, \frac{\sqrt{3}}{2})$.