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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)(i)	A AND B cars identified	B1
	A = fastest AND B = slowest	B1
1(a)(ii)	speed = distance ÷ time in any recognised form	C1
	50 ÷ 4	C1
1(b)(i)	12.5 (m / s)	A1
	100 × 3.6 OR 360 (s) indicated	C1
	answers in the range 5–7 minutes	A1
1(b)(ii)	any one from:	B1
	car will move faster / slower at times / speed not constant	
	road will have bends / hills etc.	
	slower moving traffic or other sensible road conditions	

Question	Answer	Marks
2(a)	measuring cylinder (partially filled) with water / displacement can filled with water	B4
	object (submerged) into water owtte	
	new volume noted / displaced water collected in measuring cylinder	
	(volume of object =) difference in volumes / volume of water collected	
2(b)	density = mass $\div$ volume written in any recognised form	C1
	347 $\div$ 18	C1
	19.28 OR 19.3 (g / cm ³)	A1

Question	Answer	Marks
3(a)	$w = m \times g$ in any recognised form	C1
	2250 / 10	C1
	225 (kg)	A1
3(b)(i)	moment = force $\times$ distance from pivot in any recognised form	C1
	400 $\times$ 0.4 OR 400 $\times$ 40	C1
	160 OR 16 000	A1
	Nm OR Ncm	B1
3(b)(ii)	apply force further from pivot owtte	B1

Question	Answer	Marks
4(a)(i)	elastic	B1
4(a)(ii)	elastic	B1
	kinetic	B1
4(a)(iii)	kinetic	B1
	thermal	B1
4(b)	pull band further back / exert greater force on band / increase elastic potential energy	B1

Question	Answer	Marks
5(a)	<u>Tyre B</u>	B1
	<u>larger / bigger surface area</u>	B1
	less pressure (on ground) / weight distributed	B1
5(b)	molecules gain kinetic energy / move faster	B1
	more (frequent) / harder collisions (with tyre)	B1
	Increased / greater pressure (on tyre)	B1

Question	Answer	Marks
6(a)(i)	mercury	B1
6(a)(ii)	arrow between 0 °C and start of capillary tube	B1
6(a)(iii)	0 (°C) AND 100 (°C)	B1
6(b)	<u>emitter</u>	B1
	<u>conductor</u>	B1
	<u>convection</u>	B1
	<u>radiation</u>	B1

Question	Answer	Marks
7(a)	wavelength correctly indicated	B1
7(b)	<u>12</u> (cm)	B1
7(c)	40 / 60	C1
	0.67 (Hz)	A1
7(d)	direction of travel perpendicular to direction of vibration owtte	B1
7(e)	any component of the electromagnetic spectrum	B1

Question	Answer	Marks
8(a)(i)	top ray passes through f_2	B1
	bottom ray passes through f_2	B1
	refraction correctly shown either at centre of lens OR at both edges of lens	B1
8(a)(ii)	C to f_2	B1
8(b)(i)	critical angle	B1
8(b)(ii)	ray internally reflected	B1
	reflecting angle = incident angle	B1

Question	Answer	Marks
9(a)	light travels faster than sound OR reverse argument	B1
9(b)	reflection (from building) / bouncing back (from building)	B1
9(c)	time taken for first sound = 0.5 s	C1
	Time taken for echo = 2.5 s OR time for sound to travel from hammer and return = 2.0 s	C1
	2.0 s	A1
9(d)	quieter / less amplitude / less energy	B1

Question	Answer	Marks
10(a)(i)	two curved field lines drawn above and below the magnet	B1
	lines start and finish at the poles of the magnet	B1
10(a)(ii)	both arrows point left	B1
10(a)(iii)	(plotting) compass	B1
10(b)	place end on end / see if attraction / repulsion occurs	B1
	repulsion at one end	B1

Question	Answer	Marks
11(a)	ammeter in series	B3
	voltmeter across wire	
	two cells correctly linked positive to negative	
11(b)	$V = IR$ in any recognised form	C1
	$R = 2.7 \div 0.3$	C1
	9 (Ω)	A1
11(c)	1 higher / more	B1
	2. lower / less	B1

Question	Answer	Marks
12(a)	Gamma	B1
12(b)	1 helium nuclei OR nuclide notation OR 2p, 2n	B1
	2 low / few cm of air / stopped by paper	B1
12(c)	2 half-life indicated	B1
	<u>25</u> (%)	B1