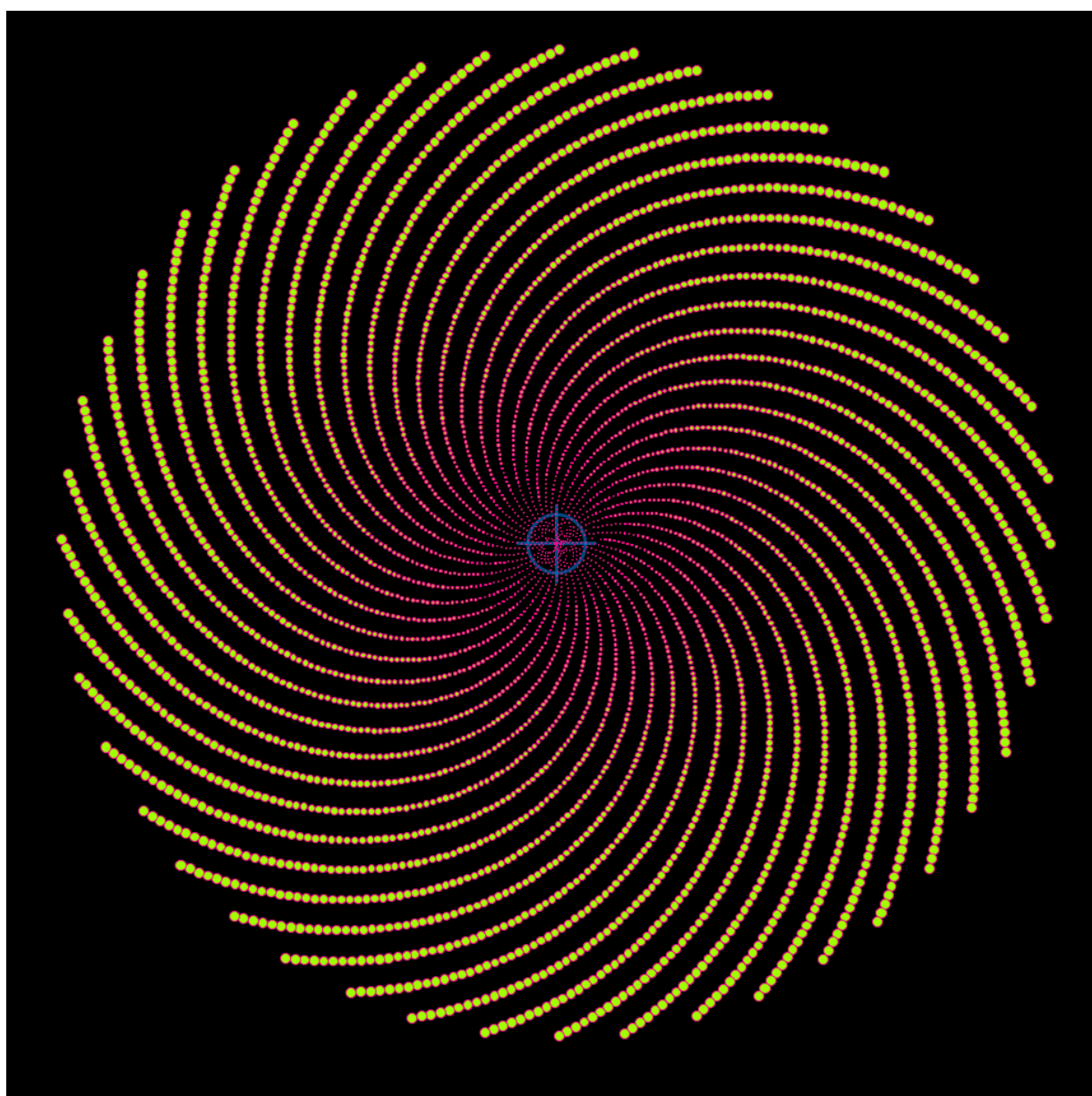


Further Pure A-Level Mathematics
Compulsory Course Component
Core 2

POLAR COORDINATES



Artwork made using Polar Coordinates

POLAR COORDINATES

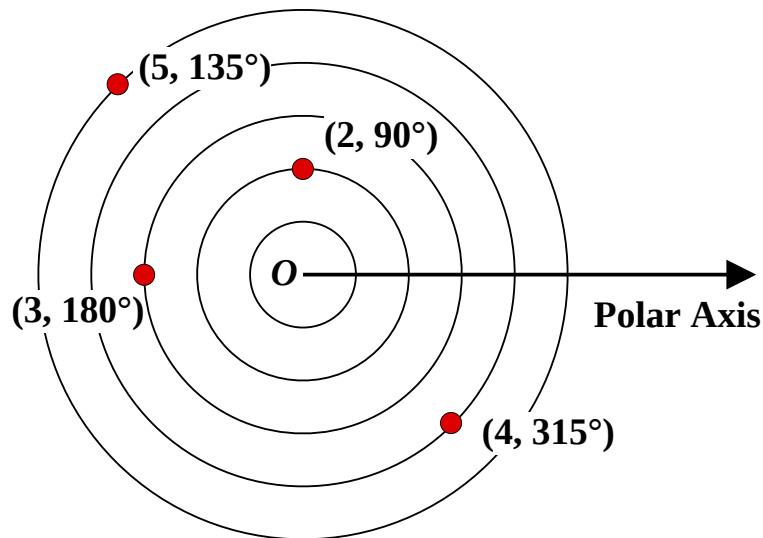
Lesson 1

Further A-Level Pure Mathematics, Core 2

Polar Coordinates

1.1 The Polar Coordinate System

The polar coordinates of a point describe its position in terms of a distance, r , from the origin, O , (called the “pole”) and an angle, θ , measured anticlockwise from the polar axis. Usually the polar axis is in the same direction as the positive x -axis when using Cartesian coordinates.



