A 2kg mass falls 30 m, starting from rest. What is its KE at the end of the fall?

a) 20 J
b) 60 J
c) 300 J
d) 600 J
e) None of the above.
The correct answer is: d) 600 J; as follows

- The easy way: Conservation of M.E.
  \[ ME = PE + KE = \text{Constant} = ME_i = ME_f \]
  \[ ME_i = 0 + mgh_i = 2 \times 10 \times 30 = 600J \]
  \[ = ME_f = KE_f + 0 \text{ (since } PE_f = mgh_f = 0) \]
- i.e., \( KE_f = 600 \text{ J} \).
- The hard way: \( v_f = g \cdot t_f, \) & \( h = g \cdot t_f^2/2 \) yield
  \[ v_f = g \cdot (2h/g)^{1/2} = (2g^*h)^{1/2}, \text{ so that} \]
  \[ KE_f = (1/2)m^*v_f^2 = (1/2)m^* \{(2g^*h)^{1/2}\}^2 \]
  \[ = m^*g^*h = 2 \times 10 \times 30 = 600 \text{ kg}^*m^2/s^2 = 600 \text{ J}. \]