

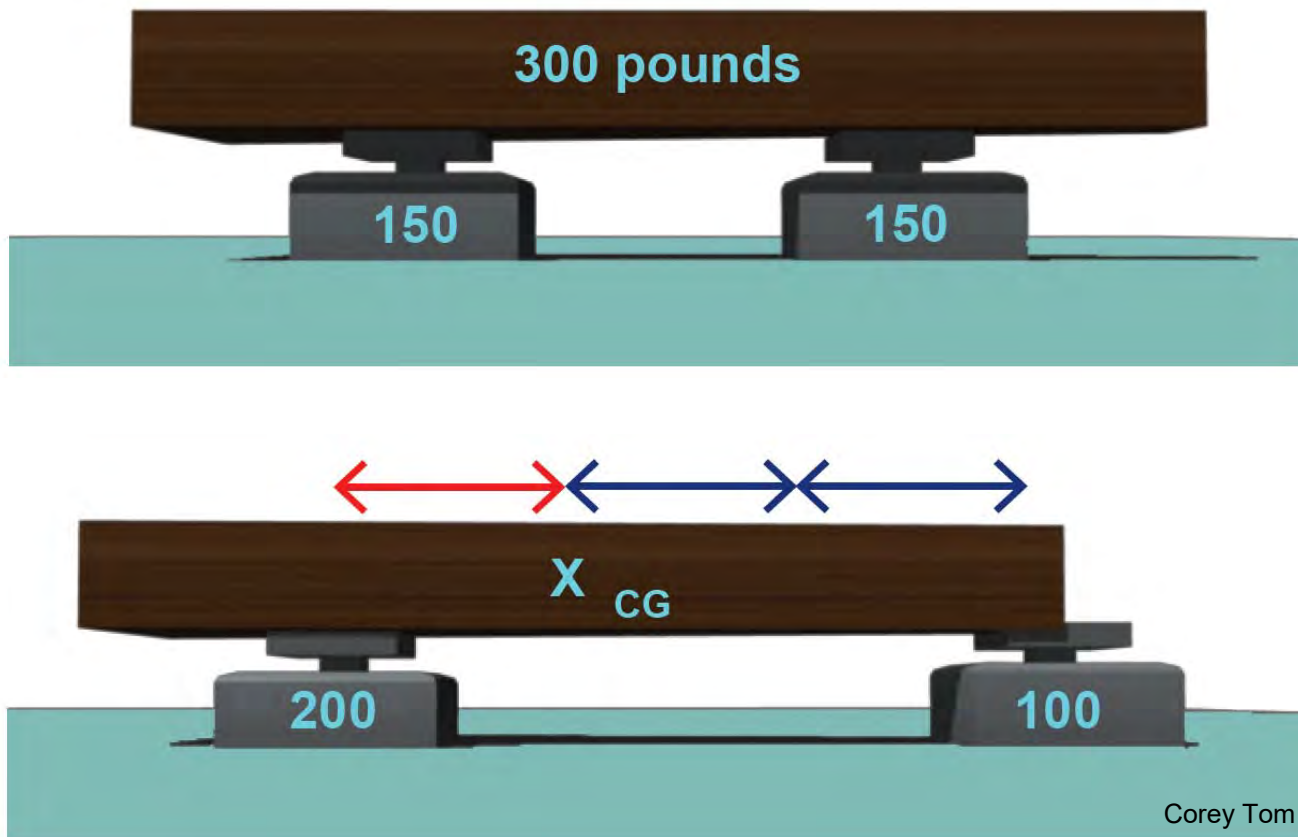
Weight Shift



National Science Foundation
WHERE DISCOVERIES BEGIN

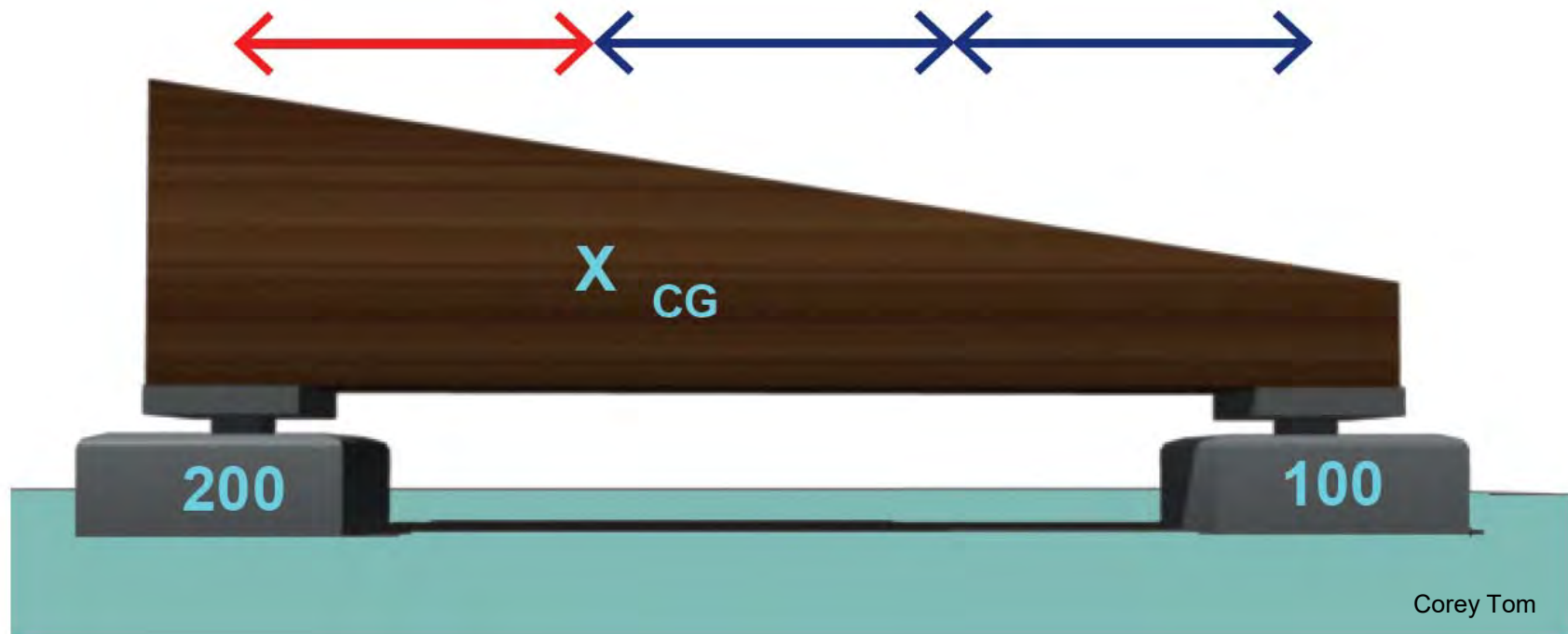
Weight Shift

The scale closest to the Center of Gravity supports a greater amount of weight.



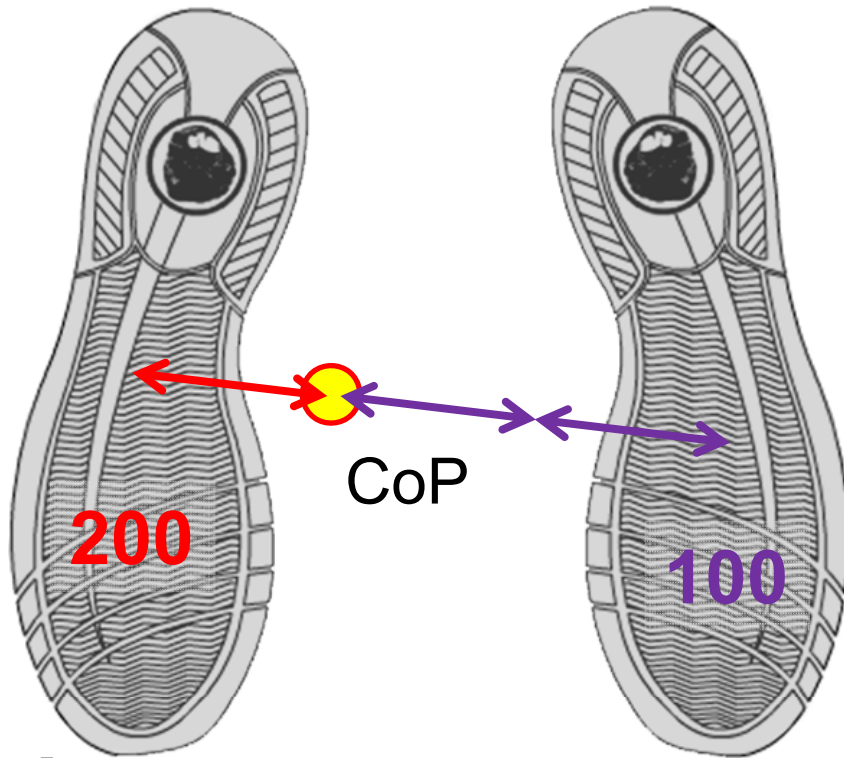
Weight Shift

The scale closest to the CG supports a proportionally greater amount of weight.

