

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	<input checked="" type="checkbox"/> B $2.5 \div 4$		(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	either $P = 2.5 \times 0.2$ or $2.5 = P / 0.2$ (1) 0.5 (W) (1)	give full marks for correct answer, no working	(2)

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	3.0 ± 0.5 (cm)		(1)

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	an explanation linking <ul style="list-style-type: none"> • 2 MHz (1) and any one from: <ul style="list-style-type: none"> • has a higher intensity inside tissue (1) • less energy absorbed (1) • less attenuation (1) • penetrates furthest /deepest (1) 	this frequency alone RA loses intensity more gradually highest penetration accept "2MHz and 4MHz" with correct reason for 1 mark	(2)

Number			
QWC	*1(c)	<p>A comparison of endoscopes with any one of the following devices:</p> <p>Diagnostic devices</p> <ul style="list-style-type: none"> • CAT scanners • Fluoroscopes • Thermal imagers / IR thermometers • Pulse oximeters • PET scanners • X-ray machines • Gamma cameras <p>Link to electromagnetic radiation</p> <ul style="list-style-type: none"> • Endoscopes use TIR of light in optical fibres • CAT scanners X- rays and computer to generate 3D images • Fluoroscopes use X- rays and a video camera • Thermal imagers use infrared emitted by a body • IR / red LEDs used to measure oxygen levels • PET scanners detect radiation emitted by electron-positron annihilation • Gamma cameras detect gamma rays from radioactive sources <p>Other factors for comparison</p> <ul style="list-style-type: none"> • Safety • Ease of use • Frequency / wave length • Intensity • Penetration • Ionising / non-ionising 	(6)
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> • a limited comparison between an endoscope and one device e.g. endoscopes use light and CAT scanners detect broken bones • 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 comparison between an endoscope and one device, linking them to the electromagnetic radiation used for both and a detail of use for one of them e.g. endoscopes use visible light to examine internal organs and CAT scans use X-rays • 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 comparison between an endoscope and one device, linking them to the electromagnetic radiation used for both and a detail of use for both of them e.g. endoscopes use visible light which is passed down optical fibres by TIR to examine internal organs. Fluoroscopes use X-rays and a video camera to show positioning of stents in arteries. • 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
2(a)	elastic potential energy		(1)

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

Question Number	Answer	Acceptable answers	Mark
2(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
2(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>*2(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	1-2	<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	3-4	<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
3(a)(i)	(force of) water (on ski)	air resistance/drag ignore wind/unqualified friction	(1)

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	substitution (1) 500 – 300 evaluation (1) 200 (N)	give full marks for correct answer, no working	(2)

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	to the right	forward/direction skier is travelling/towards the boat	(1)

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	B J		(1)

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	substitution (1) $54 \times 10 \times 5$ evaluation (1) 2700	Ignore unit (J) even incorrect give full marks for correct answer, no working	(2)

Question Number	Answer	Acceptable answers	Mark
3(b)(iii)	A description including two of the following points <ul style="list-style-type: none"> • (some) KE at the ramp (1) • is transferred to GPE at top (1) • still has some KE at top (1) • some energy lost due to air resistance (1) 	KE to GPE for 1 mark air friction	(2)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	1260 W		(1)

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	substitution (1) $5040 = 240 \times 10 \times \text{height}$ transposition (1) $\text{height} = \frac{5040}{240 \times 10}$ evaluation (1) 2.1 (m)	substitution and transposition in either order give full marks for correct answer, no working	(3)

Question Number	Answer	Acceptable answers	Mark
4(b)	no movement (in direction of force) / (work done =) weight $\times 0 = 0$	stationary it is not changing height is in same position ignore ref to terminal velocity, force and acceleration	(1)

Question Number	Answer	Acceptable answers	Mark
4(c)	substitution (1) 240×6.4 evaluation (1) 1500 Unit (1) kg m/s independent mark	1536 give (2) marks for correct answer, no working Ns	(3)