

Question number	Answer	Notes	Marks
1 (a)	<p>cooking – micro(waves) OR infrared (waves);</p> <p>treating cancer – ultraviolet OR x-rays OR gamma (rays);</p> <p>identifying broken bones - x-rays;</p>	if more than one example given for each use then reject mark if any incorrect	3
(b)	C - the same speed;		1
(c) (i)	<p>drawn ray shows refraction in the correct direction (downwards) at both surfaces;</p> <p>drawn ray is above yellow ray and diverges from it (if ray had entered at the original point);</p>	<p>judge by eye ignore arrows and labels dependent on previous</p> <p>allow if ray drawn enters parallel to original ray</p>	2
(ii)	A- black;		1

Total 7 marks

Question number	Answer	Notes	Marks
2 (a) (i)	B - 960 joules per second;		1
(ii)	power = current x voltage;	allow equation as correct symbols and/or rearrangement e.g. $I = P \div V$	1
(iii)	appropriate calculation (including substitution OR rearrangement); answer to at least 2 sf seen anywhere; e.g. $960 = I \times 230$ (I =) 4.2 (A)	using 4 (A) to calculate power (920 W) or voltage (240 V) scores 1 mark max. (4.17391) allow 4.1 (A)	2
(b) (i)	any 3 of: MP1. large current to earth / in earth wire; MP2. fuse blows / melts / breaks; MP3. idea that circuit is broken; MP4. idea that the risk of shock is reduced / prevented;	ignore references to electricity or charge allow 'current surge' for large current 'ground' for earth ignore references to fire	3
(ii)	D - 13 A;		1
(c)	MP1. a way of measuring current e.g. ammeter; MP2. a method to vary current in fuse; MP3. a method of identifying that the fuse has broken e.g. lamp goes out, idea that current falls to zero etc.;	accept any points seen in diagram allow data logger allow variable power supply, variable resistor	3

Total 11 marks

Question number	Answer	Notes	Marks
3 (a)	A - Force X 7.5 N, Force Y 7.5 N ;		1
(b)	idea that force X decreases; from 15 (N) / to 0 (N);	ignore references to force Y and moments 'it goes from 15 to 0' gets 2 marks	2

Total 3 marks

(c)	any 1 of: MP1. idea of pressure decreasing (with depth / time); MP2. idea of force changing with {pressure / depth / time}; MP3. idea of (available) GPE decreasing;	allow RA allow 'weight' for force ignore 'mass'	1
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Total 10 marks

Question number	Answer	Notes	Marks
8 (a) (i)	step-down (transformer);		1
(ii)	<p>MP1. soft material loses magnetism quickly / easily;</p> <p>MP2. idea that magnetic field (in core) alternates / changes;</p>	ignore unqualified references to losing magnetism	2
(b) (i)	$\frac{\text{input / primary voltage}}{\text{output / secondary voltage}} = \frac{\text{primary turns}}{\text{secondary turns}}$	<p>allow</p> <ul style="list-style-type: none"> • equation in words with turns ratio shown as a fraction • standard abbreviations :- s, p, in, out, 1, 2 • N or n for number of turns (condone T for number of turns) • "number of coils" for number of turns <p>rearrangements also to include turns ratio as a fraction</p> $(V_S/V_P) = (N_S/N_P)$ <p>[equation inverted]</p> $V_S = (V_P) (N_S/N_P) \text{ [} V_S \text{ as subject]}$ $V_P = (V_S) (N_P/N_S) \text{ [} V_P \text{ as subject]}$	1
(ii)	<p>substitution into a correct equation; evaluation (including rearrangement);</p> <p>e.g.</p> $44 / V = 520 / 30$ $(V =) 2.5 (V)$	<p>allow</p> <p>3, 2.53, 2.54, 2.538</p>	2