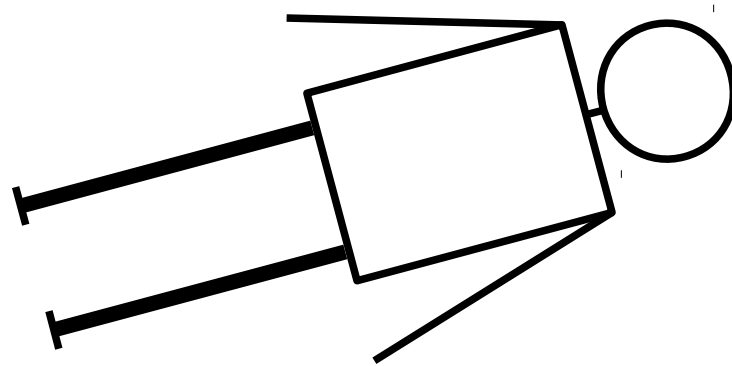


How do I not fall down?



Important Concepts of Balance

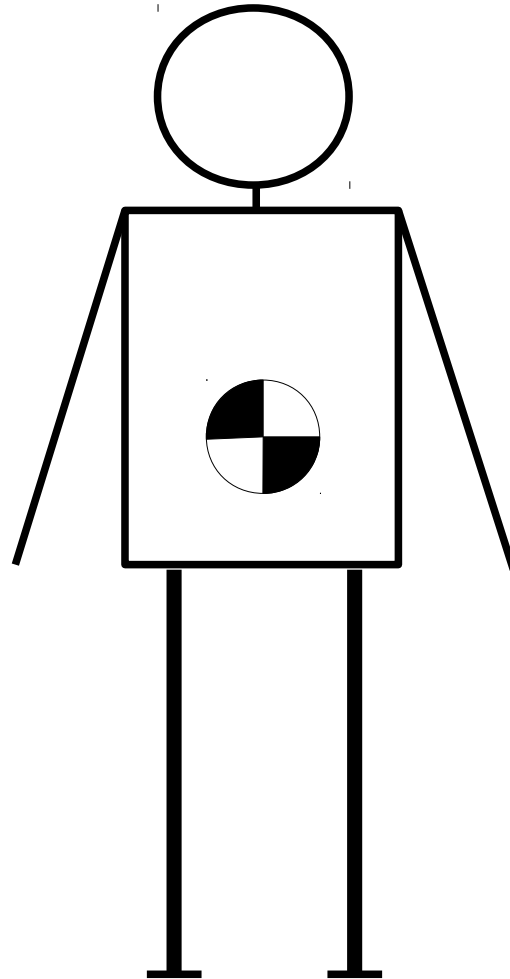
Center of Mass (CoM)

Base of Support (BoS)

Center of Pressure (CoP)

Center of Mass (CoM)

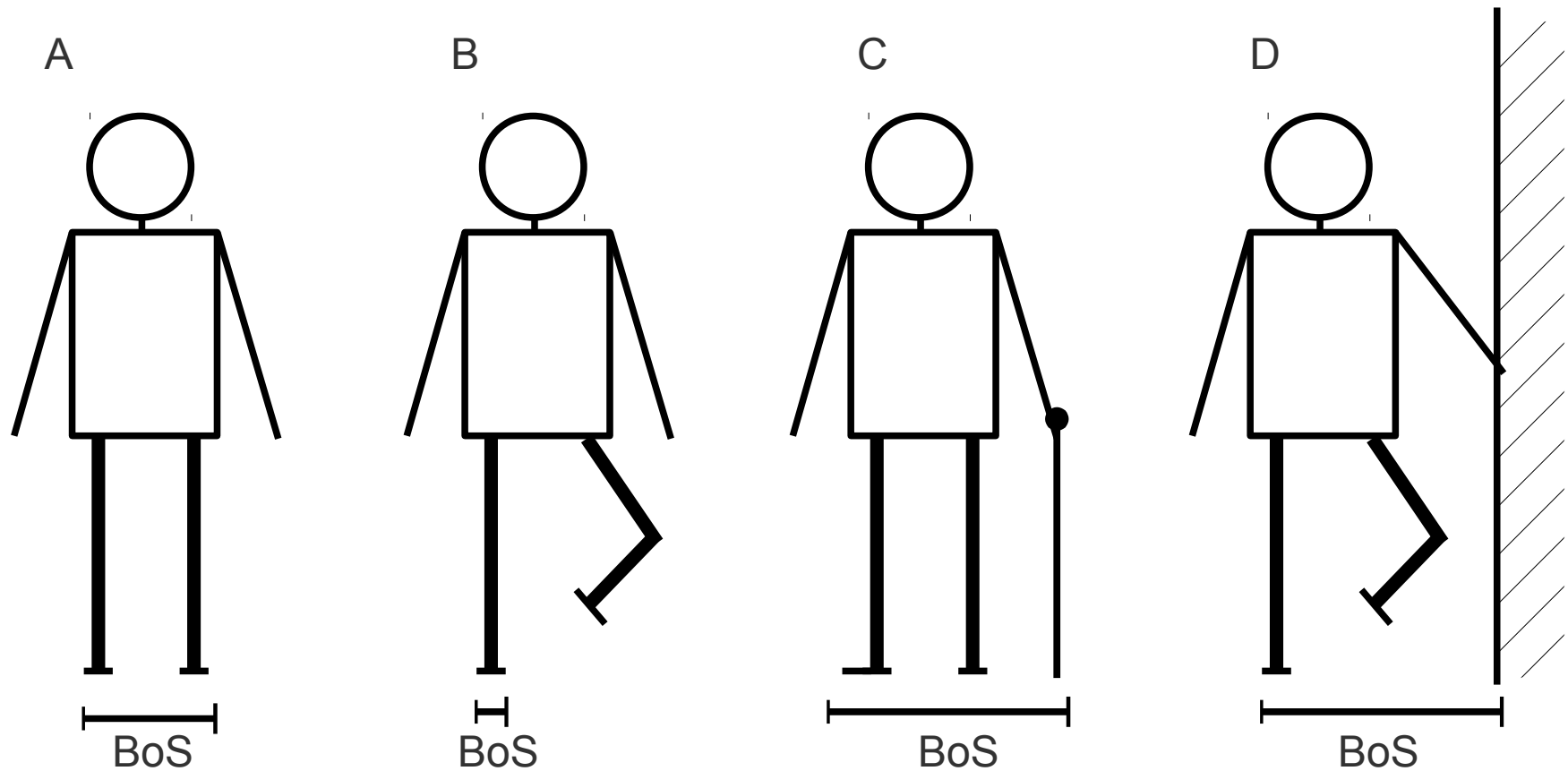
The point at which all the body's mass seems to be concentrated*



