Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

PHYSICS **0625/32**

Paper 3 Core Theory **March 2017**

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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NOTES ABOUT MARK SCHEME SYMBOLS AND OTHER MATTERS

M marks	are method marks upon which further marks depend. For an M mark to be scored, the point to which it refers **must** be seen in a candidate's answer. If a candidate fails to score a particular M mark, then none of the dependent marks can be scored.
B marks	are independent marks, which do not depend on other marks. For a B mark to be scored, the point to which it refers must be seen specifically in the candidate's answers.
A marks	In general, A marks are awarded for final answers to numerical questions. If a final numerical answer, eligible for A marks, is correct, with the correct unit and an acceptable number of significant figures, all the marks for that question are normally awarded. It is very occasionally possible to arrive at a correct answer by an entirely wrong approach. In these rare circumstances, do not award the A marks, but award C marks on their merits. However, correct numerical answers with no working shown gain all the marks available.
C marks	are compensatory marks in general applicable to numerical questions. These can be scored even if the point to which they refer are not written down by the candidate, **provided subsequent working gives evidence that they must have known it.** For example, if an equation carries a C mark and the candidate does not write down the actual equation but does correct substitution or working which shows that they knew the equation, then the C mark is scored. A C mark is not awarded if a candidate makes two points which contradict each other. Points which are wrong but irrelevant are ignored.
Brackets ( )	around words or units in the mark scheme are intended to indicate wording used to clarify the mark scheme, but the marks do not depend on seeing the words or units in brackets e.g. 10 (J) means that the mark is scored for 10, regardless of the unit given.
<u>Underlining</u>	indicates that this <u>must</u> be seen in the answer offered, or something very similar.
OR / or	indicates alternative answers, any one of which is satisfactory for scoring the marks.
e.e.o.o.	means "each error or omission".
o.w.t.t.e.	means "or words to that effect".
Ignore	indicates that something which is not correct or irrelevant is to be disregarded and does not cause a right plus wrong penalty.
Spelling	Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit. However, beware of and do not allow ambiguities: e.g. spelling which suggests confusion between reflection / refraction / diffraction or thermistor / transistor / transformer.
Not/NOT	indicates that an incorrect answer is not to be disregarded, but cancels another otherwise correct alternative offered by the candidate i.e. right plus wrong penalty applies.

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e.c.f.	means “error carried forward” . This is mainly applicable to numerical questions, but may occasionally be applied in non-numerical questions if specified in the mark scheme. This indicates that if a candidate has made an earlier mistake and has carried an incorrect value forward to subsequent stages of working, marks indicated by e.c.f. may be awarded, provided the subsequent working is correct.
Significant Figures	Answers are normally acceptable to any number of significant figures $\geqslant 2$. Any exceptions to this general rule will be specified in the mark scheme.
Units	Deduct one mark for each incorrect or missing unit from **an answer that would otherwise gain all the marks available for that answer: maximum 1 per question.** No deduction is incurred if the unit is missing from the final answer but is shown correctly in the working. Condone wrong use of upper and lower case symbols, e.g. pA for Pa. **Use the annotation Xp to signify where a unit penalty has been applied.**
Arithmetic errors	Deduct only one mark if the **only** error in arriving at a final answer is clearly an arithmetic one. Regard a power-of-ten error as an arithmetic one.
Transcription errors	Deduct only one mark if the only error in arriving at a final answer is because given or previously calculated data has clearly been misread but used correctly.
Fractions	Only accept these where specified in the mark scheme.
Crossed out work	Work which has been crossed out **and not replaced but can easily be read**, should be marked as if it had not been crossed out.

