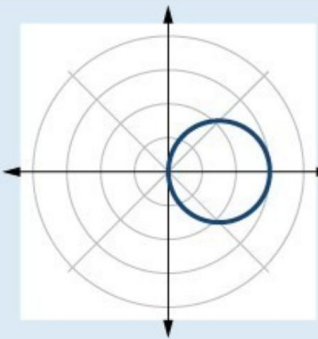
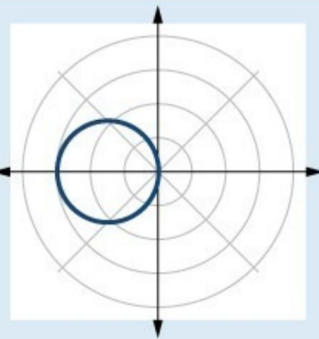
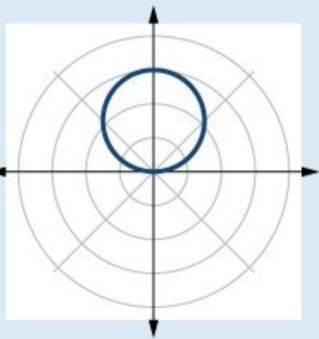
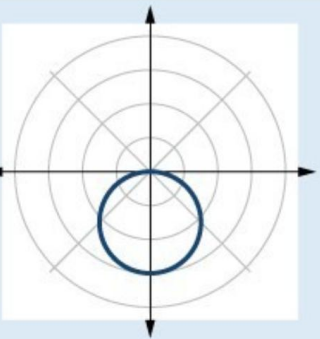
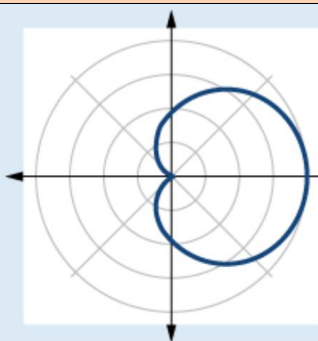
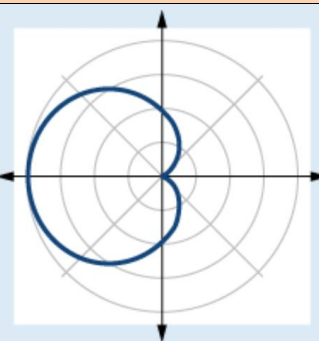
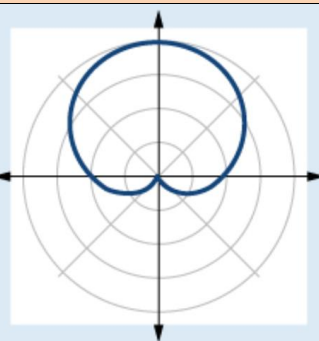
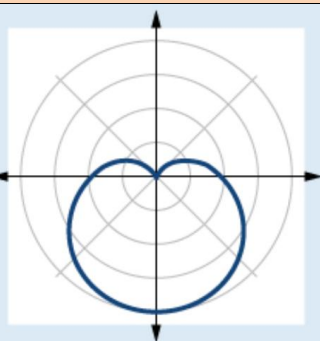
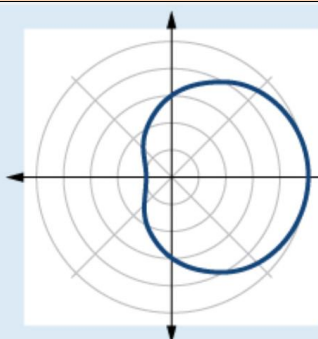
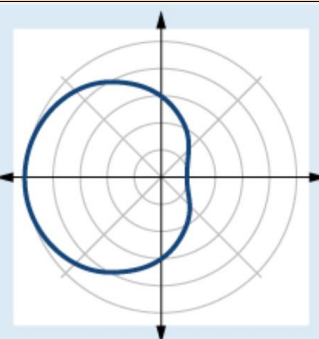
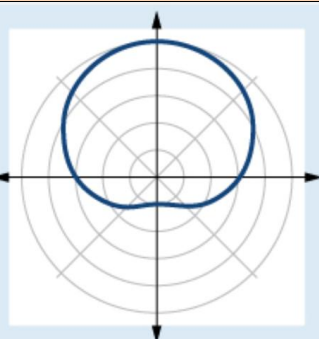
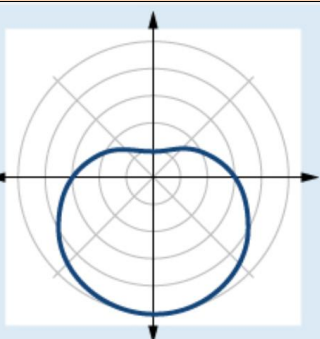
