Pre-Calculus Printed Packet for 5/26-5/29

Here is the final packet and what is in it. First there is a Quizizz that is from last week. So the problems are similar to the homework section 10.7 from last week. We are certain that the 3rd quarter grade will be much more significant than the work you do during Distance Learning. But the Distance Learning will have an effect on your grade. So please continue to do the best you can on the homework and Quizizz.
You will turn last week's Quizizz 10.7 in with your homework for this week (just 10.8) next Monday 6/1.

In this packet you will see all of the PowerPoint notes and Homework Problems for Section 10.8. This chapter (and particularly this section) is more challenging than last chapter, so we only have one section per week. Again make sure you are showing your work for your homework just like you have all year long. **For this week only you just need to write down the problem and sketch the graph in polar form.**

Finally, we hope that you and your family are all doing well. We miss you and wish you the best.

Sincerely,
Your Pre-Calculus Team

This packet contains:	Required to turn in 04/28?:	Checklist (for yourself):
Week 5 Quizizz 10.7	Yes	Done?
10.8 PowerPoint	No	
10.8 Pgs. 757-8 23-57 Odds, 69	Yes	Done?

QUIZIZZ

NAME : _____

CLASS : _____

DATE : _____

Polar Coordinates

15 Questions

1. Which of the following points are equivalent to $\left(3, \frac{5\pi}{4}\right)$? Select all that apply.

☐ a) $\left(-3, \frac{5\pi}{4}\right)$

☐ b) $\left(-3, \frac{\pi}{4}\right)$

☐ c) $\left(3, -\frac{3\pi}{4}\right)$

☐ d) $\left(-3, -\frac{7\pi}{4}\right)$

2. Convert the point $\left(-2, -\frac{4\pi}{3}\right)$ into rectangular coordinates.

☐ a) $\left(\sqrt{3}, -1\right)$

☐ b) $\left(1, -\sqrt{3}\right)$

☐ c) $\left(-1, \sqrt{3}\right)$

☐ d) $\left(-\sqrt{3}, 1\right)$

3. Convert the point $(-4, -4)$ into polar coordinates.

☐ a) $\left(4, \frac{5\pi}{4}\right)$

☐ b) $\left(-4, \frac{5\pi}{4}\right)$

☐ c) $\left(4\sqrt{2}, \frac{5\pi}{4}\right)$

☐ d) $\left(4\sqrt{2}, \frac{\pi}{4}\right)$

4. Convert the point $\left(4, \frac{7\pi}{9}\right)$ into rectangular coordinates. Round your answer to two decimal places.

