

For equilibrium:

effort x effort moment arm = resistance x resistance moment arm

$$\frac{\text{effort}}{\text{resistance}} = \frac{\text{resistance moment arm}}{\text{effort moment arm}}$$

For equilibrium:

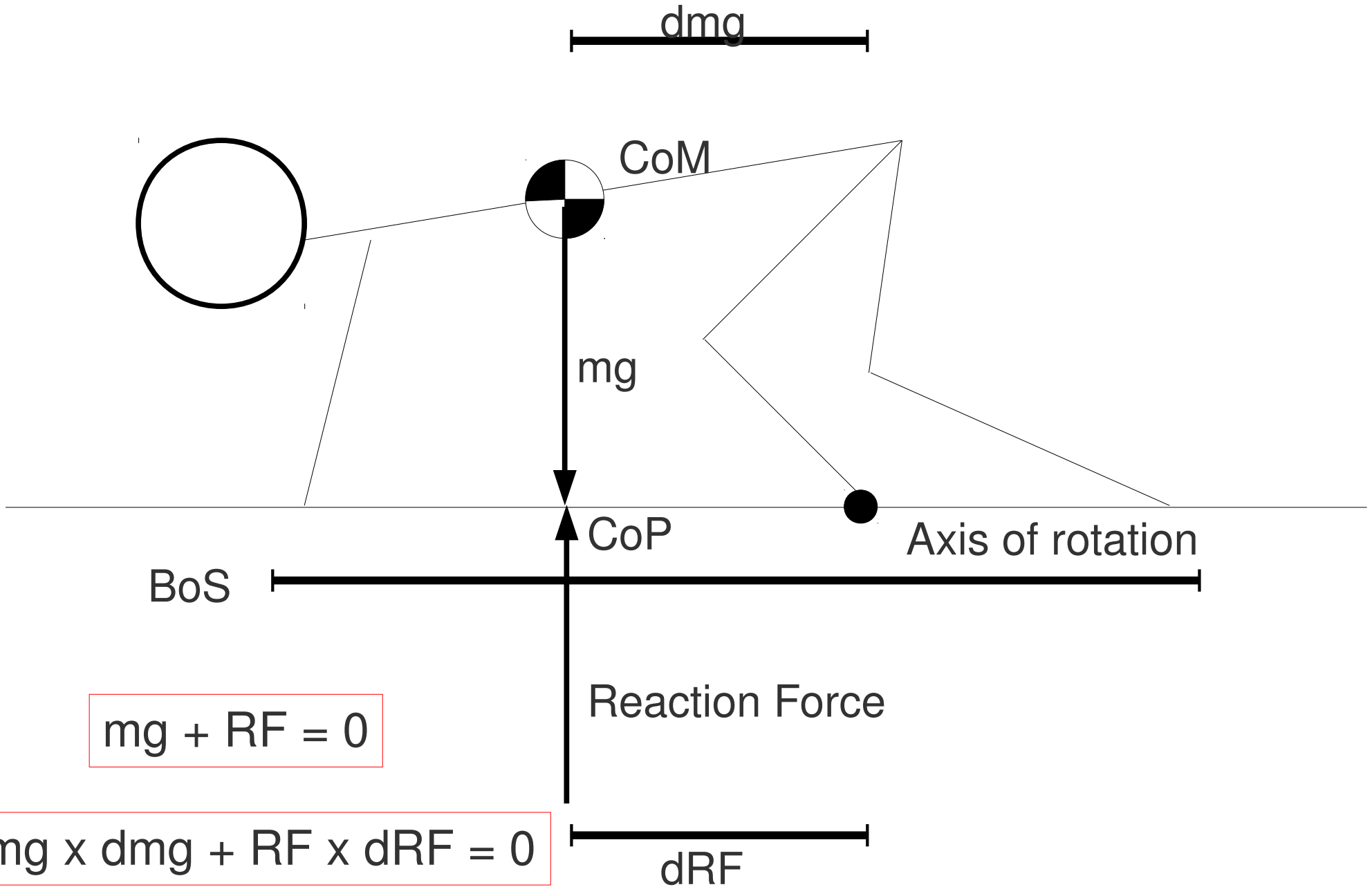
Sum of forces equal to zero

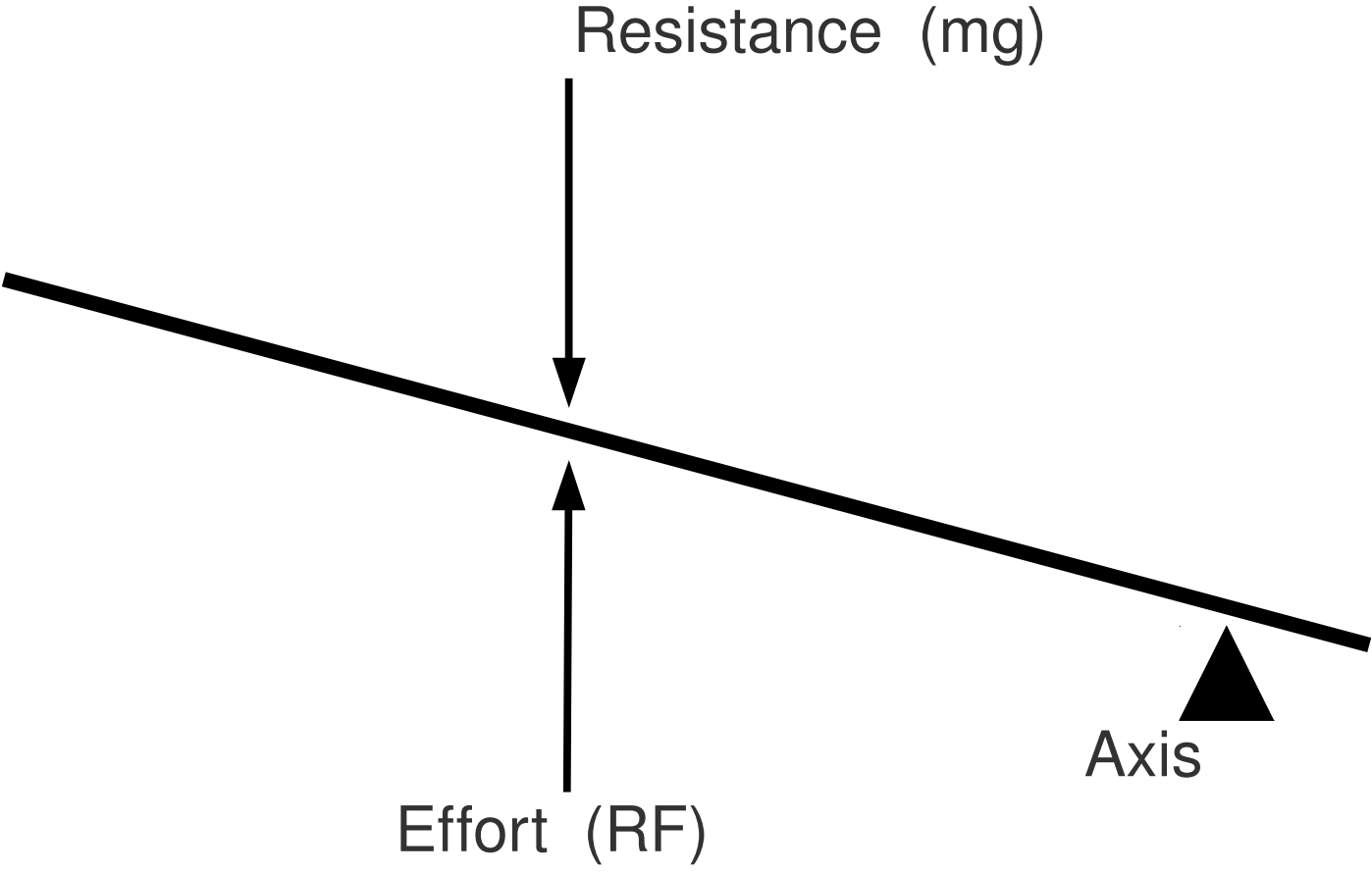
$$\Sigma F = 0$$

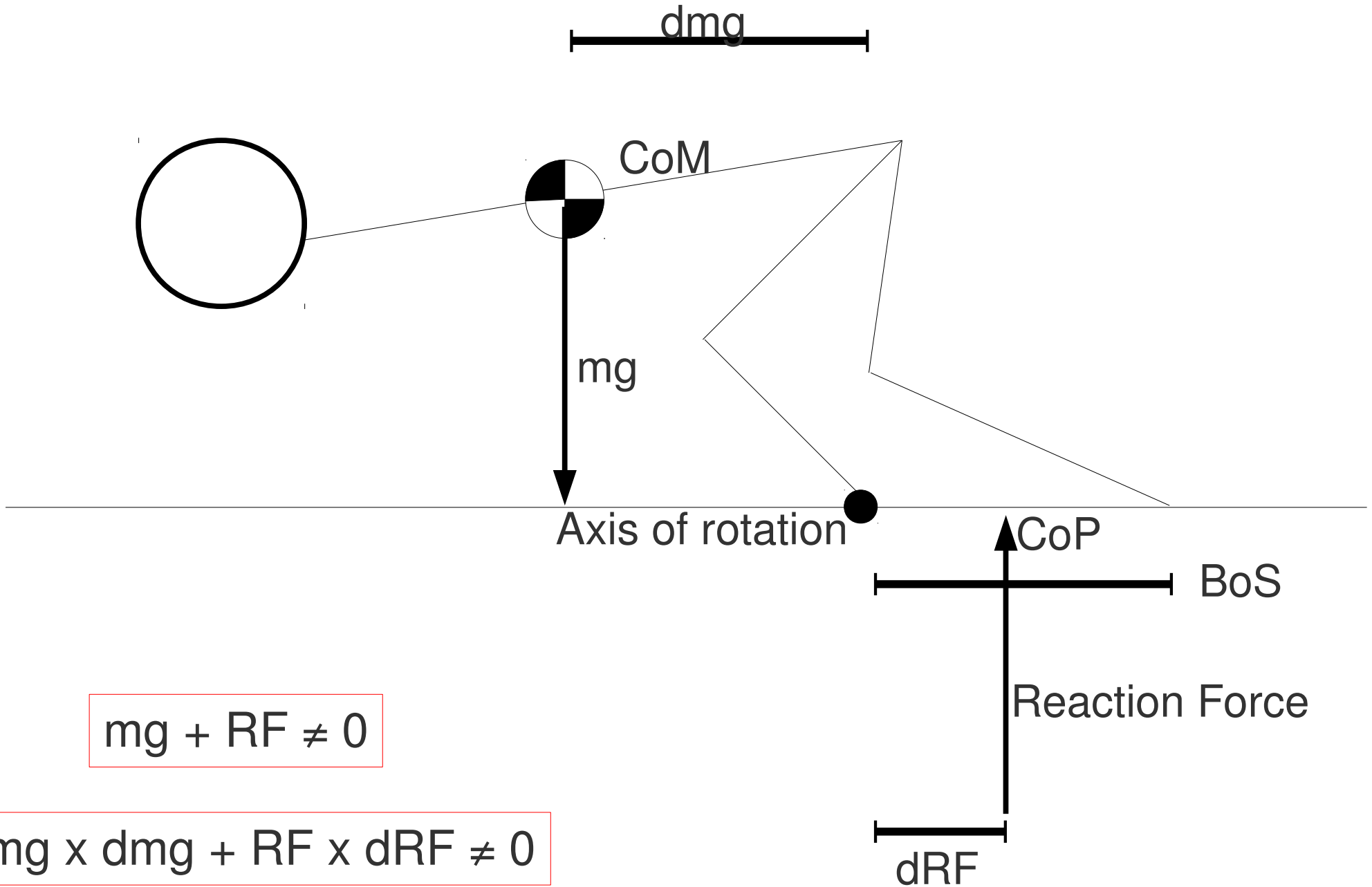
