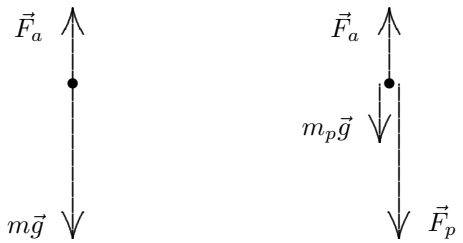
35. We take the down to be the $+y$ direction.

(a) The first diagram (below) is the free-body diagram for the person and parachute, considered as a single object with a mass of $80\,\text{kg} + 5\,\text{kg} = 85\,\text{kg}$. $\vec{F}_a$ is the force of the air on the parachute and $m\vec{g}$ is the force of gravity. Application of Newton's second law produces $mg - F_a = ma$, where a is the acceleration. Solving for F_a we find

$$F_a = m(g - a) = (85\,\text{kg})(9.8\,\text{m/s}^2 - 2.5\,\text{m/s}^2) = 620\ \text{N} .$$



(b) The second diagram (above) is the free-body diagram for the parachute alone. $\vec{F}_a$ is the force of the air, $m_p\vec{g}$ is the force of gravity, and $\vec{F}_p$ is the force of the person. Now, Newton's second law leads to $m_p g + F_p - F_a = m_p a$. Solving for F_p, we obtain

$$F_p = m_p(a - g) + F_a = (5.0)(2.5 - 9.8) + 620 = 580\ \text{N} .$$