☐ a) $(-2.57, 3.06)$

☐ b) $(2.44, 0.17)$

☐ c) $(3.99, 0.17)$

☐ d) $(-3.06, 2.57)$

5. Convert the point $(-5, 2)$ into polar coordinates. Round your answer to two decimal places.

☐ a) $(4.58, 2.76)$

☐ b) $(5.39, 2.76)$

☐ c) $(4.58, -1.19)$

☐ d) $(5.39, -1.19)$

6. Convert the equation $3x + 5y - 2 = 0$ into a polar equation.

☐ a) $r^2 = 9\cos 2\theta$

☐ b) $r = 10\sec\theta$

☐ c) $r = \frac{2}{3\cos\theta + 5\sin\theta}$

☐ d) $r = \frac{2}{5\cos\theta + 3\sin\theta}$

7. Convert the equation $x^2 + y^2 = 16$ into a polar equation.

☐ a) $r^2 = 4$

☐ b) $r = 4$

☐ c) $r = 4\sin\theta$

☐ d) $r = 4\cos\theta$

8. Convert the equation $r = -7$ into a rectangular equation.

☐ a) $x^2 + y^2 = 49$

☐ b) $x + y = 7$

☐ c) $x + y = -7$

☐ d) $y = 7$

9. Convert the equation $r = -3\sec\theta$ into a rectangular equation.

☐ a) $x = -3$ ☐ b) $x = 3$

☐ c) $y = 3$ ☐ d) $y = -3$

10. Which equations are used to convert polar form to rectangular form? Select all that apply.

☐ a) $x = r\cos\theta$ ☐ b) $y = r\sin\theta$

☐ c) $x^2 + y^2 = r^2$ ☐ d) $\tan\theta = \frac{y}{x}$

11. Which equations are used to convert rectangular form to polar form? Select all that apply.

☐ a) $x = r\cos\theta$ ☐ b) $y = r\sin\theta$

☐ c) $x^2 + y^2 = r^2$ ☐ d) $\tan\theta = \frac{y}{x}$

12. If the r-value of a polar coordinate is negative, then

☐ a) you add or subtract π to the θ. ☐ b) you add or subtract 2π to the θ.

☐ c) Leave θ the same.