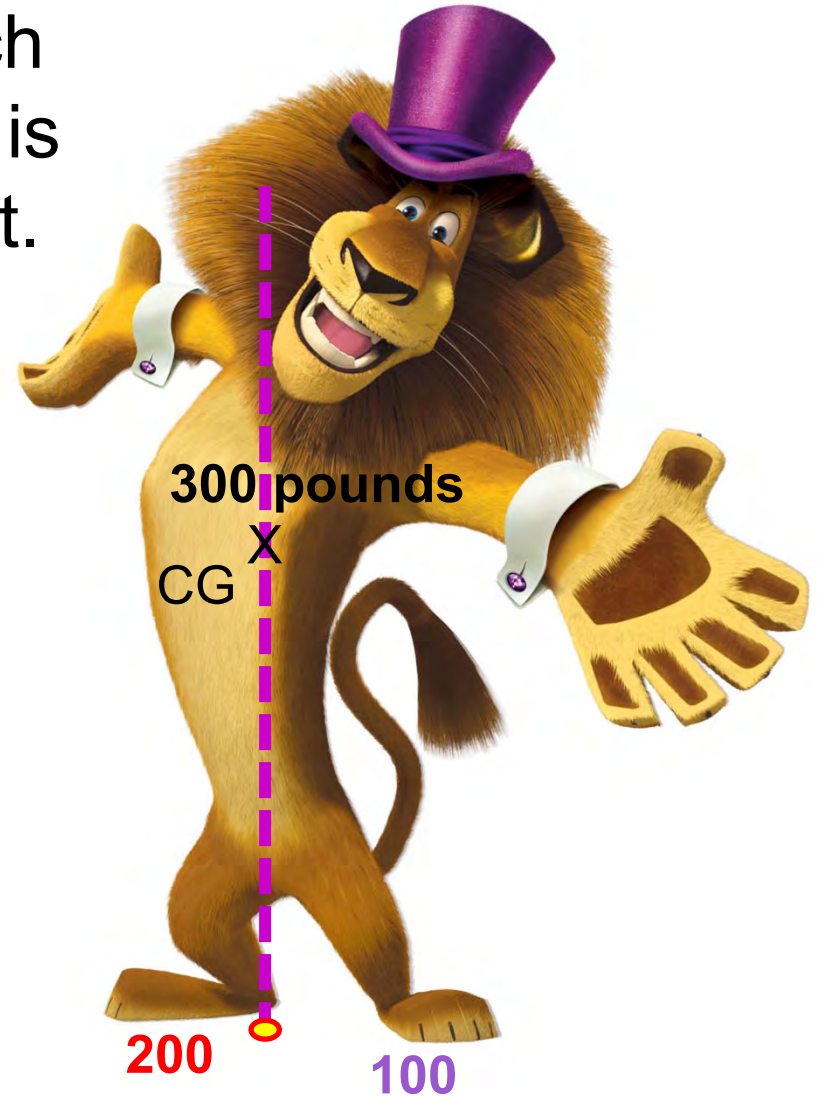


Weight Shift in Characters

Alex the Lion is leaning such that his Center of Pressure is closer to the screen-left foot.