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Question	Answer	Marks
1(a)(i)	A **OR** E stated	**B1**
1(a)(ii)	C	**B1**
1(a)(iii)	area under graph	**C1**
	0.5 × 16 × 8	**C1**
	64 (m)	**A1**
1(b)	single straight line from origin drawn	**B1**
	diagonal line finishing at 10 m / s in 20 s	**B1**
1(c)	Steeper (gradient) owtte	**B1**
	Total:	**8**

Question	Answer	Marks
2(a)(i)	N, L	**B1**
2(a)(ii)	M, K	**B1**
2(b)	D = M ÷ V in any recognised form	**C1**
	2.6	**A1**
	g / cm^3	**B1**
	Total:	**5**

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Question	Answer	Marks
3(a)	point where all the weight seems to act owtte	**B1**
3(b)(i)	moments clockwise = moments anticlockwise	**C1**
	2.5 X 18 = 1.5 x ? **OR** 45 ÷ 1.5	**C1**
	30 (cm)	**A1**
3(b)(ii)	w = m × g in any recognised form	**C1**
	2.5 ÷ 10	**C1**
	0.25 (kg)	**A1**
	Total:	**7**

Question	Answer	Marks
4(a)	fission	**B1**
4(b)	plutonium **OR** uranium	**B1**
4(c)	L in first box	**B1**
	K and M in second and third boxes respectively	**B1**
	J in fourth box	**B1**
4(d)	dangerous to humans / ionising radiation	**B1**
	(concrete) prevents leaks / absorbs radioactivity	**B1**

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Question	Answer	Marks
4(e)	no polluting gases / saves fossil fuels / does not need wind to operate owtte	**B1**
	waste products difficult to deal with / last long time	**B1**
4(f)	wind **OR** wave / tidal **OR** solar **OR** wood **OR** biofuel **OR** HEP **OR** geothermal **OR** hydroelectric	**B1**
	Total:	**10**

Question	Answer	Marks
5(a)	P = F ÷ A in any recognised form	**C1**
	6500 ÷ 100	**C1**
	65 (N / cm^2)	**A1**
5(b)	smaller area (at point)	**B1**
	greater pressure	**B1**
	Total:	**5**

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Question	Answer	Marks
6(a)	evaporation / boiling solidification / freezing melting	**B3**
6(b)	faster movement / gain kinetic energy	**B1**
	larger separation of molecules owtte	**B1**
6(c)	all boxes ticked	**B1**
6(d)	bimetal strips	**B1**
	train rails buckling	**B1**
	Total:	**8**

Question	Answer	Marks
7(a)	energy	**B1**
	frequency	**B1**
	amplitude	**B1**
	wavelength	**B1**
7(b)	(transverse) vibrations perpendicular to travel/energy transfer	**B1**
	Total:	**5**

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Question	Answer	Marks
8(a)	indication of speeds / velocity	**B1**
	light quickest	**B1**
8(b)(i)	echo / reflection (of sound)	**B1**
	from cliff	**B1**
8(b)(ii)	speed = distance ÷ time in any recognised form	**C1**
	1000 ÷ 330	**C1**
	3.03 (s)	**A1**
	5–7 seconds	**B1**
	Total:	**8**

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Question	Answer	Marks
9	Any five, in any order, from	
	water heats up	**B1**
	molecules gain kinetic energy / move faster / move further apart	**B1**
	water expands **OR** water volume increases	**B1**
	density (of water) decreases	**B1**
	warm water rises **OR** cool water falls	**B1**
	convection (current)	**B1**
	Total:	**5**

Question	Answer	Marks
10(a)	70 (^{o})	**B1**
10(b)(i)	normal correctly positioned on B	**B1**
	reflected ray drawn correctly	**B1**
10(b)(ii)	*r* labelled correctly	**B1**
10(c)	*i* = *r* / angle of incidence = angle of reflection	**B1**
	Total:	**5**

Question	Answer	Marks
11(a)	metal	**B1**
11(b)(i)	volt **OR** V **OR** mV	**B1**
11(b)(ii)	1 Nothing owtte	**B1**
	2 pointer deflects / moves	**B1**
	backwards **and** forwards owtte	**B1**
11(c)	1 strength of magnet	**B1**
	2 rate of (relative) movement	**B1**
	Total:	**7**

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Question	Answer	Marks
12(a)	neutron	**B1**
	proton	**B1**
	electron	**B1**
12(b)	nucleus labelled	**B1**
	P + N in central position	**B1**
	3 protons and 4 neutrons clearly shown	**B1**
	3 electrons in outer shell(s)	**B1**
	Total:	**7**

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