**Noteguide for solving Translational and Torsional equilibrium Problems**

**In general, a system that is in equilibrium is in translational equilibrium and torsional equilibrium:**

**Force Equilibrium:**

* 1. Draw Picture/Draw Arrows for forces
  2. Calculate weights
  3. Express/calculate components
  4. **Set up a <sum of all forces> = 0 equation for x**
  5. **and a <sum of all forces> = 0 for the y direction**

**Torque Equilibrium:**

* 1. Pick a Pivot Point

(at location of unknown force)

* 1. Express all torques:
  2. **±rF ± rF ± rF… = 0**

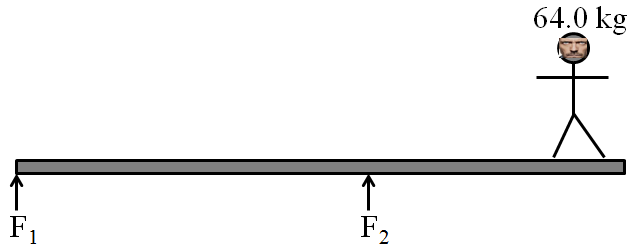
+ is CW, - is ACW

r is distance from pivot

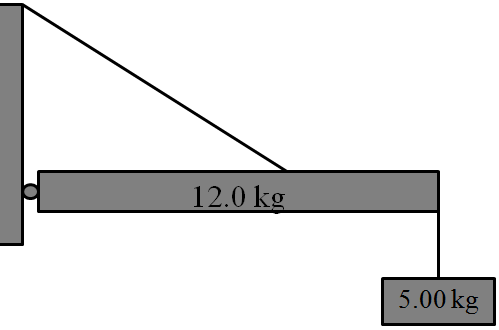
**Do Maths**

Typically, the torque equation is solvable, and then you can substitute into the other two equations

**Example 1:** The beam is 6.0 m long, 45 kg and uniform. The person is standing 0.50 m from the right side, and F2 is 4.0 m from the left side. Find F1 and F2 (F1 = 125.08 N down, F2 = 1194.4 N up)



The beam is uniform and 4.00 m long, the cable is attached 2.30 m from the left side at a 30.0o angle with the beam. Find T, Wx, Wy: (T = 375 N, Wx = 325 N right, Wy = 20.9 N down)



The 10.0 kg beam is uniform and 8.00 m long and makes an angle of 35.0o with the wall, the cable is attached 3.80 m from the bottom end. Find the tension in the cable and the force exerted by the wall in the x and y direction (Careful what angle you use for the tension) T = 274.8 N, Wx = 274.8 N right, Wy = 235.4 N up