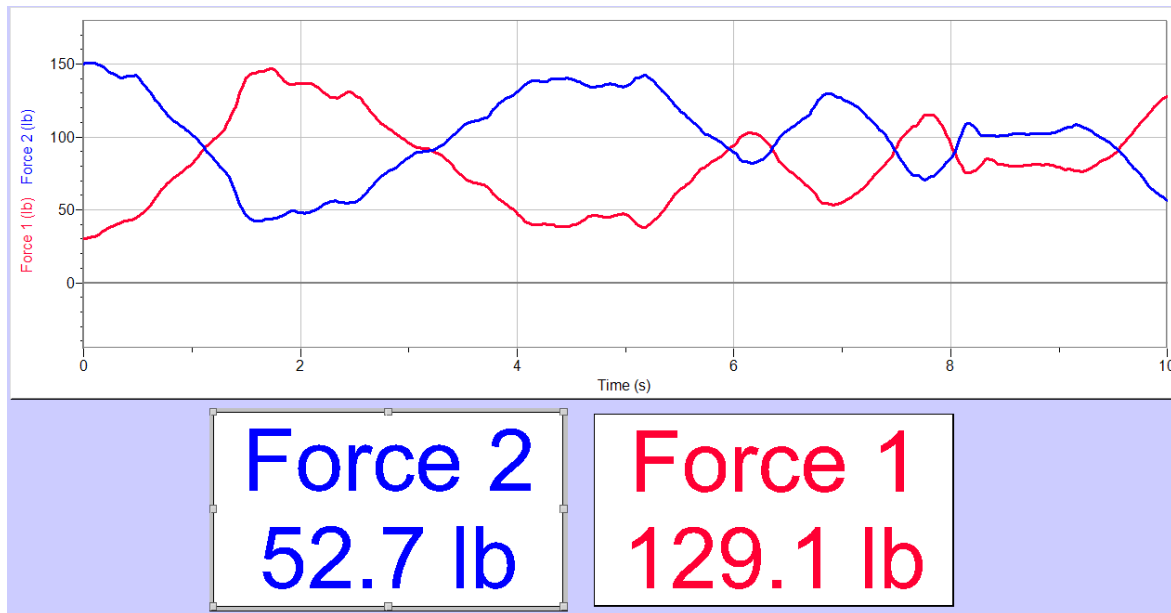


Corey Tom



Weight Shift on Force Plates

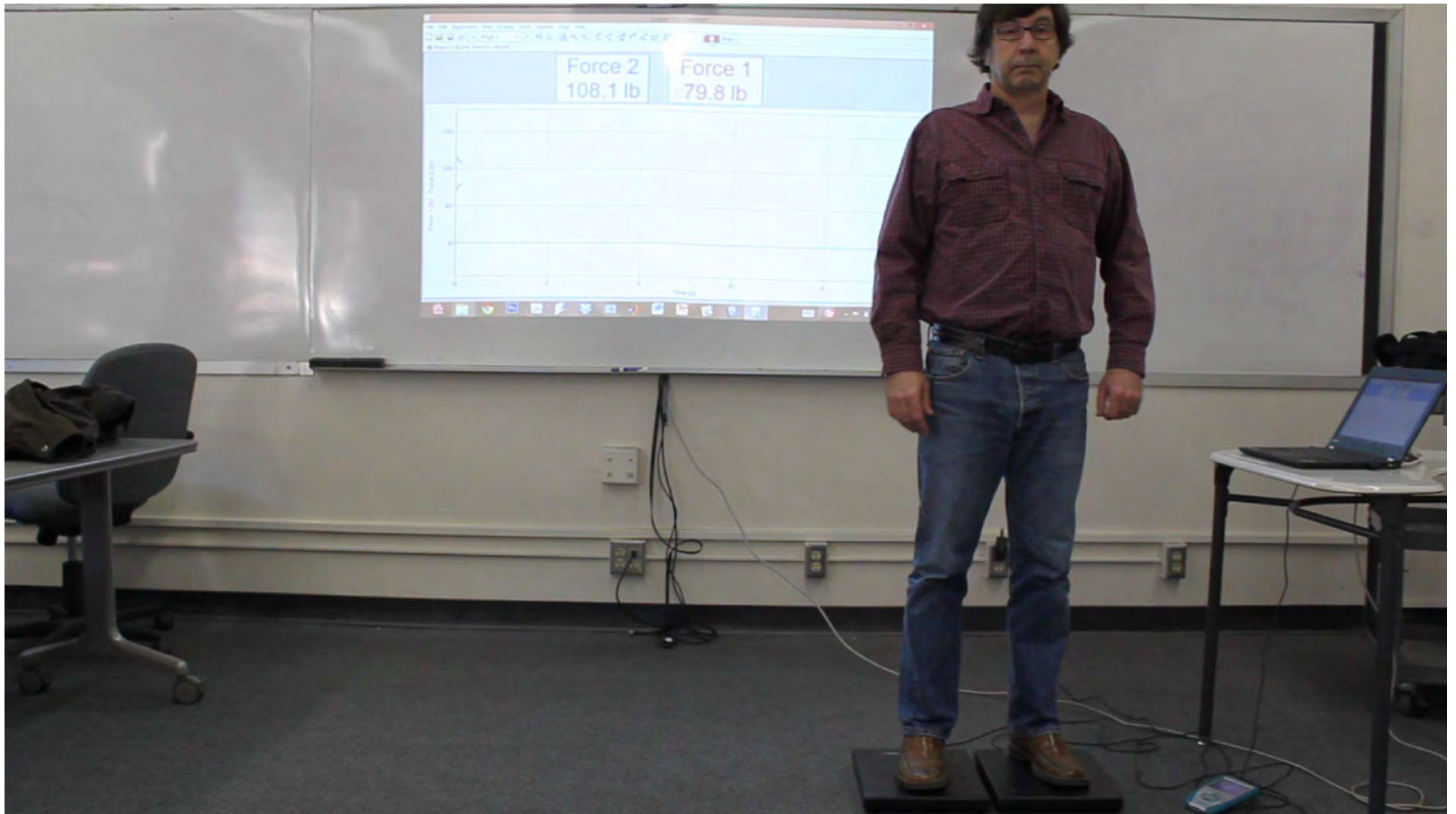
Force plates are essentially digital