

2.23. Solve: The formula for the particle's velocity is given by

$$v_f = v_i + \text{area under the acceleration curve between } t_i \text{ and } t_f$$

For $t = 4$ s, we get

$$v_{4\text{ s}} = 8 \text{ m/s} + \frac{1}{2}(4 \text{ m/s}^2)4 \text{ s} = 16 \text{ m/s}$$

Assess: The acceleration is positive but decreases as a function of time. The initial velocity of 8.0 m/s will therefore increase. A value of 16 m/s is reasonable.