8 physical science

Chapter Eight
Section One

A force

- A force is a push or a pull.
- A force causes change in motion.
- Force= Mass times Acceleration
- Unit: Newton
- Net force: combination of all forces on an object

newton

- Dictionary and desk; one meter
- makes it go from, for example 0 m/s/s to 1 m/s/s
- the force required to cause a one kilogram mass to accelerate by one meter per second per second

A Newton

- A Newton is the force required to accelerate a __1 kg object____ by __1 m/s/s_____.

Sample problems

- If you apply a _____ Newton force to a _____kg brick, it would accelerate by _____ meters per second each second.
- If you apply a 6 Newton force to a 2kg brick, it would accelerate by 3 meters per second each second.
- If you apply a 36 Newton force to a 12 kg brick, it would accelerate by _____ m/s/s.
- F = M*A ; A= F/M; = 36/12 = 3

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Chapter Eight
Section Two

friction

- You know what it is. How would you define it?
- the force that opposes motion between two surfaces that are touching
- Car tires cause friction.--Some friction is good. Too much is bad.

Four types of Friction

- 1. Sliding: two solid surfaces slide over each other
- 2. Static: Between objects that aren't moving—it's why you can't push a couch across a carpeted floor
- 3. Fluid: a solid object moving through a fluid; why sidewalks are slippery when wet
- 4. Rolling: easy to push a bicycle along a sidewalk

Drag

- Friction between a solid surface and a fluid.
- Parachutes cause drag. So do rudders.

air resistance

- friction / drag in a gas
- Parachutes cause air resistance

gravity

- According to Newton: (1687 AD) is a force which causes objects with mass to attract each other. (Pulled)
- According to Einstein: (1916 AD) is caused by the curvature of spacetime--objects move toward indentations in the spacetime continuum. (Pushed)

2

- the pull (or push) of the force of gravity on an object
- measured in kilograms on earth, but can also be measured in Newtons

Addendum:

- 1. Momentum = Mass x Velocity; (No Specific Unit)
- 2. Force = Mass x Acceleration (Unit = Newton)
- 3. Cross Multiplying & Canceling:

cross-multiplying & Canceling:

- Q: How many seconds are in a non-leap year?
- A: $\frac{60\ \text{Seconds}}{1\ \text{Minute}} \times \frac{60\ \text{Minutes}}{1\ \text{Hour}} \times \frac{24\ \text{Hours}}{1\ \text{Day}} \times \frac{365\ \text{Days}}{1\ \text{Year}} =$

$$31536000\ \frac{\text{Seconds}}{\text{Year}}$$

Mass v. Weight

- Mass: A measure of how much matter is in an object
- Weight: A measure of the pull of gravity on an object
- p.272ff

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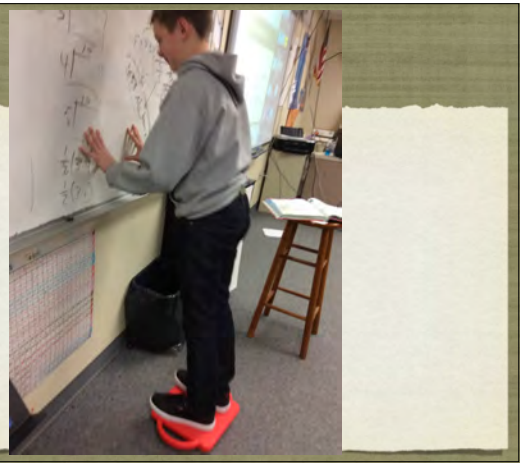
Chapter Eight
Section Three

Law #1 of motion

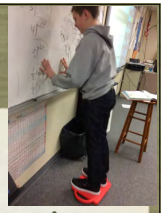
- Inertia: Objects move in a straight line at a constant velocity unless acted upon by another force
- p. 86: Resistance of an object to a change in its velocity

law #2 of motion

- If Acceleration = Force / Mass, then what does Force equal? (Remember your Fact Families).
- Force = Mass x Acceleration
- F =MA
- A= F/M M= F/A



law #3 of motion



- For every ___Action___, there is a ___Reaction___ which is ___Equal___ and ___Opposite___.

newton's three laws of motion

- 1. Inertia--an object in motion tends to stay in motion, and an object at rest tends to stay at rest
- 2. Force = Mass times Acceleration
- 3. For every action, there is a reaction which is equal and opposite.

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Chapter Eight
Section Four

momentum

- Mass = stuff
- Velocity = speed in a direction
- What hits you harder a 100kg object traveling toward you at 20 mph, or a 50kg object traveling at 40mph?
- An object's mass times its velocity.
- Unit: kg m / s

law of conservation of momentum

- Momentum can be transferred from one object to another;
- Can't be created nor destroyed
- Pool Table

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Chapter Eight
Section Five

Free Fall

- Motion where the acceleration is caused by gravity
- 9.8 m /s /s on earth acceleration
- so, after 2 seconds it's traveling 9.8x2 or 19.6 m/s; keeps accelerating

Satellites

- Objects that orbit around other objects in space;
- Follow a curved path around earth; combination of gravity & inertia

Centripetal Force

- "Center-seeking"
- A force that causes an object to move in a circular path;
- If you could turn off a centripetal force, inertia would cause the object to fly off in a straight line (Like cutting a yo-yo string)

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Chapter Eight
Section Six

Buoyant Force

- upward force on a submerged object;
- Displacement: volume of fluid equal to the volume of submerged object; compare their weights to see if object floats
- = Density