bathroom scales that can be connected to a computer for collecting data.



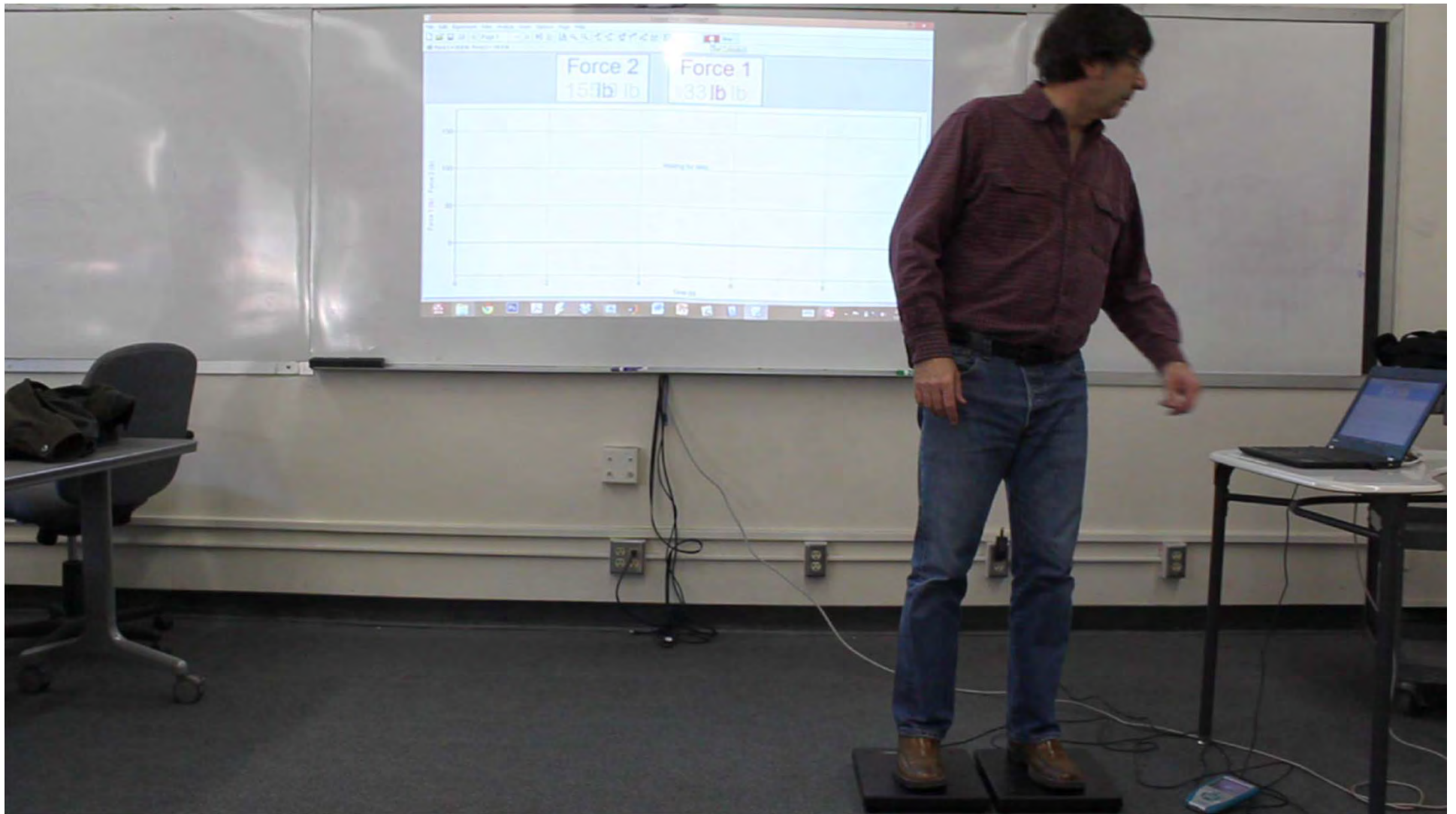
Variation in weight is surprisingly large.