*Kreighbaum and Barthels, 1996

Base of Support (BoS)

The region bounded by body parts in contact with some resistive surface that exerts a reaction force against the body*



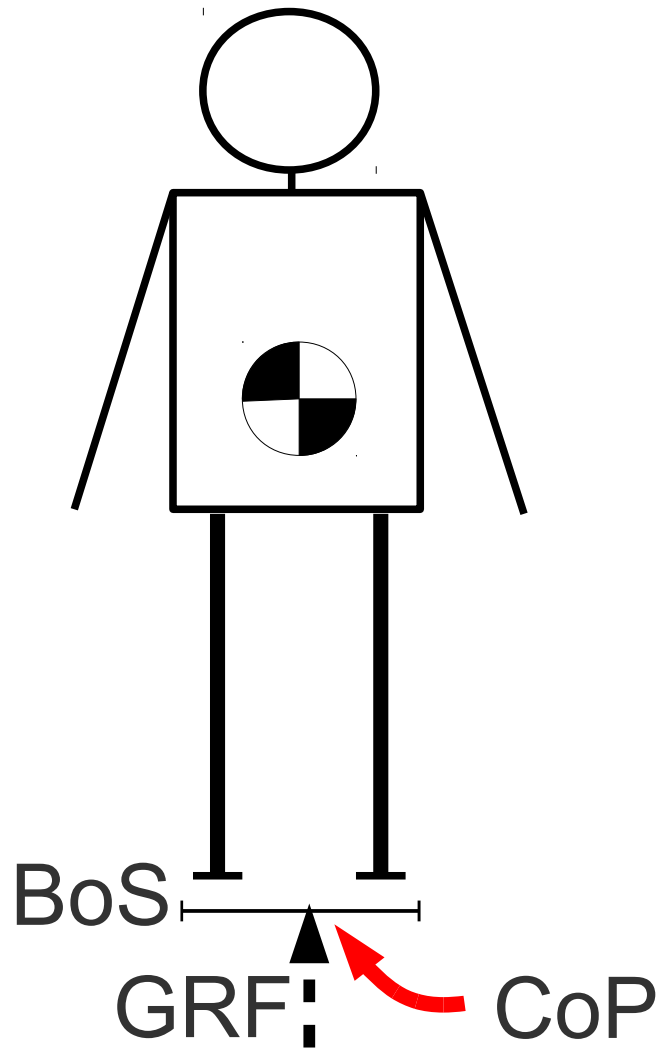
*Kreighbaum and Barthels, 1996

Center of Pressure (CoP)

The point of application of the sum of all ground reaction forces

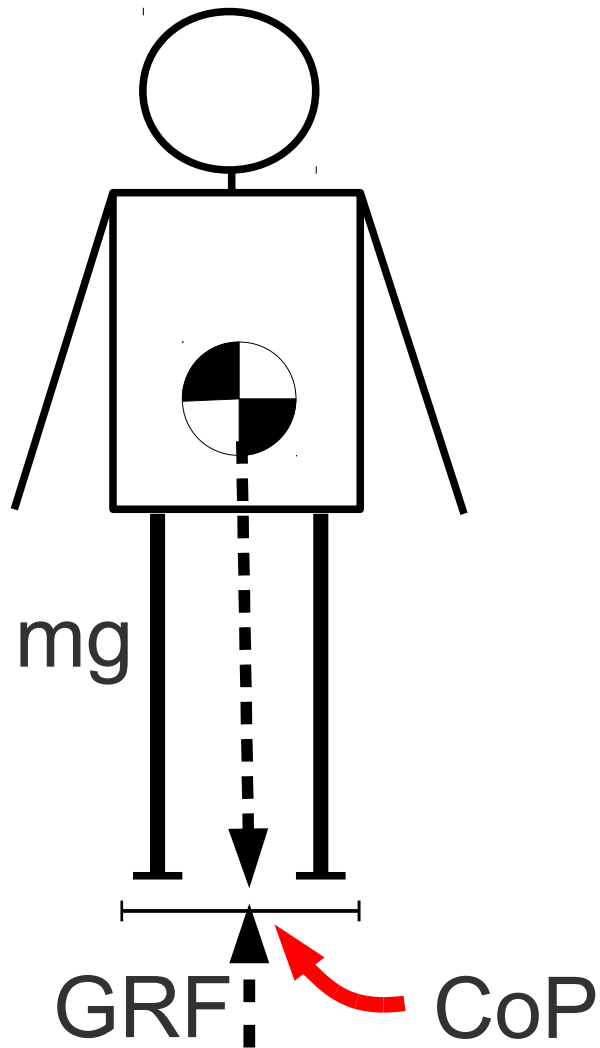
Center of Pressure (CoP)

