Notes

Only write what is in <u>underlined</u>

- Momentum = Mass X Velocity

$$\vec{p} = m\vec{v}$$

- The SI unit for mass = kg.
- The SI unit for velocity = m/s.
- The SI unit for momentum = kg x m/s.

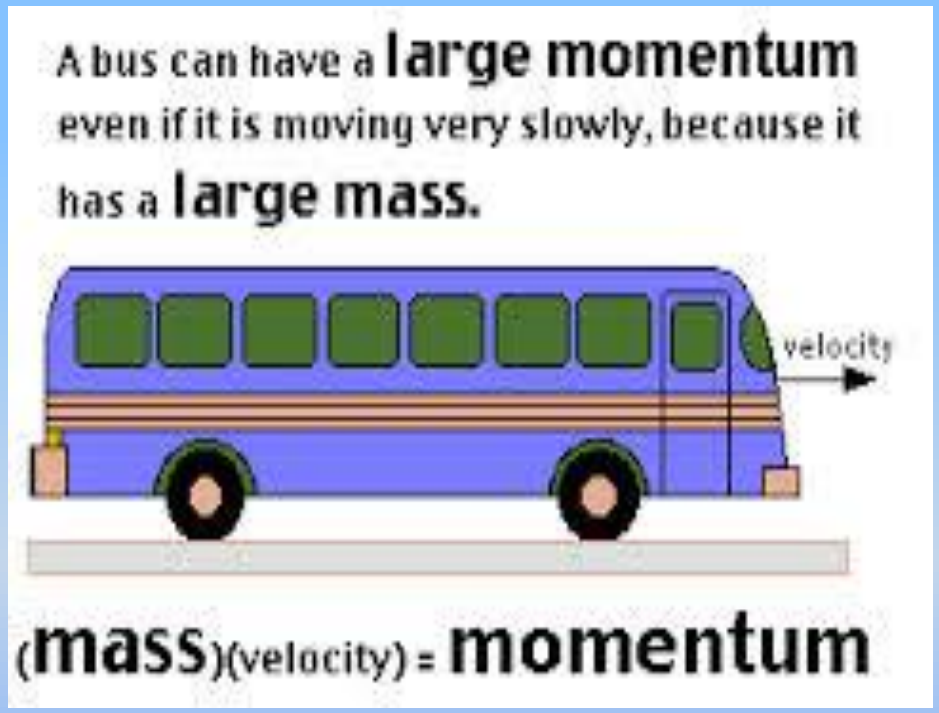
- Momentum is "conserved" – which means it is not lost (it transfers).
- Ex: Newton's Cradle
- Momentum transfers from one object into the other object that it runs/slams/crashes into.