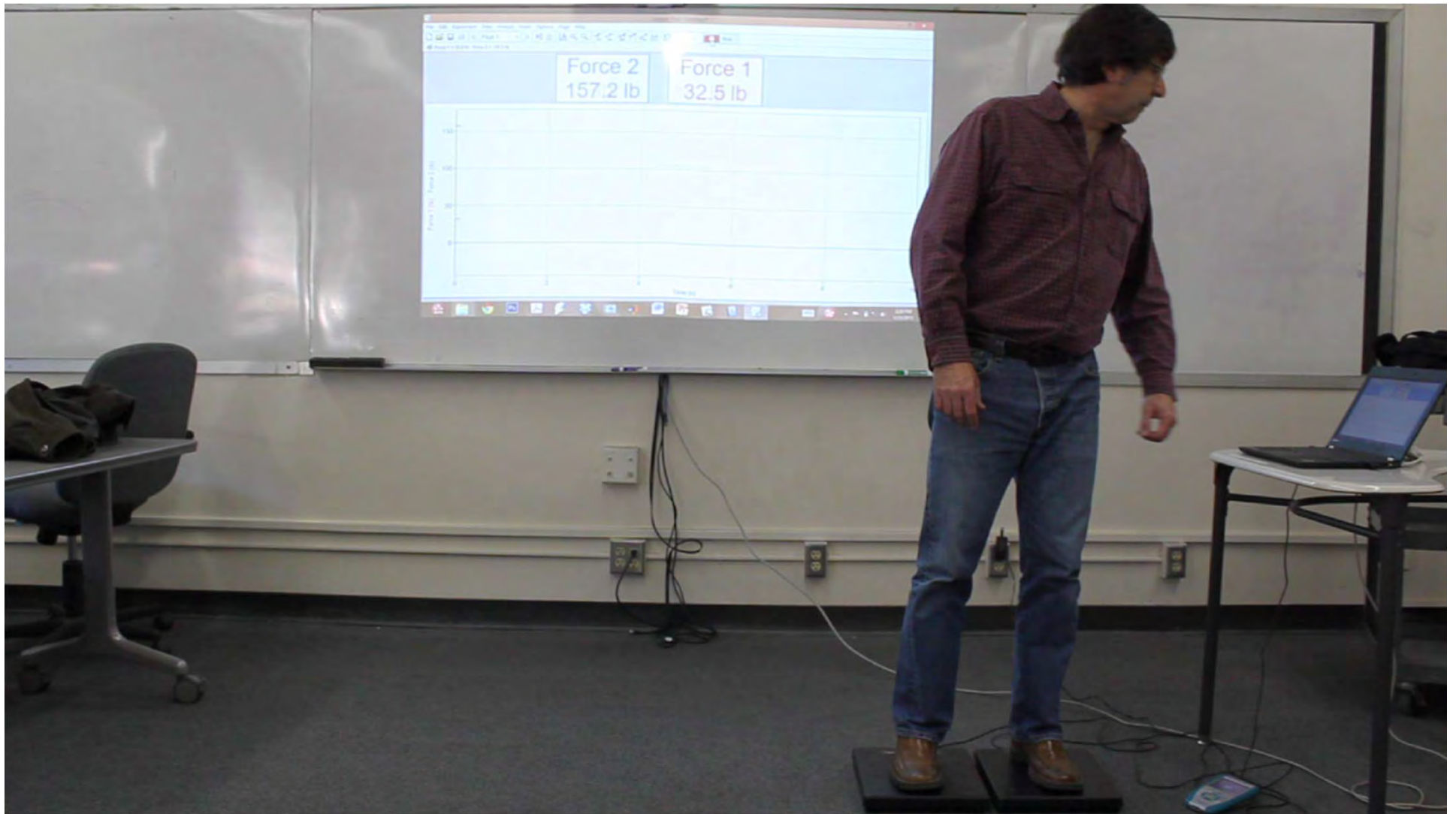
Weigh Shift on Force Plates



Weigh Shift on Force Plates

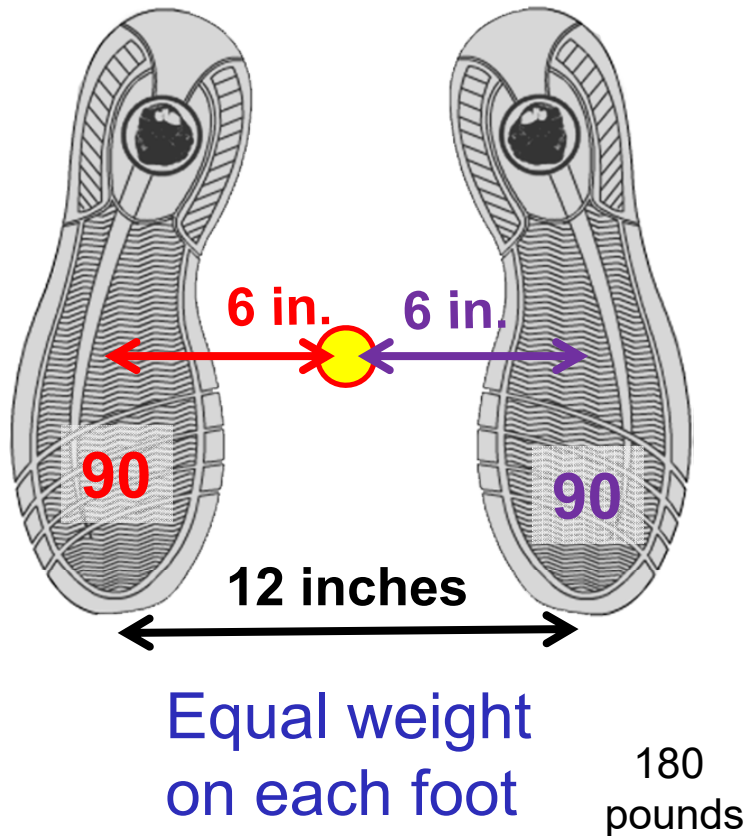


Weigh Shift on Force Plates



