

Center of Gravity

1. Qualitatively, what and where is the center of gravity?
2. Why do we care?
3. Quantitatively, what and where is the center of gravity?

What and where is the COG?



Why do we care?



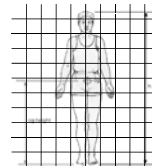
Quantify a Segmental Center of Gravity

$$com_x = X_{prox} + L\%(X_{dist} - X_{prox})$$

$$com_y = Y_{prox} + L\%(Y_{dist} - Y_{prox})$$

The x and y coordinates for the shoulder of a female tennis player are <1.0,1.6>. The x and y coordinates for the elbow are <1.0, 1.8>. What is the location of the center of gravity of the upper arm?

Segment Mass Percents:			Segment Length Percents (from proximal):		
Segment	Males	Females	Segment	Males	Females
Head & Neck	8.96	8.20	Head & Neck	55.0	55.0
Trunk	46.84	45.00	Trunk*	50.0*	50.0*
Upper Arm	3.25	2.90	Upper Arm	43.6	45.8
Forearm	1.87	1.57	Forearm	43.0	43.4
Hand	0.65	0.50	Hand	46.8	46.8
Thigh	10.50	11.75	Thigh	43.3	42.8
Shank	4.75	5.35	Shank	43.4	41.9
Foot	1.43	1.33	Foot	50.0	50.0



Quantify Whole-body Center of Gravity

$$\Sigma(w \times r) = (\Sigma W) \times r_{cog}$$

[chapter05_files/wholebodycom.xls](#)

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