Question Number	Answer	Acceptable answers	Mark
1(a)(i)	electrical	electric	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	chemical		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	20 (J)	200 – 180 (even if calculated value from this is incorrect)	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	(changed to) {thermal energy / heat}	dissipated (lost) to {surroundings / motor / air / atmosphere} sound / noise **reject** if kinetic, light or chemical is mentioned	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	$\frac{180}{200} \times 100$ (1) 90 (%) (1)	award full marks for correct answer with no working $\frac{180}{200}$ 0.9, 9/10 Or [100 – (20/200)] % not needed but if a unit is given then maximum score is 1	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	**D** dark : rough		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	**C** the container is losing thermal energy at the same rate it is absorbing it	Heat for thermal Same amount in same time for same rate	**(1)**

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)	kinetic (energy)	Movement (energy) KE	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	substitution: 0.6 x 20 (1) evaluation 12 (1) J (1)	 give 2 marks for correct answer no working unit is an independent mark joules, Nm, kgm^2/s^2 , Ws	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(c)	substitution: 0.5 x 18 (1) evaluation 9.0 (1)	 9 give full marks for correct answer no working	**(2)**

Question Number		Indicative Content	Mark
QWC	*)	a description including some of the following points: • chemical to kinetic while in his hand • kinetic (gradually) to potential while rising / from 0-10 m • eventually all potential at 10 m with a little thermal (heat) energy • some mention of conservation of energy • potential (gradually) to kinetic as falls / 10 m-0 • with a little more thermal (heat) energy • at 0 m sound energy • at 0 m thermal (heat) energy	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description which identifies a change in one relevant type energy or a transfer of energy from one form to another e.g. kinetic energy increases OR kinetic energy changes to sound. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description giving detail of a relevant energy change/transfer e.g. kinetic energy changes into potential energy as it moves upwards OR kinetic energy increases as it falls. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description of a sequence of relevant energy changes /transfers e.g. kinetic energy is transferred into potential energy as it rises. This then changes back into kinetic energy as it falls back down. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
3(a)	**C** when the bungee cord is stretched the most		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	**A** 600 kg m/s		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	Substitution: (1) 60 x 10 x 50 or 600 x 50 Evaluation: (1) 30 000 Unit: (1) J / Nm	 give two marks for correct answer no working j / joule 30 kJ for full marks	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	After falling 50 m / when the cord becomes straight/when cord starts to stretch	tension starting to increase at terminal velocity ignore maximum velocity/speed	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(iii)	An explanation linking any two of not all GPE is transferred to KE (1) some {of the GPE transfers to thermal energy /work is done} (1) due to drag (1)	 not all GPE goes to KE maximum energy is same (value) as GPE before falling /speed does not reach the speed at which he should fall some lost as heat/sound (of rope or movement through air) (air) resistance / friction ignore wind	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)	elastic potential energy		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	0.3(J) (1)	0.5-0.2 (J)	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	substitution (1) 0.2÷0.5 evaluation (1) 0.4 / 40(%) / $^{2}/_{5}$	Give full marks for correct answer with no working	 **(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	Any two of the following • thermal/heat (1) • (idea that energy is) dissipated/spreads out (1) • to the surroundings (1)	 Ignore transferred to Atmosphere/air **Accept** makes surroundings warmer (2) Ignore lost	 **(2)**

Question Number		Indicative content	Mark
QWC	***4(c)**	A description including some of the following points **Forms of energy** • gravitational potential energy • kinetic energy • elastic potential energy • heat(thermal) and sound **Location of energy** • gravitational potential energy of mass as it rises • kinetic energy of mass as it moves • Elastic potential energy stored in spring • Heat/sound dissipated to surroundings **Linked ideas** • As the pendulum falls, gravitational potential energy changes to kinetic energy. • the kinetic energy from the pendulum ends up as heat, warming the surroundings. • the elastic potential energy in the clockspring becomes kinetic energy of the pendulum to keep the pendulum swinging.	**(6)**
Level	**0**	no rewardable material	
1	**1-**	• a limited description including the name of one form of energy that is involved in the pendulum swing eg. the pendulum has kinetic energy. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3-**	• a simple description of the pendulum swing indicating where the energy can be found **OR** a simple transfer eg. When the pendulum is moving it has kinetic energy / the pendulum is high at the side of the swing so it has gravitational potential energy / As the pendulum swings it loses heat to the air / kinetic energy changes to potential energy / KE to PE. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description of an energy transfer indicating where the energy can be found **and** where the transfer takes place eg. as the pendulum swings to and fro, gravitational potential energy changes to kinetic energy / kinetic energy is dissipated as heat and sound to the surroundings • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
5(a)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	both points correctly plotted (1)	allow +/- half square	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	smooth curve (1) (does not need to go through all points i.e. can miss out top section)	allow slight discontinuities/double lines/ thick lines NOT dot to dot /two straight lines	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(iii)	temperature from 34 °C to 39 °C inclusive (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(iv)	21(°C) (1)	22(°C) /23(°C)	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)(i)	it/black is a good absorber of heat /energy/radiation/IR (1) i.e. it absorbs/takes in more infrared/IR	**allow** it/black absorbs/takes in heat **ignore** attracts/emitter/conductor **NOT** (so it) cools down quickly	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)(ii)	substitution (1) 9000 ÷ 20 evaluation (1) 450 (W)	ignore powers of 10 until evaluation e.g. 90 ÷ 2 gains 1 mark 45 gains 1 mark give full marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(c)(iii)	substitution (1) 9000 ÷ 18 000 (x 100%) evaluation (1) 50 (%)	ignore powers of 10 until evaluation e.g. 90 000 ÷ 1800 gains 1 mark 5 gains 1 mark 0.5 or ½ or half gains both marks give full marks for correct answer, no working	**(2)**