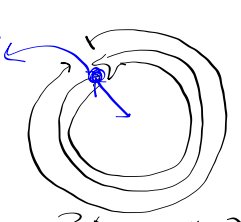
EXAMPLE 2: *Nannosquilla decemspinosa* is a small, legless crustacean living on the west coast of Panama. When stranded on the beach by high tide, it moves back to the water by doing sommersaults. If *nannosquilla* has a body length of 3.0 cm, takes this body length and curls it up as a wheel (having this circumference), rotates as a wheel at 70.0 RPM, and if it must travel 4.0 meters to return to the water, how long does it take it to get back into the water?

S
$x_0 = 0$
$x = 4.0\ m$
$v_0 = 0.035\ m/s$
$v = 0.035\ m/s$
$a_t = 0$
t

$\theta_0 = 0$ P.O.I.
$\theta =$
ω_0
ω
$\alpha = 0$
t



3.0 cm = 0.03 m

$C = 2\pi r$

$r = \frac{C}{2\pi} = \frac{0.03}{2\pi} = 4.8 \times 10^{-3}\ m$

$70 \frac{rot}{min.} \times \frac{2\pi r}{1\ rot} \times \frac{1\ min}{60\ s} = 0.035\ m/s$

$x = x_0 + v_0 t + \frac{1}{2} a_t t^2$

$4 = (0.035)t$

$t = 114.3\ s$

EXAMPLE 3: A wheel with a diameter of 19.0 centimeters starts from rest and reaches a speed of 40.0 RPM after rotating through 46 radians.

a) Determine the wheel's constant angular acceleration. $0.2\ rad/s^2$

b) How long did the above process take? $21\ s$

$s = \begin{cases} x_0 \\ x \\ v_0 \\ v \\ a_t \\ t \end{cases}$

$\theta_0 = 0$

$\theta = 46\ rad$

$\omega_0 = 0$

$\omega = 40 \frac{rot}{min} \cdot \frac{2\pi}{rot} \cdot \frac{1\ min}{60\ s} = 4.2 \frac{rad}{s}$

$\alpha = 0.2\ rad/s^2$

$t = 21\ s$

$\leftarrow r = ? \rightarrow$

$\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0)$

$4.2^2 = 2\alpha(46)$

$\alpha = 0.2\ rad/s^2$

$\omega = \omega_0 + \alpha t$

$4.2 = 0.2t$

$t = 21\ s$