

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(i)</b>	electrical	electric	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(ii)</b>	chemical		<b>(1)</b>

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

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

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(iii)</b>	$\frac{180}{200} \times 100$ (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	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c)(i)</b>	<b>D</b> dark : rough		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c)(ii)</b>	<b>C</b> 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	<b>(1)</b>

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	kinetic (energy)	Movement (energy) KE	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</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, $\text{kgm}^2/\text{s}^2$ , Ws	<b>(3)</b>

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

Question Number		Indicative Content	Mark
<b>QWC</b>	<b>* )</b>	<p>a description including some of the following points:</p> <ul style="list-style-type: none"> <li>• chemical to kinetic while in his hand</li> <li>• kinetic (gradually) to potential while rising / from 0-10 m</li> <li>• eventually all potential at 10 m with a little thermal (heat) energy</li> <li>• some mention of conservation of energy</li> <li>• potential (gradually) to kinetic as falls / 10 m-0</li> <li>• with a little more thermal (heat) energy</li> <li>• at 0 m sound energy</li> <li>• at 0 m thermal (heat) energy</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b>	No rewardable content	
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>	
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>	

Question Number	Answer	Acceptable answers	Mark
<b>3(a)</b>	<b>C</b> when the bungee cord is stretched the most		<b>(1)</b>

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

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

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(ii)</b>	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	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(iii)</b>	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	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)</b>	elastic potential energy		<b>(1)</b>

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

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

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(iii)</b>	Any two of the following <ul style="list-style-type: none"> <li>• thermal/heat (1)</li> <li>• (idea that energy is) dissipated/spreads out (1)</li> <li>• to the surroundings (1)</li> </ul>	Ignore transferred to  Atmosphere/air  <b>Accept</b> makes surroundings warmer (2) Ignore lost	<b>(2)</b>

Question Number	Indicative content	Mark
<b>QWC</b>	<p><b>*4(c)</b> A description including some of the following points</p> <p><b>Forms of energy</b></p> <ul style="list-style-type: none"> <li>• gravitational potential energy</li> <li>• kinetic energy</li> <li>• elastic potential energy</li> <li>• heat(thermal) and sound</li> </ul> <p><b>Location of energy</b></p> <ul style="list-style-type: none"> <li>• gravitational potential energy of mass as it rises</li> <li>• kinetic energy of mass as it moves</li> <li>• Elastic potential energy stored in spring</li> <li>• Heat/sound dissipated to surroundings</li> </ul> <p><b>Linked ideas</b></p> <ul style="list-style-type: none"> <li>• As the pendulum falls, gravitational potential energy changes to kinetic energy.</li> <li>• the kinetic energy from the pendulum ends up as heat, warming the surroundings.</li> <li>• the elastic potential energy in the clockspring becomes kinetic energy of the pendulum to keep the pendulum swinging.</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b> no rewardable material	
<b>1</b>	<p><b>1-</b></p> <ul style="list-style-type: none"> <li>• a limited description including the name of one form of energy that is involved in the pendulum swing eg. the pendulum has kinetic energy.</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
<b>2</b>	<p><b>3-</b></p> <ul style="list-style-type: none"> <li>• a simple description of the pendulum swing indicating where the energy can be found <b>OR</b> 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.</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>	
<b>3</b>	<p><b>5 - 6</b></p> <ul style="list-style-type: none"> <li>• a detailed description of an energy transfer indicating where the energy can be found <b>and</b> 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</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>	

Question Number	Answer	Acceptable answers	Mark
<b>5(a)</b>	A		<b>(1)</b>

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

Question Number	Answer	Acceptable answers	Mark
<b>5(b)(ii)</b>	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	<b>(1)</b>

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

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

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



Question Number	Answer	Acceptable answers	Mark
<b>5(c)(ii)</b>	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	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(c)(iii)</b>	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	<b>(2)</b>