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PHYSICS

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Paper 3 Core Theory

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MARK SCHEME

Maximum Mark: 80

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This document consists of **9** printed pages.



Question	Answer	Marks
1(a)	(A =) lead, (B=) iron, (C=) aluminium	B1
1(b)	density = mass ÷ volume in any form (V =) M/d	C1
	200 ÷ 8.4	C1
	24 (cm ³)	A1
1(c)	add water to measuring cylinder/note the volume of water added	B1
	lower/immerse metal object into water	B1
	note new volume of water owtte	B1
	subtract new volume from initial volume/determine difference in volumes	B1

Question	Answer	Marks
2(a)(i)	10 (km)	B1
2(a)(ii)	1.5 (hours)	B1
2(a)(iii)	speed = distance ÷ time in any form	C1
	10 ÷ 1.5	C1
	6.7 (km/h) accept 6.67 (km/h)	A1
2(b)(i)	4:30 (pm) OR 16:30	B1
2(b)(ii)	30 (minutes)	B1
2(b)(iii)	smaller gradient OR less steep slope owtte	B1

Question	Answer	Marks
3(a)	0.35 (m)	B1
	0.025 (m)	B1
3(b)	(weight =) mass $\times$ gravity in any form	C1
	50×10 OR $(20 \times 10) + (30 \times 10)$	C1
	500 (N)	A1
3(c)	moment = force $\times$ distance from pivot	C1
	140×1.3	C1
	180	A1
	Nm	B1

Question	Answer	Marks
4(a)	centre of cone nearer base than apex	B1
	centre of sphere	B1
4(b)	any three from: centre of mass is higher surface (area in contact with table) is smaller (so a) small displacement causes toppling (because with a small displacement the) vertical line through centre of mass is outside the base owtte	B3

Question	Answer	Marks
5(a)	A (at end of sentence)	B1
	B (at end of sentence)	B1
5(b)(i)	energy cannot be created or destroyed	B1
	but can be transformed/changed (from one form to another)	B1
5(b)(ii)	Energy losses as heat or sound (to surroundings)	B1

Question	Answer	Marks
6(a)(i)	conduction OR radiation	B1
6(a)(ii)	conduction	B1
6(a)(iii)	convection	B1
6(b)(i)	any THREE from: hot water in each can same volume of water in each can/same temperature thermometer/radiation detector placed near can or seen on labelled diagram thermometer/radiation detector at same distance from each can measure temperature (change) on each thermometer	B3
6(b)(ii)	bigger / faster temperature change from better emitter	B1

Question	Answer	Marks
7(a)	Any one from: angle of incidence is greater than the critical angle light is travelling from a(n optically) more dense medium to(wards an optically) less dense medium (at a large angle)	B1
7(b)(i)	dispersion	B1
7(b)(ii)	From A to B: red, orange, yellow, green, blue, indigo, violet	B1
7(c)	correct name for any part of em spectrum other than visible light	M1
	correct use of named part of em spectrum	A1

Question	Answer	Marks
8(a)(i)	(principal) axis ignore X-axis	B1
8(a)(ii)	F marked near intersection of ray and principle axis	B1
8(b)(i)	Either: ray from top of object towards centre of lens	B1
	continues from centre and crosses initial ray	B1
	OR 1st ray through F on left of lens (needs to be added by candidate)	(B1)
	2nd ray parallel to principle axis and crosses initial ray	(B1)
8(b)(ii)	inverted arrow drawn from axis to point where rays cross	B1
8(b)(iii)	diminished circled	B1
	inverted circled	B1

Question	Answer	Marks
9(a)(i)	variable resistor	B1
9(a)(ii)	connect material in gap/between X and Y	B1
	if reading on ammeter material is a(n electrical) conductor	B1
9(a)(iii)	BOTH copper AND gold ticked i.e. 2nd and 4th boxes	B1
9(b)(i)	<u>voltmeter</u>	B1
9(b)(ii)	$V = IR$ OR $(R =) V/I$	C1
	= $6.0 \div 0.$	C1
	= $30 (\Omega)$	A1

Question	Answer	Marks
10(a)	any 3 from: earth wire is connected to metal case earth wire has low resistance large current in earth wire fuse in live wire fuse (heats up and) melts this disconnects case/computer/circuit from supply (and so protects user)	B3
10(b)	$(V_p / V_s) = (N_p / N_s)$ in any form	C1
	$240 / 12 = 3000 / N_s$ OR $N_s = 3000 \times (12/240)$ OR $N_s = 3000 / 20$	C1
	150 (turns)	A1

Question	Answer	Marks
11(a)	1 mark for each correct column	
	(type of radiation): gamma in top box beta in bottom box	B1
	charge: -1 (in bottom box)	B1
	mass: 4 (in middle box)	B1
	nature: electron (in bottom box)	B1
11(b)	line on graph from 4500 to curve OR from 8000 and 4000	C1
	line on graph from curve to 23 minutes OR from curve to 4 minutes AND 27 minutes	C1
	23(minutes)	A1

Question	Answer	Marks
12(a)	pointer deflects to the left	B1
	(then pointer) returns to zero reading	B1
12(b)	any three from: (magnet has a) magnetic field conductor/coil cuts magnetic field (this) induces or produces emf/voltage/p.d. in the conductor/coil (so reading on meter) no cutting of field when far from coil (so no reading on meter)	B3