



Cambridge IGCSE™

PHYSICS**0625/42**

Paper 4 Extended Theory

May/June 2021

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **11** printed pages.

Question	Answer	Marks
1(a)	same (as density of surrounding air)	B1
1(b)(i)	falls	B1
1(b)(ii)	volume decreases	B1
	density increases	B1
1(c)(i)	starts at origin	B1
	finishes horizontal by eye	B1
	gradient decreasing smoothly to 0	B1
1(c)(ii)	10 m / s ² (down)	B1
	0 ignore any unit	B1

Question	Answer	Marks
2(a)	force $\times$ <u>perpendicular</u> distance from pivot / point	B1
2(b)	($F_1 d_1 = F_2 d_2 =$) $500 \times 20 = F \times 12$ numbers substituted in any form	C1
	($F = 10\,000 / 12 =$) 830 N	A1

Question	Answer	Marks
2(c)	clear diagram or description (of object) with pivot and <u>vertical</u> forces / weights / masses / cord tension causing moments in each direction	B1
	indicate / measure forces and perpendicular distances	B1
	calculates a moment or shows / describes how to AND confirms equality of total moment (in each direction) AND statement of equilibrium / balance	B1

Question	Answer	Marks
3(a)	(PE loss =) mgh AND (KE gain =) $\frac{1}{2}mv^2$	B1
	PE (loss) = KE (gain)	B1
	alternative route 1 for 1 st two m.p.s	
	$v^2 = u^2 + 2as$	(B1)
	$u = 0$	(B1)
	alternative route 2 for 1 st two m.p.s	
	$s = ut + 0.5at^2$ OR $h = 0.5gt^2$	(B1)
	$u = 0$ AND $t = \sqrt{3}$ OR 1.73	(B1)
	$v^2 (= 2gh) = 2 \times 10 \times 15$ OR $v^2 = 300$ OR $v = 10\sqrt{3}$ OR $v = 10 \times 1.73$	B1
	$\{v = 17 \text{ m/s AND } v^2 = 300 \text{ or } v = 10\sqrt{3}\}$ OR $v = 17.3(2) \text{ m/s}$	B1

Question	Answer	Marks
3(b)	(F =) change of p / (change of) time OR rate of change of momentum	C1
	(F =) 30×17.32	C1
	(F =) 520 N	A1

Question	Answer	Marks
4(a)(i)	random / haphazard / zig-zag / irregular	B1
4(a)(ii)	(liquid / water) <u>molecules</u> move fast OR (pollen) <u>particles</u> massive	B1
	collide / bombard	B1
	uneven collisions / collisions from different directions (cause random movement) OR (liquid / water) <u>molecules</u> move randomly	B1
4(b)(i)	cooling	B1
	(thermal) energy used / needed to evaporate (ethanol) / overcome attractive forces (between molecules / particles)	B1
	thermal energy taken from skin / patient / person	B1
	alternative route for last two m.p.s	
4(b)(ii)	more / most energetic (liquid) molecules / particles escape OR less / least energetic (liquid) remain	(B1)
	less / least energetic molecules / particles linked to lower temp (of skin)	(B1)
	greater / increases / faster / higher	B1

Question	Answer	Marks
5(a)	air good insulator / poor conductor	B1
	holder / it stops / reduces conduction OR no / less thermal energy conducted (to hand)	B1
	temperature (of outside of holder) lower (than cup) OR less energy to skin / hand / person	B1
5(b)	(put a) lid / cover (on cup)	B1
	mention of convection	B1
	less / no convection (from surface)	B1
	alternative route for last 2 m.p.s	
	mention of evaporation	(B1)
	less / no evaporation (from surface / container)	(B1)
5(c)	radiation	B1

Question	Answer	Marks
6(a)	blue ray refracted MORE towards normal at first surface	B1
	refraction away from normal at second surface	B1
	ray of blue light below ray of green light and diverging throughout path (after entering prism)	B1
6(b)	$v = f\lambda$ in any form OR $(f=) v / \lambda$	C1
	$(f =) 3 \times 10^8 \div 4.8 \times 10^{-7}$	C1
	$(f =) 6.3 \times 10^{14}$ Hz	A1

Question	Answer	Marks
7(a)	3 lines from N face to S face middle line must be straight AND perpendicular to end faces	B1
	at least 1 arrow from N to S AND NO arrows from S to N	B1
7(b)(i)	needle perpendicular to end faces AND {arrow pointing to S OR correctly labelled N OR S}	B1
7(b)(ii)	compass / needle / it aligns with field OR compass / needle / it points in direction of magnetic field OR compass / needle / it points to S(outh)	B1
	N pole of needle attracted to S of magnet(s) OR N pole repelled by N of magnets OR unlike poles attract / like poles repel	B1
7(c)	heat OR hammer	B1
	with magnet lying (magnetically) E – W	B1
	OR place in coil / solenoid with a.c.	(M1)
	withdraw OR reduce current to 0	(A1)

Question	Answer	Marks
8(a)(i)	α in Box 4 / towards bottom of page	B1
	γ in Box 3 / no deflection	B1
8(a)(ii)	α in Box 1 / into page	B1
	γ in Box 3 / no deflection	B1

Question	Answer	Marks
8(b)(i)	clockwise accept rotation arrow on diagram	B1
	force on L wire up / up arrow on L wire labelled force on diagram	B1
	force on RH wire down / down arrow on R wire labelled force on diagram	B1
8(b)(ii)	none / zero (moment)	B1
8(b)(iii)	current in coil reverses OR changes direction	B1
	force(s) (on wires in new positions) still up on L OR down on R owtfte	B1

Question	Answer	Marks
9(a)	anti-clockwise arrow labelled (conventional) current somewhere in circuit	B1
	electron (flow) arrow opposite to (conventional) current	B1
9(b)	$Q = It$ in any form or $(Q =) It$ OR 13×1	C1
	$(Q = It =) 13 \times 1 (= 13 \text{ C})$	C1
	$(n = 13 / 1.6 \times 10^{-19} =) 8.1 \times 10^{19}$	A1

Question	Answer	Marks
10(a)	$V = IR$ in any form or $(R =) V / I$	C1
	$(R = 9.2 / 0.004 =) 2300 \Omega$	A1

Question	Answer	Marks
10(b)	(much) greater current in lamp OR lamp activated / lights / glows / gets brighter owtte	B1
	resistance of <u>thermistor</u> / <u>component</u> / <u>K</u> reduced (compared to value at (very) low temperature)	B1
	voltage / p.d. of point X / across R increases	M1
	(larger) current in lamp	A1
10(c)	thermistor	B1

Question	Answer	Marks
11(a)(i)	(initial CR adjusted for background = $220 - 20 =$) 200	C1
	(after 1 half-life CR adjusted for background =) 100 OR (detected CR) = 120	C1
	2.4 min	A1
	12 or 13	C1
11(b)	($12 + 20 =$) 32 OR ($13 + 20 =$) 33	A1
	incorrect	B1
	container / (2 mm) plastic does not absorb / stop / block / is penetrated by γ	B1
	good extra detail e.g. any one of: • container / (2 mm) plastic absorbs / stops α • partially correct as statement • need lead to stop γ • γ is dangerous / harmful owtte	B1