

Question Number	Answer	Mark
<b>1(a)(i)</b>	D the spring has more elastic potential energy than the weight has kinetic energy	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(ii)</b>	<p>A description including three from</p> <p>MP1 Elastic potential energy /EPE (in stretched spring) (1)</p> <p>MP2 (EPE is) transferred to KE (initially) (1)</p> <p>MP3 change from KE to GPE or vice versa(1)</p> <p>MP4 (correct idea of) energy changes continuing</p> <p>MP5 {total mechanical energy /kinetic +potential energy} decreases (continuously) (1)</p> <p>MP6 (Eventually all is transferred to) {thermal/heat} (energy) (1)</p>	<p>care should be taken not to award marks for contradictory examples</p> <p>Starting point for description does not matter</p> <p>Ignore sound energy</p> <p>EPE becomes/goes to KE (initially)</p> <p>condone amplitude decreases to zero KE or PE 'lost' to surroundings</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(i)</b>	B increase the efficiency of the motorcycle		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(ii)</b>	<p>MP1 (bump produces) relative motion (1)</p> <p>MP2 (motion between magnet and coil) {induces / generates} voltage (1)</p>	<p>coil moves round magnet/magnet moves {into/out of} coil / coil {cuts / moves across} magnetic field</p> <p>ignore magnets slide inside a coil (see stem)</p> <p>electromagnetic induction</p> <p>condone {induces / generates }</p> <p>{current/electricity}</p> <p>ignore (see stem)</p> <p>electrical energy provides / produces</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(iii)</b>	<p>An explanation linking</p> <p>MP1 {more/frequent} bumps (1) (idea of shorter time / increased frequency)</p> <p>MP2 (bigger bumps produce) bigger amplitude / move more up and down (idea of bigger size) (1)</p> <p>MP3 (so) {induced voltage /voltage generated} is larger (1)</p>	<p>idea of up and down for bump (coil / magnets) move up and down {faster / more often}</p> <p>(coil/magnets) move {further/higher/bigger distance} (up and down)</p> <p>{induced current/current generated} is larger</p> <p>electromagnetic induction gives more voltage/current</p> <p>condone more electricity/electrical energy is {induced / generated}</p> <p>allow once for MP1 (if MP1 or MP2 is not scored): 'bumpier' 'go in and out more'</p>	<b>(3)</b>

**(Total for Question 3 = 10 marks)**

Question number	Ans		Mark
2(a)	evidence that anomalous reading excluded (1)  answer (1) average length = 20.31 (mm)	accept 101.57 ( $\pm 5$ ) for first mark  accept 20.314 (mm)	(2)

Question number	Answer	Additional guidance	Mark
2(b)(i)	<ul style="list-style-type: none"> <li>• Axes with linear scales that use more than half of each edge of the grid and labelled with units from table (1)</li> <li>• All points correctly plotted to <math>\pm</math> half a square (1)</li> <li>• Single straight line passing through all points and the origin (1)</li> </ul>	allow 1 mark if only one plotting error and correct line drawn for points plotted	(3)

Question number	Answer	Additional guidance	Mark
2(b)(ii)	<p>A comment that makes reference to the following points:</p> <p>(using table)</p> <ul style="list-style-type: none"> <li>• idea that equal increments of force/weight/mass cause equal increments of extension (1)</li> <li>• correct reference to figures in the table (1)</li> </ul> <p>OR</p> <p>(using graph)</p> <ul style="list-style-type: none"> <li>• the graph line is straight (1)</li> <li>• the graph line passes through the origin (1)</li> </ul> <p>AND</p> <p>therefore the student's conclusion is correct (1)</p>	last marking point can only be achieved if at least one of the other two marks is awarded	(3)

Question number	Answer	Additional guidance	Mark
2(c)	<p>An answer that combines points of interpretation/evaluation to provide a logical description:</p> <ul style="list-style-type: none"> <li>• above 37.5 N/4 mm there are large increases of extension for small increases in load (1)</li> <li>• the maximum extension of the wire is about 16.5 mm before it breaks (1)</li> <li>• above 12 mm the wire keeps on extending when the load is reduced below 46 N (1)</li> </ul>	<p>accept extension is (much) greater for each 1 N increase in load above 37.5 N</p>	<p><b>(3)</b></p>

Question number	Ans	I guidance	Mark
<b>3(a)</b>	evidence that anomalous reading excluded (1)  evaluation (1) average length = 20.31 (mm)	accept 101.57 ( $\div 5$ ) for first mark    accept 20.314 (mm)	<b>(2)</b>

Question number	Answer	Additional guidance	Mark
<b>3(b)(i)</b>	<ul style="list-style-type: none"> <li>• Axes with linear scales that use more than half of each edge of the grid and labelled with units from table (1)</li> <li>• All points correctly plotted to <math>\pm</math> half a square (1)</li> <li>• Single straight line passing through all points and the origin (1)</li> </ul>	allow 1 mark if only one plotting error and correct line drawn for points plotted	<b>(3)</b>

Question number	Answer	Additional guidance	Mark
<b>3(b)(ii)</b>	<p>A comment that makes reference to the following points:</p> <p>(using table)</p> <ul style="list-style-type: none"> <li>• idea that equal increments of force/weight/mass cause equal increments of extension (1)</li> <li>• correct reference to figures in the table (1)</li> </ul> <p>OR</p> <p>(using graph)</p> <ul style="list-style-type: none"> <li>• the graph line is straight (1)</li> <li>• the graph line passes through the origin (1)</li> </ul> <p>AND</p> <p>therefore the student's conclusion is correct (1)</p>	last marking point can only be achieved if at least one of the other two marks is awarded	<b>(3)</b>

Question number	Answer	Additional guidance	Mark
3(c)	<p>An answer that combines points of interpretation/evaluation to provide a logical description:</p> <ul style="list-style-type: none"> <li>• above 37.5 N/4 mm there are large increases of extension for small increases in load (1)</li> <li>• the maximum extension of the wire is about 16.5 mm before it breaks (1)</li> <li>• above 12 mm the wire keeps on extending when the load is reduced below 46 N (1)</li> </ul>	<p>accept extension is (much) greater for each 1 N increase in load above 37.5 N</p>	(3)