45. (a) Estimating the initial speed from the slope of the graph near the origin is somewhat difficult, and it may be simpler to determine it from the constant-acceleration equations from chapter 2: $v = v_0 + at$ and $x = v_0 + \frac{1}{2}at^2$, where $x_0 = 0$ has been used. Applying these to the last point on the graph (where the slope is apparently zero) or applying just the x equation to any two points on the graph, leads to a pair of simultaneous equations from which $a = -2$ m/s^2 and $v_0 = 10$ m/s can be found. Then,

$$K_0 = \frac{1}{2}mv_0^2 = 2.5 \times 10^3 \text{ J} = 2.5 \text{ kJ} .$$

(b) The speed at $t = 3.0$ s is obtained by

$$v = v_0 + at = 10 + (-2)(3) = 4 \text{ m/s}$$

or by estimating the slope from the graph (not recommended). Then the work-kinetic energy theorem yields

$$W = \Delta K = \frac{1}{2}(50 \text{ kg})(4 \text{ m/s})^2 - 2.5 \times 10^3 \text{ J} = -2.1 \text{ kJ} .$$