

Task. How long will it take a car starting from rest to travel $d = 659.0$ km if its acceleration is $a = 2.4 \text{ m/s}^2$?

Solution. The formula for the distance by time t passed with constant acceleration has the following form:

$$d(t) = v_0 t + \frac{at^2}{2}.$$

In our case the initial velocity $v_0 = 0$, so

$$d(t) = \frac{at^2}{2},$$

whence

$$t = \sqrt{\frac{2d}{a}}.$$

We should find t such that $d = 659 \text{ km} = 659000 \text{ m}$ and acceleration is $a = 2.4 \text{ m/s}^2$. Substituting values we get:

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2 * 659000}{2.4}} = 741.06 \text{ sek} = \frac{741.06}{60} \text{ min} = 12.35 \text{ min}.$$