The CoP is necessarily within the Base of Support

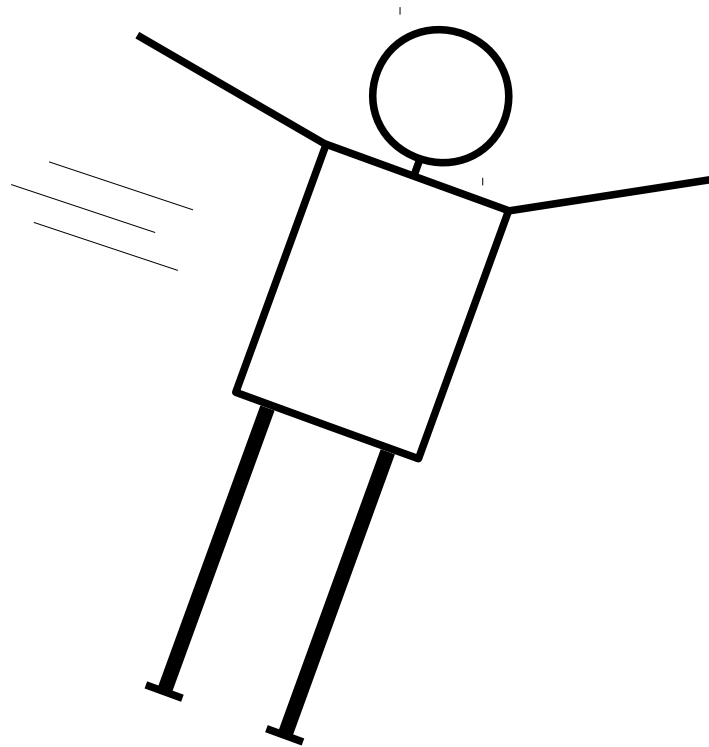


Static Balance

The CoP is vertically aligned with CoM



How do these concepts relate to balance?

