

Precalculus
Polar Coordinates, Conversion & Tables | 3-Topic Precalculus Bundle

3-topic bundle | 288 problems | Four activity formats

01 Equivalent Polar Coordinates

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

02 Polar and Rectangular Coordinate Conversion

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

03 Polar Graphs from Tables

[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; 404 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
Equivalent Polar Coordinates

Equivalent Polar Coordinates | APPC-U03-P23

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 diagnosis and corrected pair, same or different, distance and location, one pair, one polar pair and equivalence group.

8 PDFs and a README; 157 buyer pages.

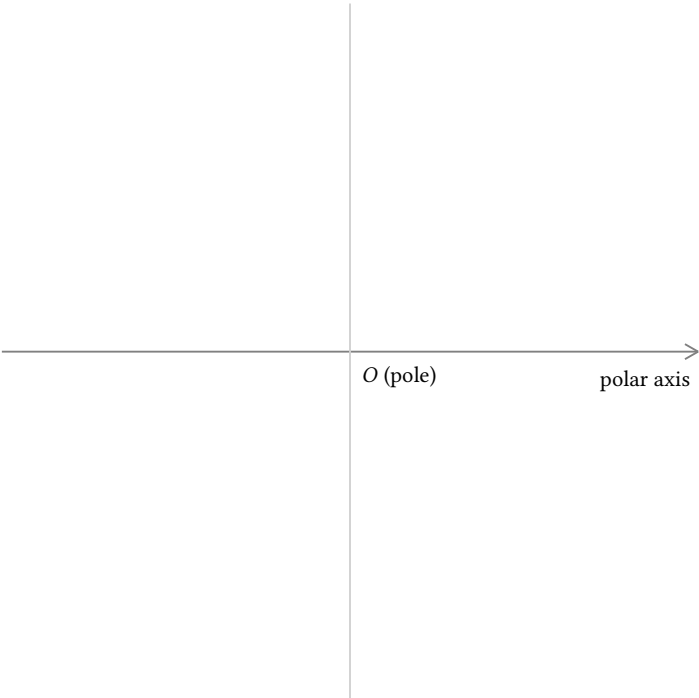
AP Precalculus

Equivalent Polar Coordinates

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.

Find the signed radius r that makes $(r, 5\frac{\pi}{6})$ equivalent to $(5, 11\frac{\pi}{6})$.



Condition or evidence	Supplied value
Incomplete polar record	$(r, 5\frac{\pi}{6})$
Known polar record	$(5, 11\frac{\pi}{6})$

Bank label: _____

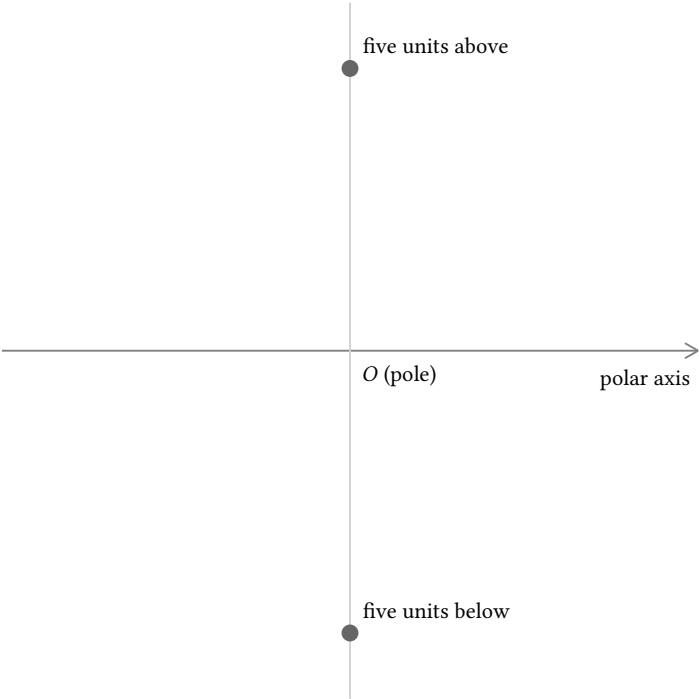
AP Precalculus

Equivalent Polar Coordinates

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.

A plot offers points five units above and five units below the pole. Which one represents $(-5, \frac{\pi}{2})$?



Condition or evidence	Supplied value
Candidate points	
	five units above
	five units below
Given polar record	$(-5, \frac{\pi}{2})$

AP Precalculus

Equivalent Polar Coordinates

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: $\theta = -3\frac{\pi}{10}$

An equivalent pair for $(7, 4\frac{\pi}{3})$ is required to have $\theta = \frac{\pi}{3} + 2k\pi$. What must r be for every integer k ?
Solve the card and move only to the card whose incoming header matches the entire requested response.

