

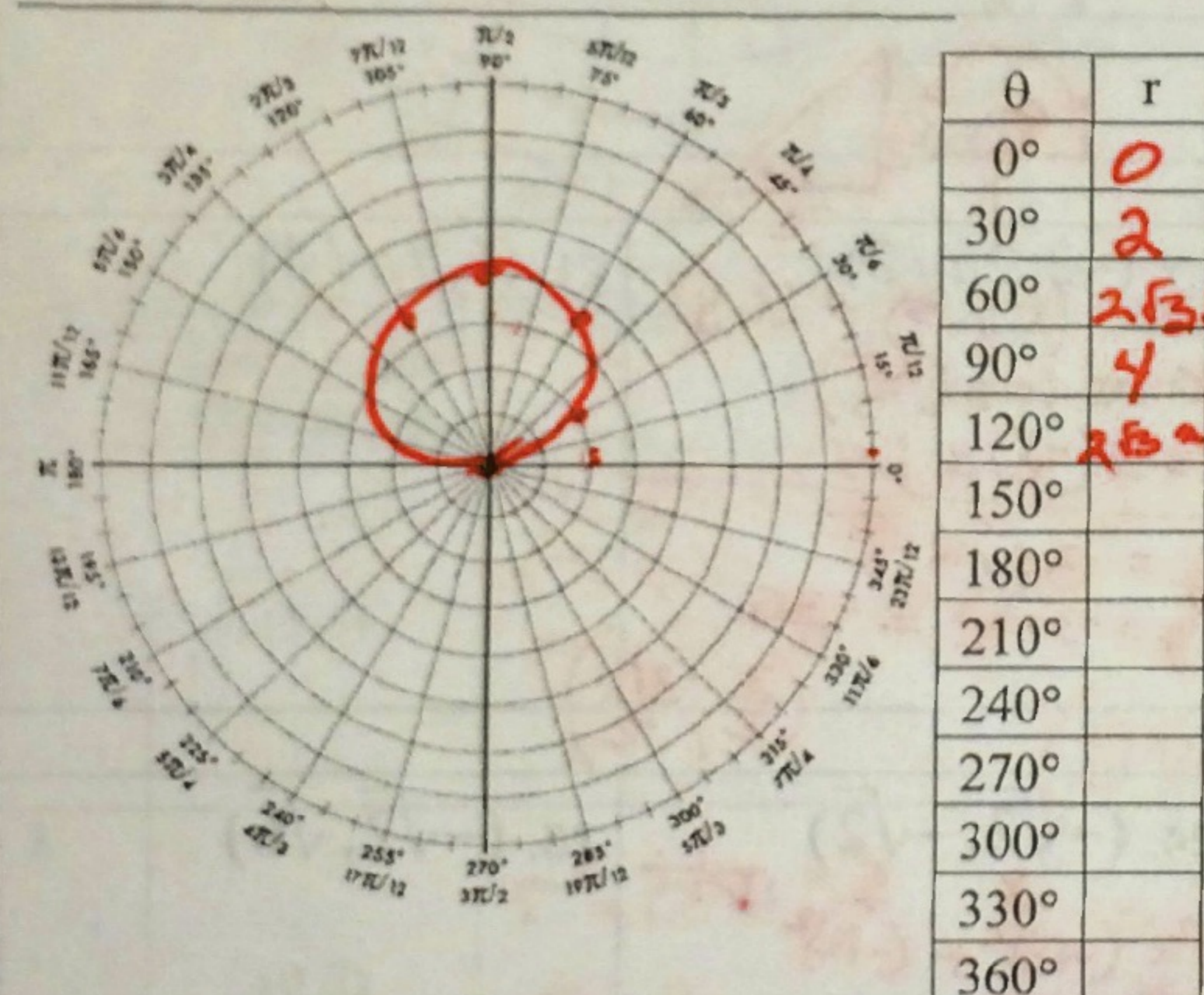
#17 Graphs of Polar Equations

I. Match the equation with the correct description. DO WITHOUT GRAPHING!

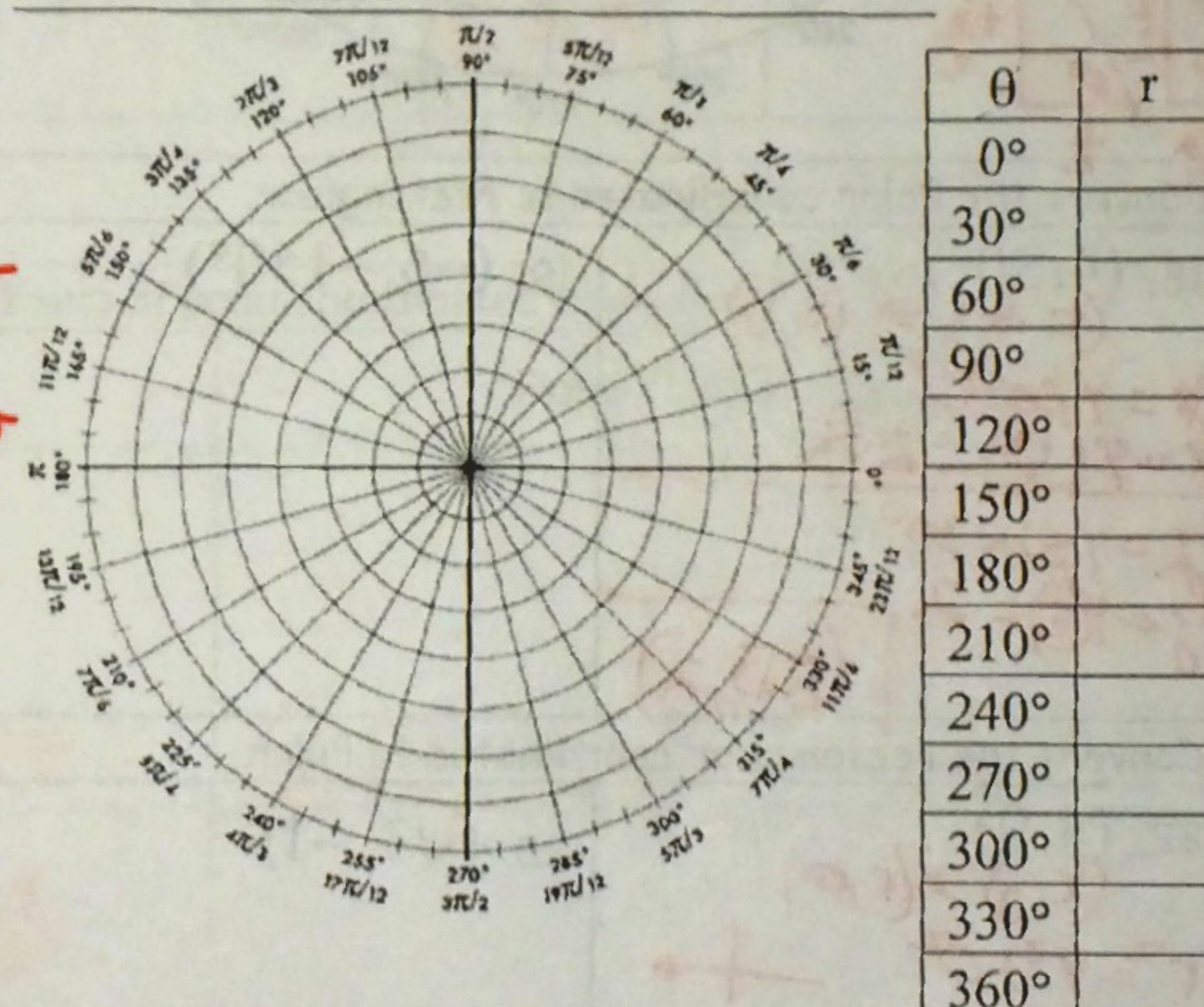
1. $r = 2 - 2\sin\theta$ B	6. $r = 6\sin 2\theta$ C	A. Circle B. Cardioid C. Rose D. Limacon with Loop E. Limacon without Loop F. Spirals of Archimedes G. Lemniscates
2. $r = 3\cos 4\theta$ C	7. $r = 4 - 2\sin\theta$ E	
3. $r = 9\cos\theta$ A	8. $r = 3 + 3\sin\theta$ B	
4. $r = 4 - 2\cos\theta$ E	9. $r = 5 - 5\cos\theta$ B	
5. $r = 3 + 5\sin\theta$ D	10. $r = 2 + 3\sin\theta$ D	
11. $r^2 = 9\cos 2\theta$ G	12. $r = 4\theta + 3$ F	

Graph each of the following polar equations.

