

Answer on Question #48547 – Physics – Mechanics | Kinematics | Dynamics

1. Car traveling at a speed of 80km/h comes to a stop 5seconds after the driver applied brake. If the distance the car covers between the time the driver applied the brake until the time it comes to rest is 60 m then it's acceleration will be?

$$\begin{aligned} v &= 80 \frac{\text{km}}{\text{h}} = 22.2 \frac{\text{m}}{\text{s}} \\ t &= 5\text{s} \\ l &= 60\text{m} \\ \hline a &=? \end{aligned}$$

Solution.

After applying brake, the time to rest depends on the friction forces and the braking forces. These forces are constant at all values of velocity, so the acceleration is constant and do not depend on the distance, which the car covers between the time of braking beginning until stopping.

The acceleration from the initial velocity v to the final velocity 0 during the time t : $a_x = \frac{0-v}{t} = -\frac{v}{t}$.

The absolute value of the acceleration is $a = \frac{v}{t}$.

Let check the dimension: $[a] = \frac{m}{s} : s = \frac{m}{s^2}$.

Let evaluate the quantity: $a = \frac{22.2}{5} = 4.44 \left(\frac{m}{s^2} \right)$.

Answer: $4.44 \frac{m}{s^2}$.