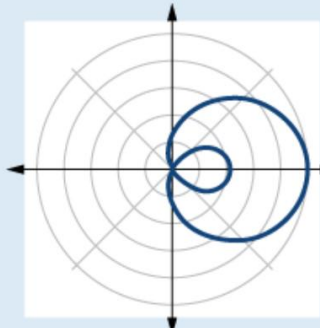
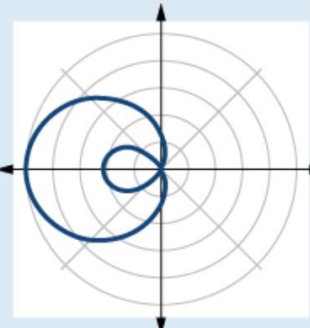
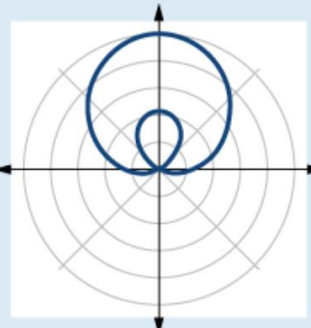
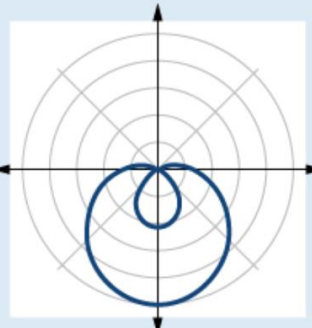
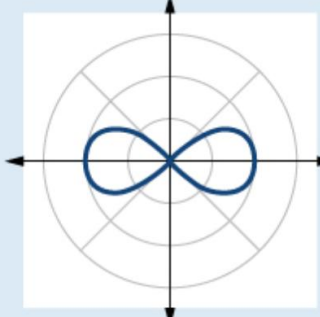
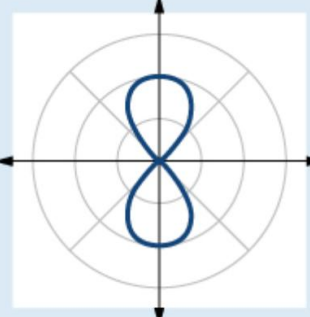
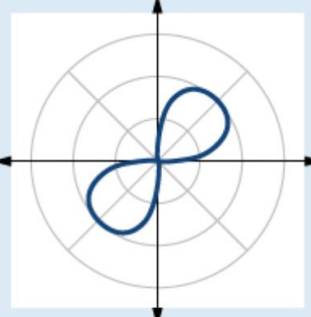
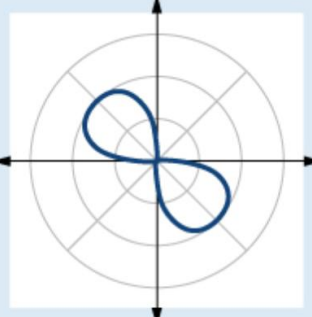
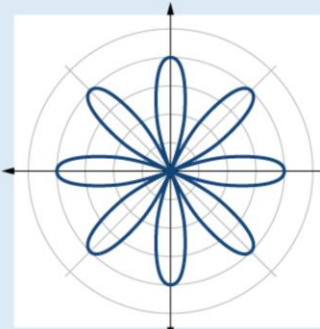
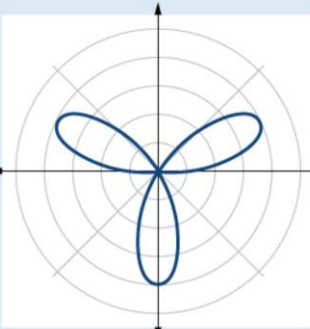
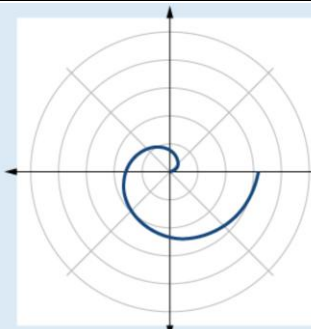
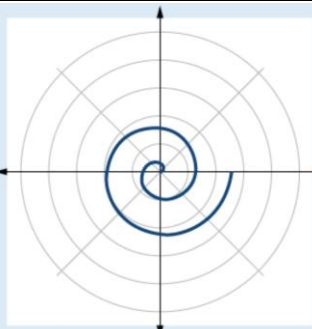


