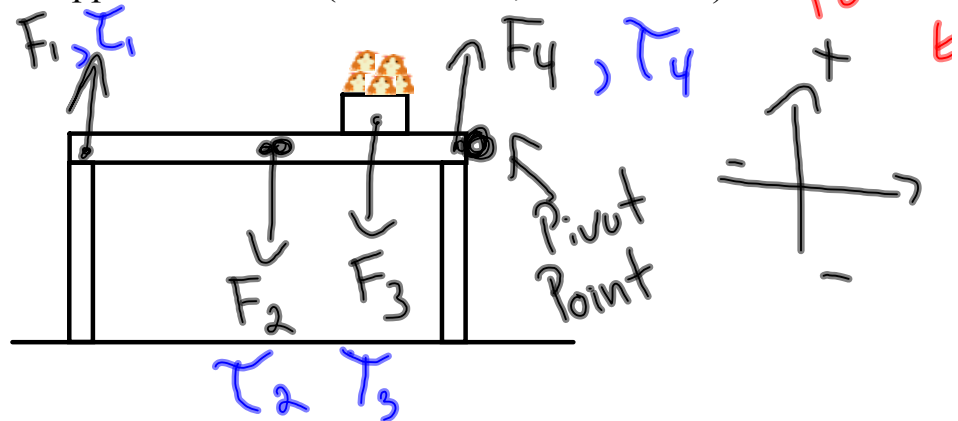


\* If a solid object has mass, treat the object as if all its mass were concentrated at a point - the center of mass.

Example: A uniform 1500 kg beam, 20.0 m long, supports a 15000 kg box of hamsters 5.0 m from the right support column. Calculate the magnitude of the forces on the beam exerted by each of the vertical support columns. ( $1.2 \times 10^5$  N,  $4.2 \times 10^4$  N)



$$F_{net} = F_1 + F_2 + F_3 + F_4$$

$$0 = F_1 - (1500)(9.81) - (15000)(9.81) + F_4$$

$$\tau_{net} = \tau_1 + \tau_2 + \tau_3 + \tau_4$$

$$0 = -20F_1 + (10)(F_2) + (5)(F_3) + 0$$

$$0 = -20F_1 + (10)(1500)(9.81) + (5)(15000)(9.81)$$

$$F_1 = \frac{-882900 \text{ Nm}}{-20 \text{ m}} = \underline{\underline{44000 \text{ N}}}$$

$$\overset{F_{net}}{0} = 44000 - 14715 - 147150 + F_4$$

$$\underline{\underline{F_4 = 117000 \text{ N}}}$$