

FORCES AND NEWTON'S LAWS

FORCES

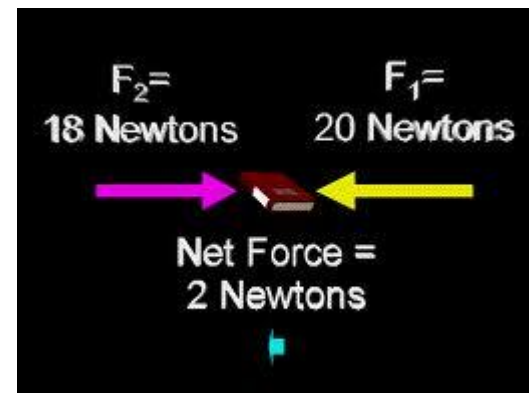


- Push or pull that acts on an object
- Cause a resting object to move
- Cause a moving object to accelerate
- Unit is Newtons, N
 - $\text{kg} \cdot \text{m}/\text{s}^2$



FORCES

- Net Force
 - Overall force acting on an object
- Unbalanced forces
 - One opposing force is greater than another
 - Forces going in the same direction
 - Causes acceleration
 - Net force greater than or less than zero
- Balanced forces
 - Equal and opposite force
 - Net force is zero



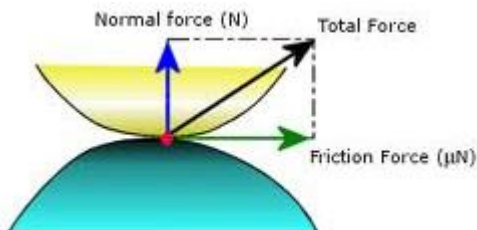
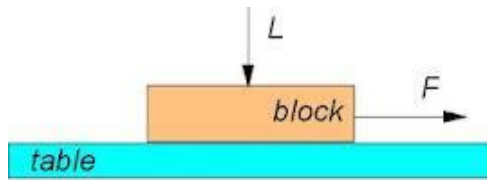
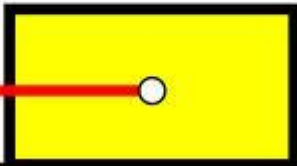
FORCES



Motion



Friction



○ Friction

- Force that opposes motion of objects moving against each other

1. Static

- Friction force on objects not moving

2. Sliding

- Force in opposite direction of moving object

3. Rolling

- Point at which round object slides against a surface

4. Fluid

- Force in opposite direction of object in a fluid



FORCES

○ Gravity

- Attractive force between two objects that have mass
- Earth's gravity always pulls objects to the center of Earth
- Objects accelerate down and fight air resistance

○ Weight

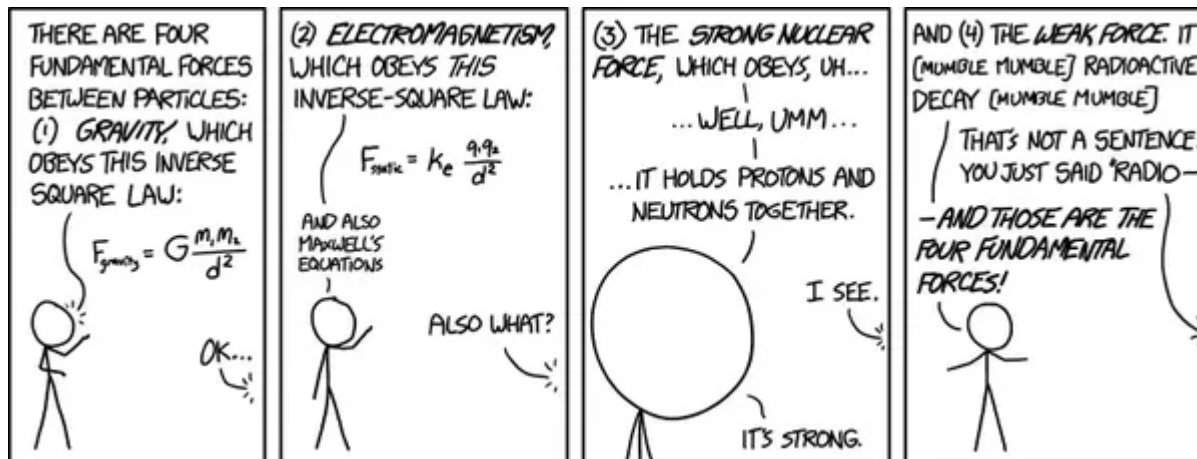
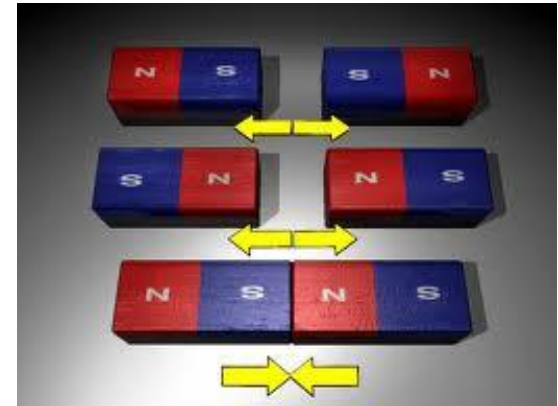
- Force of gravity acting on an object
- Weight equals mass times gravity
- $g = 9.8 \text{ m/s}^2$



