

18. (a) All forces are vertical and all distances are measured along an axis inclined at 30° . Thus, any trigonometric factor cancels out and the application of torques about the contact point (referred to in the problem) leads to

$$F_{\text{triceps}} = \frac{(15 \text{ kg}) (9.8 \text{ m/s}^2) (35 \text{ cm}) - (2.0 \text{ kg}) (9.8 \text{ m/s}^2) (15 \text{ cm})}{2.5 \text{ cm}} = 1.9 \times 10^3 \text{ N} .$$

- (b) Equilibrium of forces (with upwards positive) leads to

$$F_{\text{triceps}} + F_{\text{humer}} + (15 \text{ kg}) (9.8 \text{ m/s}^2) - (2.0 \text{ kg}) (9.8 \text{ m/s}^2) = 0$$

and thus to $F_{\text{humer}} = -1.9 \times 10^3 \text{ N}$, with the minus sign implying that it points downward.