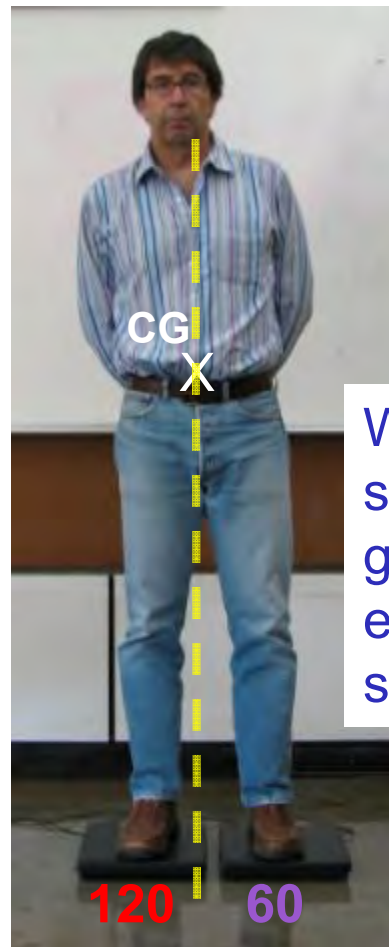
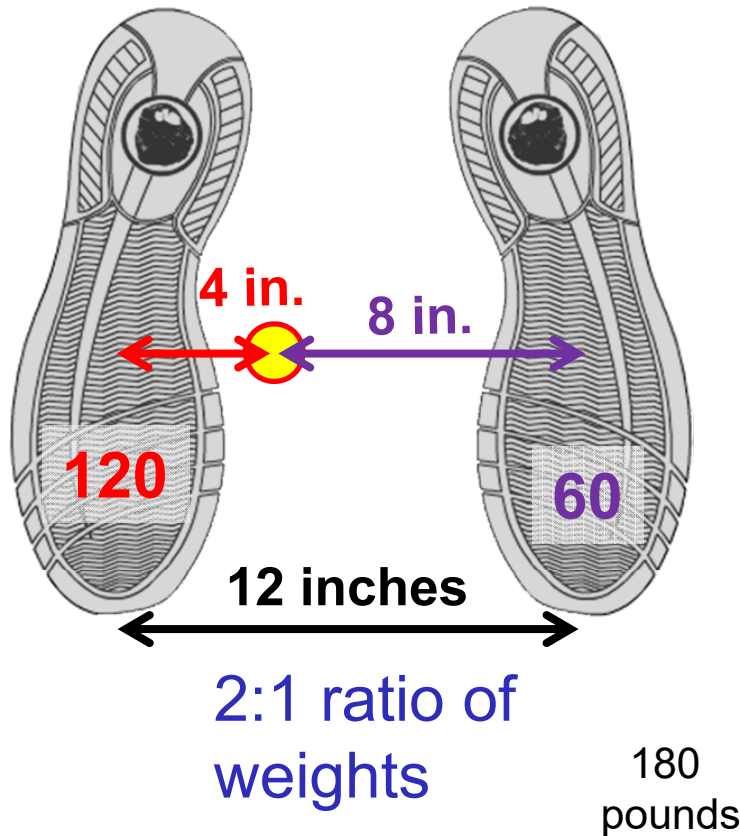
Weight Shift Measurements

Weight shift only requires a small shift in the location of the center of gravity.



