27. We choose up as the $+y$ direction, so $\vec{a} = -3.00 \text{ m/s}^2\,\hat{\text{j}}$ (which, without the unit-vector, we denote as a since this is a 1-dimensional problem in which Table 2-1 applies). From Eq. 5-12, we obtain the firefighter's mass: $m = W/g = 72.7$ kg.

(a) We denote the force exerted by the pole on the firefighter $\vec{F}_{\text{f p}} = F\,\hat{\text{j}}$ and apply Eq. 5-1 (using SI units).

$$\begin{aligned} \vec{F}_{\text{net}} &= m\vec{a} \\ F - F_g &= ma \\ F - 712 &= (72.7)(-3.00) \end{aligned}$$

which yields $F = 494$ N. The fact that the result is positive means $\vec{F}_{\text{f p}}$ points up.

(b) Newton's third law indicates $\vec{F}_{\text{f p}} = -\vec{F}_{\text{p f}}$, which leads to the conclusion that $\vec{F}_{\text{p f}} = 494$ N down.