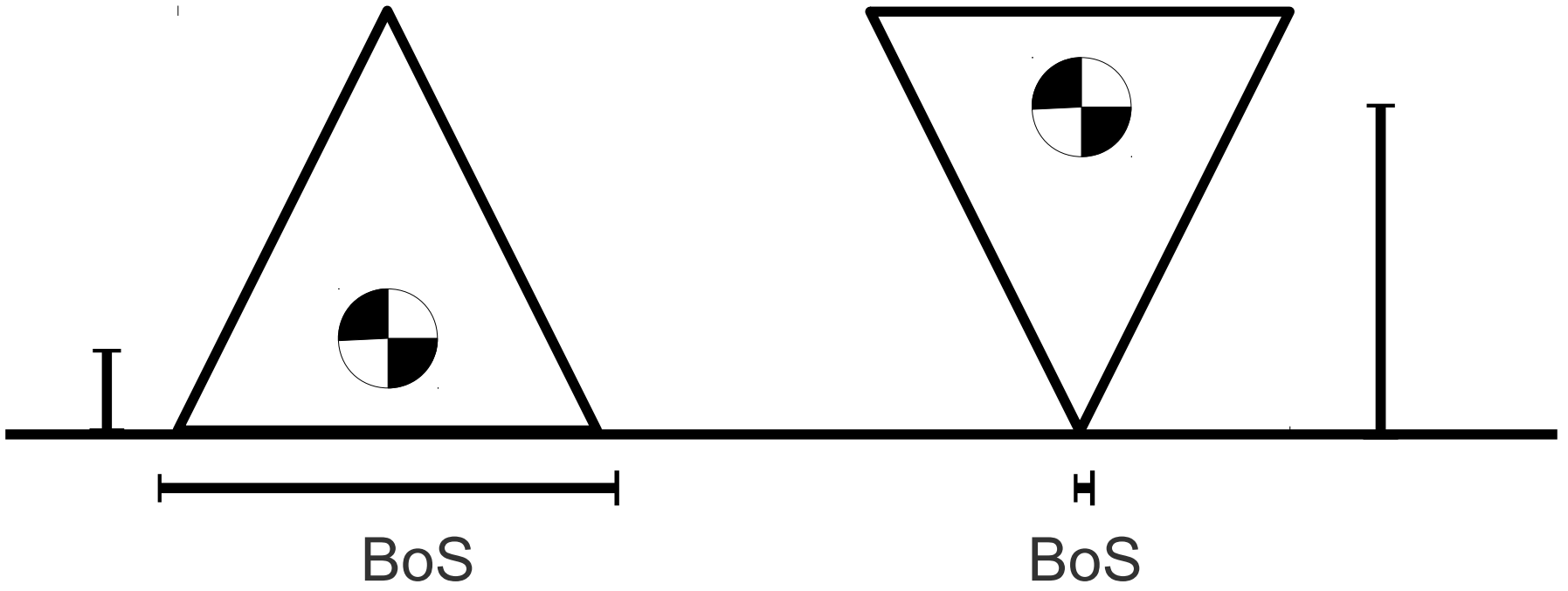


Stability

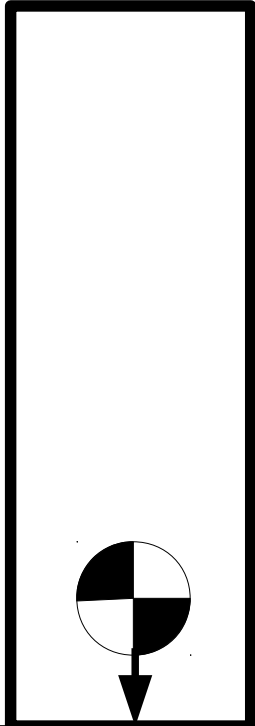
The resistance to disturbance of a body's equilibrium*

A

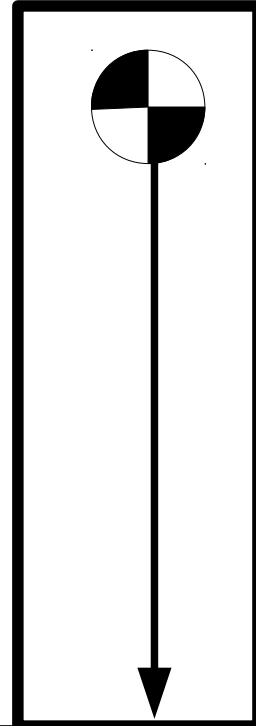
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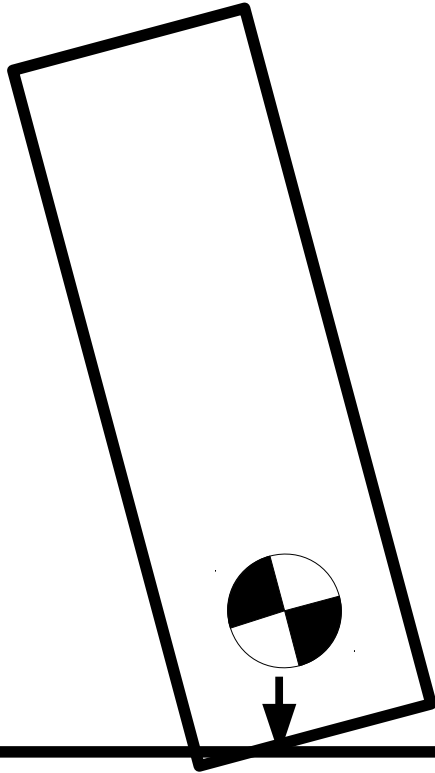
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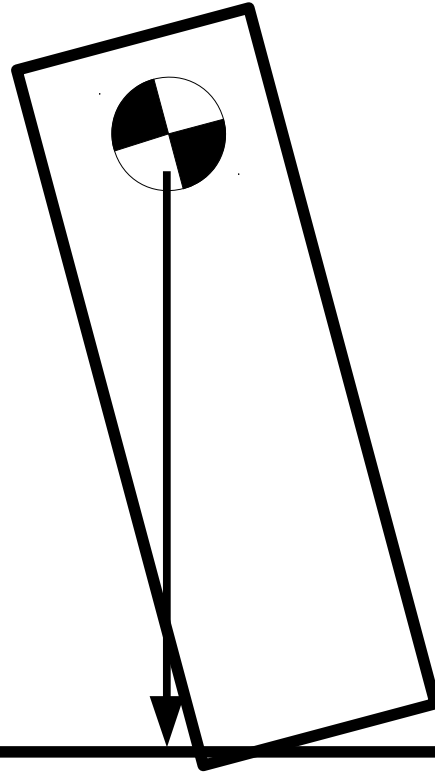
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A

