

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
International General Certificate of Secondary Education

## **MARK SCHEME for the October/November 2013 series**

<b>0625 PHYSICS</b>	
<b>0625/32</b>	Paper 3 (Extended 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 & 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 he 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.
- 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.
- e.e.o.o.** means "each error or omission".
- o.w.t.t.e.** means "or words to that effect".
- c.a.o.** means "correct answer only".
- Spelling** Be generous about spelling and use of English. However, 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.
- Ignore** indicates that something which is not correct or irrelevant is to be disregarded and does not cause a right plus wrong penalty.

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e.c.f. meaning "error carried forward" is mainly applicable to numerical questions, but in particular circumstances be applied in non-numerical questions. This indicates that 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, bearing in mind the earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but **only** applies to marks annotated e.c.f.

#### Significant Figures

Answers are normally acceptable to any number of significant figures  $\geq 2$ . Any exceptions to this general rule will be specified in the mark scheme.

**Units** Deduct one mark for each incorrect or missing unit from a final answer that would otherwise gain all the marks available for that answer: maximum 1 per question.

#### Arithmetic errors

Deduct one mark if the **only** error in arriving at a final answer is clearly an arithmetic one.

#### Transcription errors

Deduct 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 markscheme.

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- 1 (a) measure area (under curve)
- (b) draws tangent at steepest part by eye, within thickness of lines  
accept triangle/lines to indicate values on straight steepest part of curve B1  
finds  $\Delta v$  and  $\Delta t$  from tangent or at straight steepest part of curve B1  
any  $v$  divided by any  $t$  or in equation B1  
 $3.0 - 4.2 \text{ m/s}^2$  B1 [4]
- (c) uses 62 and 10 NOT  $2 \times 62$  C1  
 $6.2 \text{ m/s}$  A1 [2]
- [Total: 7]
- 2 (a) evidence of division of 12 mm by 0.080 s C1  
 $(v =) 0.15 \text{ m/s}$  or  $150 \text{ mm/s}$  C1  
uses  $t = \text{his } (\Delta)v/a$  in any form C1  
 $(t = [0.15 - 0] / 0.03 = 0.15 / 0.03) = 5(.0) \text{ s}$  accept 1 sig. fig.  
allow e.c.f. from clearly identifiable wrong speed A1 [4]
- (b) use of  $F / a$  OR  $F = ma$  in any form, numbers or symbols, ignore  $g$  C1  
 $(0.06/0.03 =) 2(.0) \text{ kg}$  accept 1 significant figure A1 [2]
- (c) greater M1  
because mass is less, ignore comments about force A1 [2]
- [Total: 8]
- 3 (a) (i) (both have) magnitude o.w.t.t.e. B1  
(only) vector has direction B1 [2]
- (ii) valid example of vector quantity  
e.g. displacement, weight, force, velocity B1  
valid example of scalar quantity  
e.g. distance, length, time, pressure, mass, energy accept height B1 [2]



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(ii)	use tiles as lids reduce convection/evaporation (to room)			
	OR alternative method put tiles under cans reduce, ignore prevent, conduction (to bench)		(M1) (A1)	
	for both methods, ignore other modes of heat transfer, ignore place tiles around can			[2]
(c)	black can/B		M1	
	black absorbs (radiation) better, ignore anything about emission		A1	[2]
				<b>[Total: 10]</b>
6	(a)	light in air      BOX 5 $3 \times 10^8$ m/s sound in air      BOX 2    300 m/s sound in water    BOX 3    1500 m/s	B1 B1 B1	[3]
	(b)	distance = speed $\times$ time    in any form    NOT speed = $2d/t$	C1	
		$t_{\text{air}} = 120 \div$ value for speed of sound in air	C1	
		$t_{\text{rail}} (= 120/5000) = 0.024$ s	C1	
		(time difference =) candidate's $t_{\text{air}}$ – candidate's $t_{\text{rail}}$ correctly evaluated (expect $0.400 - 0.024 = 0.376$ s)	A1	[4]
				<b>[Total: 7]</b>
7	(a)	(i) BOX 2 ticked    virtual BOX 3 ticked    magnified	B1 B1	
		(ii) AB circled	B1	[3]
	(b)	(i) normal at M towards C	B1	[1]
		(ii) $40^\circ \leq$ angle of reflection $\leq 50^\circ$	B1	[1]
		(iii) any <u>clear</u> indication that OP is also the reflected ray	B1	[1]
		(iv) lines extended back from M and P <u>to meet</u> to the right of mirror AND indication of intersection as image position	M1	
		image within 25 mm of right hand margin line AND higher than P but within 16 mm	A1	[2]
				<b>[Total: 8]</b>

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- 8 (a) (one third length so) one third  $R$ , accept any division by 3  
(half area so) twice  $R$ , accept any doubling, including divide by  $\frac{1}{2}$  C1  
(resistance =  $0.45 \times \frac{2}{3}$ ) =  $0.3(0)\Omega$  accept 1 sig. fig. A1 [3]
- (b) (i)  $1(\Omega)$  and  $3(\Omega)$  used in correct parallel formula C1  
 $2(\Omega)$  added to candidate's parallel resistance C1  
2.7 or 2.8 or  $2.75 \Omega$  A1 [3]
- (ii) any 2 from:  
 $I_1 = I_4$  OR  $I_1 = I_2 + I_3$  OR  $I_4 = I_2 + I_3$   
OR other correct relevant equation/inequality e.g.  $I_4 = 4I_3$ ,  $I_4 > I_3$  B2 [2]
- (iii) any 2 from:  
 $V_1 = V_4$  OR  $V_1 = V_2 + V_3$  OR  $V_4 = V_2 + V_3$   
OR correct relevant inequality e.g.  $V_1 > V_3$  B2 [2]
- [Total: 10]**
- 9 (a) (i) current/electricity could flow through/across switch due to dampness / humidity  
OR water (good) conductor B1  
danger of shock/electrocution B1  
accept alternative:  
short (circuit) (B1)  
(danger because) lights go out when fuse blows (B1) [2]
- (ii) pull switch with long cord of insulating material  
OR normal switch outside workroom  
OR switch with non-contact operation/insulating cover/sensor actuation B1 [1]
- (b) (i) friction with hose M1  
reasoning relating to charge moved to/from aircraft OR to/from hose  
OR rubber insulates A1 [2]
- (ii) (water conducts) charge to/from aircraft OR away/to ground OR through  
tyres/wheels  
OR earthing o.w.t.t.e. B1 [1]
- [Total: 6]**

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- 10 (a) (i) AND gate
- (ii) correct symbol must have 2 inputs, 1 output  
concave input side, somewhat pointed on output side with small circle B1 [1]
- (b) (i) HIGH/1 B1
- (ii) HIGH/1 B1 [2]
- (c) transistor circled B1 [1]
- [Total: 5]
- 11 (a) (i) 90 B1
- (ii) 39 B1 [2]
- (b) (i) tick corresponds to candidate's (a)(ii) B1 [1]
- (ii) zirconium c.a.o. B1 [1]
- (c) X (and) Z (are isotopes of same element) M1
- same proton number A1 [2]
- [Total: 6]