CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2013 series

0625 PHYSICS

0625/22 Paper 2 (Core Theory), maximum raw mark 80

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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NOTES ABOUT MARK SCHEME SYMBOLS AND OTHER MATTERS

B marks are independent marks, which do not depend on any other marks. For a B mark to be scored, the point to which it refers must actually be seen in the candidate's answer.

M marks are method marks upon which accuracy marks (A marks) later 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 A marks can be scored.

C marks are compensatory method marks which can be scored even if the points to which they refer are not written down by the candidate, provided subsequent working gives evidence that they must have known it e.g. if an equation carries a C mark and the candidate does not write down the actual equation but does correct working which shows he knew the equation, then the C mark is scored.

A marks are accuracy or answer marks which either depend on an M mark, or which are one of the ways which allow a C mark to be scored.

c.a.o. means "correct answer only".

e.c.f. means "error carried forward". This indicates that if a candidate has made an earlier mistake and has carried this incorrect value forward to subsequent stages of working, the candidate may be given marks indicated by e.c.f. provided the subsequent working is correct, bearing in mind this earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but **only** applies to marks annotated "e.c.f."

e.e.o.o. means "each error or omission".

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.

Underlining indicates that this must 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.

Spelling Be generous about spelling and use of English.

Significant figures
Answers are acceptable to any number of significant figures ≥ 2, except if specified otherwise, or if only 1 sig. fig. is appropriate.

Units Incorrect units are not penalised, except where specified. More commonly, marks are allocated for specific units.

Fractions These are only acceptable where specified.

Extras Ignore extras in answers if they are irrelevant; if they contradict an otherwise correct response or are forbidden by the mark scheme, use right + wrong = 0

Ignore indicates that something which is not correct is disregarded and does not cause a right plus wrong penalty.

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.

1	**(a)**	7.02 7.13 6.97		B1	
	(b)	evidence of adding three times		C1	
		7.04 e.c.f. **(a)**		A1	
	(c)	distance / length of slope		B1	
	(d)	oil axles (accept oil wheels) steeper slope / raise plank push trolley	any 1	B1	[5]
2	**(a)**	speed × time OR area under graph		C1	
		8 × 50		C1	
		400 (m)		A1	
	(b)	half candidate's **(a)** OR ½ × base × height		C1	
		200 (m) e.c.f. from **(a)**		A1	
	(c)	600 (m) e.c.f. from **(a)(b)**		B1	
	(d)	**(i)** equation using candidate's **(c)**/60		C1	
		10 e.c.f. **(c)**		C1	
		m / s		B1	
		(ii) horizontal straight line at 10 m / s e.c.f. **(i)**		M1	
		from 0 s – 60 s, not beyond		A1	[11]

3	(a)	(i)	food coal oil/diesel/petrol/etc. gas	any 1	B1	
		(ii)	waves wind hydro (electric) tides geothermal sun (light) / solar biofuel wood	any 1	B1	
		(iii)	waves tides / tidal hydro (electric)	any 1	B1	
	(b)		fossil fuels will run out/not renewable fossil fuels increasingly expensive to extract fossil fuels cause pollution/climate change/global warming	any 2	B1 + B1	[5]
4	(a)	(i)	tick under boy lying down		M1	
		(ii)	larger area (of contact with floor)		A1	
	(b)	(i)	greater/more/stronger/higher than		B1	
		(ii)	becomes less / decreases / falls		B1	[4]
5	(a)		31 ± 2 (mm)		C1	
			31 ± 0.2 (mm)		A1	
	(b)	(i)	number of waves per second/unit time		B1	
		(ii)	reference to (vertical) displacement/distance/height/depth half peak to trough distance / distance from mean position		B1 A1	
	(c)		reflects / 3rd box ticked		B1	[6]

6 (a) Mark both parts together

(i)(ii) glycerol highest BP **and** water highest thermal capacity — B1

1st explanation, needs to be comparative:
glycerol stops rising at higher temperature than water
OR
290 > 100 – both numbers must be seen — B1

2nd explanation:
more energy to raise temperature (in 1 minute)
OR
4 < 8; water must be stated to score mark — B1

(b) (i) conduction — B1

(ii) convection — B1
radiation — B1

(iii) arrows indicating air moving up above heater — B1
complete convection current indicated — B1 [8]

7 (a) cell OR battery — B1
rheostat / variable resistor / resistance — B1
lamp / light / bulb — B1
switch — B1

(b) all 5 components shown in series — B1
correct symbol for ammeter — B1

(c) 2nd box ticked — B1 [7]

8 (a) A and B both — B1

(b) C — B1

(c) D — B1

(d) (i) attract c.a.o. — B1

(ii) no effect / nothing c.a.o. — B1 [5]

9	**(a)**	**(i)**	at least 1 complete circle drawn	C1	
			at least two circles not touching each other and centred on hole	A1	
			at least 4 concentric circles not touching each other	B1	
		(ii)	iron filings OR compass (needle)	M1	
			sprinkle / tap card OR move around wire / tap compass	A1	
	(b)	**(i)**	break circuit when current too high/large OR break circuit when overloaded OR prevent wires/circuit overheating/damage to circuit / electrocution	B1	
		(ii)	$V = IR$ in any form OR V/R	C1	
			12/4	C1	
			3.0 (A) OR 3 (A)	A1	
			nothing happens to circuit breaker e.c.f. allow correct deduction based on candidate's current	B1	[10]
10	**(a)**	**(i)**	normal correct	B1	
		(ii)	reflected ray correct	B1	
		(iii)	both angles *i* and *r* in correct place	B1	
	(b)		bottom box/*i* = *r* ticked	B1	
	(c)	**(i)**	ray continued to upper mirror	B1	
			reflected at correct angle	B1	
		(ii)	parallel OR same (direction)	B1	[7]

11	**(a)**	**(i)**	protons and neutrons two of each		M1 A1	
		(ii)	easier to get inside body OR can be breathed in reference to ability of gas to diffuse/spread/move in air danger to internal organs / damages cells	any 2	B1 + B1	
	(b)	**(i)**	C		B1	
		(ii)	B or D any 1		B1	
		(iii)	A		B1	
		(iv)	C		B1	[8]

12 **(a)** radioactive materials/sources
OR
any named radioactive material — B1

(b) to prevent access by (unauthorised) people / can only be opened by key holder — B1

(c) to reduce/prevent escape of radiation/radioactive emissions — C1

to reduce/prevent escape of beta or gamma radiation — A1 [4]