

Cambridge IGCSE™

PHYSICS	0625/31
Paper 3 Theory (Core)	October/November 2022
MARK SCHEME	
Maximum Mark: 80	

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Question	Answer	Marks
1(a)	21 (cm ³)	B1
1(b)	0.2(0) (cm ³)	A4
	(average volume of one drop) = $4(.0) / 20$	C3
	(volume = $25 - 21 =$) $4(.0)$ (cm ³)	C1
	total volume = number of drops $\times$ (average) volume of one drop	C1
1(c)	any four from: • measure volume of water (in a measuring cylinder) • add metal to water in the measuring cylinder • so that metal is completely submerged • measure (new) volume of water in a measuring cylinder (with metal) • find the difference between the two volumes.	B4

Question	Answer	Marks
2(a)	300 (N)	A2
	(resultant force =) force to right – force to left OR 1200 – 900	C1
	to the right OR in forward direction	B1
2(b)(i)	7.20 (s)	B1
2(b)(ii)	16 (m / s)	A3
	200 / 12.8	C2
	(average speed =) (total) distance / (total) time in any form	C1
2(c)	48 (m)	A3
	$\frac{1}{2} (6 + 18) \times 4.0$ OR $6 \times 4 + \frac{1}{2} \times 12 \times 4$	C2
	distance = area under graph OR area = $\frac{1}{2}$ (sum of parallel sides) $\times$ base	C1

Question	Answer	Marks
3(a)	6000 (Ncm)	A3
	(moment of force =) 200×30	C2
	(moment of force =) force $\times$ (perpendicular) distance (of force from pivot)	C1
3(b)(i)	any two from: - chemical energy to (gravitational) potential energy (of sail) - chemical energy to kinetic energy - kinetic energy (of winch) to kinetic energy (of rope / sail) - kinetic energy (of rope / sail) to (gravitational) potential energy (of sail).	B2
3(b)(ii)	chemical energy OR kinetic energy to thermal OR sound (energy)	B1

Question	Answer	Marks
4(a)	(weight =) 50 (N)	A2
	(weight =) mass $\times g$ OR 5×10	C1
4(b)	75 (J)	B1
4(c)	3.9	A4
	$280 / 72$	C3
	($P =$) F / A OR (pressure =) force / area	C1
	(area = $4 \times 18 =$) 72 (cm ²)	C1
	N / cm ²	B1

Question	Answer	Marks
5(a)(i)	880 (mm Hg)	A3
	(180 – 60 =) 120 (mm Hg)	C2
	(left tube =) 60 (mm Hg) AND (right tube =) 180 (mm Hg) seen	C1
5(a)(ii)	(U-tube) manometer	B1
5(b)(i)	any two from: - molecules in air moving at high speed / kinetic energy - molecules collide with cylinder OR wall (of cylinder) OR piston - force of collisions (per unit area) cause pressure.	B2
5(b)(ii)	smaller / lower pressure (on cylinder)	B1
	(because) reduced rate of collisions OR fewer collisions with cylinder OR wall (of cylinder) OR piston (per unit area)	B1

Question	Answer	Marks
6(a)(i)	refraction	B1
6(a)(ii)	wavelength	M1
	(of) waves (in shallow water) is shorter / smaller ORA	A1
	OR	
	speed	(M1)
	(of) waves / wavefronts (in shallow water) is slower ORA	(A1)
6(b)	2.5 (Hz)	A3
	25 / 10	C2
	(frequency =) number of (complete) waves sent out OR passing a point in one second / unit time OR 1 Hz is 1 wave in one second OR no. of waves ÷ time taken	C1
6(c)(i)	any electromagnetic wave OR an S-wave	B1
6(c)(ii)	(particle vibrations are) perpendicular / at right angles	B1
	to the direction of propagation / wave travel / energy transfer	B1

Question	Answer	Marks
7(a)	any two from: (bar XY) is a (permanent) magnet (because) end X is repelled (by magnet/S pole) (so) end X is a S pole.	B2
7(b)	(plotting) compass placed at one point on / near magnet	B1
	(repeatedly mark and) move compass in direction of arrow	B1
	start from different positions (to show pattern)	B1

Question	Answer	Marks
8(a)	5 correct symbols for 3 marks 3 or 4 correct symbols for 2 marks 1 or 2 correct symbols for 1 mark any from: - correct symbol for battery - correct symbol for ammeter - correct symbol for lamp - correct symbol for fixed resistor - correct symbol for switch.	B3
	all components drawn connected in a series circuit	B1
8(b)	electrons	B1
8(c)	6(.0) (V)	A3
	0.40×15	C2
	$(V =) I \times R$ OR $R = V/I$	C1

Question	Answer	Marks
9(a)(i)	protects (transformer / wiring) from fire / overheating	B1
9(a)(ii)	any two from: • large current (in fuse) • (causes) fuse to melt • (and so) prevents current in appliance OR breaks circuit OR isolates appliance from supply.	B2
9(b)	110 (V)	A3
	$V_s / 230 = 150 / 314$ OR $V_s = (150 / 314) \times 230$ OR $V_s = 230 / 2.093$ OR $150 / 314 = ? / 230$	C2
	$V_s / V_p = N_s / N_p$	C1
9(c)(i)	(soft) iron	B1
9(c)(ii)	copper	B1
9(c)(iii)	fewer turns on output / secondary (than on input coil)	B1

Question	Answer	Marks																											
10(a)	4 correct ticks for 3 marks 2 or 3 correct ticks for 2 marks 1 correct tick for 1 mark	B3																											
	<table><tr><td rowspan="2">characteristic</td><td colspan="3">type of radiation</td></tr><tr><td>α (alpha)-particles</td><td>β (beta)-particles</td><td>γ (gamma)-rays</td></tr><tr><td>electromagnetic wave</td><td></td><td></td><td>(✓)</td></tr><tr><td>least ionising</td><td></td><td></td><td>✓</td></tr><tr><td>least penetrating</td><td>✓</td><td></td><td></td></tr><tr><td>a helium nucleus</td><td>✓</td><td></td><td></td></tr><tr><td>negatively charged</td><td></td><td>✓</td><td></td></tr></table>		characteristic	type of radiation			α (alpha)-particles	β (beta)-particles	γ (gamma)-rays	electromagnetic wave			(✓)	least ionising			✓	least penetrating	✓			a helium nucleus	✓			negatively charged		✓	
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10(b)	241	B1																											
	(Pu)																												
	94	B1																											
10(c)	$2(.0) \times 10^{12}$ (atoms)	A3																											
	$8(.0) (\times 10^{12}) / 4$ OR $8(.0) (\times 10^{12}) \times \frac{1}{2} \times \frac{1}{2}$	C2																											
	28 years = 2 half-lives OR 28 years / 14 = 2 (half-lives)	C1																											