13. The origin of a polar coordinate system is called the _____.

☐ a) start ☐ b) beginning

☐ c) origin ☐ d) pole

14. To plot the point (r, θ), you would use the _____ coordinate system.

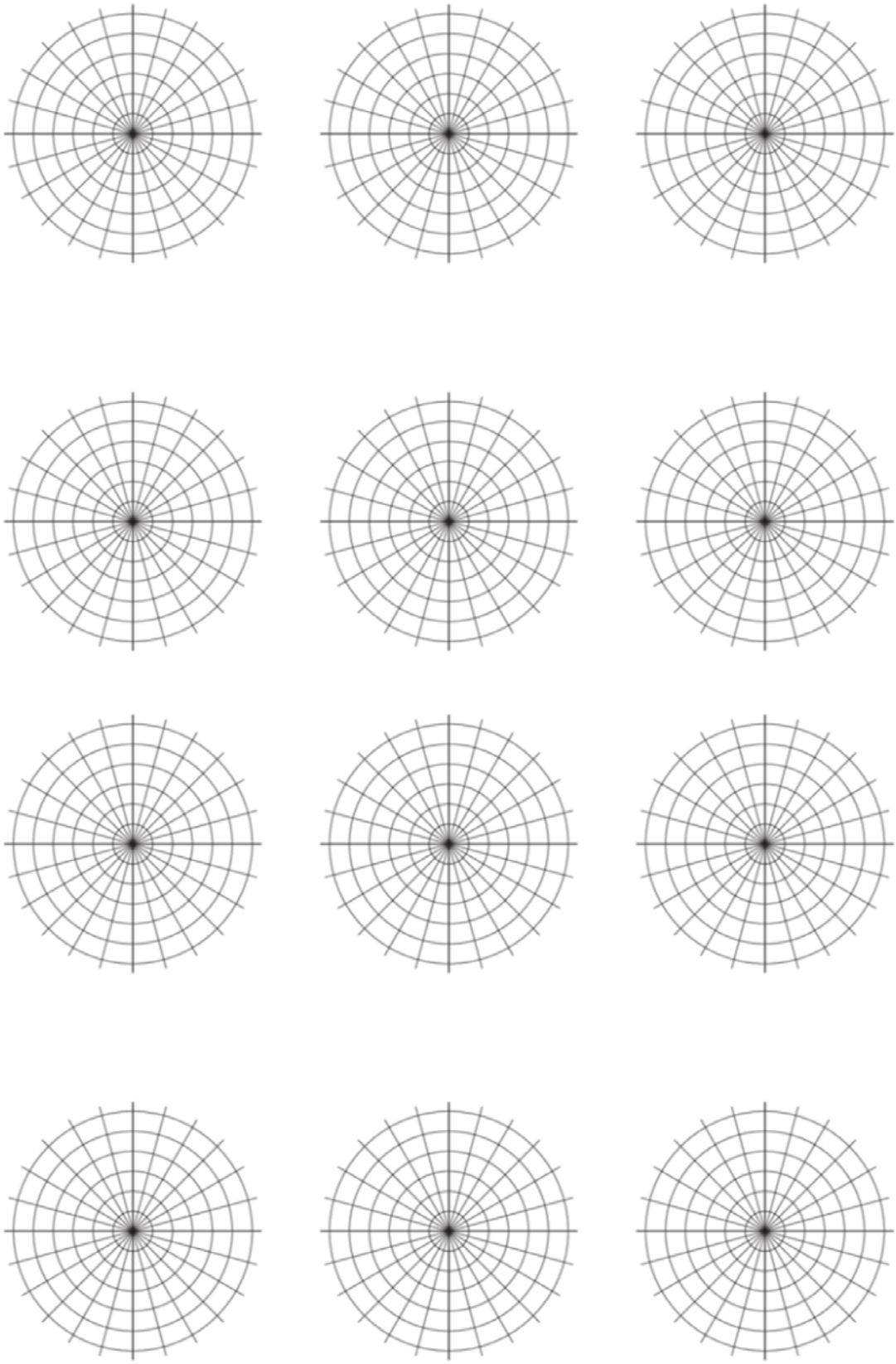
☐ a) rectangular ☐ b) polar

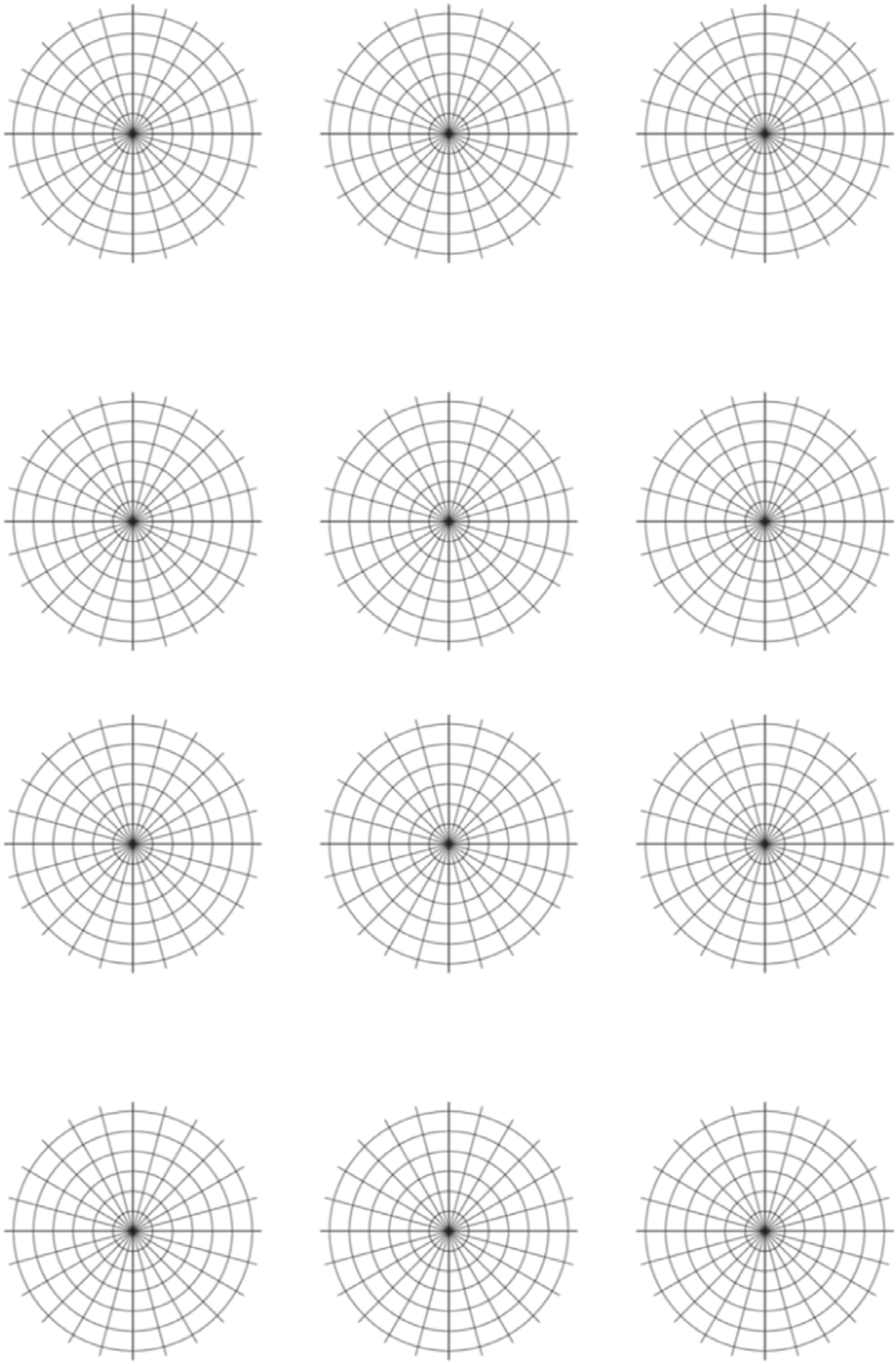
☐ c) imaginary ☐ d) color

15. To plot the point (x, y), you would use the _____ coordinate system.

☐ a) rectangular ☐ b) polar

☐ c) imaginary ☐ d) color





10.8

PRE-CALCULUS

DISTANCE LEARNING FOR PRE-CALCULUS

This is our last week of Distance Learning!!! Great job to you, our students!!! You took something that was difficult for all of us and did an outstanding job of staying focused and working with us to get it done. We appreciate your hard work!!!

If you haven't joined us for Zoom Patriot Plus Sessions each week here are the last sessions with the teachers, days and times:

Favalora – Mondays and Fridays at 10 am

Bower – Tuesdays and Thursdays at 2 pm

Ruibal – Wednesdays at 10 am

We would love to see your smiling faces one last time!!!

Remember your last Quizizz is on Friday 5/29. It will cover 10.8 only.

As you go through the following notes, you may want to print out slides 15-22 to take the fill-in-the-blank notes.

WARM UP

1) Change $\left(4, -\frac{\pi}{4}\right)$ into rectangular coordinates
2) Change $\left(-4, 4\sqrt{3}\right)$ into polar coordinates
