After fixing a flat tire on your bicycle you give the wheel a spin.

1. If its initial angular speed was $6.35 \frac{rad}{s}$ and it rotated 14.2 revolutions before coming to rest, what was its average angular acceleration?

2. For what length of time did the wheel rotate?

3. If the wheel were to be spun at $120 \frac{rev}{min}$ how long would it take to reach $30 \frac{rev}{min}$?

(Assume the same α as #1.)

1.

$\omega_i = 6.35 \frac{rad}{s}$

$\Delta\theta = 14.2\,rev \left(\frac{2\pi\,rad}{1\,rev}\right) = 89.22\,rad$

$\omega = 0 \frac{rad}{s}$

$\alpha = ?$

$\omega^2 = \omega_i^2 + 2\alpha\Delta\theta$

$\alpha = \frac{\omega^2 - \omega_i^2}{2\Delta\theta} = \frac{-(6.35\,rad/s)^2}{2(89.22\,rad)}$

$= -0.226 \frac{rad}{s^2}$

2) $\Delta t = ?$

$\alpha = -0.226 \frac{rad}{s^2}$

$\omega = 0 \frac{rad}{s}$

$\omega_i = 6.35 \frac{rad}{s}$

$\omega = \omega_i + \alpha \Delta t$

$\Delta t = \frac{\omega - \omega_i}{\alpha} = \frac{-6.35 \frac{rad}{s}}{-0.226 \frac{rad}{s^2}}$

$= 28.1 s$

3) $\omega_i = 120 \frac{rev}{min} \times \frac{1 min}{60 s} \times \frac{2\pi rad}{1 rev} = 12.57 \frac{rad}{s}$

$\omega = 30 \frac{rev}{min} \times \frac{1 min}{60 s} \times \frac{2\pi rad}{1 rev} = 3.14 \frac{rad}{s}$

$\Delta t = ?$

$\alpha = -0.226 \frac{rad}{s^2}$

$\omega = \omega_i + \alpha \Delta t$

$\Delta t = \frac{\omega - \omega_i}{\alpha} = \frac{3.14 \frac{rad}{s} - 12.57 \frac{rad}{s}}{-0.226 \frac{rad}{s^2}}$

$= 41.7 s$