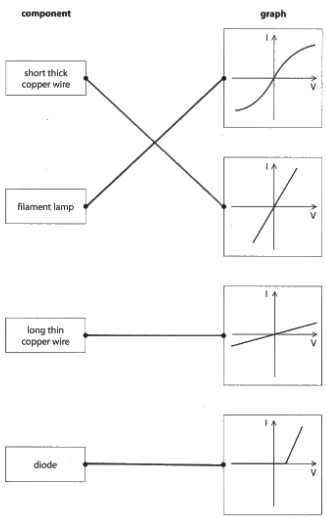
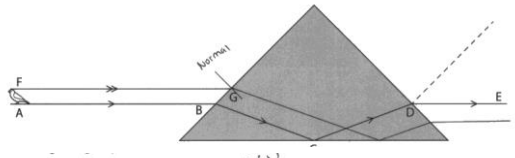
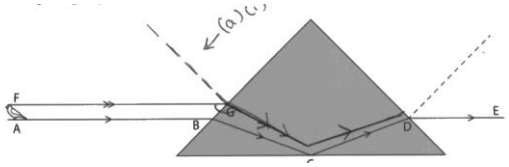
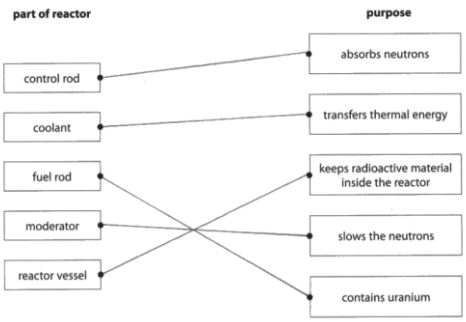
Question number	Answer	Notes	Marks
5 (a)	any four in any order voltmeter; ammeter; power supply; **variable** resistor/connecting wires/switch;	 accept battery accept variable power supply for 2 marks	4
(b) i	any 1 of the following: MP1. resistance changes with temperature; MP2. temperature affects current; 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;  -1 if multiple lines drawn to or from the same box		3

Total 10 marks

Question number	Answer	Notes	Marks
11 (a) i	normal drawn at G ;	by eye	1
ii	value for G ; (45) value for D; (45)	tolerance ±2°	2
b	ray has been reflected; totally internally; because angle of incidence > critical angle;	allow 42 or 43°	3
c	correct refraction at G downwards; TIR on bottom surface; emergent ray parallel to and below DE;  =3  = MP1 only		3

Total 10 marks

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