Condition or evidence	Supplied value
Given angle form	$\theta = \frac{\pi}{3} + 2k\pi$
Incomplete polar record	(r, θ)
Known polar record	$(7, 4\frac{\pi}{3})$

Your response: _____

AP Precalculus

Equivalent Polar Coordinates

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 $(-a, \frac{\pi}{6})$ with $a = -5$, evaluate the radius before interpreting the point. Correct the claim that the visible minus sign automatically reverses the ray. Justify the comparison by distinguishing signed radius, ordinary distance and actual location.

Compare the stated cases, methods, or representations and justify the conclusion using the supplied conditions.

Condition or evidence	Supplied value
Assumption	$a = -5$
Given polar record	$(-a, \frac{\pi}{6})$
Student claim to examine	The written minus sign always means a negative radius.

Equivalent Polar Coordinates

Full Worked Solutions - excerpt

Worked example

Problem. Fill in r so the table entry $(r, 13\frac{\pi}{6})$ names the same point as $(3, \frac{\pi}{6})$.

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Candidate	Reference
$(r, 13\frac{\pi}{6})$	$(3, \frac{\pi}{6})$

Answer. $r = 3$

Explanation and check.

The angles differ by 2π , so the radius retains both its magnitude and sign.

Worked example

Problem. Complete the row $(r, 0)$ so it is equivalent to $(-8, \pi)$.

Solve the card and move only to the card whose incoming header matches the entire requested response.

Condition or evidence	Supplied value
Incomplete record	$(r, 0)$
Known record	$(-8, \pi)$

Answer. $r = 8$

Explanation and check.

The negative radius reverses the π ray to the 0 ray at distance 8, so the second pair uses $r = 8$.

AP Precalculus
Polar and Rectangular Coordinate Conversion

Polar and Rectangular Coordinate Conversion | APPC-U03-P24

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for polar pair plus check, polar coordinates, polar pair with quadrant check, rounded polar coordinates, rounded coordinates and positive-radius polar pair.

8 PDFs and a README; 154 buyer pages.

AP Precalculus

Polar and Rectangular Coordinate Conversion

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 point has rectangular form $(3, y)$, polar radius 5, and lies above the x -axis. Complete the missing coordinate.

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Condition or evidence	Supplied value
Condition	$y > 0$
Given polar radius	5
Incomplete rectangular record	$(3, y)$

Bank label: _____

For $(-5, 2)$, find positive-radius polar coordinates to the nearest tenth of a degree. Explain the quadrant correction and check the signs of the two projections.

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

x	y
-5	2

Condition or evidence	Supplied value
Required angle interval	$0^\circ \leq \theta < 360^\circ$
Precision	nearest tenth of a degree

Bank label: _____

Convert the measured point $(0.4, -6)$ to positive-radius polar form using the stated rounding. Preserve the quadrant near the negative y -axis.

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

x	y
0.4	-6

Condition or evidence	Supplied value
Required angle interval	$0^\circ \leq \theta < 360^\circ$
Angle precision	nearest tenth
Radius precision	nearest hundredth

Bank label: _____

A calculator returns a reference angle near 20.6° for $(-8, -3)$. Produce the correct polar angle, radius, and a sign check by reprojection.

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Condition or evidence	Supplied value		
Required angle interval	$0^\circ \leq \theta < 360^\circ$		
Given rectangular point	<table><tr><td>−8</td></tr><tr><td>−3</td></tr></table>	−8	−3
−8			
−3			
Precision	Given angle θ nearest tenth degree Radius nearest hundredth		
Given calculator ratio angle	about 20.6°		

Bank label: _____

AP Precalculus

Polar and Rectangular
Coordinate Conversion

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.

A positive-radius point has $\theta = 3\frac{\pi}{2}$ and $y = -4$. Determine r and the missing x -coordinate.

Show a complete response in the numbered workspace, preserving requested exactness, units, interval endpoints, and justification.

Condition or evidence	Supplied value
Given angle θ	$3\frac{\pi}{2}$
Radius convention	positive
Given x -coordinate	missing
Given y -coordinate	-4

