

Introduction to Polar Graphs

Main Idea

Plot Points You should be very conformable plotting points in radians as well as degrees. Simply make a table of values with r 's and corresponding θ 's, then start plotting until you can make sense of the the graph. If connecting the points is uneasy, choose smaller angle intervals, i.e. instead of plotting and calculating the r every 30 degrees, plot every 5 degrees.

Get to Know Your Calculator

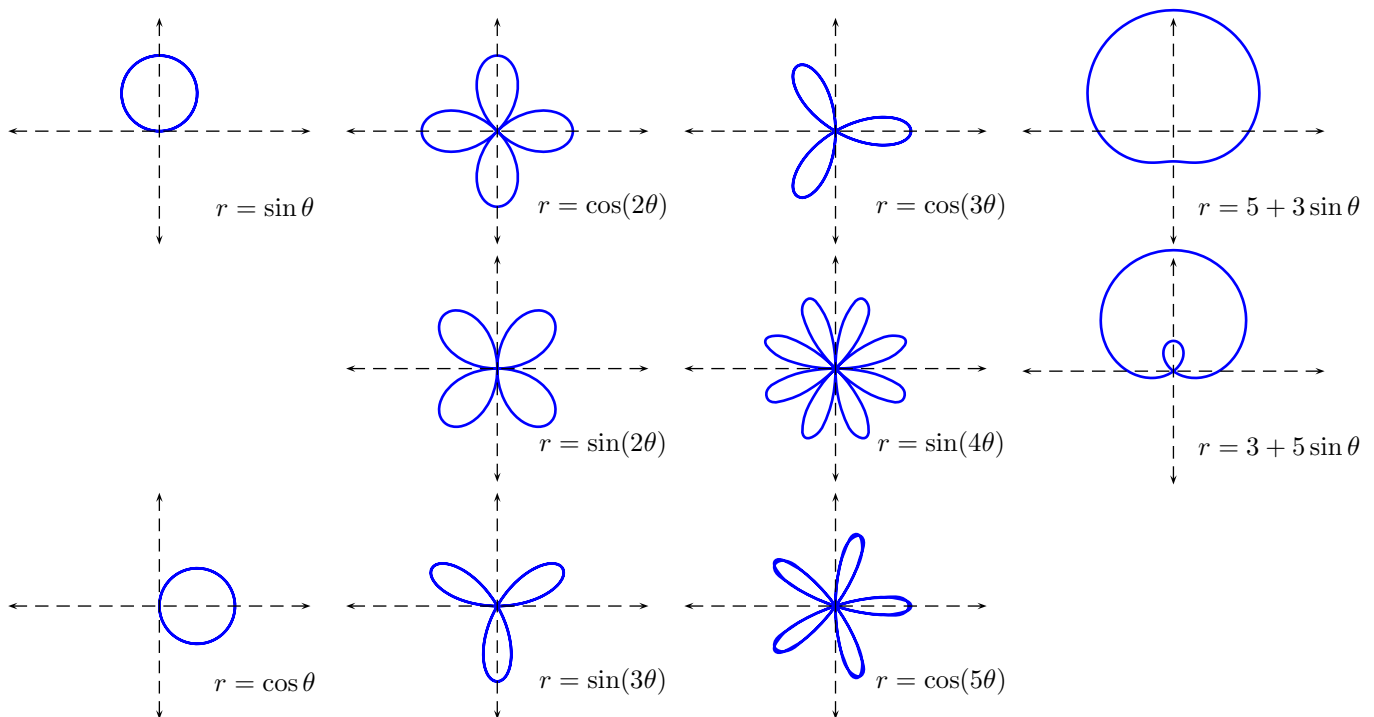
I am usually not a big calculator fan, but this may be a good time when we can use it appropriately to graph some of these functions. After all, there is limited beauty and creativity that occurs when plotting points.

Get to know Famous Questions

1. Can you calculate what is the largest r value on a graph for a given equation? and for which angles does it occur? 2. For which angles θ does the graph go through the origin? 3. How is the graph affected if we restrict the values of θ ?

Get to know Famous Graphs

Get to know Famous Graphs 1. Can you calculate what is the largest r value on a graph for a given equation? and for which angles does it occur? 2. For which angles θ does the graph go through the origin? 3. How is the graph affected if we restrict the values of θ ?



