Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Features of Polar Equations

Features of Polar Equations | APPC-U03-P27

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for minimum distance and locations, distance and parameter, ordered exact parameter list, closest point and distance, distance and location and distinct coordinate set.

8 PDFs and a README; 83 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.

In the family $r = a + \cos\theta$, choose a so that the curve reaches the pole at $\theta = \pi$. Bank label: _____	For $r = a + 2\sin\theta$ with $a \geq 2$, determine a if the greatest distance from the pole is 5. Bank label: _____
Determine a in $r = a + \sin\theta$ if every radius is negative and the closest distance to the pole is 2. Bank label: _____	At what parameter does $r = 5\theta$ reach the pole on $-1 \leq \theta \leq 1$? 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.

Find every θ in $0 \le \theta \le \pi$ for which $r = 2\sin\theta$ is zero, and name the plane point reached.

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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 For $0 \le \varphi < 2\pi$, the curve $r = 3 + 3\cos(\theta - \varphi)$ has its cusp at the pole when $\theta = 5\frac{\pi}{6}$. Find φ. Your response: _____	**Incoming:** $\varphi = 11\frac{\pi}{6}$. Choose a in $r = 2 + a\cos\theta$ so that $\theta = 0$ is a pole parameter. Verify the resulting zero. Your response: _____
Incoming: -2 Find a if $r = a + 4\cos\theta$ must pass through the pole at $\theta = 2\frac{\pi}{3}$. Your response: _____	**Incoming:** a = 2. For k>0, the curve r=k(1-cos θ) has farthest distance 10. Determine k. 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 table row gives $(\theta, r) = (\frac{\pi}{4}, -7)$, and a student reports a distance of -7. Correct both the distance and the plotted direction.

A student finds seven zero parameters for $r = \sin(3\theta)$ on $0 \le \theta \le 2\pi$ and reports seven different poles. Correct the feature count.

Features of Polar Equations

Full Worked Solutions - excerpt

Worked example

Problem. Choose a in $r = 2 + a\cos\theta$ so that $\theta = 0$ is a pole parameter. Verify the resulting zero.

Answer. -2

Explanation and check.

At $\theta = 0$ the radius is $2 + a$. Setting it to zero gives $a = -2$, and substitution yields $r(0) = 2 - 2 = 0$.

Worked example

Problem. For k>0, the curve r=k(1-cos θ) has farthest distance 10. Determine k.

Answer. k = 5.

Explanation and check.

The factor $1 - \cos\theta$ is largest at $\theta = \pi$, where it equals 2. Thus the farthest distance is $2k$, and $2k = 10$ gives $k = 5$.