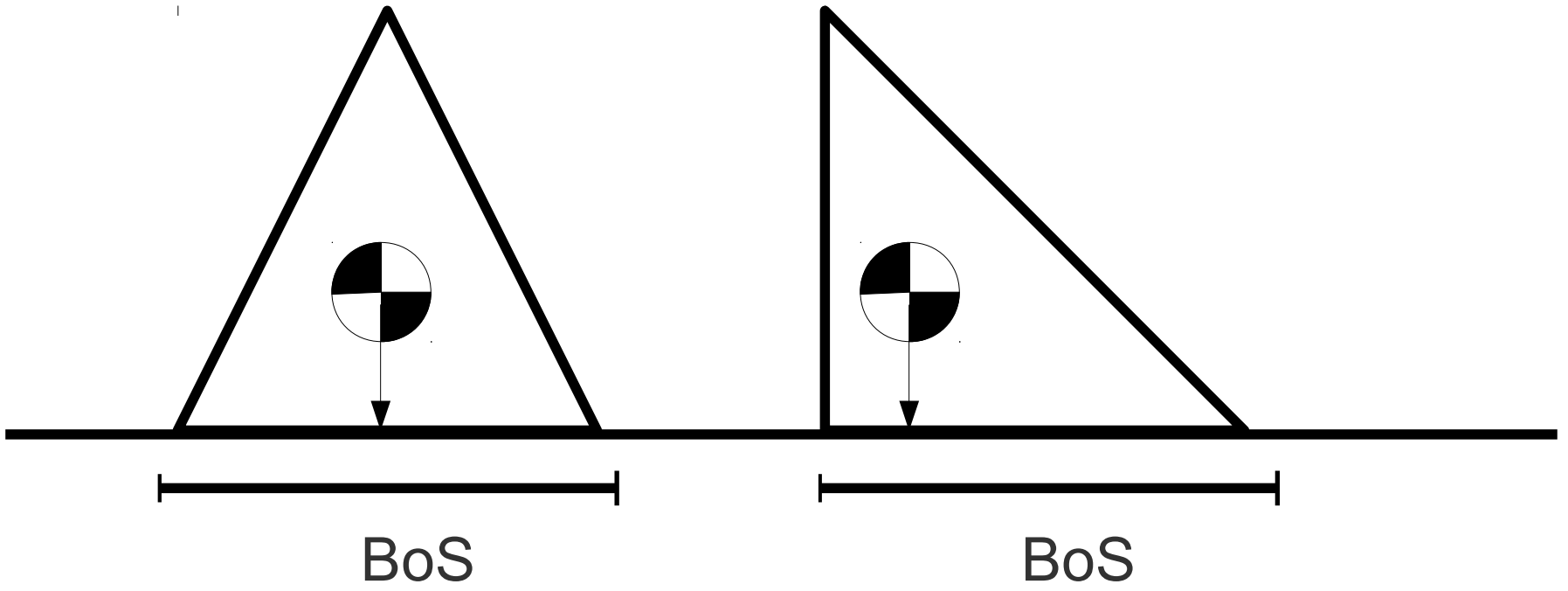


B

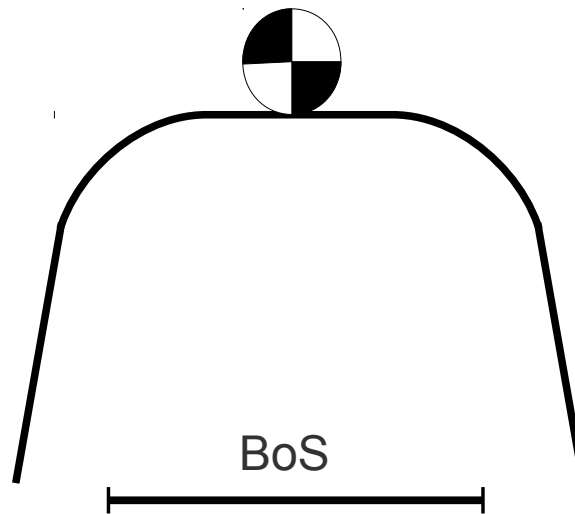
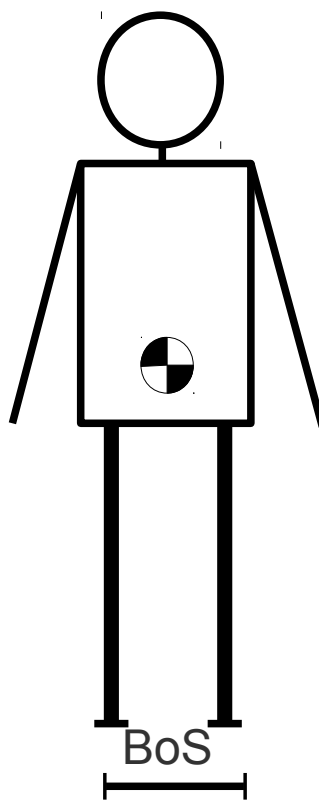


