

Precalculus · Polar Coordinates and Parametric Equations · Quiz

Common Core N-CN.B.4, F-IF.C.7 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This precalculus polar parametric quiz asks 10 multiple-choice questions on polar coordinates and parametric equations, and each answer comes with a short explanation.

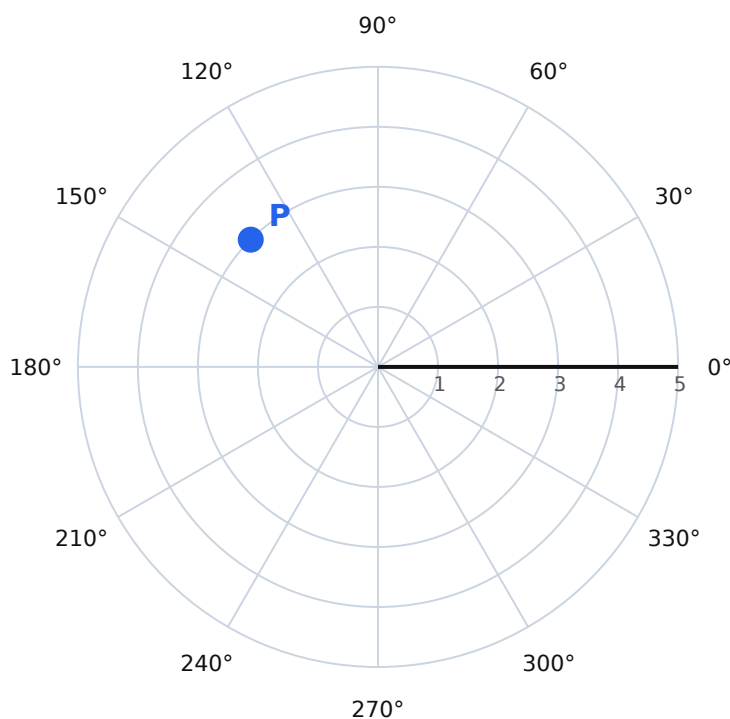
Ten multiple-choice questions on polar points, conversions, polar graphs and parametric equations. Choose the best answer, then read the explanation to learn the typical mistake. Each question has exactly one correct option.

PrecalculusCommon Core: N-CN.B.4 · F-IF.C.7

Questions

Question 1

What are the polar coordinates of point P, using $r > 0$ and $0^\circ \leq \theta < 360^\circ$?



Point P on a polar grid.

- A. $(3, 45^\circ)$
- B. $(3, 225^\circ)$
- C. $(135, 3)$
- D. $(3, 135^\circ)$

Question 2

What is the x -coordinate of the polar point $(10, \frac{\pi}{3})$?

- A. $5\sqrt{3}$
- B. 10
- C. 5
- D. $\frac{10}{\sqrt{3}}$

Question 3

Which polar pair equals the rectangular point $(-1, 1)$?

- A. $(\sqrt{2}, \frac{3\pi}{4})$
- B. $(\sqrt{2}, \frac{\pi}{4})$
- C. $(\sqrt{2}, \frac{5\pi}{4})$
- D. $(2, \frac{3\pi}{4})$

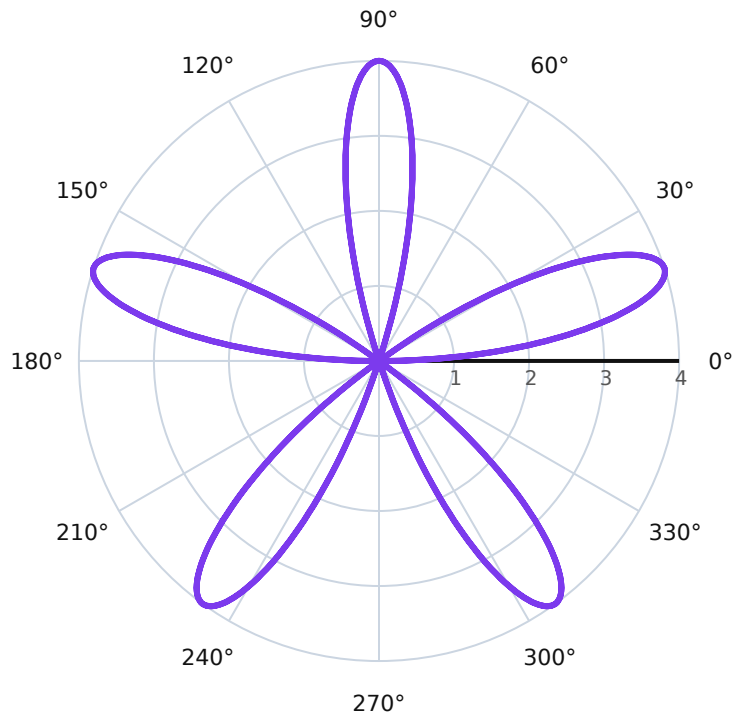
Question 4

Which rectangular equation matches $r = 4\cos\theta$?

- A. $(x-2)^2 + y^2 = 4$
- B. $x^2 + y^2 = 4$
- C. $(x-4)^2 + y^2 = 16$
- D. $x^2 + (y-2)^2 = 4$

Question 5

Which equation has the graph shown, a rose with petals of length 4 and one petal pointing straight up?



A rose with five petals.

- A. $r = 4\cos 5\theta$
- B. $r = 4\sin 5\theta$
- C. $r = 4\sin 10\theta$
- D. $r = 5\sin 4\theta$

Question 6

What type of graph is $r = 2 + 2\sin\theta$?

