

Polar Switch Lab

Rewrite equations between rectangular and polar forms.

HIGH SCHOOL • MA.912.T.4.2

MA.912.T.4.2 "Represent equations given in rectangular coordinates in terms of polar coordinates. Represent equations given in polar coordinates in terms of rectangular coordinates."

NAME _____

DATE _____

SWITCHING COORDINATE FORMS

To change a rectangular equation to polar form, use $x=r \cos(\theta)$, $y=r \sin(\theta)$, and $x^2+y^2=r^2$. To change a polar equation to rectangular form, replace $r \cos(\theta)$ with x and $r \sin(\theta)$ with y .

WORKED EXAMPLE

Convert $x^2+y^2=10x$ to polar form.

1. Replace x^2+y^2 with r^2 and x with $r \cos(\theta)$: $r^2=10r \cos(\theta)$.
2. Divide by r : $r=10\cos(\theta)$.

Answer: $r=10\cos(\theta)$

PRACTICE 6 problems

1 Convert $x^2+y^2=6y$ to polar form.

ANSWER _____

2 Convert $x=-5$ to polar form.

ANSWER _____

3 Convert $r=8$ to rectangular form.

ANSWER _____

4 Convert $r=4\cos(\theta)$ to rectangular form.

ANSWER _____

5 Convert $r=3\sin(\theta)$ to rectangular form.

ANSWER _____

6 Convert $r \cos(\theta)+2r \sin(\theta)=7$ to rectangular form.

ANSWER _____

APPLY IT Show your work

- 1** A drone films a skateboard competition while following a path modeled by $x^2 + y^2 = 12x$, where the origin is the center of the park. Write the path in polar form.

WORK SPACE

ANSWER _____

- 2** At an esports event, a motion-tracking zone includes every point 9 feet from the tracking hub. The zone is modeled by $r=9$. Write the boundary in rectangular form.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Convert $r = 5/(2\cos(\theta) - \sin(\theta))$ to rectangular form.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Convert $x^2+y^2=6y$ to polar form.	$r=6\sin(\theta)$
2	Convert $x=-5$ to polar form.	$r \cos(\theta)=-5$
3	Convert $r=8$ to rectangular form.	$x^2+y^2=64$
4	Convert $r=4\cos(\theta)$ to rectangular form.	$x^2+y^2=4x$
5	Convert $r=3\sin(\theta)$ to rectangular form.	$x^2+y^2=3y$
6	Convert $r \cos(\theta)+2r \sin(\theta)=7$ to rectangular form.	$x+2y=7$

PART 2 · APPLY IT

1. $r=12\cos(\theta)$ Replace x^2+y^2 with r^2 and x with $r \cos(\theta)$. Divide $r^2=12r \cos(\theta)$ by r .
2. $x^2+y^2=81$ Square both sides to get $r^2=81$. Replace r^2 with x^2+y^2 .

CHALLENGE

$$2x-y=5$$

Accept equivalent forms, such as $r=-5\sec(\theta)$ for problem 2. For equations involving r , accept algebraically equivalent forms with appropriate domain restrictions.