AP Precalculus

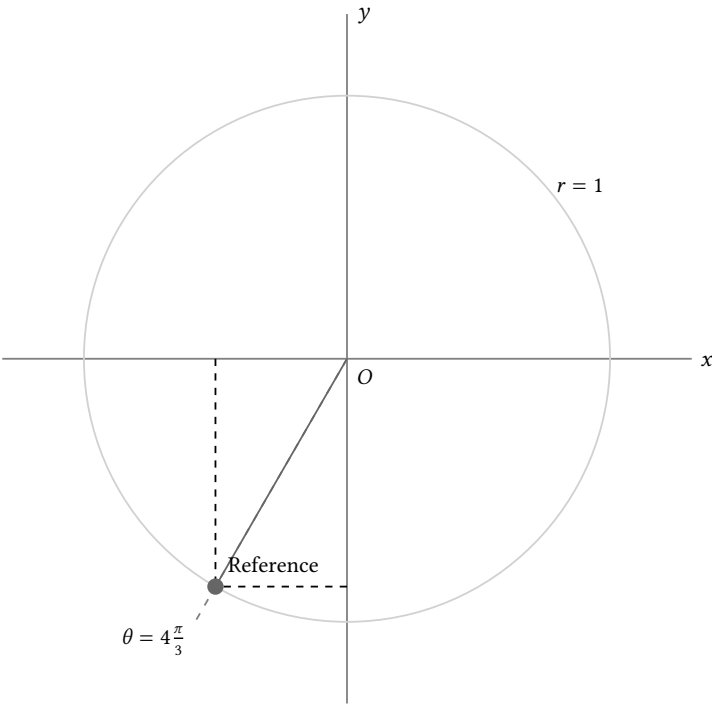
Polar and Rectangular
Coordinate Conversion

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: $(11, 3\frac{\pi}{2})$

Convert $(-9, 4\frac{\pi}{3})$ and explain why both coordinates become positive.



$\cos \theta$	$\sin \theta$
$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$

Condition or evidence	Supplied value
Given quadrant to verify	I
Given polar record	$(-9, 4\frac{\pi}{3})$

Your response: _____

AP Precalculus

Polar and Rectangular
Coordinate Conversion

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 converts $(4, \frac{\pi}{6})$ to $(2, 2\sqrt{3})$. Identify the swapped roles and repair the ordered pair.

Identify the error or first invalid step, give the corrected result, and state a brief mathematical reason.

Condition or evidence	Supplied value
Given polar record	$(4, \frac{\pi}{6})$
Student rectangular result to examine	$(2, 2\sqrt{3})$

Polar and Rectangular Coordinate Conversion

Full Worked Solutions - excerpt

Worked example

Problem. A point has rectangular form $(3, y)$, polar radius 5, and lies above the x -axis. Complete the missing coordinate. Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Condition or evidence	Supplied value
Condition	$y > 0$
Given polar radius	5
Incomplete rectangular record	$(3, y)$

Answer. $y = 4$

Explanation and check.

From $3^2 + y^2 = 5^2$, $y^2 = 16$. The upper-half-plane condition selects $y = 4$ rather than -4 .

Worked example

Problem. A point has radius 10, $y = -6$, and lies left of the y -axis. Reconstruct x .

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Condition or evidence	Supplied value
Condition	$x < 0$
Given polar radius	10
Incomplete rectangular record	$(x, -6)$

Answer. $x = -8$

Explanation and check.

The norm equation gives $x^2 + 36 = 100$, so $x = \pm 8$. The left-half-plane condition selects $x = -8$.

AP Precalculus

Polar Graphs from Tables

Polar Graphs from Tables | APPC-U03-P25

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for two new rows and adequacy explanation, two radius values, ordered rows, directed partial trace, polar graph and directed trace.

8 PDFs and a README; 93 buyer pages.

AP Precalculus

Polar Graphs from Tables

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.

Complete the radius column for $r = 2$ at $\theta = 0, \frac{\pi}{2}$, and π, preserving the given angle order. _____ Bank label: _____	For $r = 1 + \sin \theta$, evaluate the outputs at $0, \frac{\pi}{2}$, and π and place them in the same order. _____ Bank label: _____
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AP Precalculus

Polar Graphs
from Tables

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.

