



Cambridge IGCSE™

PHYSICS

0625/42

Paper 4 Theory (Extended)

March 2021

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **10** printed pages.

Question	Answer	Marks
1(a)	78 N	A3
	$(m=) \rho V$ OR $\rho = m / V$ in any form	C1
	$W = mg$	C1
1(b)	4.5×10^3 N	A3
	$(F=) (\Delta) PA$ OR $P = F / A$ in any form	C1
	$(\Delta P = 1.3 \times 10^5 - 1.0 \times 10^5 =) 3 \times 10^4$	C1
	outwards	B1
1(c)	$(\rho =) 800 \text{ kg / m}^3$	A3
	$(\rho =) P / gh$ OR $P = \rho gh$ in any form	C1
	$(\rho =) 9.6 \times 10^4 / (10 \times 12)$	C1

Question	Answer	Marks
2(a)(i)	(moment of a force) is the turning effect (about a point / pivot)	B1
2(a)(ii)	$2.8 \times 10^6 \text{ Nm}$	A2
	(moment =) Fd in any form	C1
2(b)(i)	scalar / speed has magnitude <u>only</u> OR scalar / speed has no direction	B1
	vector / velocity has magnitude and direction	B1
2(b)(ii)	any scalar quantity	B1
	any vector quantity	B1

Question	Answer	Marks
2(c)	correct triangle or parallelogram drawn	B1
	resultant force (including correct arrow)	B1
	scale 1 cm = 4 N or 1 cm = 5 N	B1
	40–47 N AND 33°–40° (anticlockwise from 20 N)	B1

Question	Answer	Marks
3(a)	renewable / yes	B1
	crops can be regrown (to replace resource) / waste materials don't run out	B1
3(b)	water will cool (too much) / thermal energy lost (during transfer)	B1
	lag/insulate (pipes) OR transport in a poor conductor of thermal energy	B1
3(c)	any two from:	B2
	• air pollution / harmful gases / acid rain • CO₂ / greenhouse gases / contribution to global warming • not renewable • damage from mining / drilling or any valid environmental consequence of transport of coal	

Question	Answer	Marks
4(a)	molecules strike walls	B1
	momentum (of molecules) changes / momentum = mass × velocity	B1
	force = rate of change of momentum	B1
	pressure = (sum of) force(s) / area / pressure = rate of change of momentum / area	B1

Question	Answer	Marks
4(b)(i)	$(p_2 =) p_1 V_1 / V_2$	A2
	$p_1 V_1 = p_2 V_2$	C1
4(b)(ii)	<u>greater</u>	B1
	molecules move <u>faster</u> / have <u>greater</u> KE / molecules have <u>greater</u> momentum	B1
	(leads to) <u>more</u> frequent / <u>harder</u> collisions (with walls) / great rate of change of momentum	B1

Question	Answer	Marks
5(a)	echo	B1
5(b)	$(\lambda =) 7.5 \times 10^{-4} \text{ m}$	A3
	$(\lambda =) v / f$ OR $v = f\lambda$ in any form	C1
	$(\lambda =) 1.5 \times 10^3 / 2 \times 10^6$	C1
5(c)(i), (ii)	labelled wavelength of incident wave	B1
	3 part circles to the left of the barrier and centred to right of the barrier	B1
	wavelengths of reflected and incident waves same	B1

Question	Answer	Marks
6(a)	Any two correct rays from - from O through optical centre (and beyond) - from O parallel to principal axis to centre line of lens then through F_1 - from F_2 through O to centreline of lens then parallel to principal axis	M2
	rays traced back to intersect AND 2.4 – 3.6 cm	A1
6(b)	magnified	B1
	same way up as object	B1
	virtual	B1
6(c)	one ray from each prism refracted towards principal axis	B1
	(rays) converge to the right of original convergence on the principal axis	B1

Question	Answer	Marks
7(a)	no cutting of (magnetic) flux / <u>magnetic</u> field	B1
7(b)	to the top of the page / RH box	B1
	current, motion and (magnetic) field mutually at right angles	B1
	(magnetic) field from left to right	B1
7(c)(i)	opposite current (direction) / opposite deflection (on ammeter)	B1
7(c)(ii)	greater current / deflection	B1

Question	Answer	Marks
8(a)	<u>energy</u> supplied by a source in driving charge around a complete circuit / <u>energy</u> needed to drive unit charge / 1 coulomb round circuit	B1
8(b)(i)	$(P=)$ 90 W	A3
	$(P=)$ VI in any form	C1
	$(V/R \text{ OR } I=)$ 2	C1
8(b)(ii)	(p.d. =) 15 V	A2
	(p.d. =) 60 – 45	C1
	$(I = 15 / 10 =)$ 1.5 A	A2
8(b)(iii)	$(I =)$ V/R OR $V = IR$ in any form	C1

Question	Answer	Marks															
9(a)	<table><tr><td>I/P</td><td>I/P</td><td>O/P</td></tr><tr><td>0</td><td>0</td><td></td></tr><tr><td>0</td><td>1</td><td></td></tr><tr><td>1</td><td>0</td><td></td></tr><tr><td>1</td><td>1</td><td></td></tr></table>	I/P	I/P	O/P	0	0		0	1		1	0		1	1		B1
I/P	I/P	O/P															
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I/P	I/P	O/P															
0	0	0															
0	1	1															
1	0	1															
1	1	1															
9(b)	two inputs to curved face, sharp end with small circle and one output	B1															

Question	Answer	Marks
9(c)(i)	1 0 1 0	
9(c)(ii)	AND	B1
	input 1 and 1 gives output 1	B1
	any 0 input gives 0 output	B1

Question	Answer	Marks
10(a)	2	B1
	4	B1
	+2	B1
10(b)	${}_{38}^{90}\text{Sr} \rightarrow {}_{39}^{90}\text{Y} + {}_{-1}^0\beta$	
	nucleon numbers 90 on both sides of equation	B1
	Sr and proton number 38 on left AND Y and proton number 39 on right	B1
	${}_{-1}^0\beta$ (to right of arrow)	B1
10(c)	(original mass = $4 / 9.2 =$) 37 mg	A2
	2 half-lives	C1