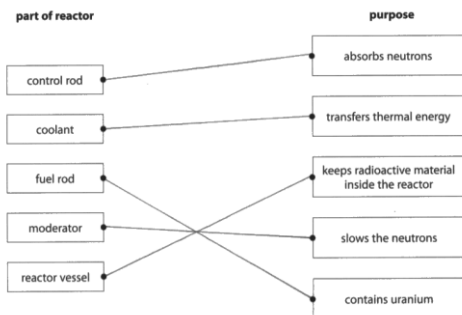


Question number		Answer	Notes	Marks
4	(a)	(however expressed) driving force > resistive force;	there is a resultant force forces are not balanced	1
	(b)	i	a = change in velocity; time	1
	b	ii	substitution; evaluation;	2
		e.g. $a = \frac{24-15}{6}$ $a = 9/6 = 1.5 \text{ (m/s}^2\text{)}$		
	(c)	any two from: MP1. braking force increases; MP2. the driving / forward force becomes zero/decreases; MP3. air resistance decreases (as speed decreases); MP4. resultant force is now in opposite direction;	the overall resistive force /backwards force increases allow resultant force increases for 1 mark	2

Total 6 marks

Question number	Answer	Notes	Marks
5 (a)	any four in any order voltmeter; ammeter; power supply; variable resistor/connecting wires/switch;	accept battery accept variable power supply for 2 marks	4
(b) i	any 1 of the following: MP1. resistance changes with temperature; MP2. temperature affects current; MP3. the wire will get hot because of the current;		1
ii	any suitable method; further detail; e.g. use a switch only on for short time allow wire to cool between readings use only low current	allow water bath	2
(c)	4 correct lines score 3 marks;;; 2 or 3 correct lines score 2 marks;; 1 correct line scores 1 mark; <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>component</p> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">short thick copper wire</div> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">filament lamp</div> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">long thin copper wire</div> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">diode</div> </div> <div style="text-align: center;"> <p>graph</p> </div> </div> <p>-1 if multiple lines drawn to or from the same box</p>		3

Total 10 marks

Question number	Answer	Notes	Marks
12 (a)	<p>5 correct lines score 4 marks;;; 4 or 3 correct lines score 3 marks;;; 2 correct lines score 2 marks;; 1 correct line scores 1 mark;</p> 		4
b	C neutrons;		1
c	<p>any four from:</p> <p>MP1. neutron absorbed by;</p> <p>MP2. uranium(-235) nucleus;</p> <p>MP3. causing it to split;</p> <p>MP4. into 2 daughter products / nuclei / isotopes;</p> <p>MP5. releasing further neutrons /energy;</p>	<p>only accept precise terminology allow hits/collides/eq</p> <p>allow named products</p>	4
d	<p>any three comparisons from (however expressed):</p> <p>MP1. decay is random but fission is not;</p> <p>MP2. fission induced by input particle but decay occurs without an input particle;</p> <p>MP3. fission produces 2 daughter nuclei but decay produces only 1;</p> <p>MP4. α or β are emitted from decay but not from fission;</p>		3