Chapters/ Sections will be Covered

Book: Fundamentals of Physics by David Halliday, Jearl Walker, and Robert Resnick

Chapter Title: Force and Motion-I

Sections:

- Newton’s First Law
- Inertial Reference Frames
- Newton's Second Law
- Some Particular Forces
- Newton’s Third Law

Class Activity: Math Problem #1 (Force)

A force exerted by a stretched rubber band produces an acceleration of $5\ m/s^2$ on an ice-cream carton of mass $m_1 = 1\ kg$. When a force exerted by an identical rubber band stretched by the same amount is applied to a carton of ice cream of mass m_2, it produces an acceleration of $11\ m/s^2$.

(a) What is the mass of the second carton of ice cream?

(b) What is the magnitude of the force exerted by the rubber band on the carton?

Class Activity: Math Problem #2 (Force)

Astronauts in space use a propulsion unit to move. The unit provides a constant net force $\vec{F}$ for 3 s. After 3 s, the astronaut moved 2.25 m. If the astronaut's mass is 68 kg, what is $\vec{F}$?

Class Activity: Math Problem #3 (Force)

An elevator and its load have a combined mass of 800 kg. The elevator is initially moving downward at 10 m/s; it slows to a stop with constant acceleration in a distance of 25.0 m. What is the tension T in the supporting cable while the elevator is being brought to rest?

Sample Quiz Question

What is Newton's first law of motion?
a) A net force on an object causes it to accelerate.
b) A zero net force on an object does not cause it to accelerate.
c) A net force in equilibrium is zero.
d) Reactions are equal and opposite

What is a proportionality constant in Newton's second law?
a) Net force
b) Acceleration
c) Mass
d) Frictional force

Sample Quiz Question

Which statement is true in the following options about free-fall?
a) The gravitational force is the only force acting on an object
b) Normal force is called the weight of an object
c) Earth does not have influence on gravitational acceleration
d) None of the above

What is the mass of an object?
a) A quantitative measure of the inertia of an object
b) It is the weight of an object
c) It is an extrinsic property of an object
d) Does not have enough information

Sample Quiz Question

How many forces are acting on a pulling cord on an object?
a) 1
b) 2
c) 3
d) 4

Which is true for inertial reference frames?
a) A frame of reference where Newton's third law is valid
b) A frame of reference where action has magnitude and reaction
c) A frame of reference where the body accelerates due to a net force
d) A frame of reference where no external force does not accelerate a body

Sample Quiz Question

On a regular day, a person suddenly stumbles onto a road and flies forward. Why does the person move forward by flying?
a) Gravity
b) Friction
c) Acceleration
d) Inertia

Which example is true for Newton's second law?
a) A Balloon pops loudly
b) Passengers move forward if a bus suddenly stops
c) Students are sitting in a class
d) A bus is speeding up as it starts moving

Probable Mid-term Questions: Lecture 8

A person is pulling a block with a cable. Using a free-body diagram, explain the forces on the block and write down the force expression.

Explain the difference between frictional force and tension.

Find the difference between the normal force and weight of a zero-accelerating object of mass m.

Find the difference between Newton's first and second law of motion.