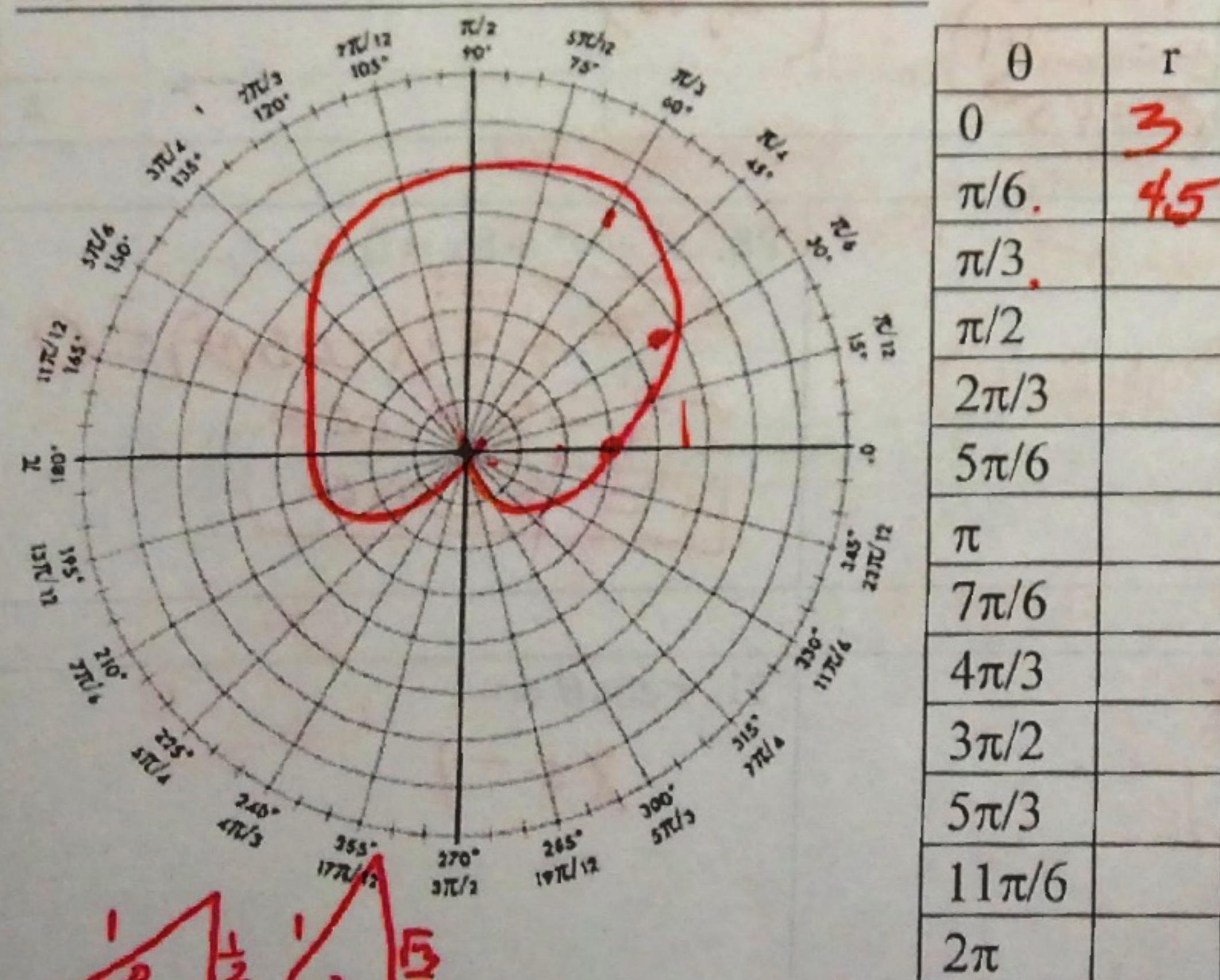
13. $r = 4\sin\theta$



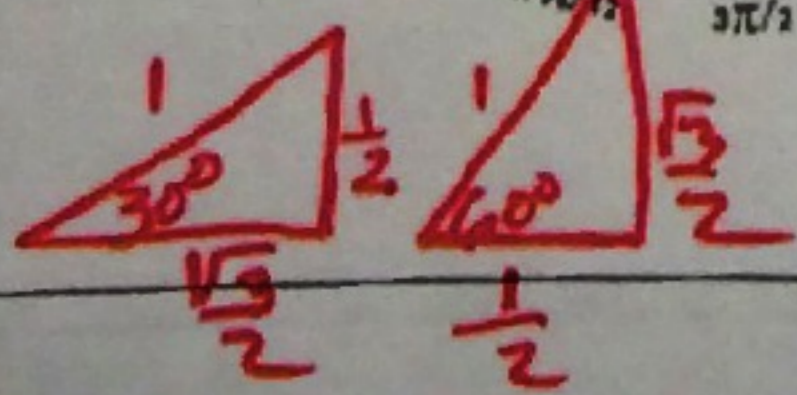