Plot the ordered table for $r = 1$ and add an arrow showing the direction as θ increases from 0 to 2π. Required response <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr><td style="padding: 2px 10px;">0</td><td style="padding: 2px 10px;">1</td></tr> <tr><td style="padding: 2px 10px;">$\frac{\pi}{2}$</td><td style="padding: 2px 10px;">1</td></tr> <tr><td style="padding: 2px 10px;">π</td><td style="padding: 2px 10px;">1</td></tr> <tr><td style="padding: 2px 10px;">$3\frac{\pi}{2}$</td><td style="padding: 2px 10px;">1</td></tr> <tr><td style="padding: 2px 10px;">2π</td><td style="padding: 2px 10px;">1</td></tr> </table>	0	1	$\frac{\pi}{2}$	1	π	1	$3\frac{\pi}{2}$	1	2π	1	Sketch only the portion traced by $r = 2$ for $0 \leq \theta \leq \frac{\pi}{2}$, marking both endpoint statuses.
0	1										
$\frac{\pi}{2}$	1										
π	1										
$3\frac{\pi}{2}$	1										
2π	1										
The $\theta - r$ graph is the horizontal line $r = 3$ for one full turn. Which plane trace matches, and why is the line $y = 3$ not the same graph?	The listed samples for $r = \sin(2\theta)$ are all zero. Explain why they do not show the trace, then evaluate the proposed extra input $\frac{\pi}{4}$. Required response <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr><td style="padding: 2px 10px;">0</td><td style="padding: 2px 10px;">0</td></tr> <tr><td style="padding: 2px 10px;">$\frac{\pi}{2}$</td><td style="padding: 2px 10px;">0</td></tr> <tr><td style="padding: 2px 10px;">π</td><td style="padding: 2px 10px;">0</td></tr> </table>	0	0	$\frac{\pi}{2}$	0	π	0				
0	0										
$\frac{\pi}{2}$	0										
π	0										
Use the ordered rows for $r = \theta$ to construct the trace on $[0, \frac{\pi}{2}]$ and describe its direction. Required response <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr><td style="padding: 2px 10px;">0</td><td style="padding: 2px 10px;">0</td></tr> <tr><td style="padding: 2px 10px;">$\frac{\pi}{4}$</td><td style="padding: 2px 10px;">$\frac{\pi}{4}$</td></tr> <tr><td style="padding: 2px 10px;">$\frac{\pi}{2}$</td><td style="padding: 2px 10px;">$\frac{\pi}{2}$</td></tr> </table>	0	0	$\frac{\pi}{4}$	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{\pi}{2}$	Evaluate $r = 2 \cos \theta - 1$ at the four listed angles. Keep zero and negative outputs unchanged for later plotting. The supplied angles, in order, are $\theta = 0, \frac{\pi}{3}, \pi, 3\frac{\pi}{2}$.				
0	0										
$\frac{\pi}{4}$	$\frac{\pi}{4}$										
$\frac{\pi}{2}$	$\frac{\pi}{2}$										

AP Precalculus

Polar Graphs
from Tables

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: $(0, 1), (\frac{\pi}{4}, 0), (\frac{\pi}{2}, -1), (\pi, -1)$ Determine the plane arc traced by $r = -1$ for $0 \leq \theta \leq \frac{\pi}{2}$.

Required response

0	-1
$\frac{\pi}{2}$	-1

Your response: _____

Incoming: The upper arc from filled $(2, 0)$ through $(1, 1)$, approaching but not including the pole.Complete the table for $r = 3 \cos \theta$ at $\frac{\pi}{6}, \frac{\pi}{2}$, and $5\frac{\pi}{6}$.

Your response: _____

Incoming: An outward quadrant-III curve from $(-1, 0)$ to $(0, -\frac{3}{2})$, with both endpoints filled.Determine the portion traced by $r = -1$ for $-\pi \leq \theta \leq \frac{\pi}{2}$, including its direction.

Required response

$-\pi$	-1
$-\frac{\pi}{2}$	-1
0	-1
$\frac{\pi}{2}$	-1

Your response: _____

Incoming: A three-quarter unit-circle arc from $(1, 0)$ through $(0, 1), (-1, 0)$, to $(0, -1)$.Sketch the windowed trace of $r = \theta + \pi$ from $\theta = -\pi$ to $\theta = -\frac{\pi}{2}$.

Required response

$-\pi$	0
$-3\frac{\pi}{4}$	$\frac{\pi}{4}$
$-\frac{\pi}{2}$	$\frac{\pi}{2}$

Your response: _____

AP Precalculus

Polar Graphs from Tables

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 replaces the negative output of $r = \cos \theta$ by its magnitude. Repair the $\theta = \pi$ row and state where that signed-radius point plots.

Required response

0	1
$\frac{\pi}{2}$	0
π	1

A student submits the horizontal $\theta - r$ graph as the plane trace of $r = 2$. Explain the coordinate-system confusion and replace it with the correct polar graph.

Polar Graphs from Tables

Full Worked Solutions - excerpt

Worked example

Problem. Evaluate $r = 2 + \sin \theta - \cos \theta$ at the four quadrantal angles.

Answer. $(0, 1), (\frac{\pi}{2}, 3), (\pi, 3), (3\frac{\pi}{2}, 1)$

Explanation and check.

Insert the four sine-cosine pairs $(0, 1), (1, 0), (0, -1)$, and $(-1, 0)$ into the rule.

Worked example

Problem. Compute $r = 2 \sin \theta + \cos(2\theta)$ at the four quadrantal angles.

Answer. $(0, 1), (\frac{\pi}{2}, 1), (\pi, 1), (3\frac{\pi}{2}, -3)$

Explanation and check.

Substitution gives $0 + 1, 2 - 1, 0 + 1$, and $-2 - 1$, respectively.