Answer on Question #42811-Physics-Mechanics | Kinematics | Dynamics

Question. No: 1

A lift is filled with patients has a total mass of $m = 2055\ kg$. As the lift begins to go up, the acceleration is $a = 0.75\frac{m}{s^2}$. What is the tension in the rope T that is lifting the lift?

Solution

We can apply Newton's Second Law:

$$ma = T - mg \rightarrow T = m(a + g) = 2055\ kg\left(0.75\frac{m}{s^2} + 9.81\frac{m}{s^2}\right) = 21.7\ kN.$$

Answer: $21.7\ kN$.

Question. No: 2

A man pushes a lawnmower with a force of $F = 170\ N$ at an angle of 37° down from the horizontal. The lawn is $d = 12.0\ m$ wide and requires 16 complete trips across and back. How much work does he do?

Solution

The work is

$$W = 16 \cdot Fd \cos 37° = 16 \cdot 170\ N \cdot 12.0\ m \cdot \cos 37° = 26.1\ kJ.$$

Answer: $26.1\ kJ$.

Question. No: 3

A bus's tire rotates at an initial angular speed of $\omega_i = 20.5\frac{rad}{s}$. The driver accelerates, and after 4.5 s the tire's angular speed is $\omega_f = 29.0\frac{rad}{s}$. What is the tire's average angular acceleration during the 4.5 s time interval?

Solution

The tire's average angular acceleration during the $t = 4.5\ s$ time interval is

$$\alpha = \frac{\omega_f - \omega_i}{t} = \frac{29.0\frac{rad}{s} - 20.5\frac{rad}{s}}{4.5\ s} = 1.89\frac{rad}{s^2}.$$

Answer: $.89\frac{rad}{s^2}$.

Question. No: 4

An object's momentum depends upon the object's

a) mass, speed and acceleration.

b) mass, speed and direction of motion.

c) speed and acceleration.

d) velocity and direction of motion.

e) mass and acceleration.

Solution

An object's momentum $\vec{P}$ is

$$\vec{P} = m\vec{v}.$$

Therefore, it depends upon the object's mass, speed and direction of motion.

Answer: b) mass, speed and direction of motion.