LESSON MAKER PRO

Curve Switch Lab

Move between parametric and rectangular equations.

HIGH SCHOOL · MA.912.T.4.6

MA.912.T.4.6 "Convert from a parametric representation of a plane curve to a rectangular equation, and convert from a rectangular equation to a parametric representation of a plane curve."

NAME _____ DATE _____

SWITCHING FORMS

To change parametric equations into a rectangular equation, solve one equation for t and substitute into the other equation. To write a parametric form for a line, you can often set x or y equal to t. For a circle centered at the origin, $x = r \cos t$ and $y = r \sin t$ give $x^2 + y^2 = r^2$.

WORKED EXAMPLE

Convert $x = 11 + 10t$ and $y = 12 - 13t$ to a rectangular equation.

1. Solve $x = 11 + 10t$ for t: $t = (x - 11)/10$.
2. Substitute: $y = 12 - 13(x - 11)/10$.
3. Multiply by 10 and simplify: $13x + 10y = 263$.

Answer: $13x + 10y = 263$

PRACTICE 6 problems

1 Convert $x = 4t - 5$ and $y = 6t + 7$ to a rectangular equation.

ANSWER _____

2 Write a parametric representation for $y = -9x + 14$.

ANSWER _____

3 Convert $x = 15 - t$ and $y = 8t - 16$ to a rectangular equation.

ANSWER _____

4 Write a parametric representation for $x^2 + y^2 = 81$.

ANSWER _____

5 Convert $x = 17 + 7t$ and $y = 25 + 21t$ to a rectangular equation.

ANSWER _____

6 Write a parametric representation for $x = 5y - 4$.

ANSWER _____

APPLY IT Show your work

1 In a coordinate-based video game, a character moves according to $x = 6t - 18$ and $y = 9t + 5$. Write the rectangular equation for the character's path.

WORK SPACE

ANSWER _____

2 A student designs an animated logo that follows the equation $x^2/36 + y^2/64 = 1$. Write one parametric representation for the logo's path.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Convert $x = 7 + 4t$ and $y = 2 - 3t$ to a rectangular equation. Then explain whether the point (15, -4) lies on the curve.

WORK SPACE AND ANSWER

Curve Switch Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Convert x = 4t - 5 and y = 6t + 7 to a rectangular equation.	**3x - 2y = -29**
2	Write a parametric representation for y = -9x + 14.	**x = t, y = -9t + 14**
3	Convert x = 15 - t and y = 8t - 16 to a rectangular equation.	**8x + y = 104**
4	Write a parametric representation for $x^2 + y^2 = 81$.	**x = 9 cos t, y = 9 sin t**
5	Convert x = 17 + 7t and y = 25 + 21t to a rectangular equation.	**y = 3x - 26**
6	Write a parametric representation for x = 5y - 4.	**x = 5t - 4, y = t**

PART 2 · APPLY IT

1. **3x - 2y = -64** Solve x = 6t - 18 for t, then substitute into the equation for y. Simplifying gives 3x - 2y = -64.
2. **x = 6 cos t, y = 8 sin t** The horizontal radius is 6 and the vertical radius is 8. Use cosine for x and sine for y.

CHALLENGE

3x + 4y = 29. Since 3(15) + 4(-4) = 29, the point (15, -4) lies on the curve.

Accept any equivalent rectangular equation obtained by multiplying both sides by the same nonzero constant. For parametric answers, accept equivalent forms that trace the same curve.