

Format for the Hypocycloid

We are going to need 3 different time variables

$t_1 := 0, .1..2\cdot\pi$ Gives the outer and inner circle

$t_2 := 0, .1.. \frac{\text{FRAME}}{10}$ generates the curve (the hypocycloid) traced out by the fixed point on the smaller circle

$t := \frac{\text{FRAME}}{10}$ gives just the center of the smaller circle and the fixed point on the circle

Define the radii of the inner and outer circle

$a := 3$ $b := 1$

Define the equations of the outer circle:

$x_1(t_1) := a \cdot \cos(t_1)$ $y_1(t_1) := a \cdot \sin(t_1)$

Define the equations of the center of the inner circle

$x_2(t) := (a - b) \cdot \cos(t)$ $y_2(t) := (a - b) \cdot \sin(t)$

Define the equations for the inner circle:

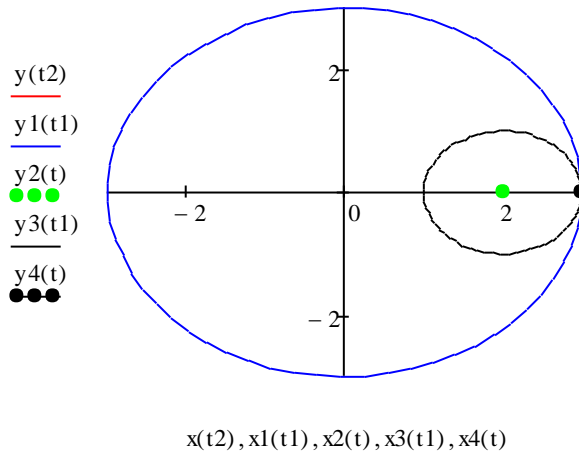
$x_3(t_1) := (a - b) \cdot \cos(t) + b \cdot \cos(t_1)$ $y_3(t_1) := (a - b) \cdot \sin(t) + b \cdot \sin(t_1)$

Define the equations of the cycloid:

$x(t_2) := (a - b) \cdot \cos(t_2) + b \cdot \cos\left[t_2 \cdot \left(\frac{a}{b} - 1\right)\right]$ $y(t_2) := (a - b) \cdot \sin(t_2) - b \cdot \sin\left[\left(\frac{a}{b} - 1\right) \cdot t_2\right]$

Define the equations of the fixed point on the circle:

$x_4(t) := (a - b) \cdot \cos(t) + b \cdot \cos\left[t \cdot \left(\frac{a}{b} - 1\right)\right]$ $y_4(t) := (a - b) \cdot \sin(t) - b \cdot \sin\left[t \cdot \left(\frac{a}{b} - 1\right)\right]$



The actual format would look like:

$$t1 := 0, .1..2 \cdot \pi \quad t2 := 0, .1.. \frac{\text{FRAME}}{10} \quad t := \frac{\text{FRAME}}{10}$$

$$a := 3 \quad b := 1$$

$$x1(t1) := a \cdot \cos(t1) \quad y1(t1) := a \cdot \sin(t1)$$

$$x2(t) := (a - b) \cdot \cos(t) \quad y2(t) := (a - b) \cdot \sin(t)$$

$$x3(t1) := (a - b) \cdot \cos(t) + b \cdot \cos(t1) \quad y3(t1) := (a - b) \cdot \sin(t) + b \cdot \sin(t1)$$

$$x(t2) := (a - b) \cdot \cos(t2) + b \cdot \cos\left[t2 \cdot \left(\frac{a}{b} - 1\right)\right] \quad y(t2) := (a - b) \cdot \sin(t2) - b \cdot \sin\left[\left(\frac{a}{b} - 1\right) \cdot t2\right]$$

$$x4(t) := (a - b) \cdot \cos(t) + b \cdot \cos\left[t \cdot \left(\frac{a}{b} - 1\right)\right] \quad y4(t) := (a - b) \cdot \sin(t) - b \cdot \sin\left[t \cdot \left(\frac{a}{b} - 1\right)\right]$$

For Integer values of a and b use 63 frames (corresponds to 2π)