FORCES

○ Fundamental Forces

- Gravity-attractive force between objects with mass
- Electromagnetic force-attractive force between objects with opposite charge
- Strong nuclear force-force holding nucleus together
- Weak nuclear force-causes radioactivity



MRS. COULTER SAYS

- Do page 30 – Skip “Predict”
- Do page 31 – Skip “Analyze”
- Do page 32 – Skip “Predict” and “Summarize”
- Skip page 33



NEWTON'S LAWS OF MOTION



○ First Law

- Object moves at constant velocity unless an unbalanced force acts on it
 - Objects at rest stays at rest
 - Objects in motion stays in motion

○ Inertia

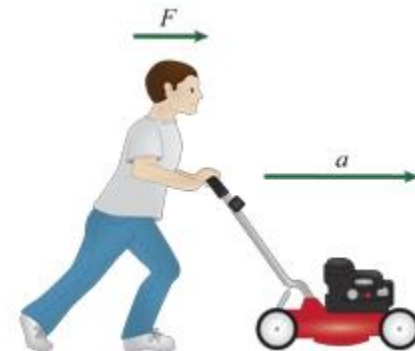
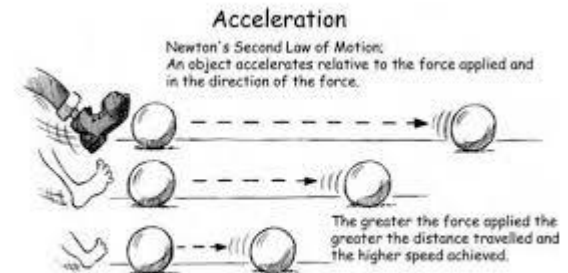
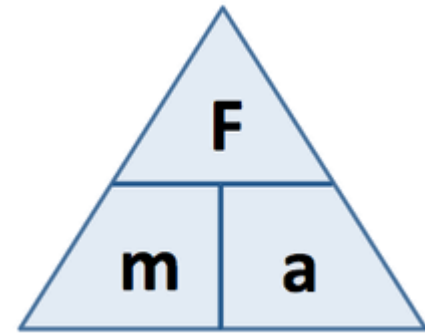
- Tendency of an object to resist change
- Dependent upon mass



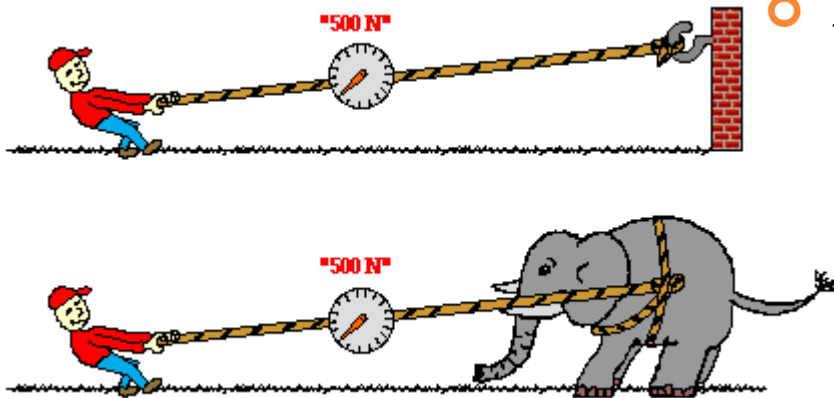
NEWTON'S LAWS OF MOTION

○ Second Law

- Motion of an object is related to mass and acceleration
- Greater force, greater acceleration
- Greater mass, smaller acceleration
- Force is a product of mass and acceleration
- $F = ma$



NEWTON'S LAWS OF MOTION



○ Third Law

- When one object exerts a force on a second object, the second object exerts a force that is equal in strength and opposite direction
- For every action there is an equal and opposite reaction



