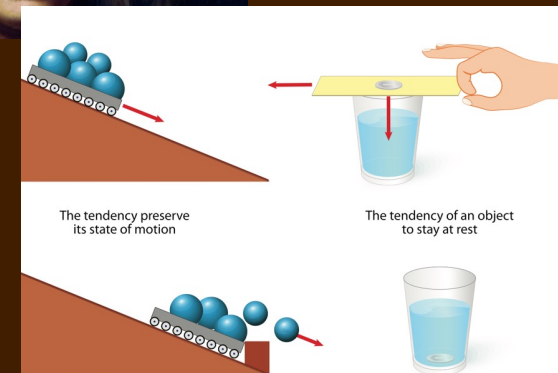
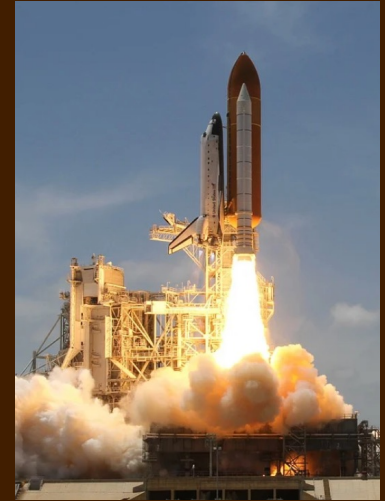
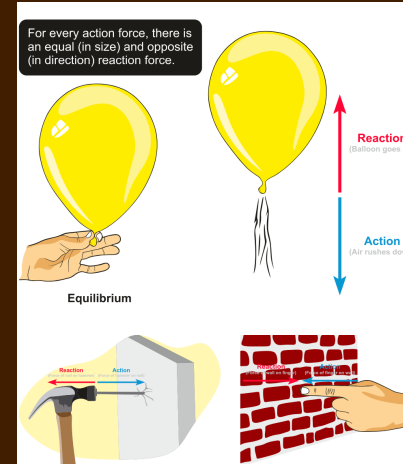


Newton's Laws of Motion

- Newton's 1st Law of Motion
 - The Law of Inertia
- Newton's 2nd Law of Motion
 - $F = ma$
- Newton's 3rd Law of Motion
 - Action = Reaction



Preview File

Please enjoy this preview of your Student Version of the presentation. Please note within this sample file:

- Some slides appear blank because they have been removed
- Student versions have portions of the text removed which is given in the teacher version and appear as _____ which the students are to fill in
- Other slides may have on them, this represents writing that has been removed on this sample

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Dynamics

Dynamics is the study of forces and their effect on how things move.

- Kinematics describes how things move
- Dynamics describes why things move

Newton's Laws of Motion

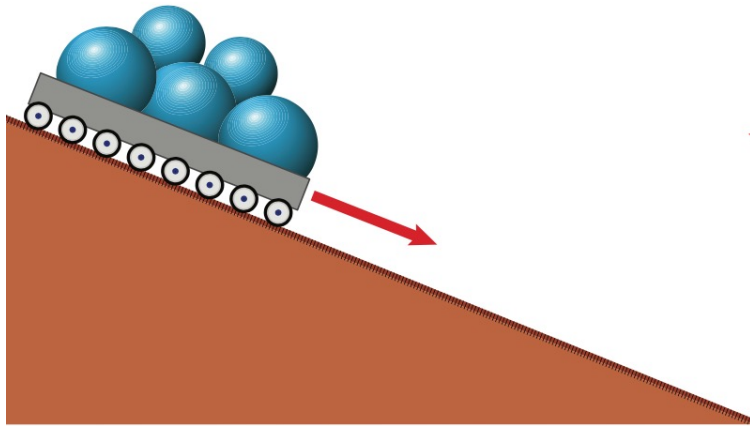
1. a.k.a. The Law of Inertia: If the net force acting on an object is zero, that object maintains its state of rest or constant velocity.
2. An object accelerates in the direction of the net force. The acceleration is directly proportional to the net force and inversely proportional to the object's mass.
3. _____



