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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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Question	Answer	Marks
1(a)	2nd line – advantage	B1
	3rd line – advantage	B1
	4th line – disadvantage	B1
1(b)	any three from: (cold) water is pumped into the ground warm rocks heat water / hot water turns to steam / water boils (steam) drives or turns or moves turbine (turbine) drives or turns or moves generator	B3

Question	Answer	Marks
2(a)	A – accelerates (from rest)	B1
	B – constant speed (of 2 m / s)	B1
	C – accelerates at faster rate / higher acceleration than previously	B1
	D – faster constant speed (of 10 m / s)	B1
2(b)	2 minutes = 120 s	C1
	area under the graph OR $d = s \times t$ OR 2×120	C1
	240 (m)	A1

Question	Answer	Marks
3(a)(i)	$D = M / V$	C1
	450 / 145	C1
	3.1 (g / cm ³)	A1
3(a)(ii)	$W = m \times g$ in any form	C1
	0.45×10	C1
	4.5 (N)	A1
3(b)	$P = F / A$ in any form	C1
	30 / 80	C1
	0.375 (N / cm ²) OR 0.38 (N / cm ²)	A1

Question	Answer	Marks
4(a)	(gravitational) <u>potential</u> (energy)	B1
4(b)	arrow at the lowest point of swing	B1
4(c)	friction / air resistance / drag	B1
4(d)	any three from: cabin has kinetic energy two surfaces rub together / friction thermal energy generated / KE transferred to thermal dissipated to surroundings / air	B3

Question	Answer	Marks
5(a)	<u>insulator</u>	B1
5(b)	Any five from: conduction / slow or limited transfer of thermal energy molecules move slower / lose kinetic energy convection stated as (drink cools) volume decreases density (of cooler drink) increases cooler water falls evaporation (of hot water) more energetic molecules escape / less energetic molecules remain	B5

Question	Answer	Marks
6(a)	normal correctly positioned	B1
6(a)(ii)	correct reflected ray at 45° to normal	B1
6(a)(iii)	<i>r</i> correctly indicated	B1
6(a)(iv)	angle <i>i</i> = angle <i>r</i>	B1
6(b)	parallel to the incident ray at P	B1
6(c)	F correctly labelled / 10 cm from lens	B1
	<u>10 (cm)</u>	B1

Question	Answer	Marks
7(a)	<u>green</u> and <u>indigo</u>	B1
7(b)	<u>radio</u> and <u>microwaves</u>	B1
	<u>infra-red</u>	B1
7(c)	damages cells / heats cells	B1
7(d)	reduced exposure / leave room / move far away	B1
	metal apron / exposure badge / metal shielding	B1

Question	Answer	Marks
8(a)	1st row tick under orbiting the nucleus	B1
	2nd row tick under in the nucleus	B1
	3rd row tick under in the nucleus	B1
8(b)(i)	<u>6</u>	B1
8(b)(ii)	<u>13</u>	B1
8(c)(i)	same proton / atomic number	B1
	different nucleon number / number of neutrons / mass number	B1
8(c)(ii)	any acceptable isotope with proton number of 6	B1

Question	Answer	Marks
9(a)(i)	steel	B1
9(b)(i)	variable resistor indicated	B1
9(b)(ii)	(steel) bar inside coil	B1
	switch closed OR current increased through coil	B1
	bar moved through coil (in same direction) OR current decreased and switch opened	B1
9(c)	at least one complete correct field line through and above coil	B1
	at least one complete correct field line through and below coil	B1

Question	Answer	Marks
10(a)(i)	<u>25.6</u> (Ω)	B1
10(a)(ii)	$V = IR$ in any form	C1
	0.23×5.6	C1
	1.29 OR 1.3	A1
10(b)	resistance decreases	B1
	current increases	B1

Question	Answer	Marks
11(a)	$N_1/N_2 = V_1/V_2$	C1
	$(49/900) \times 220$ OR use of ratios seen	C1
	11.98 OR 12 (V)	A1
11(b)	copper	B1
11(c)	d.c. is in one direction only / a.c. changes direction	B1

Question	Answer	Marks
12(a)(i)	electric bell working owtte	B1
	no sound from bell / bell is quieter	B1
12(a)(ii)	any two from: sound will travel through air / glass sound will not cross a vacuum sound needs a medium to travel through	B2
12(a)(iii)	<u>vibrations</u>	B1
12(b)	20 Hz from first column	B1
	20 kHz from second column	B1