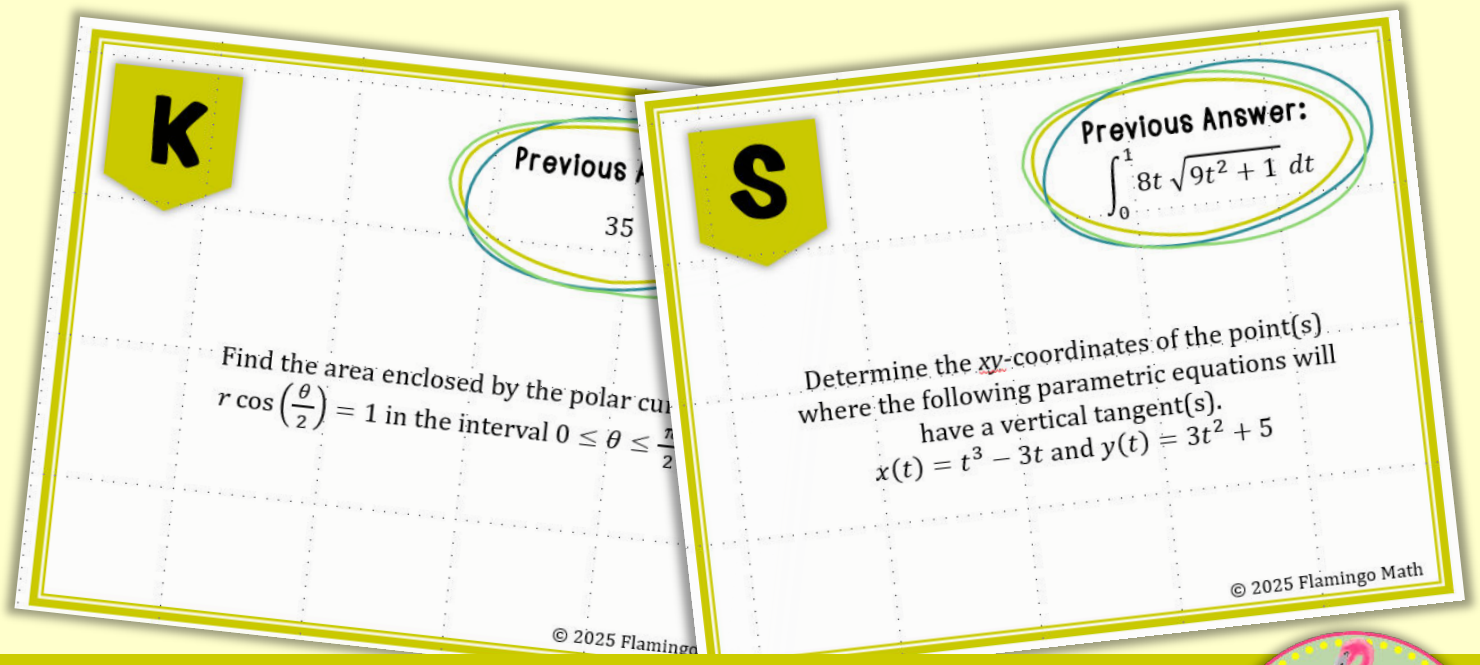
AP® Calculus BC

Parametric, Polar & Vectors



Scavenger Hunt

Flamingo MATH
Jean Adams

Parametric, Polar and Vectors Scavenger Hunt

ABOUT THE RESOURCE:

This is an activity with 20 task cards designed for **Parametric, Polar and Vectors Unit** in **AP Calculus BC**. Each card requires an analytic, algebraic, or numeric approach. This can be used at the end of the Unit 9 lessons in the CED Learning Objectives.

Teaching Suggestions:

- Use the **task cards** as a group activity.
- Use the cards as a quick review. There is a student recording sheet included.
- Have students check their results with their group.

PREPARATION:

When printing cards, be sure to choose the print range to correspond to the sections of pages in portrait layout and then the sections of pages in landscape layout.

Please visit my store for more engaging task card activities.

A

Previous Answer: $(3, 5)$

If $x = e^{3t}$ and $y = \sin(2t)$, find dy/dx in terms of t.

