1) $W = F \cdot d$ $F = mg$ $m = 0.67\,kg$ $g = 9.81\,m/s^2$ $d = 1.5\,m$

$W = (0.67\,kg)(9.81\,m/s^2)(1.5\,m)$

$W = 9.859\,J$ **$W = 9.8\,J$**

2) $F_f = \mu F_n$ $F_n = mg$ $F_n = 75\,N$ $d = 4.2\,m$ $\mu = 0.40$

$F_f = (0.40)(75\,N)$ $W = F \cdot d$

$F_f = 30\,N$ $W = (30\,N)(4.2\,m)$

$W = 126\,J$

3) $E_p = mgh$ $m = 45\,kg$ $h = 6.0\,m$ $g = 9.81\,m/s^2$

$E_p = (45\,kg)(9.81\,m/s^2)(6.0\,m)$

$E_p = 2648.7$

$E_p = 2600\,J$

4) $W = F \cdot d$ $F = mg$ $m = 750\,kg$ $g = 9.81\,m/s^2$ $d = 8.2\,m$

$W = (750\,kg)(9.81\,m/s^2)(8.2\,m)$

$W = 60331.5\,J$

$W = 60\,000\,J$

5) $P = \frac{W}{t}$ $W = 3000\,J$ $t = 2s$

$P = \frac{3000\,J}{2s} = 1500\,W$ **$P = 1500\,W$**

6) $P = \frac{W}{t}$ $P = 100\,W$ $t = 8.0h \times 3600s = 28800\,s$

$100W = \frac{W}{28800s} = 2880000$ **$P = 2.9 \times 10^6\,J$**

7) Work is not a f(x) of time just mass and gravity (in this case) - the ramp will have no affect on the req'd amt. of work needed

8) $1W = 1\frac{J}{s} \therefore 1J = 1\,W \cdot s$

$1\,kW \cdot h \rightarrow 1000\,W \cdot hr \rightarrow 1000\,W \cdot 3600s$

$3{,}600{,}000\,W \cdot s =$

$3.6 \times 10^6\,J$

9) $E_p + E_k = 1$ $\frac{1}{3}E_k + \frac{2}{3}E_p$

$E_p = 60\,000\,J \times \frac{1}{3} =$ **$20\,000\,J$ of E_k $\frac{1}{3}$ of the way down the hill**

10) $E_k = \frac{1}{2}mv^2$ $m = 0.060\,kg$ $V_A = 10.0\,m/s$ $V_B = 25.0\,m/s$

a) $E_k = \frac{1}{2}(0.060\,kg)(10.0)^2$ b) $E_k = \frac{1}{2}(0.060\,kg)(25.0\,m/s)^2$

a $E_k = 3.0\,J$ **b $E_k = 18.8\,J$**

11) $E_K = \frac{1}{2}mv^2$ $m = 1.0\times10^3$ kg $v = 90\frac{km}{h} \div 3.6 = 25 m/s$

$E_K = \frac{1}{2}(1.0\times10^3 kg)(25 m/s)^2$

$E_K = 312500 J$ **$E_K = 310\,000 J$**

12) $E_K = \frac{1}{2}mv^2$ Example[a] $m = 12 kg$ $v = 2 m/s$ → can use any numbers

a $E_K = \frac{1}{2}(12)(2)^2 = 24 J$ Example[b] $m = 8 kg$ $v = 6 m/s$

b $E_K = \frac{1}{2}(8)(6)^2 = 144 J$

24J vs 144J; 144J is **6x more E_K**

$E_K = \left(\frac{2}{3}\right)(3)^2 = 6$ ← MATH PROOF

13) $E_p = mgh$ $m = 0.275 kg$ $g = 9.81 m/s^2$

a) $h = 2.60$ $E_p = (0.275)(9.81)(2.60)$

a $E_p = 7.00 J$

b) $h = 1.80 m$ $E_p = (0.275)(9.81)(1.80)$

b $E_p = 4.86 J$

c) $h = 0.30 m$ $E_p = (0.275)(9.81)(0.30)$

c $E_p = 0.81 J$

CH 6 - Review Questions

Formulas

$W = F \cdot d$ $J = N \cdot m$

$P = \frac{W}{\Delta t}$ $W = \frac{J}{s}$

$E_k = \frac{1}{2}mv^2$ $J = kg \cdot m^2/s^2$

$E_p = mgh$ $J = kg \cdot m/s^2 \cdot m$

$\Delta E = mc\Delta T$ $J = kg \frac{J}{kg \cdot °C} °C$

Efficiency $= \frac{W_{out}}{W_{in}} \times 100$ or $\frac{P_{out}}{P_{in}} \times 100$ or $\frac{small}{large} \times 100$