3) Find a polar equation that has the same graph as equation $xy = 8$.
4) Find an equation in x and y that has the same graph as the polar equation $r(3\cos\theta - 4\sin\theta) = 12$

WARM UP-ANSWERS

1) $\left(4, -\frac{\pi}{4}\right)$ is r & θ, so $x = r\cos\theta$

$x = 4\cos\left(-\frac{\pi}{4}\right) = 4\left(\frac{\sqrt{2}}{2}\right) = 2\sqrt{2}$, and

$y = r\sin\theta = 4\sin\left(-\frac{\pi}{4}\right) = 4\left(-\frac{\sqrt{2}}{2}\right)$

$y = -2\sqrt{2}$. So $(2\sqrt{2}, -2\sqrt{2})$

2) $\left(-4, 4\sqrt{3}\right)$ is x & y in QII,

so $x^2 + y^2 = r^2$; $(-4)^2 + (4\sqrt{3})^2 = r^2; 16 + 48 = r^2, 64 = r^2, so\ r = 8.$

$\tan\theta = \frac{4\sqrt{3}}{-4} = \frac{-\sqrt{3}}{1}$, so $\theta = \frac{2\pi}{3}$. So $\left(8, \frac{2\pi}{3}\right)$

3) $xy = 8$, is $r\cos\theta \cdot r\sin\theta = 8$.

So $r^2\cos\theta \cdot \sin\theta = 8$. Now get r^2 by itself by either dividing both sides by $\cos\theta \cdot \sin\theta$ or multiplying by $\sec\theta \cdot \csc\theta$.

$So\ r^2 = 8\sec\theta \cdot \csc\theta$

4) $r(3\cos\theta - 4\sin\theta) = 12$. Distribute

$3r\cos\theta - 4r\sin\theta = 12$, becomes

$3x - 4y = 12$ (a linear equation)

10.8 GRAPHS OF POLAR EQUATIONS

Today's Learning Target – to graph polar equations by point plotting and to use symmetry, zeros and max r-values to sketch polar graphs, and to recognize special polar graphs.

