

Wednesday, September 4

How are the graphs of polar functions different from the graphs of functions in the Cartesian Coordinate Plane (rectangular coordinates)?



September 3 - Day 4

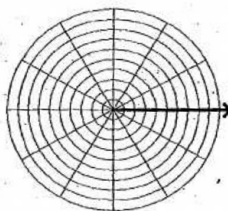
Students will verbally explain how to graph polar functions and identify the different types of graphs  
(using the words:  
circle, rose, petal, limacon, line...)

# Air Traffic Controller

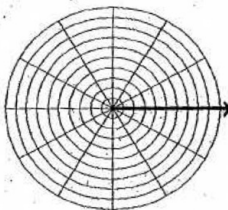
## STUDENT ACTIVITY (continued)

20: In Questions 18 and 19, you graphed polar functions of the form  $r = f(\theta)$  on the interval  $0^\circ \leq \theta \leq 90^\circ$ . These graphs represent landing approaches for aircraft. However, the graphs of these landing approaches are only parts of the complete graph for these polar functions in the  $xy$ -coordinate plane.

- a. Use the polar grid shown below to give a complete graph of  $r = 6 \cos(\theta)$  in the  $xy$ -coordinate plane. Indicate the interval of values for  $\theta$  that gives the complete graph.



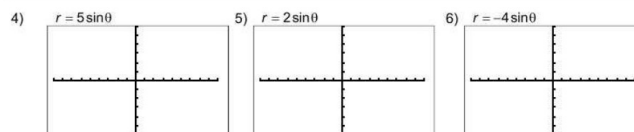
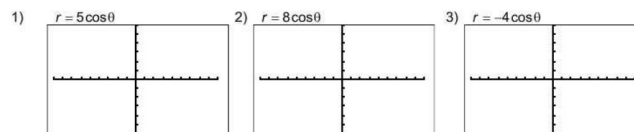
- b. Use the polar grid shown below to give a complete graph of  $r = 8 \sin(2\theta)$  in the  $xy$ -coordinate plane. Indicate the interval of values for  $\theta$  that gives the complete graph.



## Polar Equations with Technology (pp. 1 of 4)

|  |  |  |
|--|--|--|
| <p><b>NORMAL</b> SCI ENG<br/> <b>FLD</b> 0 1 2 3 4 5 6 7 8 9<br/> <b>MODE</b> <b>DEGREE</b><br/> <b>FUNC</b> <b>PR</b> <b>2nd</b> <b>SEQ</b></p> | <p><math>r_1 = 4 \sin(\theta)</math><br/> <math>r_2 =</math><br/> <math>r_3 =</math></p>                                 | <p><b>WINDOW</b><br/> <math>\theta_{min} = 0</math><br/> <math>\theta_{max} = 360</math><br/> <math>\theta_{step} = 7.5</math></p> |
| <p>To graph polar equations in a calculator, change the MODE to degree and polar ("POL").</p>  | <p>Notice that the "Y=" menu now lists "r=" equations, and the [X,T,θ,n] button gives θ as the independent variable.</p> | <p>Also, in adjusting the WINDOW, additional settings are required for values of θ.</p>  |

Using the θ-settings given above ( $\theta_{min} = 0$ ,  $\theta_{max} = 360$ ,  $\theta_{step} = 7.5$ ) in a window [-9, 9] by [-6, 6], sketch the graph each of the following equations.



- 7) Explain the characteristics (size, shape, location) of graphs made from polar equations of the form  $r = a \cos \theta$  and  $r = a \sin \theta$ .

Continue graphing.