Sum of moments equal to zero

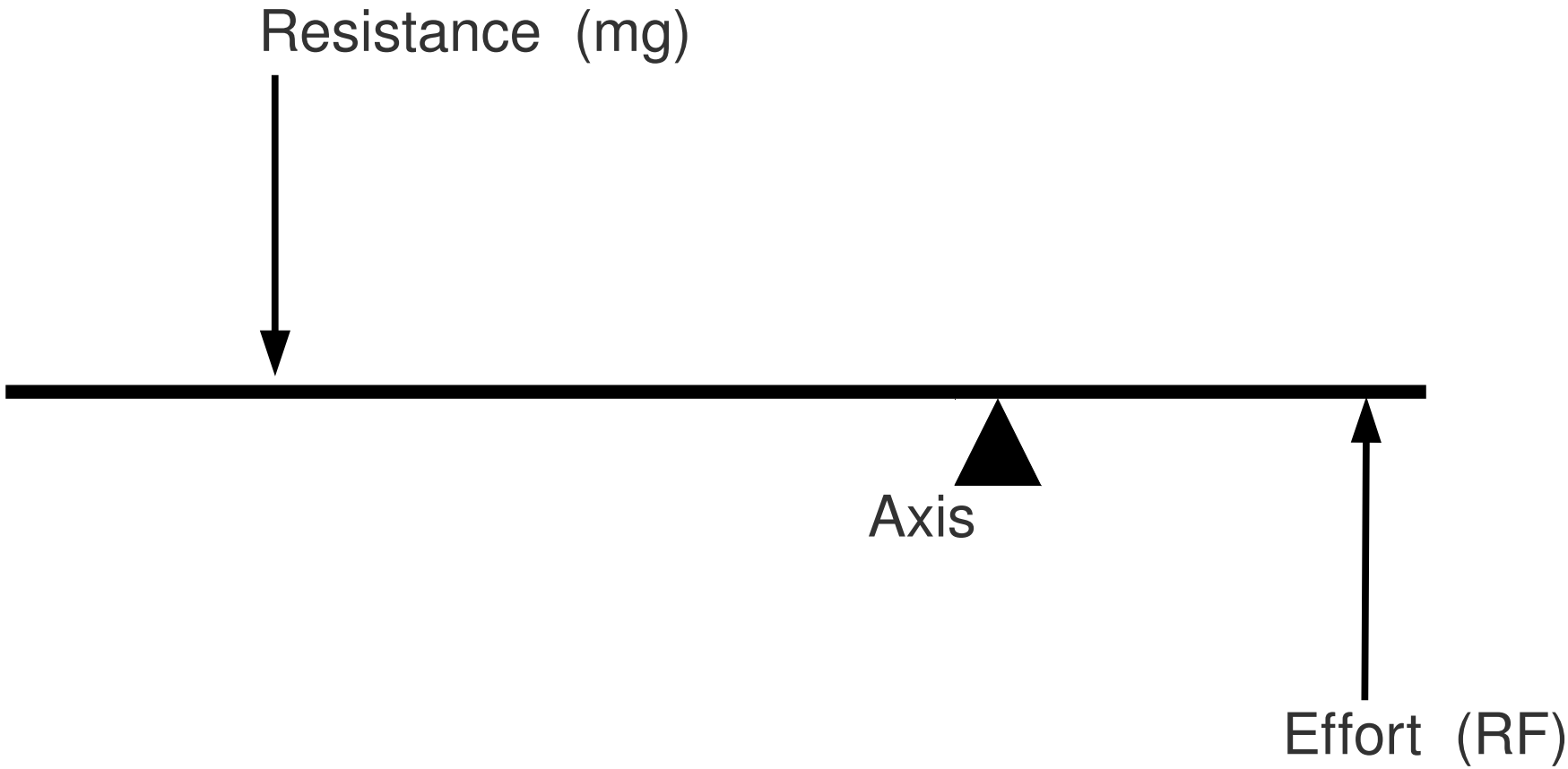
$$\Sigma M = 0$$

Sprint Start Example



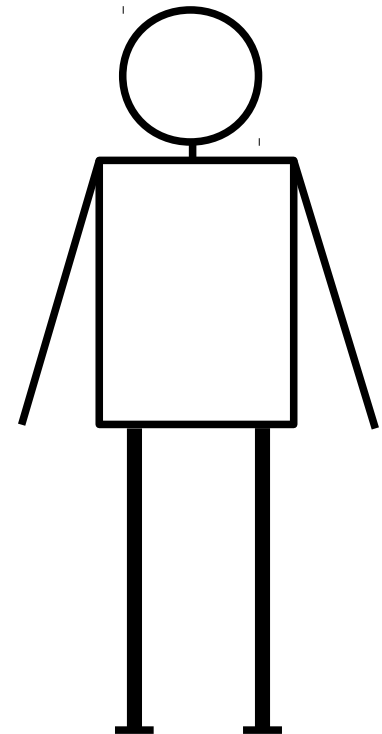




