Name of the Student:_____

Max. Marks : 25 Marks **Time : 25 Minutes**

Mark Schemes

Q1.

Question Number	Answer		Mark
(a)	Use of power = intensity x area Use of time = energy / power Time = 19 s Example of calculation $P = 8000\ \text{W m}^{-2} \times 1.5 \times 10^{-5}\ \text{m}^2$ $= 0.12\ \text{J s}^{-1}$ $t = 2.3\ \text{J} \div 0.12\ \text{J s}^{-1}$ $= 19\ \text{s}$	(1) (1) (1)	3
(b)(i)	Use of $E = IVt$ Energy = 19 000 J (2 sf)(no ue) Example of calculation $E = 1.4\ \text{A} \times 3.7\ \text{V} \times (60 \times 60)\ \text{s}$ $= 18\ 648\ \text{J}$	(1) (1)	2
(b)(ii)	Energy required = 210 x 2.3 J Use of efficiency = output energy / input energy Efficiency = 0.026 or 2.6% Example of calculation efficiency = $210 \times 2.3\ \text{J} \times 100\ \% \div 19\ 000\ \text{J}$ $= 0.026$ or 2.6%	(1) (1) (1)	3
	Total for question		8

Q2.

Question Number	Answer		Mark
(a)(i)	Use of $P = IV$ Power = 2900 W <u>Example of calculation</u> Power = 12.5 A × 230 V = 2875 W	(1) (1)	2
(a)(ii)	$P = E/t$ Energy = 400 000 J (ecf from (i)) <u>Example of calculation</u> Energy = 2875 W × 140 s = 402 500 J	(1) (1)	2
(a)(iii)	Use of efficiency = useful energy output / total energy input = 0.87 or 87% (ecf from (ii)) (do not award if > 100%) <u>Example of calculation</u> Efficiency = 351 000 J / 402 500 J = 0.87 or 87%	(1) (1)	2
(b)	Some energy transferred by heating the kettle / element / wires / surroundings **Or** Some energy transferred as sound So not all of the (input) energy is transferred to (heating) the water **Or** so useful energy output is less than energy input **Or** only the energy heating the water is useful	(1) (1)	2
	Total for question		8

Q3.

Question Number	Acceptable Answers	Mark
(a)	Use of an equation of motion involving $a = g$ *or* $-g$ **(1)** $v = u + at$ with v or $u = 0$ and double t **Or** Use of $s = ut + \frac{1}{2} at^2$ with $s = 0$ **Or** Use of $a = \frac{v-u}{t}$ with $v = -u$ **Or** Find max $s = 0.40$ m then use $s = \frac{1}{2}(v + u)\, t$ and double t **(1)** (do not award MP2 if 8 m s^{-1} used) Time = 0.57 or 0.58(s) **(1)** (Do not award 3rd mark if negatives have been ignored.) Example of calculation: using $a = \frac{v-u}{t}$ $t = \frac{0 - 2.8\,\text{ms}^{-1}}{-9.81\,\text{ms}^{-2}} = 0.285\,\text{s}$ to reach top of jump $t = 0.57$ (s)	**3**

Question Number	Acceptable Answers	Mark
(b)	Use of distance = 8 m s^{-1} × time (either their time or 0.6 s) **(1)** Distance = 4.6 m (ecf (a)) **(1)** (If show that value of 0.6 s used then $d = 4.8$ m) Example of calculation Distance = 8.0 m s^{-1} × 0.57 s Distance = 4.6 m	**2**

Question Number	Acceptable Answers	Mark
(c)	Attempt to calculate total / extra time using correct equations with correct vertical values **(1)** $t = 0.14$ s or 1/7 s extra time for additional drop assuming $u = 2.8\ m\ s^{-1}$ $t = 0.43$ s or 3/7 s time from calculation of maximum height using $u = 0$ $t = 0.71$ s or 5/7s time for whole trajectory using $s = -0.5$ m **(1)** Distance = $8.0\ m\ s^{-1} \times$ time **(1)** Extra horizontal distance travelled = 1.1m to 1.2m **(1)** Example of calculation $v^2 = (2.8\ m\ s^{-1})^2 + (2 \times 9.81\ m\ s^{-2} \times 0.50\ m)$ $v = 4.2\ m\ s^{-1}$ $t = \frac{4.2\ m\ s^{-1} - 2.8\ m\ s^{-1}}{9.81\ m\ s^{-2}}$ $t = 0.14$ s Distance = $8.0\ m\ s^{-1} \times 0.14$ s Distance = 1.1 m	4
	Total for question	**9**