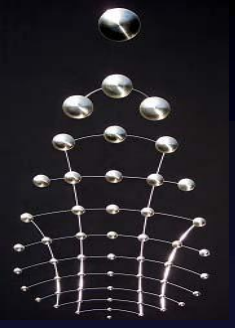
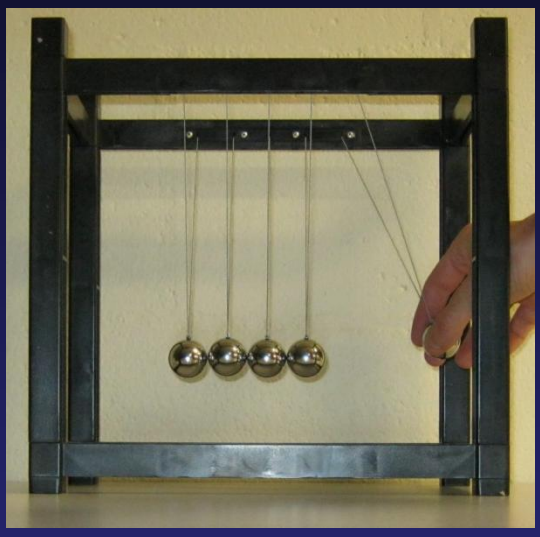


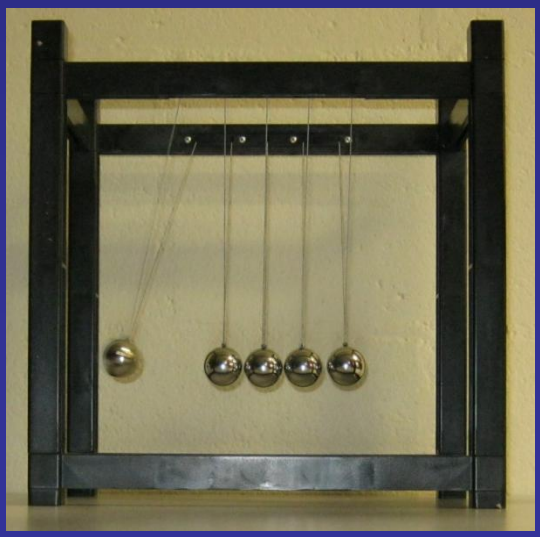
NEWTON'S CRADLE

What to do

1. **Pull an end ball away from the other balls and release**
2. **Pull aside different combinations of balls and release**



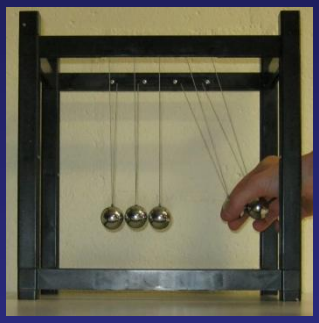
Pull one of the end balls away from the other stationary balls. This will swing back and knock the second ball in the cradle, transferring its momentum to this ball. The second ball then pushes against the third ball and so on until the momentum has reached the end of the cradle. At this point the opposite end ball will travel the same distance and velocity away from the balls as the original ball. It will then swing back and hit the stationary balls, where the cycle is repeated.

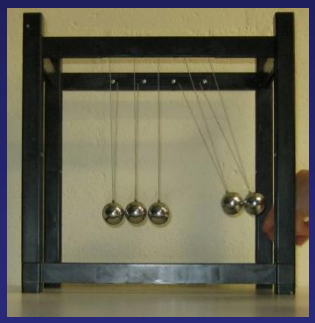


Newton's Third Law states that every action has an equal and opposite reaction. Conservation of Momentum was derived by Newton from Newton's Law and this is given by the equation:

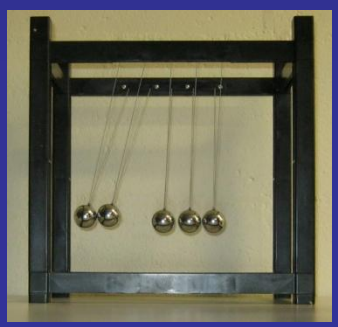
$$P = mv$$

Where ρ is momentum, m is mass and v is velocity.
This tells us that the mass-velocity product of a system is a conserved quantity.





The balls in Newton's Cradle all have the same mass. Thus, if one ball hits another ball, the velocity of the ball that has been hit will equal the velocity of the first ball before the collision. This can be seen by equating the momentum of the first and second ball; if the masses are equal, the velocities must also be equal. Some energy is lost through air resistance and heat; however, you should see the velocities of the balls remain approximately equal for the first few swings.



Try different patterns using Newton's Cradle, such as pulling two or three balls to the side and pulling a ball from each side so that they collide with the centre balls at the same moment.

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