The diagram shows four point along with their polar coordinates. Here, degrees have been used but often radians are preferred.

1.2 Plotting a Polar Curve

On a Cartesian graph the points are of the form (x, y) and equations are formed with x and y in them, these then being graphed. On a Polar graph the points are of the form (r, θ) . Mirroring what is done with the Cartesian system, polar equations can be formed with r and θ in them. And these can be graphed, but on polar graph paper, rather than Cartesian.

Here is a polar equation which is to be graphed.

$$r = 12 \cos^2 \theta - 4 \sin \theta$$

To graph this polar equation, complete the table provided and then plot the polar coordinates obtained on the polar graph paper.

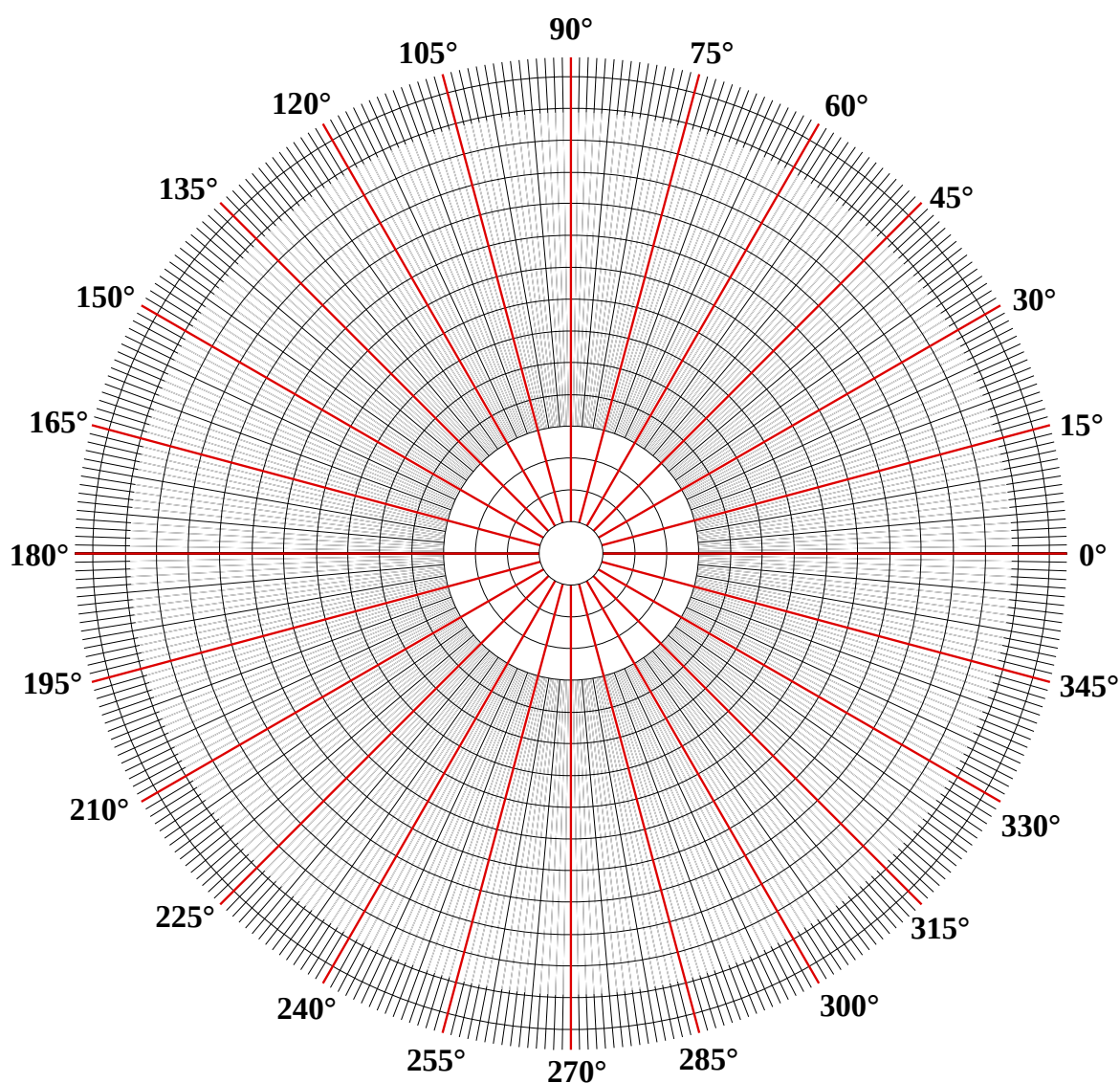
Work to 1 decimal place.

θ (in degrees)	0	15	30	45	60	75	90
$r = 12 \cos^2 \theta - 8 \sin \theta$							

θ (in degrees)	105	120	135	150	165	180
$r = 12 \cos^2 \theta - 8 \sin \theta$						

θ (in degrees)	195	210	225	240	255	270
$r = 12 \cos^2 \theta - 8 \sin \theta$						

θ (in degrees)	285	300	315	330	345	360
$r = 12 \cos^2 \theta - 8 \sin \theta$						



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Teachers may obtain detailed worked solutions to the exercises by email from MHHShrewsbury@Gmail.com