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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 **8** printed pages.

Question	Answer	Marks
1(a)	stopwatch or stopclock	B1
1(b)	improved accuracy	B1
1(c)(i)	circle around 3rd OR 3.55	B1
1(c)(ii)	$3.93 + 4.07 + 3.99 = 11.99$	C1
	$(11.99 \div 3 =) 4.0$ (s)	A1
1(c)(iii)	0.40 (s) OR (c)(ii) $\div 10$	B1

Question	Answer	Marks
2(a)	Any four from: Measure the distance between the two bridges Start stopwatch when stick hits water / starts moving (with river) stop stopwatch when stick reaches bridge Y Use speed = distance \div time repeat procedure and find average	B4
2(b)	2nd box ticked The forward force and the backward force are equal	B1

Question	Answer	Marks
3(a)	subtraction of forces to obtain resultant or 30 (N)	B1
	up(wards)	B1
3(b)	any five from: measure mass (on top pan balance) part fill measuring cylinder with water (and note volume) submerge link in measuring cylinder determine increase in volume increase in volume = volume of link use density = mass ÷ volume Only award full marks for a viable method	B5

Question	Answer	Marks
4(a)	1 solar / Sun	B1
	2 wind	B1
4(b)(i)	any two from: (renewable sources) are replaceable in a short time no (atmospheric) pollution conserves fossil fuels do not contribute to global warming no fuel costs	B2
4(b)(ii)	any one from: dilute source of energy owtte dependent on weather / intermittent supply	B1

Question	Answer	Marks
5(a)	solid	B1
5(b)	gas	B1
5(c)	liquid	B1
5(d)	gas	B1

Question	Answer	Marks
6(a)	ray leaves glass at top surface	B1
	ray refracted away from normal	B1
6(b)(i)	ray reflected into glass	B1
	angle $i =$ angle r by eye	B1
6(b)(ii)	total internal reflection	B1
6(c)	waves with arcs centred on gap	B1
	same wavelength	B1

Question	Answer	Marks
7(a)(i)	arrows horizontal / on line from radio to man	B1
	arrows in opposite direction	B1
7(a)(ii)	middle box ticked longitudinal	B1
7(a)(iii)	number in range 20–20 000	B1
	hertz	B1
7(a)(iv)	(frequency of ultrasound) is above human (hearing) range	B1
7(b)(i)	speed = dist ÷ time or any two corresponding values of distance ÷ time e.g. 600 ÷ 0.4	C1
	1500 (m / s)	A1
7(b)(ii)	900 (m) read from graph	C1
	depth = 450 (m)	A1

Question	Answer	Marks
8(a)	Any 3 from: compass placed near magnet direction of compass needle marked change position of compass repeat (above procedure) join points(to show field lines) owtte	B3
8(b)	complete curved lines drawn in correct pattern	B1
	No lines crossing / symmetrical pattern	B1
	Correct direction indicated by arrow	B1

Question	Answer	Marks
9(a)(i)	Thermistor correctly identified	B1
9(a)(ii)	correct symbol for voltmeter	B1
	Voltmeter in parallel with thermistor	B1
9(b)(i)	$V = IR$	C1
	$(R) = 6.0 \div 0.010$	C1
	600 (ohms or Ω)	A1
9(b)(ii)	Resistance is decreasing	B1
	So current will increase	B1
9(b)(iii)	Current greater than 0.04 (A)	B1
9(c)	700 (ohms or Ω)	B1

Question	Answer	Marks
10(a)(i)	Pointer(s) not on zero	B1
	Pointers in opposite directions	B1
10(a)(ii)	Any 2 from:	
	Increase speed of wire	B2
	wrap wire into a coil	
	Increase strength of magnet	
10(b)	$N_s/N_p = V_s/V_p$ OR $660 \div 60 = V_s \div 25\ 000$	C1
	V_s or output voltage = $(660 / 60) \times 25\ 000 = 11 \times 25\ 000$	C1
	275 000 (V)	A1
10(c)	Any 2 from:	
	Reduced energy / power losses	B2
	Smaller conductors needed	
	Reduced voltage drop (across cable)	

Question	Answer	Marks
11(a)(i)	84	B1
11(a)(ii)	126	B1
11(a)(iii)	84	B1
11(b)	beta and gamma OR gamma and beta	B1
11(c)	$0.4 \div 2 = 0.2$	C1
	AND $0.2 \div 2 = 0.1$ or 2×138	C1
	276 (days)	A1

Question	Answer	Marks
12(a)(i)	(They) emit <u>ionising</u> radiation	B1
	(which) damage DNA/cells/cause tumours/cancers	B1
12(a)(ii)	Any 2 from:	B2
	reduce exposure time	
	keep source at distance	
	use of suitable shielding	
	monitor exposure to radiation	