

Practice Problems - Kinetic Energy Section

Wednesday, January 31, 2018 2:32 PM

⑮ a) $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(0.045 \text{ kg})(20 \text{ m/s})^2 = \boxed{9.0 \text{ J}}$
 b) $E_k = \frac{1}{2}(0.045)(40)^2 = \boxed{36 \text{ J}}$
 c) $E_k = \frac{1}{2}(0.045)(60)^2 = \boxed{181 \text{ J}}$

$\swarrow 2 \times v \Rightarrow 4 \times E_k!$
 $\swarrow 3 \times v \Rightarrow 9 \times E_k!$

⑯ a) $E_k = \frac{1}{2}mv^2 \therefore v = \sqrt{\frac{2E_k}{m}} = \sqrt{\frac{2 \times 2000}{1000}} = \boxed{2.0 \text{ m/s}}$
 b) $v = \sqrt{\frac{2E_k}{m}} = \sqrt{\frac{2 \times 200,000}{1000}} = \boxed{20 \text{ m/s}}$
 c) $v = \sqrt{\frac{2 \times 3.6 \times 10^6 \text{ J}}{1000 \text{ kg}}} = \boxed{84.9 \text{ m/s}}$

⑰ a) $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(50+10)(5)^2 = \boxed{750 \text{ J}}$
 b) $E_k = \frac{1}{2}(60)(10)^2 = \boxed{3000 \text{ J}}$
 c) $W = \Delta E_k = 3000 \text{ J} - 750 \text{ J} = \boxed{2250 \text{ J}}$
 d) LESS WORK: $\Delta E_k (0 \rightarrow 5) = 750 \text{ J}$
 $\Delta E_k (5 \rightarrow 10) = 2250 \text{ J}$

⑱ $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(4.00)(10.0)^2 = \boxed{200 \text{ J}}$

⑲ $E_k = \frac{1}{2}(8.0)(4.0)^2 = \boxed{64 \text{ J}}$

⑳ $E_k = \frac{1}{2}mv^2, m = \frac{2E_k}{v^2} = \frac{2(18 \text{ J})}{(3.0)^2} = \boxed{4.0 \text{ kg}}$

㉑ $v = \sqrt{\frac{2E_k}{m}} = \sqrt{\frac{2(8.0)}{4.0}} = \boxed{2.0 \text{ m/s}}$

$$\textcircled{21} \quad v = \sqrt{\frac{2E_k}{m}} = \sqrt{\frac{2(8.0)}{4.0}} = \boxed{2.0 \text{ m/s}}$$

$$\textcircled{22} \quad \text{a) } E_k = \frac{1}{2}(6.0)(4.0)^2 = \boxed{48 \text{ J}}$$

$$\text{b) } E_k = \frac{1}{2}(6.0)(2.0)^2 = \boxed{12 \text{ J}}$$

$$\text{c) } E_k = \frac{1}{2}(6.0)(2.0)^2 = \boxed{12 \text{ J}}$$

$$\text{d) } 12 - 48 = \boxed{-36 \text{ J}} \text{ or } +36 \text{ J}$$

$$\text{e) } 12 - 0 = \boxed{+12 \text{ J}}$$

f) It is "lost" as heat energy

$$\textcircled{23} \quad \text{a) } E_{k_{\text{total}}} = E_{k_{3\text{kg}}} + E_{k_{1\text{kg}}} = 0 + \frac{1}{2}(1.0)(4.0)^2 = \boxed{8.0 \text{ J}}$$

$$\text{b) } E_k = \frac{1}{2}(3)(2)^2 + \frac{1}{2}(1)(2.0)^2 = 6.0 \text{ J} + 2.0 \text{ J} \\ = \boxed{8.0 \text{ J}}$$

$$\text{c) } 6.0 \text{ J}$$