

Newton's Laws

Newton's first law:

An object at rest remains at rest, and an object in motion continues moving with constant velocity unless it interacts with other objects.

Newton's second law:

$$F = m \cdot a$$



$$1 \text{ N} = 1 \frac{\text{kg} \cdot \text{m}}{\text{s}^2}$$

Homework 7

Problem 1.

Why do we need seatbelts in a car?

Problem 2.

Many automobile passengers have suffered neck injuries when struck by cars from behind. How does the law of inertia apply here? How do headrests help to guard against this type of injury?

Problem 3.

Two closed containers look the same, but one is packed with lead and the other with few feathers. How could you determine which had more mass if you and the containers are orbiting in a weightless condition in outer space?

Problem 4.

An accelerating airplane takes 30 seconds to reach the takeoff speed of 100 m/s. Mass of the airplane is 60 tons (1 ton is 1000 kilograms). Find the force acting on the airplane during the acceleration process. Express it in N; use scientific notation.