Weight Shift Measurements

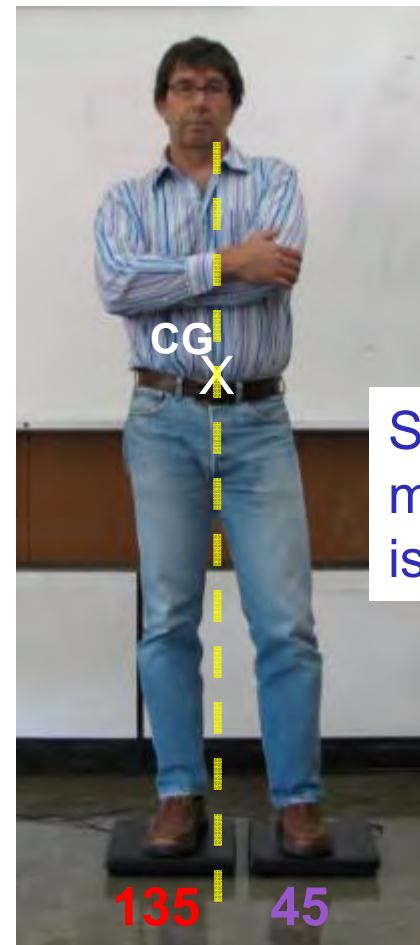
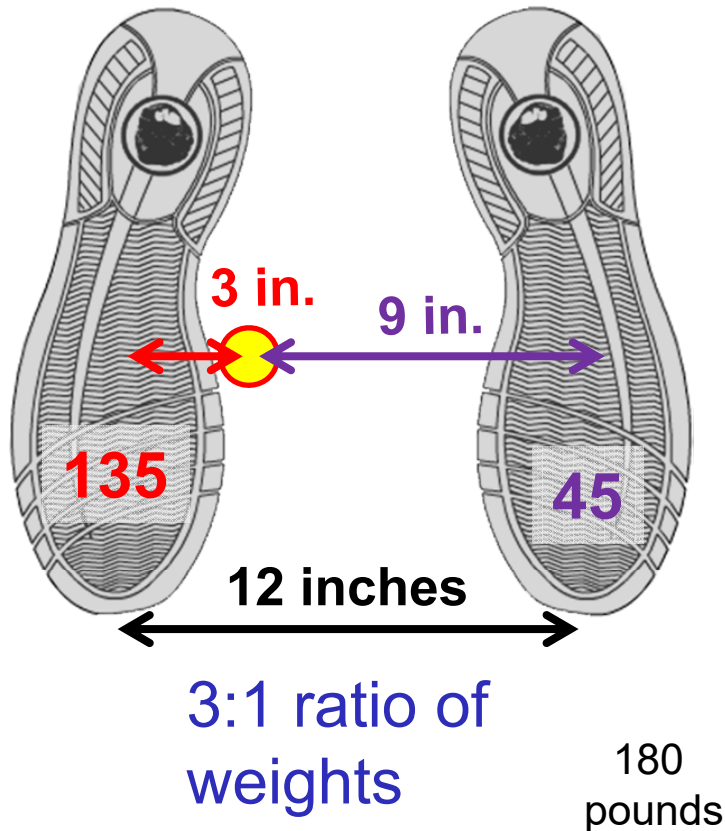
Weight shift only requires a small shift in the location of the center of gravity



With just a two inch shift of the center of gravity the weight on each foot changes significantly.

Weight Shift Measurements

Weight shift only requires a small shift in the location of the center of gravity