# Harold's Polar Parent Functions Cheat Sheet

AKA Library of Functions  
15 September 2025

| Circle                                                                              | $0 \leq \theta < 2\pi$                                                              |                                                                                      |                                                                                       |  |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|
|    |    |    |    |  |
| $r = a \cos(\theta)$<br>$a > 0$                                                     | $r = a \cos(\theta)$<br>$a < 0$                                                     | $r = a \sin(\theta)$<br>$a > 0$                                                      | $r = a \sin(\theta)$<br>$a < 0$                                                       |  |
| Cardioid                                                                            | $0 \leq \theta < 2\pi$                                                              |                                                                                      |                                                                                       |  |
|   |   |   |   |  |
| $r = a + b \cos(\theta)$<br>$a, b > 0$<br>$\frac{a}{b} = 1$                         | $r = a - b \cos(\theta)$<br>$a, b > 0$<br>$\frac{a}{b} = 1$                         | $r = a + b \sin(\theta)$<br>$a, b > 0$<br>$\frac{a}{b} = 1$                          | $r = a - b \sin(\theta)$<br>$a, b > 0$<br>$\frac{a}{b} = 1$                           |  |
| One-Loop Limaçon                                                                    | $0 \leq \theta < 2\pi$                                                              |                                                                                      |                                                                                       |  |
|  |  |  |  |  |
| $r = a + b \cos(\theta)$<br>$a, b > 0$<br>$1 < ab < 2$                              | $r = a - b \cos(\theta)$<br>$a, b > 0$<br>$1 < ab < 2$                              | $r = a + b \sin(\theta)$<br>$a, b > 0$<br>$1 < ab < 2$                               | $r = a - b \sin(\theta)$<br>$a, b > 0$<br>$1 < ab < 2$                                |  |

| Inner-Loop Limaçon                                                                  |                                                                                     | $0 \leq \theta < 2\pi$                                                               |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    |    |    |    |
| $r = a + b \cos(\theta)$<br>$a, b > 0$<br>$a < b$                                   | $r = a - b \cos(\theta)$<br>$a, b > 0$<br>$a < b$                                   | $r = a + b \sin(\theta)$<br>$a, b > 0$<br>$a < b$                                    | $r = a - b \sin(\theta)$<br>$a, b > 0$<br>$a < b$                                     |
| Lemniscate                                                                          |                                                                                     | $0 \leq \theta < 2\pi$                                                               |                                                                                       |
|   |   |   |   |
| $r^2 = a^2 \cos(2\theta)$<br>$a \neq 0$                                             | $r^2 = -a^2 \cos(2\theta)$<br>$a \neq 0$                                            | $r^2 = a^2 \sin(2\theta)$<br>$a \neq 0$                                              | $r^2 = -a^2 \sin(2\theta)$<br>$a \neq 0$                                              |
| Rose Curve                                                                          |                                                                                     | $0 \leq \theta < 2\pi$                                                               |                                                                                       |
|  |  | <b>Archimedes' Spiral</b>                                                            |                                                                                       |
| $r = a \cos(n\theta)$<br>$a \neq 0$<br>$n$ even, $2n$ petals                        | $r = a \sin(n\theta)$<br>$a \neq 0$<br>$n$ odd, $n$ petals                          |  |  |
|                                                                                     |                                                                                     | $r = \theta$<br>$\theta > 0$<br>$0 \leq \theta \leq 2\pi$                            | $r = \theta$<br>$\theta \geq 0$<br>$0 \leq \theta \leq 4\pi$                          |

#### Sources:

- LibreTexts Mathematics (2025). [6.2: Graphing Basic Polar Equations](#).

#### See also:

- [Harold's Algebraic, Transcendental, and Conic Parent Functions Cheat Sheet](#)
- [Harold's Trigonometry Parent Functions Cheat Sheet](#)
- [Harold's Polar Parent Functions Cheat Sheet](#)

