

Answer on Question #42206-Physics, Mechanics-Kinematics-Dynamics

Question. No: 1

If a car can accelerate at 4m/sec^2 , what acceleration can it attain if it is pulling another car of identical mass?

Answer

The same force on twice the mass produces half the acceleration, or $2\frac{m}{s^2}$.

Question. No: 2

Presume a ship cruises with a constant velocity when the thrust from its engines is a constant 10000N. What is the acceleration of the ship? What is the force of air resistance acting on the ship?

Answer

The acceleration of the ship is **zero**, because a ship cruises with a constant velocity.

The force of air resistance acting on the ship is equal to the thrust from engines and directed oppositely to it:

$$F_{air} = 10000\text{N}.$$

Question. No: 3

Two forces act on a book resting on a table, its weight and the support force from the table. Does the force of friction act as well? Justify your answer with an example.

Answer

No, not unless the book tends to slide or does slide across the table. Friction forces occur only when an object tends to slide or is sliding. It can be observed by trying to push a wooden box across a floor or table. This force keeps an object still and prevents it from moving when a force is applied.

Question. No: 4

The blades on a ceiling fan spin at 60 rotation per minute as shown in the figure below. The fan has a radius of 50cm. Calculate the linear speed of a point at the outer edge of a blade in meter per second.

Answer

$$v = \omega r = 60 \frac{\text{rot}}{\text{min}} \cdot 50\text{cm} = 60 \cdot \frac{2\pi \text{ rad}}{60 \text{ s}} \cdot 0.5 \text{ m} = 3.14 \frac{\text{m}}{\text{s}}.$$

Question. No: 5

Mr Aslam has a mass of 80 kilograms. His apartment is on the second floor, 600cm up from ground level. How much work does he do against gravity each time he climbs the stairs to his apartment?

Answer

$$W = mgh = 80 \cdot 9.8 \cdot 6 = 4704 \text{ J.}$$