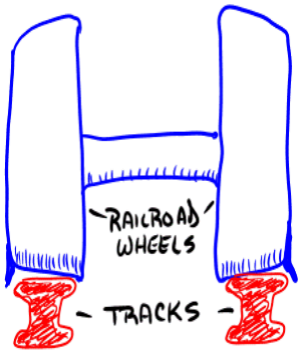
PHYSICS

Rotational Motion



- **_____ Motion**

  Does the outside horse on a merry go round go faster than the inside horse?
  - **_____ Speed – along a line *(outside horse faster)***
  - **_____ Speed – along a tangent line (while going in a circle) *(outside horse faster)***
  - **_____ Speed – (or angular speed) rotation (or revolution) per time *(both horses same)***
  - **Interesting Fact: Railroad wheel flanges do not keep wheels on the tracks. They stay because of taper.**

- **_____ Inertia**

  An object rotating about an axis tends to remain rotating about that same axis unless acted upon by an outside force.
  - **It depends on _____ and _____ .**
  - **Examples: Balance Tightrope Bar; Crouched: runner, tumbler, or skater; balanced sledge**

- **Torque (rotational counterpart of force)**

  Try to hold a rod in a horizontal position as you slide a weight toward the far end.
  - **_____ = length of _____ x _____**
  - **Examples: ancient scales using a balance, car engine torque, torque wrench, tire iron**

- **Center of _____ & Center of _____ (only different if very large and gravity varies)**
  - **Examples: centroid on a triangle, throwing knife, Leaning Tower of Pisa, try to touch your toes with back against the wall**
  - **Locating the Center of Gravity: hang object from 2 points – where plum bob lines intersect.**

- **_____ Force**
  - **Any force directed toward a fixed center is called a centripetal force.**
  - **It depends on: the *mass*, the *tangential speed* and the *radius* of curvature.**
  - **FORMULA: [$f = mv^2/r$]**
  - **Examples: car tires staying on a ramp**

- **_____ Force (It's not really a force – it's inertia!)**
  - **We call the inertia of wanting to go outward from a circle – while being pulled into a circle, centrifugal force. What we are really feeling is an equal and opposite to the centripetal force pulling us toward center and the tangential speed (which would take us on a straight line tangent to the circle.) Of course, these two add up to feeling pushed outward from the center of the circle.**
  - **Examples: clothes dryer spins off water, gravity simulation for future space stations**

- **_____ Momentum**

  Just like linear momentum (mass x velocity), angular momentum depends on mass and velocity, but also on the radius of curvature.
  - **FORMULA: [L = mvr]**
  - **Angular momentum goes by the '_____ _____ *rule'*.**
  - **Examples: Gyroscope, bicycle or motorcycle wheels**