Theorem

Let a be a nonzero real number, the graph of the equation

$$r\sin\theta = a$$

is a horizontal line a units above the pole if $a > 0$ and $|a|$ units below the pole if $a < 0$.

Theorem

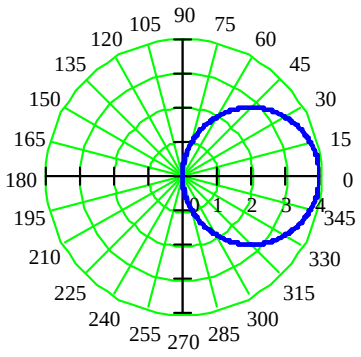
Let a be a nonzero real number, the graph of the equation

$$r\cos\theta = a$$

is a vertical line a units to the right of the pole if $a > 0$ and $|a|$ units to the left of the pole if $a < 0$.

Identify and graph the equation: $r = 4\cos\theta$

$$r^2 = 4r\cos\theta$$
$$x^2 + y^2 = 4x$$
$$x^2 - 4x + y^2 = 0$$
$$x^2 - 4x + 4 + y^2 = 4$$
$$(x-2)^2 + y^2 = 4$$



Theorem

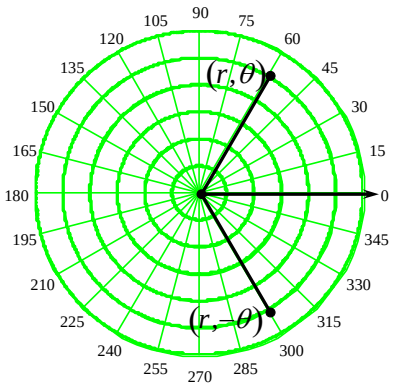
Let a be a positive real number. Then,

$r = 2a\sin\theta$	Circle: radius a; center at $(0, a)$ in rectangular coordinates.
$r = -2a\sin\theta$	Circle: radius a; center at $(0, -a)$ in rectangular coordinates.

Theorem

Let a be a positive real number. Then,

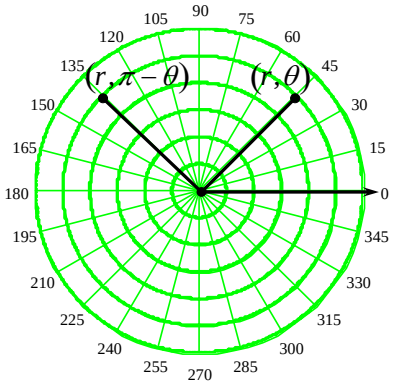
$r = 2a\cos\theta$	Circle: radius a; center at $(a, 0)$ in rectangular coordinates.
$r = -2a\cos\theta$	Circle: radius a; center at $(-a, 0)$ in rectangular coordinates.



Theorem Tests for Symmetry

Symmetry with Respect to the Polar Axis (*x*-axis):

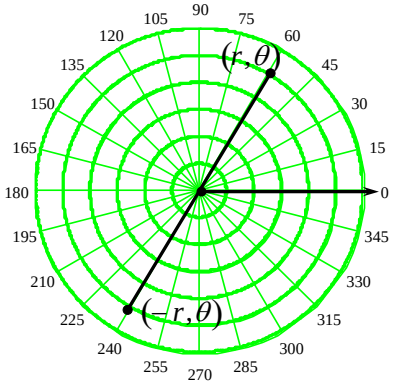
In a polar equation, replace θ by $-\theta$. If an equivalent equation results, the graph is symmetric with respect to the polar axis.



Theorem Tests for Symmetry

Symmetry with Respect to the Line $\theta = \pi/2$ (*y*-axis):

In a polar equation, replace θ by $\pi - \theta$. If an equivalent equation results, the graph is symmetric with respect to the line $\theta = \pi/2$.



Theorem Tests for Symmetry

Symmetry with Respect to the Pole (Origin):

In a polar equation, replace r by $-r$. If an equivalent equation results, the graph is symmetric with respect to the pole.