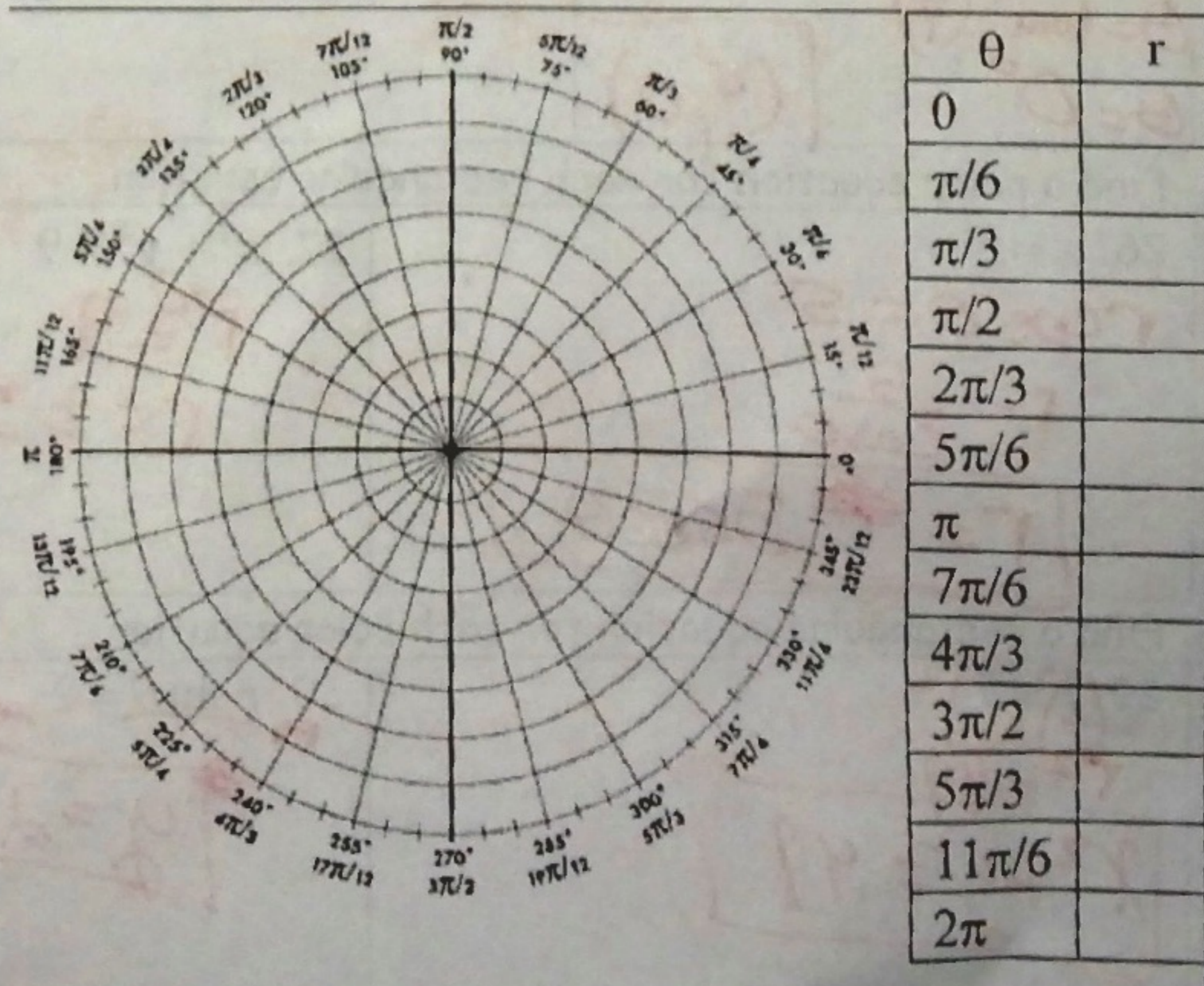
14. $r = 2 + 2\cos\theta$