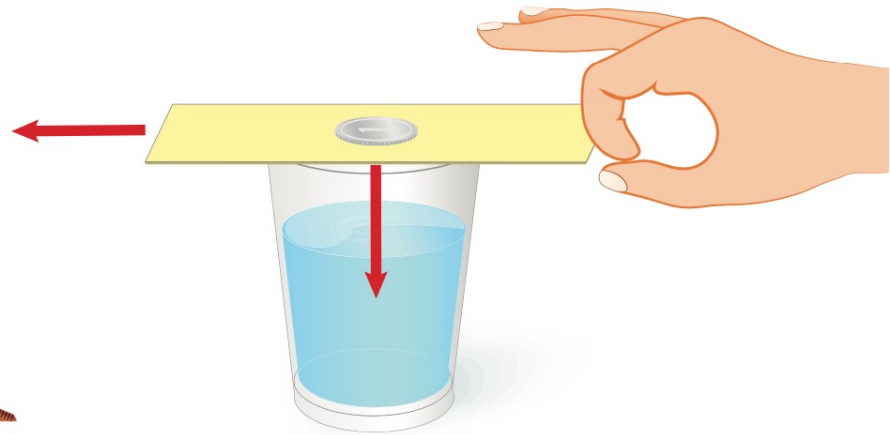
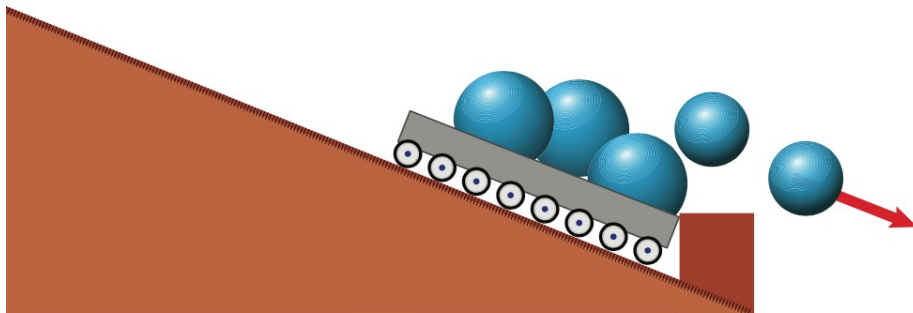
Newtons (N) as a **unit** of Force
 $N = kg \ m/s^2$

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Inertia



The tendency preserve
its state of motion

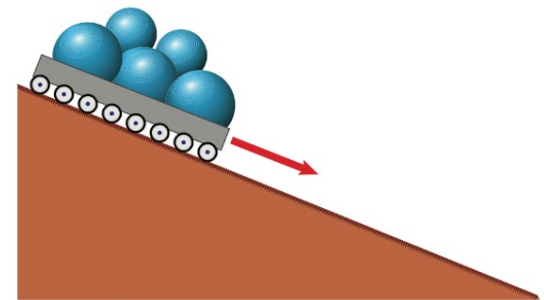


The tendency of an object
to stay at rest

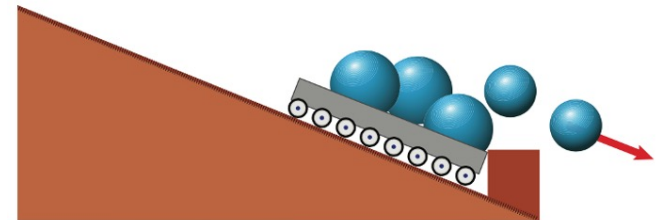


Application

- An example occurs when a car slows down quickly; the people in the car tend to continue moving forward, possibly crashing their heads into the windshield if they are not wearing a seat belt
- The seat belt

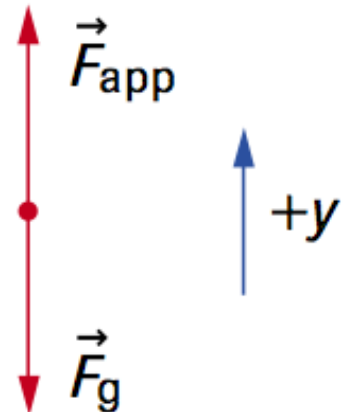


The tendency preserve
its state of motion



Check Your Understanding

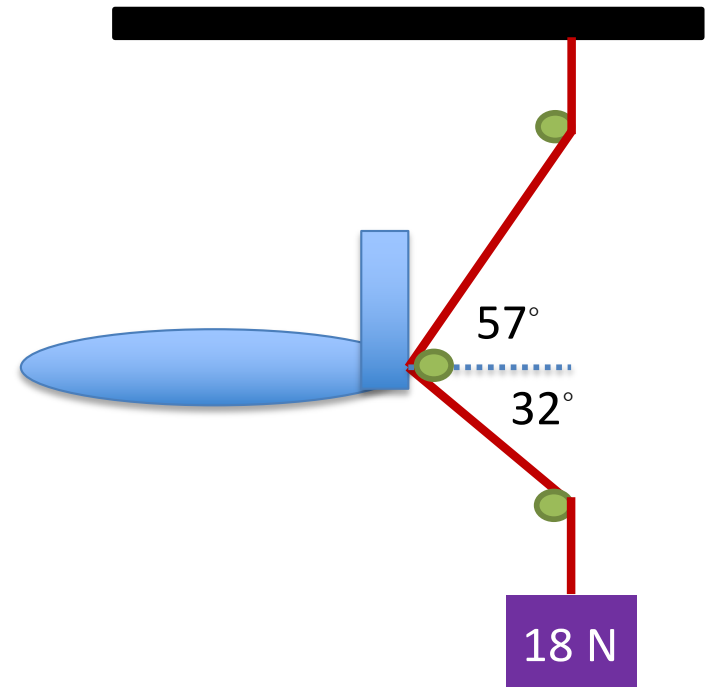
You exert a force of 45 N [up] on your backpack, causing it to move upward with a constant velocity. Determine the force of gravity on the pack.