$F_f = \mu F_n$ $F_n = F_g = mg$

CH6 - Review Questions
Part 2

14) $\frac{0.76\text{m}}{3.0\text{ m}} =$ 25% return ∴ 75% lost

15) $E_p = mgh$ $m = 1.00\text{ kg}$ $g = 9.81\text{ m/s}$ $h = 0.75\text{m}$

$E_p = (1.00)(9.81)(0.75)$

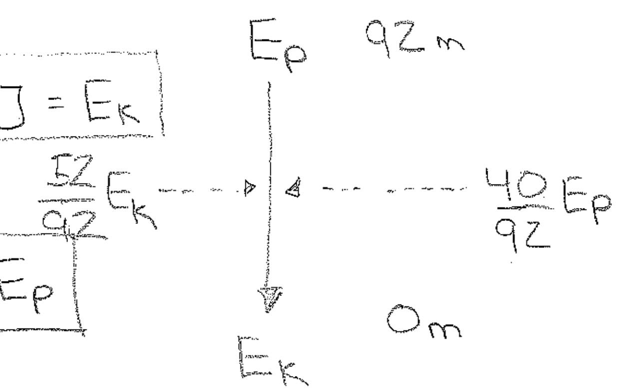
$E_p = 7.4\text{ J}$

16) $E_k = \frac{1}{2}mv^2$ $E_p = mgh$ $m = 5.0\text{kg}$ $g = 9.81\text{ m/s}$

$h = 92.0\text{ m}$

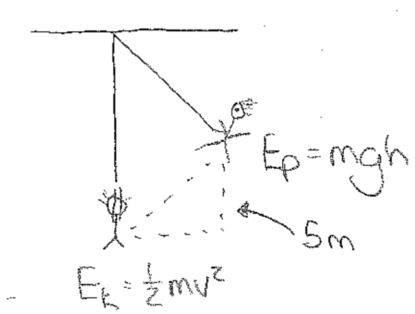
$E_p = (5)(9.81)(92)$

$E_p = 4513\text{ J} \times \frac{52}{92} = 2.5 \times 10^3\text{ J} = E_k$



$E_p = 4513\text{J} \times \frac{40}{92} = 2.0 \times 10^3\text{J} = E_p$

17)



$E_p = E_k$ $mgh = \frac{1}{2}mv^2$

$gh = \frac{1}{2}v^2$

$g = 9.81\text{ m/s}^2$

$h = 5.0\text{m}$

$(9.81)(5.0) = \frac{1}{2}v^2$

$49.05 = \frac{1}{2}v^2$

$2(49.05) = v^2$

$\sqrt{98.1} = \sqrt{v^2}$

$9.9\text{ m/s}^2 = v$

18) 3 forms of kinetic energy

1) translational 2) rotational 3) vibrational

19) Heat can be transferred via Radiation in the absence of matter

20)

100°C → 373° K	273°K + 100 = 373° K
-25°C → 248°K	273°K - 25° = 248° K
-273°C → 0° K	273°K - 273°K = 0°K
0°C → 273°K	273°K + 0 = 273°K
57°K → -216°C	-273°C + 57° = -216°C
300°K → 27°C	-273°C + 300° = 27°C

21) $\Delta E = mc\Delta T$ m = 1kg c = 4200 J/kg/°C ΔT = 80°C

$\Delta E = (1)(4200)(80)$

ΔE = 336 000 **ΔE = 340 000 J**

22) $\Delta E = mc\Delta T$ m = 0.400 kg c = 920 J/kg/°C ΔT = 74°C

$\Delta E = (0.400)(920)(74)$

ΔE = 27 232 **ΔE = 27 000 J**

23) $\Delta E = mc\Delta T$ $\Delta E = 2.47 \times 10^4$ J m = 1.50 kg c = 430 J/kg/°C

2.47×10^4 J = (1.50 kg)(430)(ΔT)

38.2945 = ΔT 150°C - 38.2945 = 111.70

T_i = 112°C

24) 25°C = 273°K + 25° = 298°K

298°K × 2 = 596°K

596°K = **323°C**

-273°C = 0°K

323°C = 596°K

25)

A - metal	B - WATER
c = 420 J/kg/°C	c = 4200 J/kg/°C
m = 1kg	m = 1 kg
ΔT = 80°C	ΔT = 80°C
$\Delta E = (1)(420)(80)$	$\Delta E = (1)(4200)(80)$
ΔE = 33600	ΔE = 336 000

WATER WILL GIVE OFF 10x MORE HEAT

26) $P = \frac{W}{t}$ $W = \Delta E = mc\Delta T$

$P \cdot t = W$

m = 10.0 kg T_i = 25°C

c = 4200 J/kg/°C

P = 1500 W

W = (1500 W)(5 min)(60 s)

W = 450 000 J

450 000 = (10)(4200)(ΔT)

10.71 = ΔT

T_i = 25° ∴ **T_f = 35.71°C**