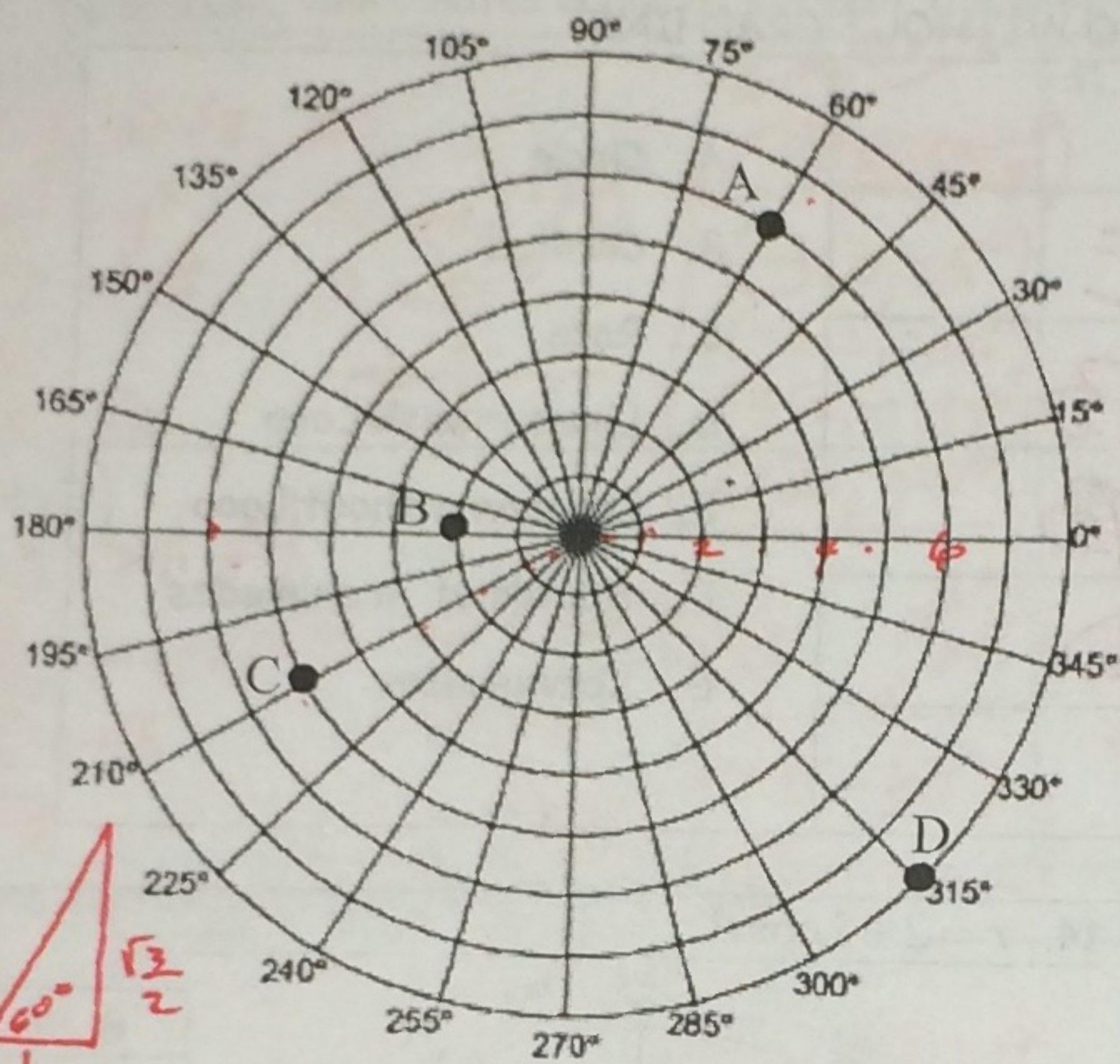
15. $r = 3 + 3\sin\theta$



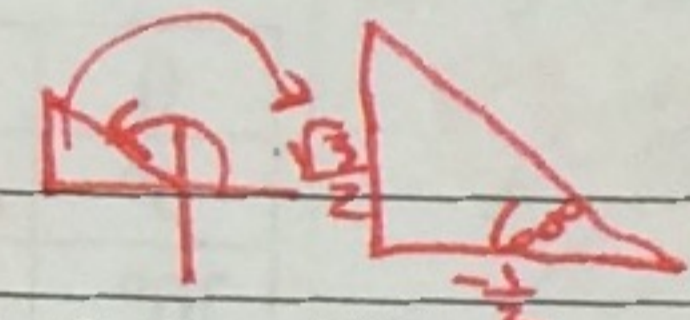
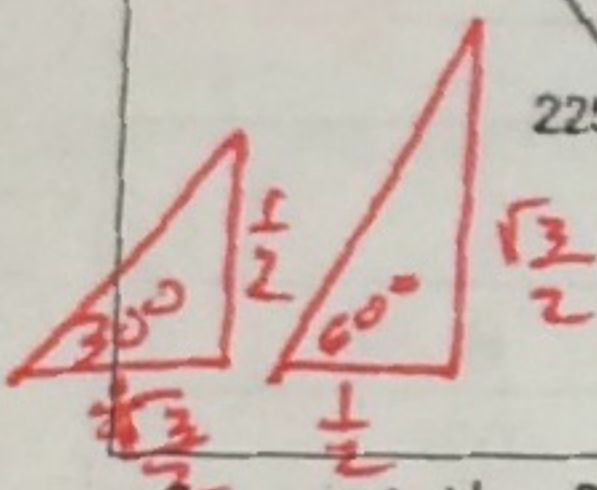
16. $r = 4 - 3\cos\theta$



17. Write the polar coordinates (r, θ) for each point in the requested form:



	Positive r	Negative r	Negative θ
A	$(6, 60^\circ)$	$(-6, 240^\circ)$	$(6, -300^\circ)$
B			
C	$(5, 210^\circ)$	$(-5, 30^\circ)$	$(-5, 330^\circ)$
D			



Convert the Polar coordinates to rectangular.

18. $(4, 30^\circ)$
 $(r, \theta) \rightarrow (x, y)$
 $x = 4 \cos 30^\circ$
 $x = 4 \left(\frac{\sqrt{3}}{2}\right) = 2\sqrt{3}$

 $y = 4 \sin 30^\circ$
 $y = 4 \left(\frac{1}{2}\right) = 2$
 $(2\sqrt{3}, 2)$

19. $(-6, -150^\circ)$

20. $(-3, 2\pi/3)$
 $(r, \theta) \rightarrow (x, y)$
 $x = -3 \cos\left(\frac{2\pi}{3}\right)$
 $x = 3\left(-\frac{1}{2}\right) = 1.5$

 $y = -3 \sin\left(\frac{2\pi}{3}\right)$
 $y = -3 \cdot \frac{\sqrt{3}}{2} = -\frac{3\sqrt{3}}{2}$