Introduction to Polar Graphs

1. Graph and Understand the graph of $r = 5 \cos \theta$
2. Graph and Understand the graph of $r = 5 \sin \theta$
3. Graph and Understand the graph of $r = -3 \cos \theta$
4. Graph and Understand the graph of $r = 3 \cos \theta$
5. Graph and Understand the graph of $r = -6 \sin \theta$
6. Graph and Understand the graph of $r = 5 \cos \theta$. Limit the study of this graph to the values of θ ranging from 0° to 90° .
7. Graph and Understand the graph of $r = 5 \sin \theta$. Limit the study of this graph to the values of θ ranging from -90° to 0° .
8. Graph and Understand the graph of $r = -3 \cos \theta$. Limit the study of this graph to the values of θ ranging from 180° to 270° .
9. Graph and Understand the graph of $r = 3 \cos \theta$. Limit the study of this graph to the values of θ ranging from 0° to 180° .
10. Graph and Understand the graph of $r = -6 \sin \theta$. Limit the study of this graph to the values of θ ranging from 90° to 180° .
11. Graph and Understand the graph of $r = 5 + \cos \theta$
12. Graph and Understand the graph of $r = 4 - 2 \cos \theta$
13. Graph and Understand the graph of $r = -3 + 2 \cos \theta$
14. Graph and Understand the graph of $r = 3 + 3 \cos \theta$
15. Graph and Understand the graph of $r = 4 - 2 \cos \theta$
16. Graph and Understand the graph of $r = -2 + 3 \cos \theta$
17. Graph and Understand the graph of $r = 3 + 2 \sin \theta$
18. Graph and Understand the graph of $r = 3 - 2 \sin \theta$
19. Graph and Understand the graph of $r = -3 + 2 \sin \theta$
20. Graph and Understand the graph of $r = 3 + 3 \sin \theta$
21. Graph and Understand the graph of $r = 2 - 3 \sin \theta$
22. Graph and Understand the graph of $r = -2 + 3 \sin \theta$
23. Graph and Understand the graph of $r = 2 + 3 \cos \theta$. Limit the study of this graph to the values of θ ranging from 0° to 90° .
24. Graph and Understand the graph of $r = 2 - 3 \cos \theta$. Limit the study of this graph to the values of θ ranging from 0° to 60° .
25. Graph and Understand the graph of $r = -2 + 3 \cos \theta$. Limit the study of this graph to the values of θ ranging from 90° to 180° .
26. Graph and Understand the graph of $r = 5 + 5 \sin \theta$. Limit the study of this graph to the values of θ ranging from 180° to 270° .
27. Graph and Understand the graph of $r = 3 - 2 \sin \theta$. Limit the study of this graph to the values of θ ranging from 135° to 225° .

28. Graph and Understand the graph of $r = -3 + 2 \sin \theta$. Limit the study of this graph to the values of θ ranging from 360° to 540° .
29. Graph and Understand the graph of $r = 5 \cos(2\theta)$
30. Graph and Understand the graph of $r = 6 \cos(4\theta)$
31. Graph and Understand the graph of $r = 5 \sin(2\theta)$
32. Graph and Understand the graph of $r = 6 \sin(4\theta)$
33. Graph and Understand the graph of $r = 5 \cos(3\theta)$
34. Graph and Understand the graph of $r = 6 \cos(5\theta)$
35. Graph and Understand the graph of $r = 5 \sin(3\theta)$
36. Graph and Understand the graph of $r = 4 \sin(5\theta)$
37. Graph and Understand the graph of $r = 5 \sin(2\theta)$. Limit the study of this graph to the values of θ ranging from 0° to 90° .
38. Graph and Understand the graph of $r = 6 \sin(4\theta)$. Limit the study of this graph to the values of θ ranging from 90° to 180° .
39. Graph and Understand the graph of $r = 5 \cos(3\theta)$. Limit the study of this graph to the values of θ ranging from 0° to 180° .
40. Graph and Understand the graph of $r = 6 \cos(5\theta)$. Limit the study of this graph to the values of θ ranging from 180° to 270° .
41. Graph and Understand the graph of $r^2 = 25 \sin^2 \theta$
42. Graph and Understand the graph of $r^2 = 25 \cos^2 \theta$
43. Graph and Understand the graph of $r^2 = 25 \cos^2 3\theta$

44. **Understanding** The graph of $r = 2 - 3 \cos \theta$ has an inner loop. What values of θ trace precisely this inner loop? i.e. $?\circ \leq \theta \leq ?\circ$
45. **Understanding** On the graph of $r = 5 \sin(3\theta)$
- (a) ' $\sin 3\theta$ ' will take values between 1 and -1 ; never larger than one, never smaller than -1 . Find the angles θ , at which $\sin 3\theta$ take on its largest value 1, or is smallest value -1 . (i.e solve $\sin 3\theta = 1$ and solve $\sin 3\theta = -1$)
 - (b) Graph $r = 5 \sin(3\theta)$ and mark the points obtained from part a). What can you say about these points? A) nothing B) they are the 'tip of the leaves' C) they are not on the leaves.
 - (c) Find the angles at which the graph goes through $(0, 0)$
 - (d) Find the interval/s for theta that trace the second 'leaf'
46. **Understanding** On the graph of $r = -5 + 2 \cos \theta$
- (a) ' $\cos \theta$ ' will take values between 1 and -1 ; never larger than one, never smaller than -1 . What is the largest or the smallest that the quantity " $-5 + 2 \cos \theta$ " can become?
 - (b) Find the angles at which " $-5 + 2 \cos \theta$ " takes on its largest value -3 , or is smallest value -7 .
 - (c) Graph $r = -5 + 2 \cos \theta$ and mark the points obtained from part b). What can you say about these points? A) nothing B) its the furthest point from the origin
 - (d) Find the angles at which the graph goes through $(0, 0)$
 - (e) Find the interval/s for theta that trace ONLY the outer leaf.