Energy Resources 2 chpt 15 - 18 Revision Answers

1)

(a) lines from solar energy to boxes 1 AND 4 only — B1

lines from natural gas to boxes 2 AND 3 only — B1

(b) (relatively) cheap OR widely available OR can be used on a large scale OR always available — B1

(c) **(i)** 2.05×10^9 N — B1

(ii) use of mgh OR weight × h — C1
1.03×10^{12} J NOT ecf from **(i)** — A1

(iii) output energy ÷ input energy OR $6.2 \times 10^{11} \div 1.2 \times 10^{12}$ — C1
0.52 OR 52 % — A1

[Total: 8]

2)

(a) kinetic (energy) — B1

(b) **(i)** (work done =) $F \times x$ in any form: words, symbols, numbers — C1
1.4×10^9 J — A1

(ii) work done = kinetic energy OR $\frac{1}{2}mv^2$ seen — C1
$(v^2 =) 2WD \div m$ OR $2 \times 1.4\,(4) \times 10^9 \div 4.5 \times 10^5$ OR 6400 — C1
80 m / s ecf **(i)** — A1

(iii) (work done against) friction / (air) resistance / drag — B1
ACCEPT energy converted to thermal energy

(c) perpendicular (to curved path) OR centripetal OR towards centre (of circle) — B1

[Total: 8]

3)

(a) (g.p.e.=) mgh OR $75 \times 10 \times 880$ — C1
$= 6.6 \times 10^5$ J / Nm OR 660 kJ / kNm — A1

(b) **(i)** (work =) Fs / Fd OR 220×2800 — C1
$= 6.2 \times 10^5$ J / Nm OR 620 kJ / kNm — A1

(ii) answer to **(a)** – answer to **(b)(i)** — C1
e.g. (k.e.=) $6.6 \times 10^5 - 6.2 \times 10^5 = 4.0 \times 10^4$ J OR 44 kJ
OR $6.6 \times 10^5 - 6.16 \times 10^5 = 4.0 \times 10^4$ J OR 44 kJ — A1

(c) (to go faster by) reduced air resistance / drag / resistive force
OR to lower centre of mass OR increase stability / balance — B1

[Total: 7]

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4)

(a) (i) gravitational (potential energy) to kinetic (energy) B1

(ii) kinetic (energy) to elastic / strain (potential energy) B1

(iii) elastic / strain (potential energy) to kinetic (energy) B1

(b) mgh OR $0.15 \times 10 \times 2.0$ OR 3(.0 J) C1
$\frac{1}{2} mv^2$ OR $v^2 = 2gh$ C1
$v^2 = 2 \times 3.0 / 0.15$ OR 40 C1
6.3(24555) m / s A1

(c) heat / thermal / internal energy lost OR ball / surface gains heat / thermal / internal energy B1

[Total: 8]

5)

(a) (i) 1. (loss of P.E. =) mgh OR $92 \times 10 \times 1500$ C1
1.38×10^6 J A1
correct use of mgh with h = 500 or 2000 gains 1 mark only

(ii) 2. (K.E. =) $\frac{1}{2} mv^2$ OR $\frac{1}{2} \times 92 \times 52^2$ C1
1.244×10^5 J at least 2 sig. figs A1

(a) (ii) difference is due to:
(work done in overcoming) air resistance/drag
OR energy converted to/lost as heat (by air resistance/drag) B1

(b) (i) increases B1

(ii) 920 N B1

[Total 7]

6)

(a) (i) mention of vacuum OR glass is a poor conductor
OR vacuum/gap between walls has no molecules/atoms/particles B1

(ii) surface/silver (of walls) is good reflector/poor absorber (of radiation) B1
surface/silver (of walls) is poor emitter (of radiation) B1

(b) add a stopper/lid/bung/cover/top to reduce/prevent (loss of heat by) convection/ conduction/radiation/evaporation OR to prevent steam/hot vapour leaving M1 B1

made of insulator OR example of insulator to reduce/prevent (loss of heat by) convection/radiation/evaporation OR to prevent steam/hot air leaving B1

[Total 6]

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7)

(a) (W.D. =) $F \times d$ **or** 640 × 3.5 — C1
2240 J to 2 or more sig. figs. — A1 [2]

(b) **(i)** (E =) VIt **or** 75 × 25 × 4.0 **or** 75 × 100 (accept (E =) VQ and $Q = It$) — C1
7500 J — A1 [2]

(ii) (efficiency =) $\frac{\text{(useful) energy output}}{\text{energy input}}$ (× 100%) **or** 2240/7500
(accept power for energy) (e.c.f. from **3(a)(i)** or **3(b)(i)**) — C1
0.3 or 0.30 or 0.299 or 30 % or 29.9 % (e.c.f. from **3(a)(i)** or **3(b)(i)**) — A1

(c) any **two** from:
electrical heating
friction
W.D. lifting supports
sound — B2 [2]

[Total: 8]

8)

(a) **(i)** (GPE =) mgh **or** 0.40 × 10 × 8.5 (accept 9.8 for 10) — C1
34 J — A1 [2]

(ii) KE = GPE in any form **or** $\frac{1}{2}mv^2$ **or** $2gh$
or 2 × 10 × 8.5 (e.c.f. from **4(a)(i)**) — C1
(v^2 =) 170 **or** (v =)$\sqrt{170}$
(e.c.f. from **4(a)(i)**) — C1
13 m / s e.c.f. from **4(a)(i)** — A1 [3]

(b) drag **or** air resistance **or** friction with air (ignore wind for air) — B1
WD **or** energy lost as heat **or** more KE needed to overcome drag etc. — B1 [2]

(c) transformed to thermal energy/heat **or** friction/air resistance slows parachutist down **or** lost to air particles
(**not** KE (accept KE of air), **not** GPE → KE → heat; ignore sound) — B1 [1]

[Total: 8]

9)

(a) (mass flow rate =) 1030 (kg/s) — C1
use of mgh — C1
loss of GPE = 1030 × 10 × 3 = 30 900 J or Nm ecf from 1st line — A1 [3]

(b) output power = (26 × 400 =) 10 400 (W) — C1
efficiency = output (power)/input (power) with/without 100
OR= output/input with/without 100 OR any numbers
that clearly show relationship the correct way up is intended — C1
efficiency = (100 × 10 400/30 900 =) 33.7% at least 2 s.f. — A1 [3]
allow ecf from **(a)** and 1st line of **(b)**

(c) **(i)** from basin/to sea/from right/to left — B1

(ii) turbine design allows rotation in both directions
OR meaningful comment on change of pitch
OR generator works when rotating in either direction — B1 [2]

[Total: 8]