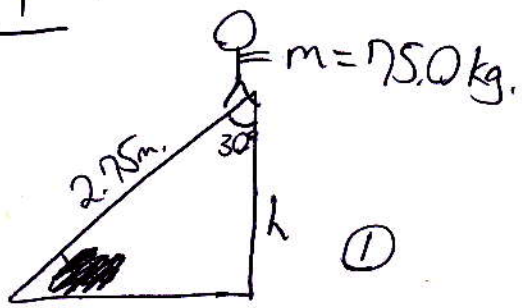
HW #4

Ch.6 #5



a) $W = F \cdot d$ (2)

$= mg\cos\theta \cdot 2.75$

$= 75(9.8)\cos 30 \cdot 2.75$

$= -1750$ J

b) No. (1)

Ch.6 #20

a) $W = \Delta KE = KE_f - KE_0 = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_0^2$

$= \frac{1}{2}m\left(\frac{1}{4}v_0\right)^2 - \frac{1}{2}mv_0^2$

$= \frac{1}{32}mv_0^2 - \frac{1}{2}mv_0^2$

$= \frac{1}{16}\left(\frac{1}{2}mv_0^2\right) - \frac{1}{2}mv_0^2$

$= \frac{1}{16}KE_0 - KE_0$

$\boxed{W = -\frac{15}{16}KE_0}$ (3)

b) No (2)

Ch. 6 #49

$m = 30\ kg \quad h = 0.90\ m.$

a) $0.50\ hp \cdot \frac{746\ W}{1\ hp} = 373\ W = 373\ J/s$

Energy per crate $= mgh = 30(9.8)(0.9) = 264.6\ J/crate$

$\frac{373\ J/s}{264.6\ J/crate} = \boxed{1.41\ crates/s} \cdot 60 = \boxed{84.6\ \frac{crates}{min}}$ (3)

b) $100\ W = 100\ J/s$

$\frac{100\ J/s}{264.6\ J/crate} = 0.38\ \frac{crates}{s} \cdot 60 = \boxed{22.7\ \frac{crates}{min}}$ (2)

Ch. 6 #73

$m = 80\ kg \qquad h = 5.20\ m.$

$v_0 = 5.00\ m/s$

$v_f = 1.50\ m/s$

a) $KE_0 = \frac{1}{2}mv_0^2 = \frac{1}{2}(80)(5)^2 = 1000\ J \qquad KE_f = \frac{1}{2}mv_f^2 = \frac{1}{2}(80)(1.5)^2 = 90\ J$

$E_f = PE + KE = mgh + \frac{1}{2}mv_f^2 = 80(9.8)(5.2) + \frac{1}{2}(80)(1.5)^2$ (2)

$= 4,076.8 + 90 = 4166.8\ J \qquad W = \Delta KE = 1000 - 90 = \boxed{910\ J}$

b) $W = \Delta E = E_f - E_0 = 4166.8 - 1000 = \boxed{3166.8\ J}$ (3)

Ch.6 #103

a) 5 km/hr. (walking) 1 km = 12 min.

O^2 consumption $\approx 12 \frac{cm^3}{kg \cdot min.}$

$m = 70$ kg.

$1\ cm^3 \approx 20$ J.

$12 \frac{cm^3}{kg \cdot min} \cdot 12\ min. \cdot \frac{20\ J}{cm^3} \cdot 70\ kg = \boxed{201,600\ J}$ (1)

b) 10 km/hr (running) 1 km = 6 min.

O^2 consumption $\approx 30 \frac{cm^3}{kg \cdot min.}$

$30 \frac{cm^3}{kg \cdot min} \cdot 6\ min. \cdot \frac{20\ J}{cm^3} \cdot 70\ kg = \boxed{252,000\ J}$ (1)

c) 15 km/hr (running) 1 km = 4 min.

O^2 consumption $\approx 45 \frac{cm^3}{kg \cdot min.}$

$45 \frac{cm^3}{kg \cdot min.} \cdot 4\ min. \cdot \frac{20\ J}{cm^3} \cdot 70\ kg = \boxed{252,000\ J}$ (1)

d) Walking is most efficient, uses least energy. (1)

+1 for attempting