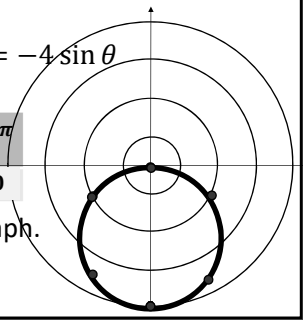
Graphing a polar equation by Point Plotting

Ex 1) Sketch the graph of the polar equation $r = -4\sin\theta$

Let's make a table and graph the points.

θ	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{3\pi}{2}$	$\frac{11\pi}{6}$	2π
r	0	-2	-3.5	-4	-3.5	-2	0	2	4	2	0

So now let's graph these points on the polar graph.



10.8 GRAPHS OF POLAR EQUATIONS

You can use symmetry, zeros, and maximum $r - Values$ to save time in graphing (instead of finding all those points.)

Here are the "tests for symmetry" along:

1) The line $\theta = \frac{\pi}{2}$. Quick Test: $r = f(\sin\theta)$

2) The polar axis $\theta = 0$: Quick Test: $r = f(\cos\theta)$

You can also use maximum $r - Value$ to graph a point

You can also find which values give you $r = 0$.

10.8 GRAPHS OF POLAR EQUATIONS

Ex. 2) Use symmetry, maximum r and $r = 0$ to sketch the graph of $r = 3 - 2\cos\theta$

Replacing (r, θ) with $(r, -\theta)$ you get $r = 3 - 2\cos(-\theta)$

Since $\cos(-\theta) = \cos\theta, r = 3 - 2\cos\theta$. So symmetry =polar axis.

Maximum $r = 3 + 2 = 5\ when \cos\theta = -1$. So at $\theta = \pi$.

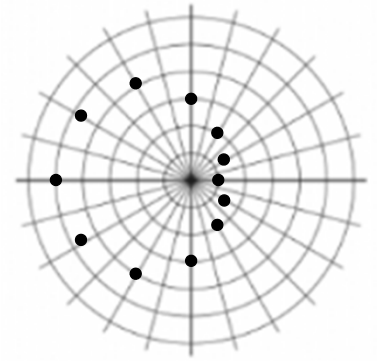
Finally the zero of r is when $0 = 3 - 2\cos\theta$, so $3 = 2\cos\theta$, then $\frac{3}{2} = \cos\theta$, so no zeros.

So let's graph it together now.

θ	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π
r	1	1.3	2	3	4	4.7	5

Now let's use the symmetry for the bottom half.

θ	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π
r	1	1.3	2	3	4	4.7	5



HOW TO GRAPH POLAR WITH TECHNOLOGY

1) You can use your Graphing Calculators – make sure your mode is switched from "FUNC" to "POL"

You will know if you are in Polar Form if you hit the "y=" button and the equation comes up "r=" instead of "y=". Just type in the equation, but for θ you just hit the "x,T, θ,n" button

2) You can also use Desmos if you want instead. Just go to desmos.com/calculator. Once there go over to the upper right corner to the picture of a wrench and click on it.

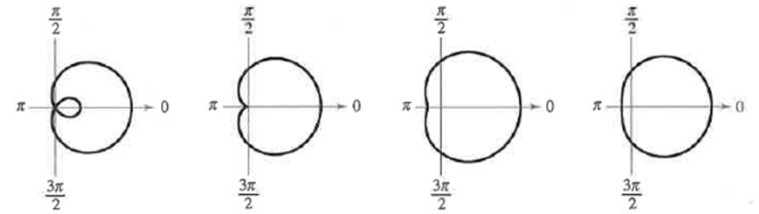
Go down to where it says "grid" and select the circular graph which is Polar Graph

Use "r" for r, but for θ you need to type the work "theta" in and it will turn to θ.