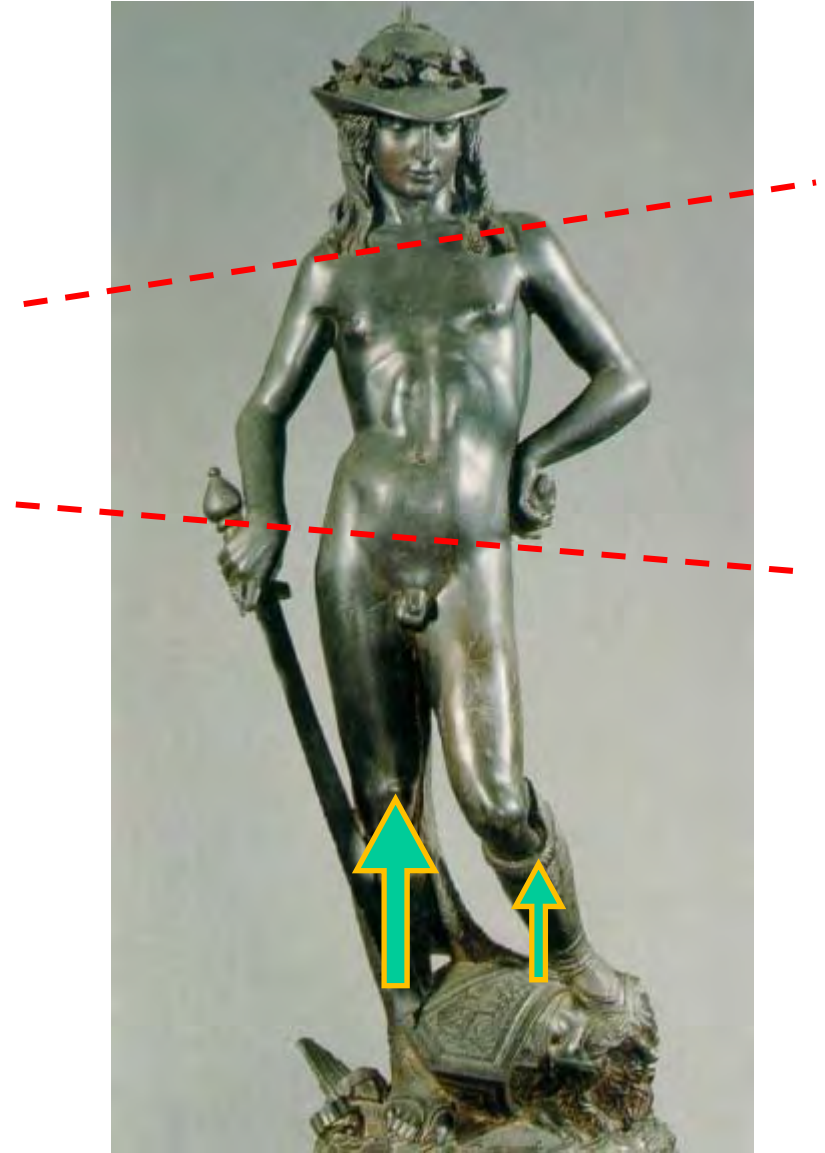


Shift the CG just one more inch and the ratio is now 3-to-1.

Contrapposto

Notice the angles of the hips and shoulders and how they converge on the side that bears most of the weight.

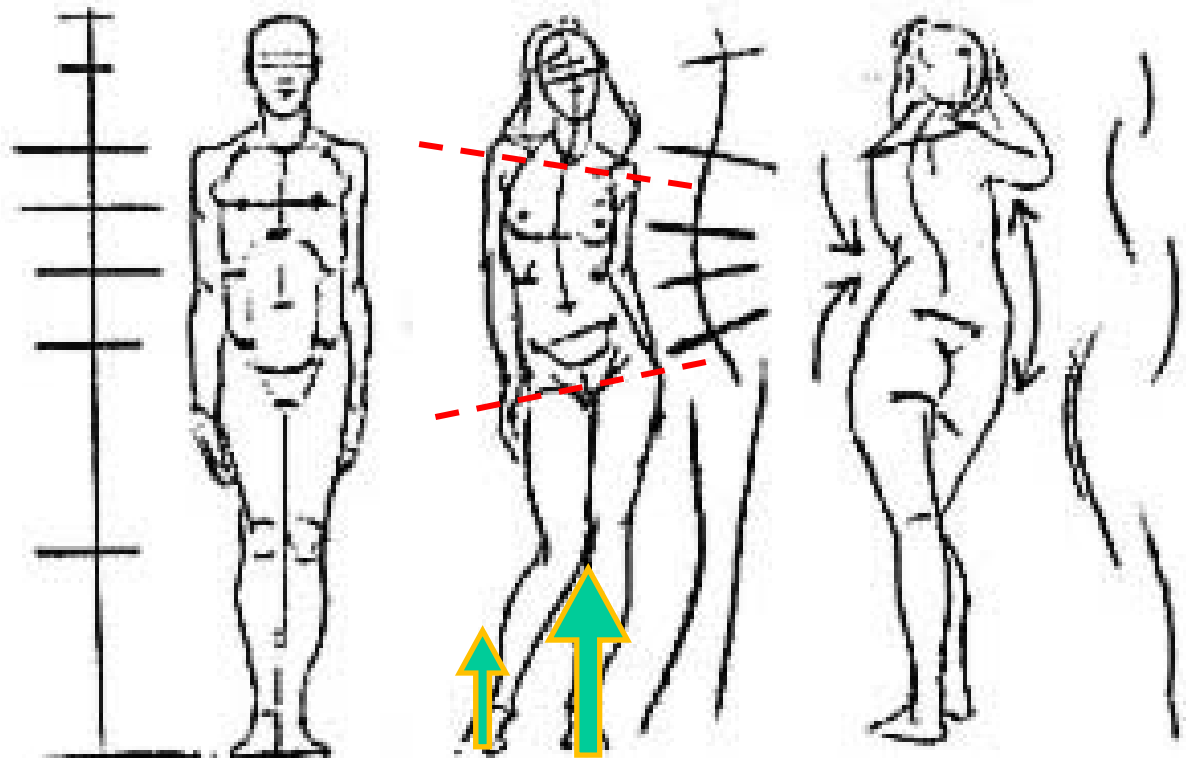
Weight shifts from foot to foot are reflected by corresponding shifts in the hips and shoulders.



Donatello's bronze statue of David (circa 1440s)

Glenn Vilppu on Weight Shift

“By simply shifting the weight to one leg, we automatically create a curve in the torso, as we generally shift the rest of the torso to compensate. This shifting doesn't stop there, but extends to the neck and head, going up, which tends to move in the opposite direction again.”



Weight Shift in Animation

Missing or incorrect weight shift is one of the most common errors in the work of student animators.

Even when only the upper body is in frame, as in this shot, a good animator will think about what the lower body is doing because weight shift is reflected in the entire pose.



Summary

- Weight will shift to one side when the Center of Gravity shifts to that side.
- Shifting the Center of Gravity by just a few inches can result in a large weight shift.
- Weight shift affects a character's pose.
- In a contrapposto pose the hip is raised on the weight-bearing side while the shoulder drops on that side.