

c) How strong would the breeze have to be knock to gymnast of balance, causing her right hand to lift off the ground?

Step 1: Write the moments about the left hand, making sure to include the contribution of the left leg due to its abduction angle and to disregard the right hand's contribution by setting $F_R = 0$.

$$\sum M_L = (m_{torso} \cdot g \cdot l_{clav}) - (m_{leg} \cdot g(l_{knee} \sin(45))) + (m_{leg} \cdot g(l_{clav} + l_{hip})) - \frac{1}{2} F_{breeze} \cdot (l_{arm} + l_{torso} + l_{leg})^2 = 0$$

Step 1: Then solve for F_{breeze} .

$$F_{breeze} = \frac{[(m_{torso} \cdot g \cdot l_{clav}) - (m_{leg} \cdot g(l_{knee} \sin(45))) + (m_{leg} \cdot g(l_{clav} + l_{hip}))]}{\frac{1}{2}(l_{arm} + l_{torso} + l_{leg})^2}$$

With $g = 10 \text{ m/s}^2$,

$$\gg F_{breeze} = 27.32 \text{ N/m}$$

With $g = 9.8 \text{ m/s}^2$,

$$\gg F_{breeze} = 26.77 \text{ N/m}$$