MRS. COULTER SAYS

- Do page 34 – Skip “Objectives”
- Do page 35 – Skip “Analyze”
- Do page 36 – All
- Do page 37 – Skip “Summarize It”



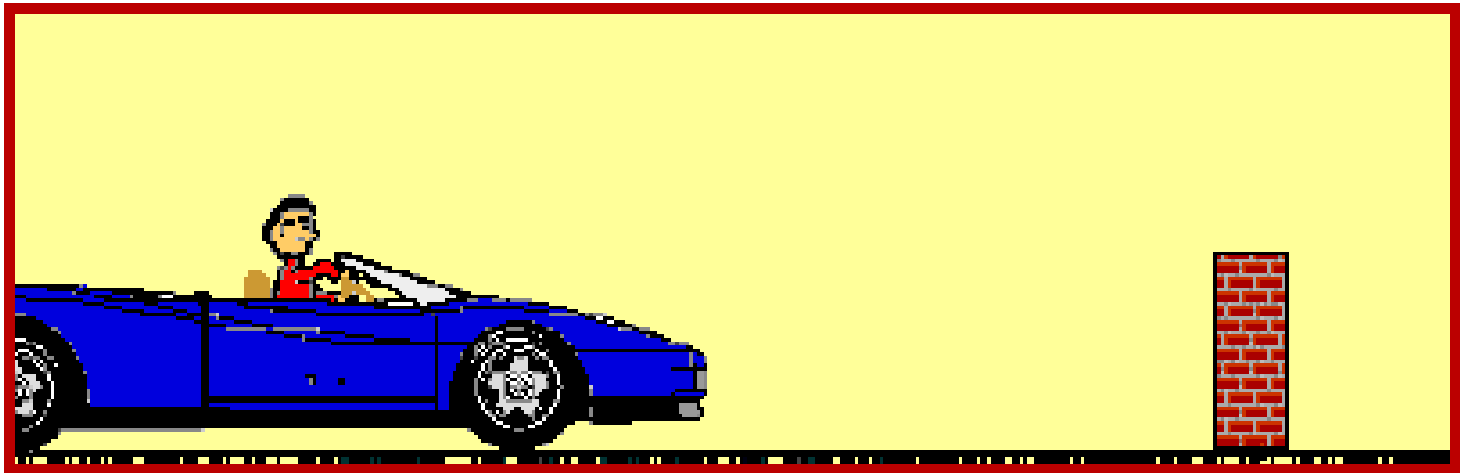
USING NEWTON'S LAWS



- What happens in a car crash?
 - 1st law says your body keeps moving at the same speed
 - Seat belts-stop your body
 - Air bags-provide a cushion
 - Crumple zones-parts on the car that crush to absorb forces



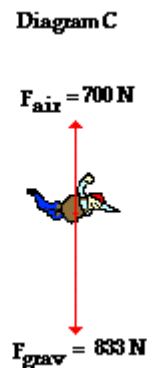
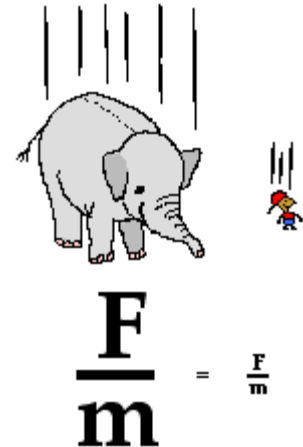
SEAT BELTS!



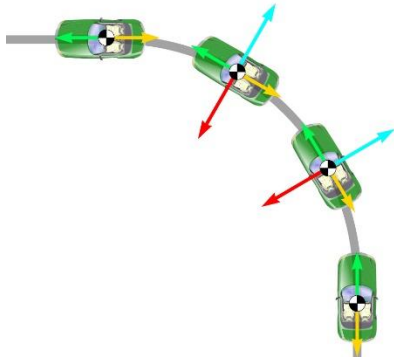
USING NEWTON'S LAWS

○ Newton's 2nd Law & Gravity

- Everything accelerates at a rate of 9.8 m/s^2
 - Air resistance-air pushing up on an object
 - Terminal velocity-maximum speed an object can fall
 - Free fall-only gravity acting on the object
 - Weightlessness-object appears to lose weight during free fall



USING NEWTON'S LAWS



○ Centripetal Force

- Force exerted toward the center of a curved path
- Gravity keeps the planets circling the sun

○ Force & Momentum

- Conservation of Momentum
 - When objects collide, momentum is conserved



FRICTION!



MRS. COULTER SAYS

- Do page 38 – Skip “Skim”
- Do page 39 – All
- Skip page 40