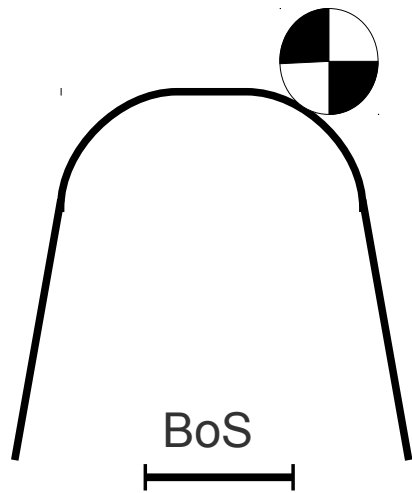
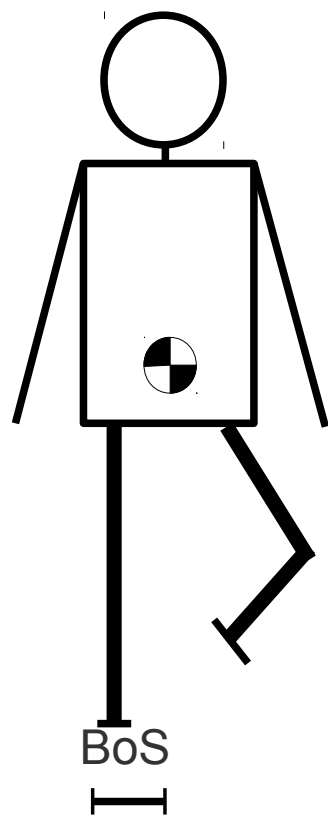
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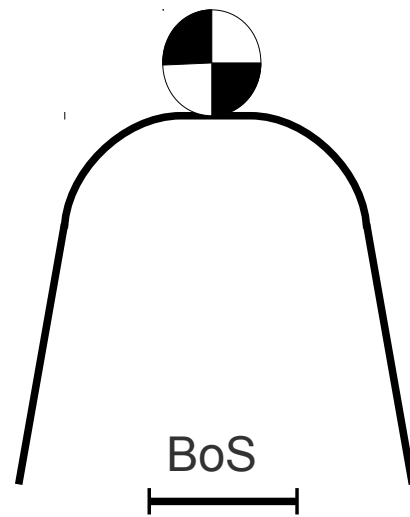
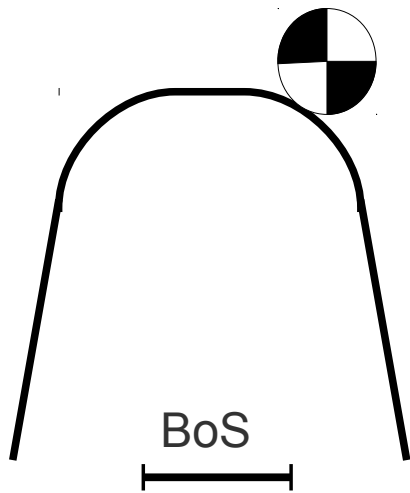
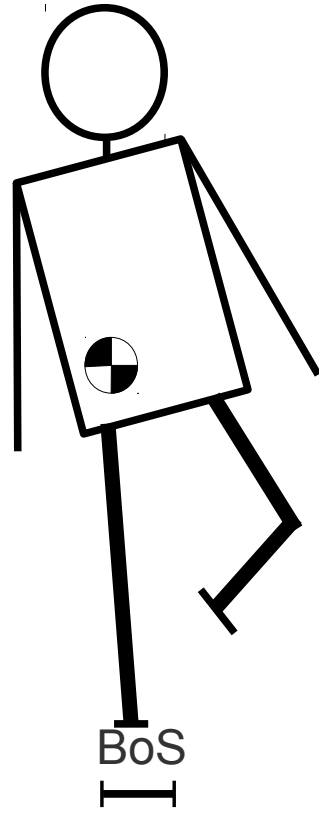
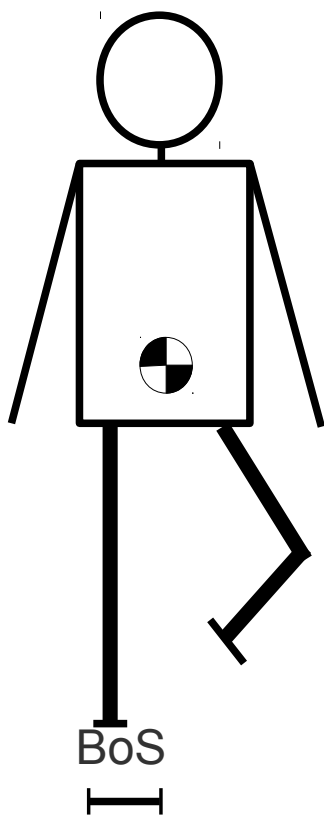
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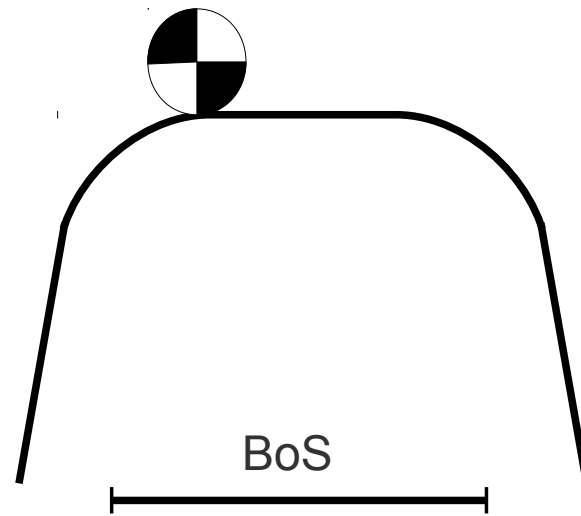
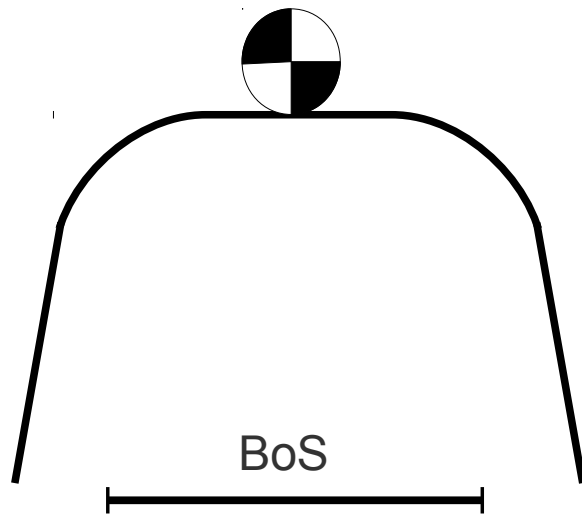
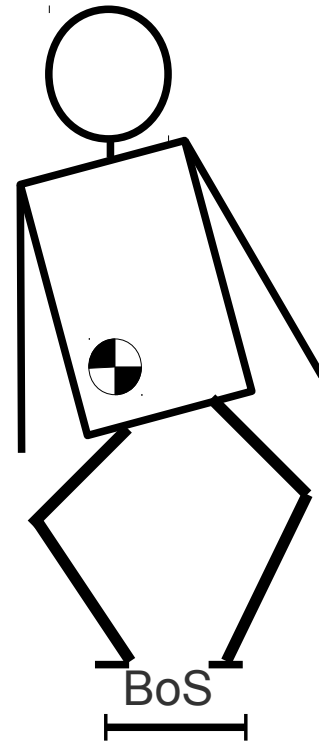
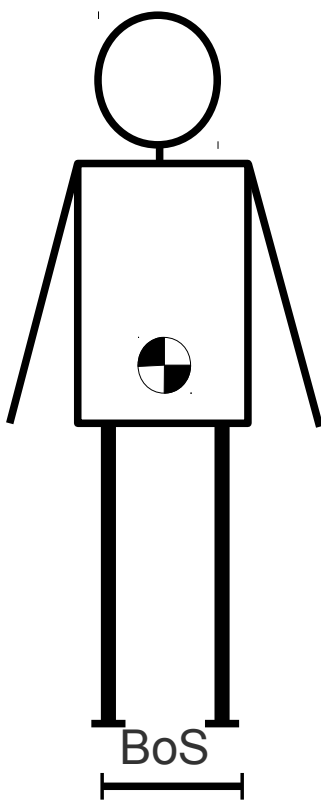


