Part D: Angular Acceleration

Formula for Linear (regular) acceleration:

$$a = \frac{v_f - v_i}{\Delta t}$$

$$\text{acceleration} = \frac{\text{final velocity} - \text{initial velocity}}{\text{time}}$$

Formula for angular acceleration:

$$\alpha = \frac{\omega_f - \omega_i}{\Delta t}$$

$$\text{angular acceleration} = \frac{\text{final angular velocity} - \text{initial angular velocity}}{\text{time}}$$

The SI unit for angular velocity is radians/second^2

(However, because radians are technically dimensionless, the dimensions are only $1/s^2$)

A car is stopped at a red light. The light turns green, the driver hits the accelerator, and the car speeds up.
In a time of 3 seconds, the wheels are turning at a rate of 1800 rpm.
What is the angular acceleration? [3 parts]
a) what is the initial angular velocity

b) figure out the angular velocity in SI units

c) figure out he angular acceleration

A quarterback is holding a football. He throws it and makes the ball spiral around as it throws:
In a time of only 0.2 seconds, the ball has acquired an angular velocity of 10 rotations per second.
What is its angular acceleration? [3 parts]
a) what is the initial angular velocity

b) figure out the angular velocity in SI units

c) figure out he angular acceleration

Imagine that over the course of the next 30 days, the earth stopped spinning.
What would be its angular acceleration
a) What is the initial angular velocity (you have already solved this problem)

b) What is the final angular velocity?

c) Find the time the earth takes the slow down in seconds.

Bonus: How long would each day and night last in the new reality?