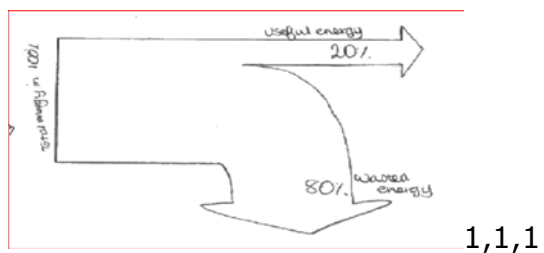


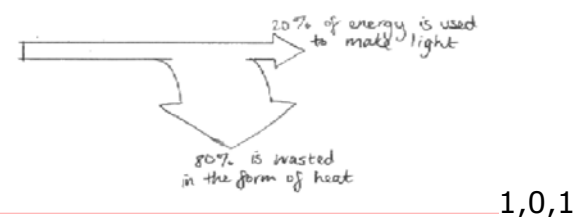
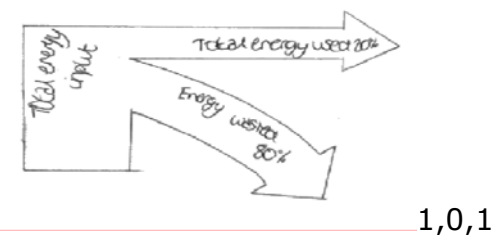
Question number	Answer	Notes	Marks
1 a i	Any two from – Radio; Microwaves; Infrared; Visible;		2
ii	Microwaves; Infrared;		2
b	D                      Increasing wavelength		1
c i	(wave) speed = frequency x wavelength		1
ii	Substitution into correct equation; Evaluation; Unit; Eg. (wave) speed = 200 000 x 1500 300 000 000 m/s	Accept equivalent Accept recognised symbols  mark unit and calc independently  Power Of Ten error = -1 e.g. not converting kHz to Hz  Accept <ul style="list-style-type: none"> <li>• bald answer</li> <li>• answer in SF</li> <li>• alternative speed units with corresponding evaluation e.g. 300 000 km/s 1.08 x 10<sup>12</sup> km/hour</li> </ul>	3

(Total for Question 1 = 9 marks)



there must not be a size difference between input and outputs, even if the light is  $\sim 1/4$  of heat

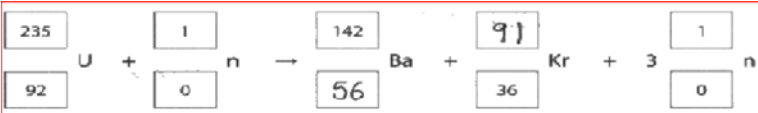
i.e. 100 units in and 100 units out



(Total for Question 2 = 8 marks)

iii	Substitution and rearrangement; Calculation ; $\frac{12}{0.05 \times 1.6}$  150 (m)	POT error loses 1 mark e.g. 0.15 (m) gets 1 mark	2
e	any Two from: <ul style="list-style-type: none"> <li>• Value of g lower(on the Moon)/RA;</li> <li>• lack of air resistance (on the Moon)/RA;</li> <li>• Time of flight greater;</li> </ul>	ignore <ul style="list-style-type: none"> <li>• 'no gravity'</li> </ul> allow <ul style="list-style-type: none"> <li>• less gravity</li> <li>• drag for air resistance</li> </ul>	2

(Total for Question 10 = 15 marks)

Question number	Answer	Notes	Marks
11 a	91; 56;  		1 1
b	Three FROM – MP1. Neutrons released; MP2. neutrons slowed by moderator; MP3. Can be absorbed by <b>other</b> (U) <b>nuclei</b> ; MP4. Causing further fissions;	ignore comments about control rods  collide or react for absorb  if MP3 or 4 or both not given then award 1 mark for a description of a first absorption	3
c i	Correct labels for – Control rods; Shielding;	Accept <ul style="list-style-type: none"> <li>• lines with or without arrow heads (in either direction)</li> <li>• any part of control rod (black in diagram)</li> <li>• any part of external box for shielding</li> </ul>	1 1 2

ii	Two from: MP1. Reactor material / waste is <b>radioactive</b> ; MP2. (radiation) ionises cells/ tissues / organs / body or causes cancer; MP3. radiation is very penetrating;	allow damages for ionises  NOT ALLOW bald 'it is dangerous' do not award marks for 'shielding prevents escape of radiation'/eq	
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(Total for Question 11 = 9 marks)