Ball on top of a hill...



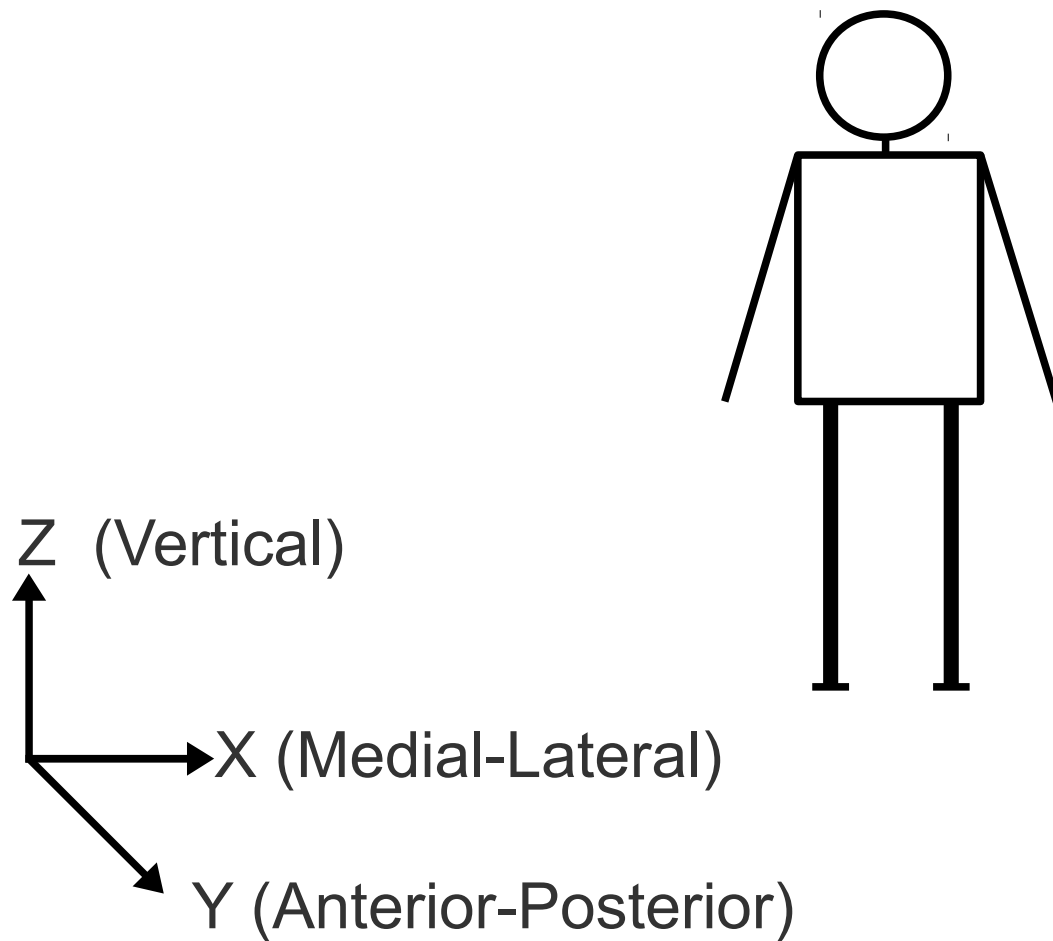






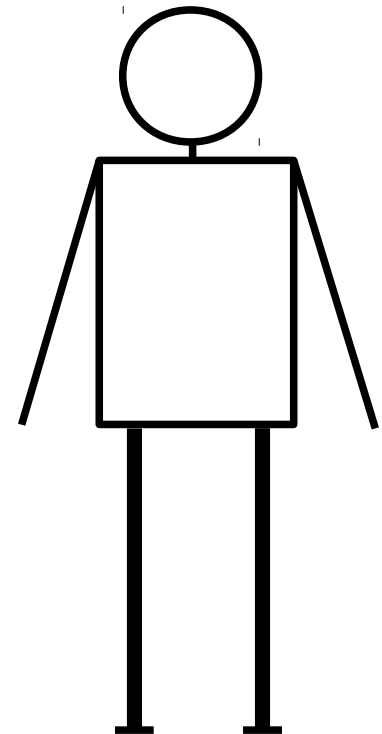
If someone was going to push you, how would you stand?

