Answer on Question #51384, Physics, Mechanics | Kinematics | Dynamics

Question

An automobile driver increasing the speed at a constant rate from 45 km/h to 58 km/h in 0.49 min. A bicycle rider speeds up at a constant rate from rest to 13 km/h in 0.49 min. What are the magnitudes of (a) the driver's acceleration and (b) the rider's acceleration?

Solution

(a) First of all, will rewrite the value:

$$V_0 = 45 km/h = \frac{45000 m}{3600 s} = 12.5 m/s$$

$$V_1 = 58 km/h = \frac{58000 m}{3600 s} = 16.11 m/s$$

$$t = 0.49 \min = 29.4 s$$

Since the driver increasing the speed at a constant rate:

$$V_1 = V_0 + at \Rightarrow$$

$$a = \frac{V_1 - V_0}{t} = \frac{16.11 m/s - 12.5 m/s}{29.4 s} = 0.1228 \frac{m}{s^2}$$

(b) Since the bicycle rider speeds up at a constant rate from rest:

$$V_1 = 0 + at = at$$

$$V_1 = 13 km/h = 3.61 m/s$$

$$\Rightarrow a = \frac{V_1}{t} = \frac{3.61 m/s}{29.4 s} = 0.1228 \frac{m}{s^2}$$

Answer

(a) $0.1228 \frac{m}{s^2}$

(b) $0.1228 \frac{m}{s^2}$