

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)	$\frac{180}{200} \times 100 \quad (1)$ 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	*)	<p>a description including some of the following points:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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(%) / $\frac{2}{5}$	Give full marks for correct answer with no working	(2)

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	Any two of the following <ul style="list-style-type: none"> • 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	<p>*4(c)</p> <p>A description including some of the following points</p> <p>Forms of energy</p> <ul style="list-style-type: none"> • gravitational potential energy • kinetic energy • elastic potential energy • heat(thermal) and sound <p>Location of energy</p> <ul style="list-style-type: none"> • 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 <p>Linked ideas</p> <ul style="list-style-type: none"> • 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-	<ul style="list-style-type: none"> • 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-	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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) $9000 \div 20$ evaluation (1) 450 (W)	ignore powers of 10 until evaluation e.g. $90 \div 2$ 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) $9000 \div 18\ 000 (\times 100\%)$ evaluation (1) 50 (%)	ignore powers of 10 until evaluation e.g. $90\ 000 \div 1800$ gains 1 mark 5 gains 1 mark 0.5 or $\frac{1}{2}$ or half gains both marks give full marks for correct answer, no working	(2)