Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

PHYSICS **0625/42**

Paper 4 Extended Theory **May/June 2019**

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.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)	(A and B) decreasing acceleration	**B1**
	(B and C) moving forwards at constant speed	**B1**
	(C and D) constant acceleration	**B1**
1(b)	(average) speed = distance/time OR $v = s/t$ in any form OR (s =) (average) speed × time OR $v \times t$ OR area under graph stated or used	**C1**
	(s =) 23 × 2/60	**C1**
	0.77 km round candidates response to 2 sfs	**A1**
1(c)	horizontal line starting at t = 2.0 min AND at speed = 0 for 1 minute	**B1**
	line of constant positive gradient starting at t >= 2.0 min NOT wrong labels X OR Y	**B1**
	for 30 seconds line continuously rising	**B1**

Question	Answer	Marks
2(a)	(Δ) p=mv in any form OR ((Δ)p=) mv OR 0.8 × 0.72	**C1**
	(Δp=) 0.58 kg m/s	**A1**
2(b)	Ft= Δp in any form OR (F=) Δp/t OR 0.58/6	**B1**
	(F=) 0.096 N accept rounding if 0.096 seen	**B1**

Question	Answer	Marks
2(c)	Statement: (acceleration is) to right/backward	**B1**
	Explanation: force (from water OR on model) to right /backwards OR acceleration in same direction as force (from water OR on model)	**B1**
2(d)	(acceleration) more (when empty)	**B1**
	mass less (and force is constant)	**B1**
	meaningful reference to F=ma / Newton's 2nd law / change in momentum	**B1**

Question	Answer	Marks
3(a)	light	**B1**
3(b)(i)	no air pollution/CO_2/acid rain/greenhouse gases/global warming/harmful gases OR no damage from mining/drilling	**B1**
	visual pollution/use of land/pollution during manufacture	**B1**
3(b)(ii)	yes/renewable AND nothing used up o.w.t.t.e.	**B1**
3(c)	(P_i =1.2 × 2.8 × 260 =) 870 (W)	**C1**
	(P_o = 2.5 × 86 =) 220 (W)	**C1**
	(efficiency =){P_o/P_i} × 100 in any form OR {P_o/P_i} × 100	**C1**
	(efficiency = {220/870} × 100 =) 25 (%)	**A1**

Question	Answer	Marks
4(a)	pressure increases	**B1**
	any **two** from : • molecules travel shorter (average) distance between collisions with <u>walls</u> NOT molecules change speed • molecules hit <u>walls</u> more often OR more collisions (per unit area) <u>with walls</u> • {greater force OR greater (rate of) change of momentum of molecules} per unit area on <u>walls</u>	**B2**
4(b)	1st box **gas**	**B1**
	2nd box **solid**	**B1**

Question	Answer	Marks
5(a)(i)	boiling	**B1**
5(a)(ii)	evaporation	**B1**
5(b)(i)	$E=mc\Delta T$ in any form OR (E=) $mc\Delta T$ OR (E=) $2.7 \times 900 \times 18$	**C1**
	44 000 (J)	**A1**
	E=Pt in any form OR (P=) E/t OR (P=) 43 740/150	**C1**
	(P=) 290 W	**A1**
5(b)(ii)	lagging/insulation/named insulator (around/on block)	**M1**
	reduction of thermal energy/heat losses	**A1**

Question	Answer	Marks
6(a)(i)	refraction	**B1**
6(a)(ii)	(waves move) faster (in region B) OR slower in region A	**B1**
6(b)	at least one complete cycle with half the amplitude	**B1**
	at least one complete cycle shorter time period	**B1**
6(c)(i)	sound travels faster in steel/metal/solid/the rail (than in air)	**B1**
6(c)(ii)	$v = f\lambda$ in any form OR (λ =) v/*f* OR (λ =) 5800/1100	**C1**
	(λ =) 5.3 m	**A1**

Question	Answer	Marks
7(a)	both rays straight to left of lens AND top ray bends clockwise AND bottom ray bends anti-clockwise	**B1**
	both rays converge to meet on the centreline at the screen	**B1**
7(b)	both rays straight to left of lens AND top ray bends clockwise less than in **(a)** AND bottom ray bends anti-clockwise less than in **(a)**	**B1**
	both rays converge and/would meet beyond screen	**B1**
7(c)(i)	object closer to lens than one focal length	**B1**
7(c)(ii)	(image) same side (of lens as object) OR image further from lens (than object)	**B1**

Question	Answer	Marks
7(c)(iii)	1 from 3 of : (image) enlarged/magnified, upright / goes up, virtual	**B1**
	all 3: (image) enlarged, upright, virtual	**B1**

Question	Answer	Marks
8(a)	bring (charged) rod close to sphere / touching sphere	**B1**
	earth sphere or equivalent	**B1**
	remove earth (connection) AND keep rod close to sphere (until earth removed) o.w.t.t.e.	**B1**
8(b)	light emitting diode OR LED	**B1**
8(c)	correct labelling of I/P and O/P, all I/P numbers correct in any order	**B1**
	all 4 rows of numbers correct, in any order	**B1**
8(d)	column D correct	**B1**
	1st two rows of E correct	**B1**
	2nd two rows of E correct	**B1**

Question	Answer	Marks
9(a)	place magnet in coil	**B1**
	EITHER	
	(gradually) withdraw magnet…	**B1**
	…with ac (in coil) switched on	**B1**
	OR	
	reduce current…	**(B1)**
	…to zero	**(B1)**
9(b)(i)	keeps coil rotating (in the same direction) o.w.t.t.e.	**B1**
	by changing direction of current (in the coil)	**B1**
	every half cycle/180 degrees	**B1**
9(b)(ii)	(coil rotates) faster	**B1**

Question	Answer	Marks
10(a)	$1/R_p = 1/R_1 + 1/R_2$ OR (R_p =) $1/(1/R_1 + 1/R_2)$ OR (R_p =) $R_1R_2/(R_1 + R_2)$ OR $(0.2 \times 0.3)/ (0.2 + 0.3)$ OR 0.6×0.2	**C1**
	(R_p =) 0.12 (Ω)	**C1**
	(R_t = 0.12 Ω + 0.20 Ω =) 0.32 Ω	**A1**
10(b)	Statement : resistance of lamp increases	**M1**
	Explanation : temperature of lamp increases	**A1**

Question	Answer	Marks
11(a)	${}^{222}_{86}Rn$ on L side of equation	**B1**
	${}^{218}_{84}Po$ on R side of equation	**B1**
	${}^{4}_{2}\alpha$ on R side of equation	**B1**
11(b)	mention of 2 half-lives OR mention or use of two halvings of 100% NOT 5700 ÷ 2 OR 14 ÷ 2	**C1**
	11 000 (years)	**A1**