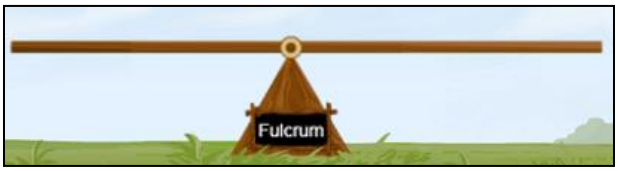
Vocabulary: Torque and Moment of Inertia

Vocabulary

- Angular acceleration – the rate of change in the angular velocity of a rotating object.
  - The symbol for angular acceleration is α (alpha).
  - The angular velocity (ω) of an object is equal to the angle through which it rotates in a given time. Units of angular velocity may be degrees per second (°/s) or radians per second (rad/s).
  - To find the angular acceleration, divide the change in angular velocity ($\Delta\omega$) by the elapsed time (Δt): $\alpha = \Delta\omega/\Delta t$.

- Fulcrum – the pivot point of a *lever*.



- Lever – a simple machine made of a stiff plank or bar that pivots on a fulcrum.
  - A see-saw is an example of a *first-class lever*, which is a lever with the fulcrum between the effort and the load.

- Moment of inertia – resistance to change in angular velocity.
  - The symbol for moment of inertia is I.
  - An object's moment of inertia depends on its mass and how the mass is distributed around the center of rotation.
  - For a point with mass m and distance r from the center of rotation, the moment of inertia is given by the formula: $I = mr^2$.

- Newton's second law – the force acting on an object is equal to the product of its mass and acceleration: $F = ma$.
  - The greater the force on an object, the greater its acceleration.
  - If you add mass to an object, it will accelerate less rapidly under a given force.
  - For a rotating body, Newton's second law states that *torque* (τ) is equal to the product of moment of inertia (I) and angular acceleration (α): $\tau = I\alpha$.

- Torque – a twisting force that causes rotation.
  - The symbol for torque is τ (tau).

- Weight – the downward force of gravity on an object.
  - To calculate weight (w), multiply mass (m) by gravitational acceleration (g):

$$w = mg$$

  - On Earth's surface, g is equal to 9.81 m/s^2.

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