Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/43**

Paper 4 Extended Theory **May/June 2021**

MARK SCHEME

Maximum Mark: 80

Published

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[Turn over

Question	Answer	Marks
1(a)	(extension =) 15 cm	**A2**
	$F = kx$ **OR** $x = F/k$ **OR** 3.0/0.2	**C1**
1(b)	extension is proportional to load	**B1**
	up to the limit of proportionality, extension proportional to load	**B1**
1(c)	graph initially straight line with positive gradient that passes through the origin	**B1**
	point labelled, increasing gradient to the right	**B1**
1(d)	• from elastic / strain energy • to gravitational potential energy EITHER: • to kinetic energy, when moving from A to equilibrium OR from kinetic energy, when moving from equilibrium to B	**B3**

Question	Answer	Marks
2(a)(i)	pressure = force/area accept P inversely proportional to area	**B1**
	same force exerted by each group of books	**B1**
	area (in contact with bookshelf) in group B is greater OR area (in contact with bookshelf) in group A is smaller	**B1**
2(a)(ii)	(pressure =) 1900 Pa	**A3**
	force = $6 \times 0.52 \times 10$ OR 31(.2) seen	**C1**
	area = $6 \times 0.013 \times 0.21$ OR 0.016(38) seen OR 163.8 (cm^2)	**C1**

Question	Answer	Marks
2(b)	(depth =) 19 m	**A3**
	$p = \rho gh$ OR $(3.0 - 1.0) \times 10^5 = 1030 \times 10 \times h$ in any form	**C1**
	$h = (3.0 - 1.0) \times 10^5 / 1030 \times 10$ OR $h = 2.0 \times 10^5 / 1030 \times 10$	**C1**

Question	Answer	Marks
3(a)	thinking time is constant	**B1**
3(b)	kinetic energy	**B1**
	kinetic energy = $\frac{1}{2} mv^2$	**B1**
	work done (to lose KE) = Fd (so stopping distance is proportional to v^2)	**B1**
	OR (alternative route)	
	time to decelerate is proportional to v	**(B1)**
	d = average $v \times t = \frac{1}{2} v \times t$	**(B1)**
	d is proportional to v^2	**(B1)**
3(c)(i)	0.68 s	**A2**
	$t = d/v$ OR 15/22 in any form	**C1**
3(c)(ii)	15 000 N	**A2**
	Ft = change in momentum OR $F \times 2.1 = 1400 \times 22$ in any form OR $F = ma$ OR $(F =)(1400 \times 22)/2.1$)	**C1**

Question	Answer	Marks
4(a)(i)	Energy transferred when 1 kg / unit mass of a substance freezes or melts	**A2**
	Energy transferred when a substance freezes/melts/changes state	**C1**
4(a)(ii)	cup containing mixture of ice and water	**M1**
	mixture of ice and water will remain at 0 °C until all ice is melted (but temperature of water at 0 °C rises) or reverse argument OR energy needed for change of state so temperature doesn't rise until this has taken place	**A1**
4(b)(i)	in evaporation more – energetic / faster moving molecules / molecules with high(er) kinetic energy escape (from surface)	**B1**
	low(er) energy / slow molecules remain OR so remaining liquid is cooler	**B1**
	thermal energy is taken from person to liquid (so person cools down)	**B1**
4(b)(ii)	(great(er) / fast(er) evaporation of sweat as) wind blows fast moving molecules away OR molecules do not re-enter the liquid	**B1**

Question	Answer	Marks
5(a)(i)	part of a circle, at least quarter of a circle, centred on centre of gap	**B1**
	waves same wavelength as incident waves	**B1**
5(a)(ii)	waves pass through gap remaining straight	**B1**
	less / no diffraction occurs	**B1**
5(b)	1.8 m	**A2**
	$\lambda = v/f$ OR 1500/850 in any form	**C1**

Question	Answer	Marks
6(a)	principal focuses marked in correct position	**B1**
6(b)	1 mark for each of: • 1 correct ray • 2nd correct ray • 3rd correct ray and image, labelled I, in correct position with arrow at bottom	**B3**
6(c)	real	**B1**
	inverted and enlarged	**B1**
6(d)(i)	(image produced by a magnifying glass is) upright OR NOT inverted OR virtual	**B1**
6(d)(ii)	position marked between principal focus and lens	**B1**

Question	Answer	Marks
7(a)	energy supplied	**M1**
	to drive a unit charge / 1 C round a complete circuit	**A1**
7(b)(i)	(R =) 2.3 Ω OR 2.2 Ω	**A3**
	$R = V/I$ in any form	**C1**
	current in R = 4 (A) OR p.d. across R = 9 (V)	**C1**
7(b)(ii)	1.1 Ω	**A3**
	resistance proportional to length (so twice length twice resistance)	**C1**
	resistance inversely proportional to area (so twice diameter decreases resistance by factor of 4)	**C1**

Question	Answer	Marks
8(a)	digital signal only two states – low or high OR 0 or 1	**B1**
	analogue signal any value	**B1**
8(b)	 correct symbol for NOR gate	**B1**
8(c)(i)	AND	**B1**
	OR	**B1**
8(c)(ii)	rows 1, 2, 5, 6 all 1	**B1**
	rows 3, 4, 7, 8 all 0	**B1**

Question	Answer	Marks
9(a)	(N_S =) 24 000	**A2**
	$N_S = N_P \times V_S/V_P$ OR $50 \times 110 \times 10^3$ / 230 in any form	**C1**
9(b)	labelled diagram showing: • (soft)-iron core • copper coils • fewer coils on secondary than primary	**B3**
9(c)	alternating voltage in primary	**B1**
	alternating / varying / changing magnetic field (in iron core)	**B1**
	voltage is induced in the secondary coil	**B1**

Question	Answer	Marks
10(a)(i)	curve bending downwards while in magnetic field (and labelled α)	**B1**
10(a)(ii)	curve bending in opposite direction from α while in magnetic field **OR** up the page if no curve shown for α in **(a)(i)** (and labelled β)	**B1**
	greater curvature for β than for α	**B1**
10(a)(iii)	line passing straight through magnetic field (and labelled γ)	**B1**
10(b)	any **two** from: • stand behind shielding provided / wall / as far away as possible • store in lead-lined boxes • limit exposure time / (monitoring exposure) with film badge • do not allow pregnant staff to work	**B2**
10(c)(i)	$^{131}_{53}\mathrm{I}$	**B1**
10(c)(ii)	any **two** from: • γ can be detected outside body • needs long enough half-life to be detected / reach part of the body required • needs short enough half-life to soon have very little activity • gamma weakly ionising or pass out of body without harm	**B2**