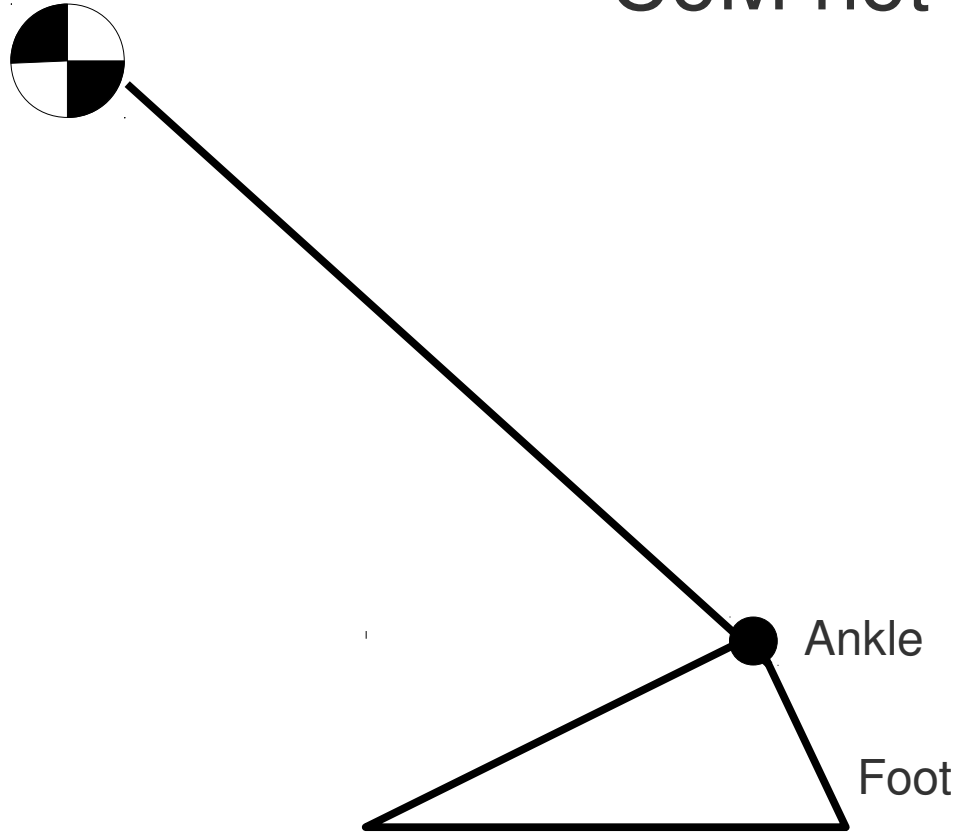


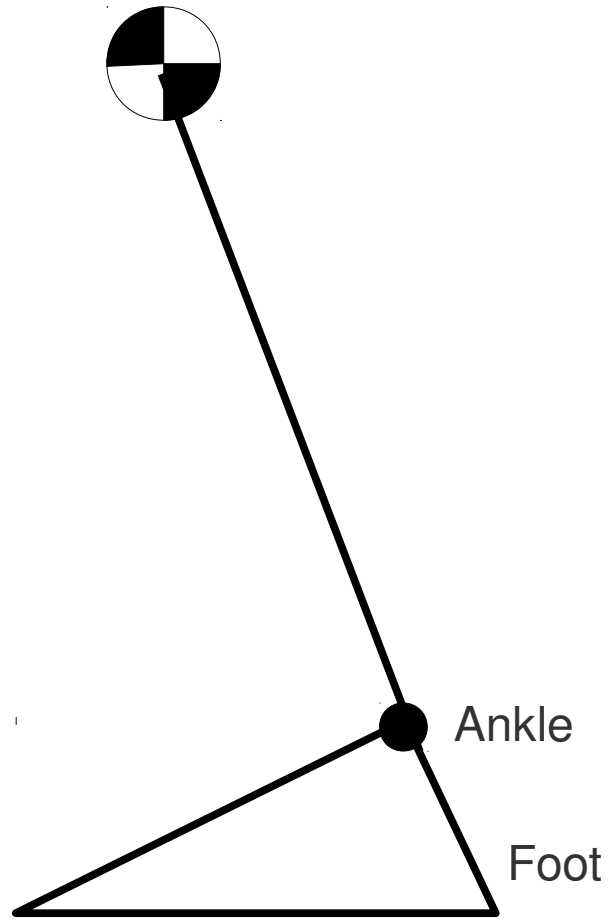
How do I not fall down?

- CoM within BoS
- CoM aligned with CoP



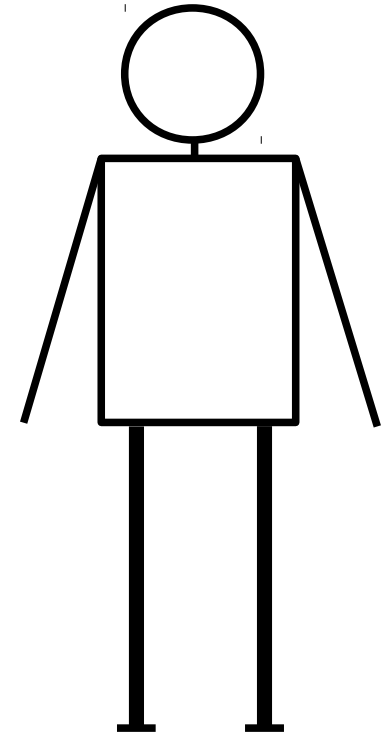
CoM not within BoS





What makes me stable?

- Large BoS (direction matters)
- CoM centered within BoS
- Lower CoM



Stability

The resistance to disturbance of a body's equilibrium*