Energy Unit Review (worksheet)

1. ... height

2. $E_p = mgh$
$= (20\text{kg})(9.8\text{m/s}^2)(2\text{m})$
$= 392\text{ J} = \underline{3.9\times10^2\text{ J}}$

3. $E_K = \frac{1}{2}mv^2$
$100 = \frac{1}{2}(25)v^2$
$\frac{200}{25} = v^2$
$\sqrt{8} = v = \underline{2.8\text{ m/s}}$

4. $E_p = mgh$
$3.6\times10^5\text{J} = (0.02)(9.8)\,h$
$h = \underline{1.8\times10^6\text{ m}}$

5. $E_p = mgh = (1250)(9.81)(45) = 5.52\times10^5\text{ J}$
$E_K = 1.5\times10^5\text{ J}$
$E_h = E_p - E_K = \underline{4.0\times10^5\text{ J}}$

6. no movement, $d=0$, $W = F\cdot0 = \underline{0\text{J}}$

7. $W = Fd$
$125\text{J} = 65\text{N}(d)$
$d = \underline{1.9\text{ m}}$

8. $P = \frac{W}{t} = \frac{mgh}{t} = \frac{(60)(9.8)(2.1)}{1.5} = 824\text{W} = \underline{8.2\times10^2\text{W}}$

9. Total energy is constant/conserved/the same
$E_T = E_p = mgh = (35)(9.8)(15)$
$= 5190\text{J} = \underline{5.2\times10^3\text{J}}$

10. $P = \frac{W}{t} = \frac{Fd}{t} = \frac{(30)(10)}{20} = \underline{15\,W}$

11. (a) $\frac{2}{6}$ b) $\frac{1}{4}$ c) $\frac{3}{14}$ d) $\frac{3}{12}$

↑ most power

12. $P = \frac{W}{t} = \frac{1.2\times10^4\,J}{60\,\text{min}\times60\,\text{s/min}} = \underline{3.3\,W}$

13. $W = Fd = mgd = 30(9.81)(1.5) = \underline{4.4\times10^2\,J}$

14. $W = Fd \qquad F = \frac{W}{d} = \frac{5400\,J}{60\,m} = \underline{90\,N}$

15. $E_p = mgh = (20)(9.81)(9.5\,m) = \underline{1.86\times10^3\,J}$

16. $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(0.7)(24)^2 = \underline{202\,J}$

17. $E_p = E_k$

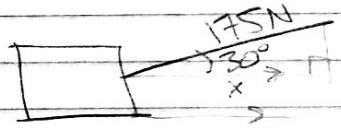
$mgh = \frac{1}{2}mv^2$

$v = \sqrt{2gh} = \sqrt{2(9.81)(15)} = \underline{17.2\,m/s}$

18. $E_k = E_p$

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

$h = \frac{v^2}{2g} = \frac{(15)^2}{2(9.81)} = \underline{11.5\,m}$

19. 

$175\cos 30° = 151.554\,N$ in direction of motion

$W = Fd$

$= (151.554)(14)$

$= 2121.76\,J = \underline{2.12\times10^3\,J}$

20. $\Delta E_{hw} + \Delta E_{hc} = 0$

$mC_w(T_f - T_{iw}) + mC_c(T_f - T_{ic}) = 0$

$(0.54)(4200)(T_f - 35) + (0.4)(390)(T_f - 115) = 0$

$2268T_f - 79380 + 156T_f - 17940 = 0$

$2424T_f = 97320$

$T_f = \underline{40.1°C}$

21. $P_{in} = 200W$

$P_{out} = \frac{Fd}{t} = \frac{(63)(9.81)(7)}{24} = 180.26$

$Eff = \frac{P_{out}}{P_{in}} \times 100\% = \frac{180.26}{200} \times 100\% = \underline{90.1\%}$

22. $\frac{W_{out}}{W_{in}} \times 100\% = \frac{635 \times 4.5}{250 \times 16} = \underline{71.4\%}$

23. The total energy is uncharged, but it changes form.
ie $E_p = E_k + E_h$ ...

24 $Eff = \frac{W_{out}}{W_{in}} \times 100 = \frac{E_p}{Fd_{ramp}} \times 100 = \frac{mgh}{Fd_{ramp}} \times 100\%$

$75.7 = \frac{(65)(9.81)(3.5)}{F(7)} \times 100$

$F = \underline{356N}$