10.8 GRAPHS OF POLAR EQUATIONS

Limaçons

$r = a \pm b\cos\theta,\ r = a \pm b\sin\theta \quad (a > 0, b > 0)$



$\frac{a}{b} < 1$ Limaçon with inner loop

$\frac{a}{b} = 1$ Cardioid (heart-shaped)

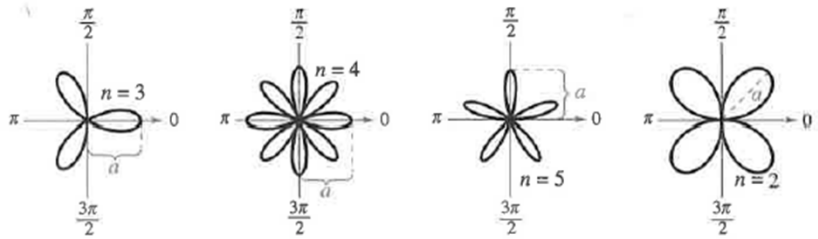
$1 < \frac{a}{b} < 2$ Dimpled limaçon

$\frac{a}{b} \geq 2$ Convex limaçon

10.8 GRAPHS OF POLAR EQUATIONS

Rose Curves

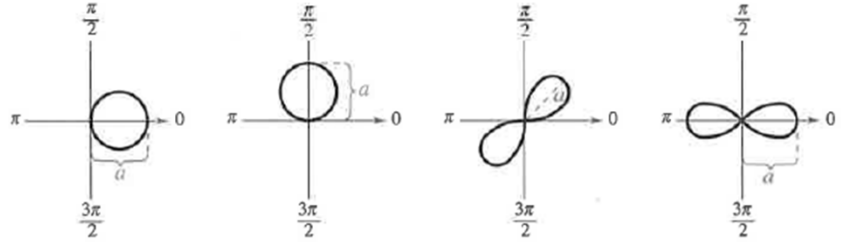
n petals when n is odd, $2n$ petals when n is even $\quad (n \geq 2)$



$r = a\cos n\theta$ $r = a\cos n\theta$ $r = a\sin n\theta$ $r = a\sin n\theta$

10.8 GRAPHS OF POLAR EQUATIONS

Circles and Lemniscates



$r = a\cos\theta$ Circle

$r = a\sin\theta$ Circle

$r^2 = a^2\sin 2\theta$ Lemniscate

$r^2 = a^2\cos 2\theta$ Lemniscate

ASSIGNMENT SHEET

1) Pgs. 757-8 23-57 O, 69
2) Quizizz 10.8

PGS. 757-8 23-57 O, 69

Sketching the Graph of a Polar Equation In Exercises 23–48, sketch the graph of the polar equation using symmetry, zeros, maximum r-values, and any other additional points.

23. $r = 5$
25. $r = \pi/4$
27. $r = 3 \sin \theta$
29. $r = 3(1 - \cos \theta)$
31. $r = 4(1 + \sin \theta)$
33. $r = 5 + 2 \cos \theta$
35. $r = 1 - 3 \sin \theta$
37. $r = 3 - 6 \cos \theta$
39. $r = 5 \sin 2\theta$
41. $r = 6 \cos 3\theta$
43. $r = 2 \sec \theta$
45. $r = \dfrac{3}{\sin \theta - 2 \cos \theta}$
47. $r^2 = 9 \cos 2\theta$

Graphing a Polar Equation In Exercises 49–58, use a graphing utility to graph the polar equation.

49. $r = 9/4$
51. $r = 5\pi/8$
53. $r = 8 \cos \theta$
55. $r = 3(2 - \sin \theta)$
57. $r = 8 \sin \theta \cos^2 \theta$

69. Microphone

The pickup pattern of a microphone is modeled by the polar equation

$r = 5 + 5 \cos \theta$

where $|r|$ measures how sensitive the microphone is to sounds coming from the angle θ.

(a) Sketch the graph of the model and identify the type of polar graph.

(b) At what angle is the microphone most sensitive to sound?