 $\left(\frac{3}{2}, -\frac{3\sqrt{3}}{2}\right)$

21. $(6, 7\pi/4)$

Convert the rectangular coordinates to Polar.

22. $(4, 0)$
 $(x, y) \rightarrow (r, \theta)$
 $r^2 = 4^2 + 0^2$
 $r = \pm 4$
 $\theta = \tan^{-1}\left(\frac{0}{4}\right)$
 $\theta = 0^\circ$
 $(4, 0)$

23. $(\sqrt{3}, -1)$

24. $(-\sqrt{2}, -\sqrt{2})$
 $r^2 = (-\sqrt{2})^2 + (-\sqrt{2})^2$
 $r^2 = 2 + 2$
 $r = \pm 2$
 $\theta = \tan^{-1}(1)$
 $\theta = 45^\circ$
 $(-2, 45^\circ)$

25. $(-\sqrt{2}, \sqrt{6})$

Find a polar equation for each rectangular equation.

26. $x = 5$
 $r \cos \theta = 5$
 $r = \frac{5}{\cos \theta}$
 $r = 5 \sec \theta$

27. $x^2 + y^2 = 9$
 $r^2 = 9$
 $r = \pm 3$

28. $x^2 + y^2 + 8x = 0$
 $r^2 + 8(r \cos \theta) = 0$
 $r^2 = -8r \cos \theta$
 $r = -8 \cos \theta$

Find a rectangular equation for each polar equation.

29. $r^2 = 49$
 $x^2 + y^2 = 49$

30. $r \sin \theta = 2$
 $y = 2$

31. $r \cos \theta = -1$
 $x = -1$