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Check Your Understanding Solution

- Find F_T by first finding F_{TX} and F_{TY}
- F_{tibia} will $= -F_T$
- $F_T = 26 \text{ N}$ [right 12° up] therefore
- $F_{\text{tibia}} = 26 \text{ N}$ [left 12° down]



Newton's Second Law of Motion

- An object accelerates in the direction of the net force
- _____

$$F = ma \rightarrow a = \frac{F}{m}$$

- Acceleration increases as 'F' increases
- Acceleration decreases as 'm' increases

Check Your Understanding

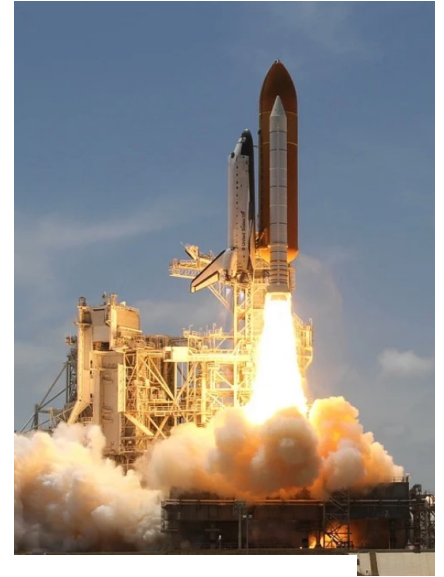
The mass of a hot-air balloon, including the passengers, is 9.0×10^2 kg. The density of the air inside the balloon is adjusted by adjusting the heat output of the burner to give a buoyant force on the balloon of 9.9×10^3 N [up]. Determine the vertical acceleration of the balloon.



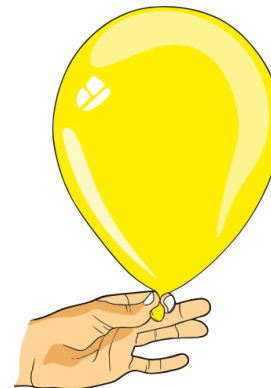
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Application

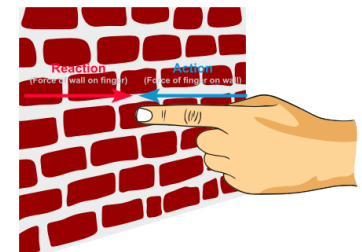
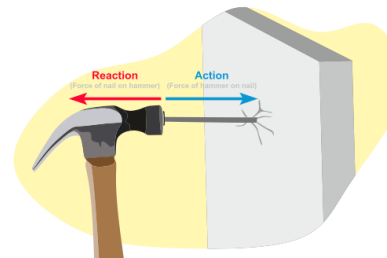
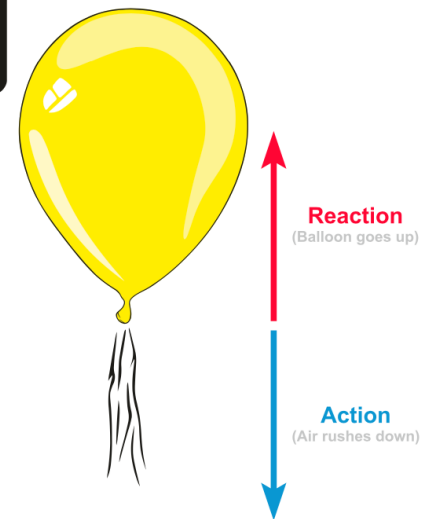
- As the rocket pushes the fuel out the back, the fuel pushes back on the rocket to move the rocket forward
- This even occurs in space where there isn't any air to push against



For every action force, there is an equal (in size) and opposite (in direction) reaction force.



Equilibrium



Check Your Understanding

A contractor is pushing a stove across a kitchen floor with a constant velocity of 18 cm/s [fwd]. The contractor is exerting a constant horizontal force of 85 N [fwd]. The force of gravity on the stove is 447 N [down].

- a) Determine the normal force (F_N) and the force of friction (F_f) acting on the stove.
- b) Determine the total force applied by the floor (F_{floor}) on the stove.

Check Your Understanding

Sleds A and B are connected by a horizontal rope, with A in front of B. Sled A is pulled forward by means of a horizontal rope with a tension of magnitude 29.0 N. The masses of A and B are

- a) the acceleration of the two-sled system.
- b) the tension in the rope connecting the sleds.

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