Some vocabulary



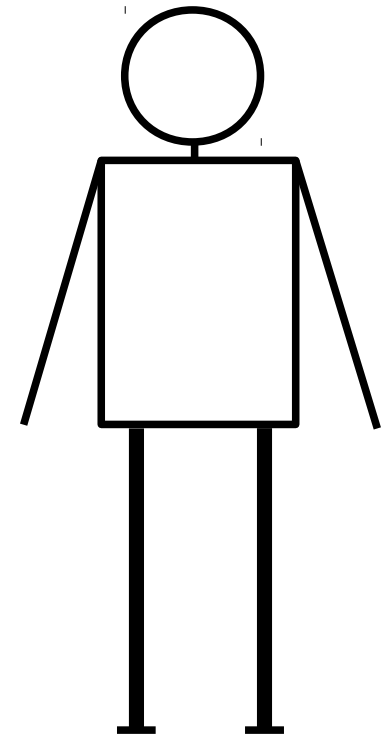
How do I not fall down?

- CoM within BoS
- CoM aligned with CoP



What makes me stable?

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



Leverage

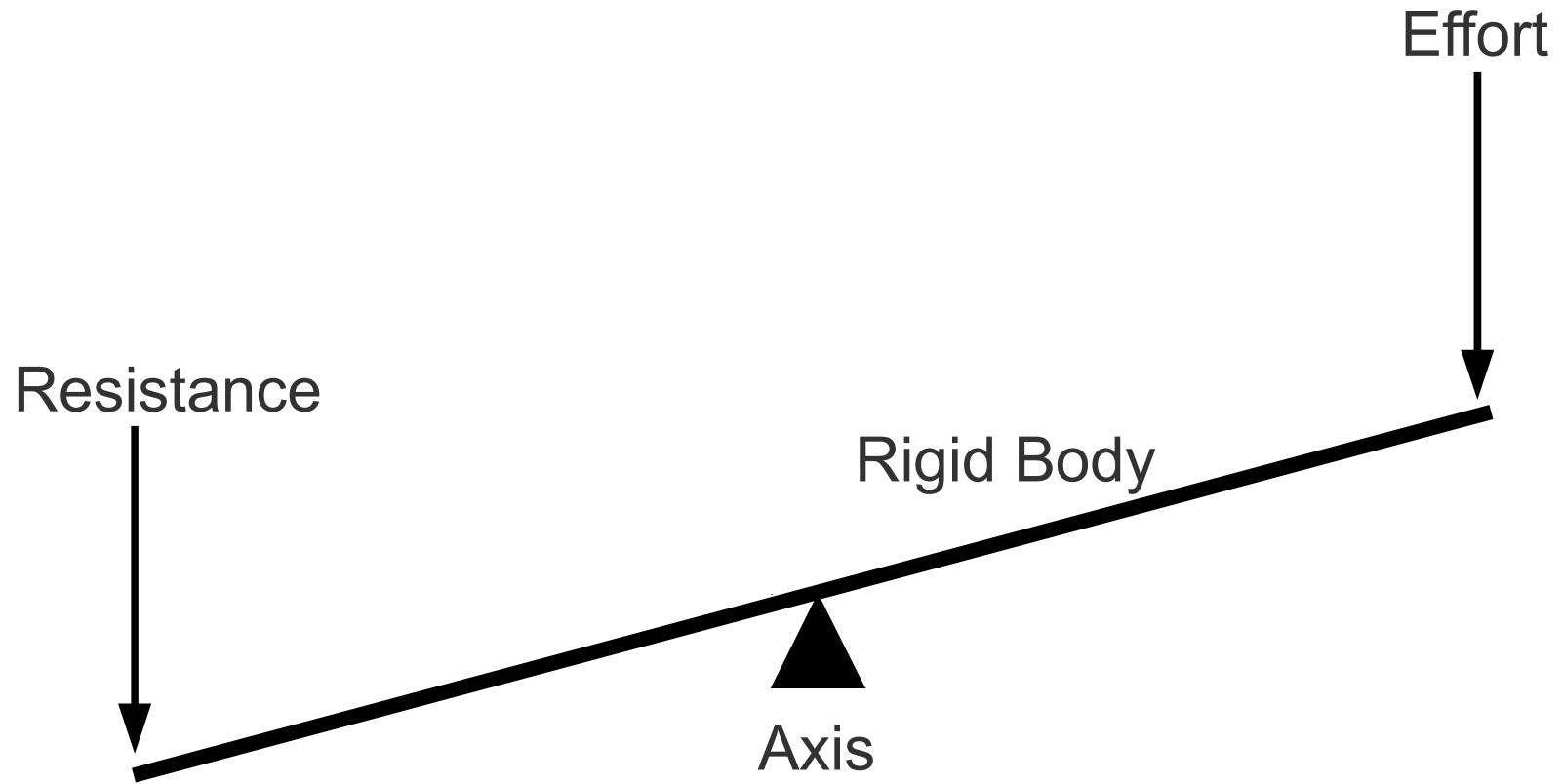
Leverage

Advantage for accomplishing a purpose*

Increased power or influence of action*

The mechanical advantage gained by use of a lever*

Components of a Lever



3 Classes of Levers

First-Class:

axis between effort force and resistive force

Second-Class:

resistive force between effort force and axis

Third-Class:

effort force between axis and resistive force