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B

Previous Answer: $\frac{3(5x^2 - 4x - 2)}{(5x -$

Detrmine the area of the region below th
parametric curve given by the set of equa
$x = f(t) = t^2$ and $y = g(t) = 4t^2 - t^4$.
the curve traces out exactly once from rig
for the given range of t, on $0 \le t \le 2$.

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C

Previous Answer: $\sqrt{5}$

Write an xy-equation of the curve with parametric equations $x = 2t$ and $y = 4t^2 + 2$.

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D

Previous A
$-6\sqrt{3}$

Find the area of the region bounded by $r =$

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E

Previous Answer: $\sqrt{10}$

A particle moves along a path given by $r(t) = (t^3 - 1)\mathbf{i} + (t^2 - 1)\mathbf{j}$. Find the acceleration of the particle at $t = 1$.

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F

Previous Answer: π

A particle moves along the xy-plane in such a way that its velocity vector is $(3t^2 - 4t, 8t^3 + 6)$. At $t = 0$ the position of the particle is at $(4, -3)$. Find the position of the particle at $t - 1$.

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G

Previous Answer: $\{(2,2); (-2,8)\}$

Find the equation of the tangent line(s) to the following set of parametric equation at $t = \frac{\pi}{2}$.
$x(t) = 3\cos(2t) - 4\sin(2t)$
$y(t) = 2\tan(6t)$

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H

Previous Answer: $\int_0^{\pi} \sqrt{(2t\cos(t^2))^2 + (3e^{3t})^2}\, dt$

In the xy-plane, a particle moves along the parabola $y = x^2 - x$, with a constant speed of $2\sqrt{10}$. If $\frac{dx}{dt} > 0$, what is the value of $\frac{dy}{dt}$ when the particle is at the point $(4, 12)$?

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J

Previous Answer: $y = x^2 + 2$

Write the rectangular equation in polar form:
$x^2 + y^2 - 2x = 0$.

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K

Previous Answer: 35

Find the area enclosed by the polar
$r\cos\left(\frac{\theta}{2}\right) = 1$ in the interval $0 \le \theta$

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L

Previous Answer: $\frac{8 + \pi}{4}$

The position vector of a particle moving in the xy-plane is $\langle\sqrt{2} - 6\cos t, t^3 - 9t\rangle$ for $0 \le t \le 2\pi$. For what value of y does the path of the particle have a horizontal tangent?

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M

Previous A
$\frac{2\cos($
$3e^{3}$

Write and simplify an integral expres
represent the length of the path descri
the parametric equation $x = 8t^3$ and y
for $0 \le t \le 1$.

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N

Previous Answer: $\frac{\pi}{4}$

Find the area of the region that lies inside the circle $r - 3\sin\theta$ and outside the cardioid $r = 1 + \sin\theta$.

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P

Previous Answer: $6\mathbf{i} + 2\mathbf{j}$

Find the area of the region bounded by $r = 3\cos\theta$.

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Q

Previous Answer: $\frac{32}{3}$

Write an integral that gives
described by the parametri
and $y = e^{3t}$ from $t = 0$ to t

R

Previous Answer: 1

S

Previous Answer: $\int_0^1 8t\sqrt{9t^2 + 1}\, dt$

Determine the xy-coordinates of the point(s) where the following parametric equations will have a vertical tangent(s).
$x(t) = t^3 - 3t$ and $y(t) = 3t^2 + 5$

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T

Previous Answer: $y = -x - 3$

Find $\frac{d^2y}{dx^2}$ for the set of parametric equations:
$x - 5t^2 - 4t$ and $y - 2t^3 + 3t^2$.

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U

Previous Answer: $r = 2\cos\theta$

Find the speed of a particle that is moving according to $r(t) = t\mathbf{i} + t^3\mathbf{j}$ at time $t = 1$.

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V

Previous Answer: $\frac{9\pi}{4}$

Find the area inside $r = 1 + \sin\theta$ and outside $r = 1$.

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Parametric, Polar & Vectors Scavenger Hunt

Name: Date: Period: ____

Directions: Start with any task card. Write the station card in the worksheet below. Complete each card and show your work for the question in the space provided. If you get back to your original start the station card, you answered all questions correctly.

Card: ____	Card: ____
Card:	Card:
Card: ____	Card: ____
Card: ____	Card: ____
Card:	Card:

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