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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)	2 : 33 : 65 – 1 : 22 : 15 OR 153.65 – 82.15	1
	71.50 (s)	1
1(b)	4 × 20 OR 4000 × 20	1
	(average speed =) distance ÷ time	1
	80 000 ÷ 1600	1
	50 (m / s)	1
1(c)(i)	(section) P or from 0 s to 2.5 s	1
	(line has) greatest gradient	1
1(c)(ii)	dist travelled = area under graph OR $\frac{1}{2} \times b \times h$	1
	$\frac{1}{2} \times 2.5 \times 40$	1
	50 (m)	1

Question	Answer	Marks
2(a)	$W = m \times g$	1
	$50 \div 1000$ OR 0.05 seen	1
	0.5 (N)	1
2(b)	any 4 from: fix ruler vertically add weight/hanger to spring fix pin (horizontally) to (top/bottom) of weight hanger pin arranged so near ruler scale ensure load stationary eye level with pin to take reading (of length) determine extension for given load repeat for different loads	4

Question	Answer	Marks
3(a)(i)	$(D =) m \div v$ in any form	1
	$120 \div 16.0$	1
	$7.50 \text{ (g / cm}^3\text{)}$	1
3(a)(ii)	$10 \text{ (m / s}^2\text{)}$	1
3(b)(i)	(downward force) weight AND (upward force) air resistance/friction/drag	1
3(b)(ii)	$(1.2 - 0.3 =) 0.9 \text{ (N)}$	1

Question	Answer	Marks
4	moment = force $\times$ (perp.) distance (from pivot/bracket)	1
	25×90 or 25×0.9	1
	2250 or 22.5	1
	N cm or N m	1

Question	Answer	Marks
5(a)	$P = F \div A$ OR $(F =) P \times A$ in any form	1
	$20\,000 \times 0.009$	1
	1800 (N)	1
5(b)	pressure increases	1
	any two from: molecules move faster/have more ke collide harder/more often (with walls of can) (change in momentum due to) collisions impart(s) force on can walls	2

Question	Answer	Marks
6(a)(i)	80 – 56 OR 24(°C)	1
6(a)(ii)	20 – 18 or 2(°C)	1
6(b)	water hotter (at start)	1
	(so) greater temperature difference (between can and surroundings)	1
6(c)	(dull) black	1
	greater (rate of) loss of thermal energy (from dark colours) OR black or it is better radiator/emitter (of thermal energy)	1

Question	Answer	Marks
7(a)	(part A) radio	1
	(part B) visible/light	1
7(b)	transverse	1
7(c)(i)	IR/infra-red	1
7(c)(ii)	gamma OR γ OR X-rays OR ultraviolet	1

Question	Answer	Marks
8(a)(i)	Longitudinal	1
8(a)(ii)	Amplitude	1
8(a)(iii)	pitch	1
8(b)	frequencies (of sound)	1
	above 20 000 Hz	1

Question	Answer	Marks
9(a)	Any two from: pole of magnet placed on/near steel rod magnet stroked along rod owtte repeat strokes same direction	2
9(b)	place pole of rod next to a known magnet	1
	like poles repel	1
9(c)	accept iron loses magnetism easily owtte or reverse argument	1

Question	Answer	Marks
10(a)(i)	<u>variable resistor</u>	1
	change the current	1
10(a)(ii)	Any three from: use low value of current measure (and record) current measure (and record) voltage repeat other values (of I and V) plot graph of pd against current (and find gradient) OR use $V = I \times R$	3
10(b)(i)	$V = I \times R$ in any form OR $(I =) V \div R$	1
	$240 \div 21.8$	1
	11.0 (A)	1
10(b)(ii)	Answer in range 12 to 15 (A)	1

Question	Answer	Marks
11(a)	Correctly-drawn magnetic field around coil	1
	lines to start and end near coil/tube	1
	field line arrows point towards left hand of coil	1
11(b)	<u>electromagnet</u>	1
11(c)	(when switch S ₁ is closed there is a) current in the coil (of wire)	1
	(soft) iron (core) becomes magnetised/magnetic field created	1
	soft iron armature attracted (to core)	1
	contacts/A and B close/(motor) circuit completed/current in motor circuit	1

Question	Answer	Marks
12(a)	neutron	1
	electron	1
12(b)	upper row: 2 in both	1
	lower row: 1 in left box AND 3 in right box	1
12(c)(i)	weak(ly) penetrating	1
12(c)(ii)	Any two from: absorbed over a short distance large mass high charge highly ionising cause cell mutation/damage DNA (high risk) of developing cancer	2