- A. cardioid
- B. circle
- C. rose with two petals
- D. limaçon with an inner loop

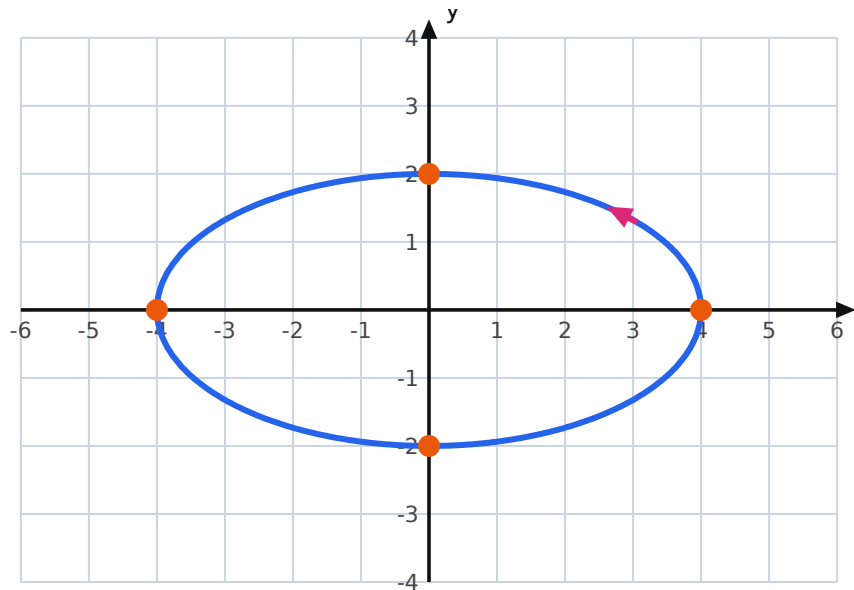
Question 7

Eliminate the parameter from $x = t + 2$, $y = t^2$.

- A. $y = x^2 - 2$
- B. $y = (x - 2)^2$
- C. $y = (x + 2)^2$
- D. $y = x^2 + 2$

Question 8

An object moves along $x = 4\cos t$, $y = 2\sin t$, as shown. Where is it at $t = \frac{\pi}{2}$?



The path of the object; the arrow shows its direction.

- A. $(4,0)$
- B. $(0,2)$
- C. $(0,4)$
- D. $(0,0)$

Question 9

What is the distance between the polar points $(3,0)$ and $(4, \frac{\pi}{2})$?

- A. 7
- B. 1
- C. 12
- D. 5

Question 10

A ball follows $x=10t$, $y=64t-16t^2$ (feet, seconds). When does it land?

- A. $t=2$ s
- B. $t=8$ s
- C. $t=4$ s
- D. $t=6.4$ s

Answer key

1. **D** - P is on the ring $r=3$ along the 135° spoke. Mixing up the order of r and θ , or the quadrant, gives the wrong pairs.
2. **C** - $x = r \cos \theta = 10 \cdot \frac{1}{2} = 5$. Using sine instead of cosine gives $5\sqrt{3}$, which is the y -coordinate.
3. **A** - $r = \sqrt{1+1} = \sqrt{2}$, and the point is in Quadrant II where $\tan \theta = -1$ gives $\theta = \frac{3\pi}{4}$. Reading $\tan^{-1}(-1)$ from a calculator without checking the quadrant is the typical error.
4. **A** - Multiply by r : $x^2 + y^2 = 4x$, so $(x-2)^2 + y^2 = 4$. The cosine puts the center on the x -axis; a sine would put it on the y -axis.
5. **B** - Five petals mean $n=5$, and length 4 means $a=4$. Sine puts a tip at $\theta = \frac{\pi}{10}$ and at $\frac{\pi}{2}$; cosine would put a tip on the polar axis.
6. **A** - The constants are equal ($a=b=2$), which makes a cardioid. An inner loop needs $a < b$.
7. **B** - $t = x-2$, so $y = (x-2)^2$. Replacing t by $x+2$, or adding 2 after squaring, are the typical slips.
8. **B** - $x = 4 \cos \frac{\pi}{2} = 0$ and $y = 2 \sin \frac{\pi}{2} = 2$. The point $(4,0)$ is where the object starts, at $t=0$.
9. **D** - The rays are perpendicular, so the distance is the hypotenuse $\sqrt{3^2 + 4^2} = 5$. Adding the radii gives 7.
10. **C** - $64t - 16t^2 = 16t(4-t) = 0$ gives $t=4$. At $t=2$ the ball is at its highest point, not on the ground.

How does this quiz work?

Read each question, choose one answer among A, B, C and D, then check it: a short explanation appears after every answer. Your score out of 10 is shown at the end, and you can restart the quiz as often as you like.

What should you review before the quiz?

Reread the key facts of the lesson and the worked example. If a question is hard, go back to the matching part of the lesson, then try the quiz again. Write your work on scrap paper: most mistakes come from skipping a step, not from the idea itself.

Remember:

- Polar to rectangular: $x = r \cos \theta$, $y = r \sin \theta$; rectangular to polar: $r^2 = x^2 + y^2$, $\tan \theta = \frac{y}{x}$.
- Every point has infinitely many polar names: $(r, \theta) = (r, \theta + 2\pi k) = (-r, \theta + \pi)$.
- A rose $r = a \cos n\theta$ has n petals for odd n and $2n$ petals for even n .
- A limaçon $r = a + b \cos \theta$ has an inner loop when $a < b$ and is a cardioid when $a = b$.
- To eliminate the parameter, solve one equation for t and substitute into the other.

How to use this precalculus polar parametric quiz

Retake this precalculus polar parametric quiz until every answer is right, then move on to the worksheet and the test.