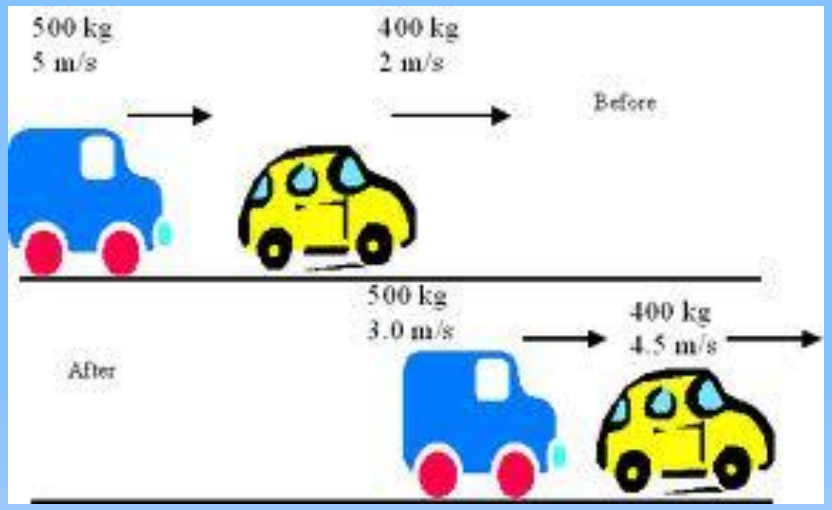
This is Newton’s Cradle

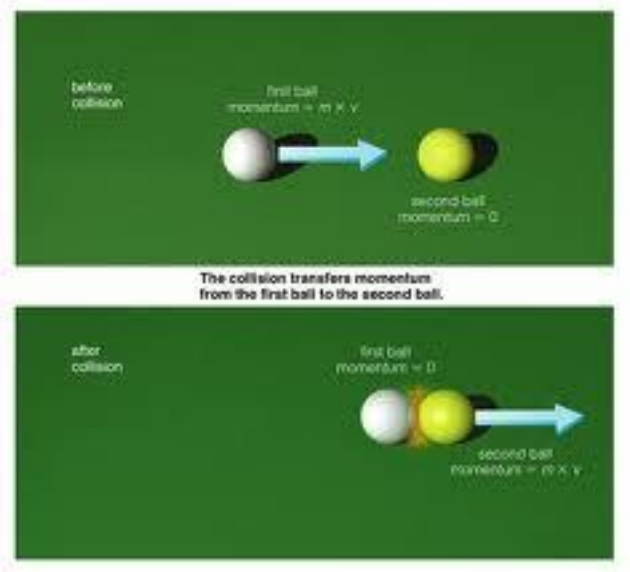
It demonstrates **momentum** being conserved. It also demonstrates **potential and kinetic energy** – which is our second set of notes today – following momentum

- Sometimes momentum depends on mass.
- A car has more mass than a bicycle. So, if they were both moving at 30 mph, then the momentum of the car would be greater.
- A car colliding at 30 mph does causes more damage than the bicycle colliding at 30 mph
- Momentum is basically "bashing power".

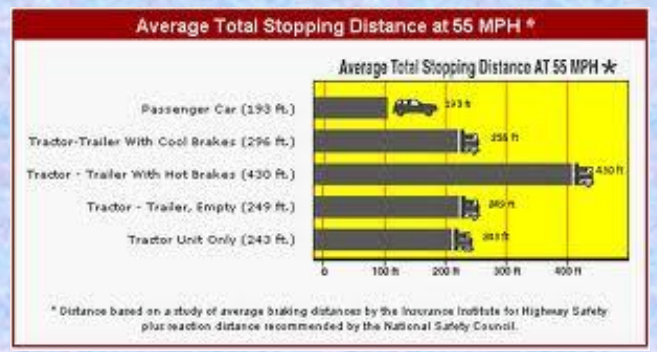
[momentum bouncy balls]
[bill nye momentum example]

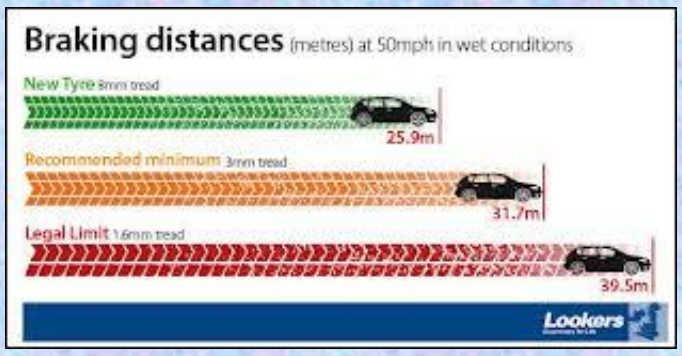






- <u>ALSO: Stopping distance is affected by momentum</u>
- The more massive the car, the more distance the car is needed to come to a stop. <u>A big semi will need more distance to come to a stop</u> compared to a regular little car.





It's complicated…

angular momentum

- Ordinary momentum is a measure of an object's tendency to move at constant speed along a straight path.
- Then there's **angular momentum** – very complicated. (that "spinny" bike tire)
- In astronomy most things move in curved paths and have **angular momentum**. Angular momentum measures an object's tendency to continue to spin

- <u>All moving objects have momentum</u>. (all moving things have velocity)

  (0 velocity = 0 momentum)
- When an object speeds up, it gains momentum – because velocity is increasing.

Momentum can be transferred, lost, or gained.

- A snowboarder gets stuck on a flat part of the mountain.
- An ice skater is spinning and tightens her spin and begins to spin faster
- Hitting a cue ball into another pool ball.
- A skateboarder going down hill

- Lost
- Gained
- Transferred
- gained

$$p = m \times v$$
$$= 2000 \times 32$$
$$= 64\,000 \text{ kg m/s}$$

Calculate Momentum (MxV)

- A 200 lb football player running 5 mph

vs

- A 300 lb football player running 2 mph
- What would happen if they were running towards eachother? (who would knock down who)

- 1000 lb-mph

- 600 lb-mph

- The 200 lb player would knock over the 300 lb player

Momentum videos

- http://www.youtube.com/watch?v=Jnj8mc04r9E&list=PL3E788EDA794CCE7B&index=6&feature=plpp_video
- http://www.youtube.com/watch?v=BiLq5Gnpo8Q&list=PL3E788EDA794CCE7B&index=17&feature=plpp_video
- http://www.youtube.com/watch?v=OuA-znVMY3I&list=PL3E788EDA794CCE7B&index=20&feature=plpp_video