

**MARK SCHEME for the May/June 2014 series**

<b>0625 PHYSICS</b>	
<b>0625/21</b>	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 May/June 2014 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

- 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 his incorrect value forward to subsequent stages of working, he may be given marks indicated by e.c.f. provided his subsequent working is correct, bearing in mind his 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".
- o.w.t.t.e.** means "or words to that effect".
- 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. If an answer can be understood to mean what we want, give credit.
- Significant figures**  
Answers are acceptable to any number of significant figures  $\geq 2$ , 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 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.

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- 1 (a) (speed =) distance/time in words, symbols or numbers C1  
 (37.1 – 2.1 =) 35 C1  
 35/7 C1  
 5(.0) (cm/day) A1
- (b) (i) 3 points correctly plotted to ½ square B2  
 (ii) (vertical) spacing not uniform/equal **OR** points not on a straight line  
**OR** points do not line up **OR** difference in gradients between points B1
- [Total: 7]**
- 2 (a) increase/change/difference in length **OR** new length – original length  
**OR** amount/length/distance it stretches B1
- (b) (i) 1. 2 seen **OR** used C1  
 11(.0)(cm) A1  
 2. 0.8(cm) B1
- (ii)  $W = m \times g$  in words, symbols or numbers  
**OR** correct conversion used, e.g. 1 kg = 10N C1  
 200g/0.2kg A1
- [Total: 6]**
- 3 (a) bright specks **OR** spots/dots **OR** flashes of light B1  
 moving randomly **OR** jerky movements **OR** zig zag/jiggling B1
- (b) line representing a smoke particle moving with a change of direction B1  
 line is straight with at least 2 changes of direction B1
- (c) collisions/bombardment B1  
 (with) air atoms/molecules/particles B1
- (d) Brownian B1
- [Total: 7]**

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- 4 (a) greater pressure from man **OR** man will fall through ice **OR** ice will break/crack B1
- (b) idea of increasing area **OR** spreading load M1
- any three from: A3
- larger (surface) area
- load/weight/force more spread out
- less pressure
- use of  $P = F/A$
- [Total: 5]**
- 5 (a) 74(°C) B1
- (b) any three from: B3
- particles move further apart/heating causes expansion
- warm air less dense **OR** cold air more dense
- hot air rises **OR** cold air falls
- convection (current)
- (c) moves/goes down (tube) **OR** gives a lower reading B1
- contracts/decreases in volume/shrinks B1
- (d) any indication between  $-10^{\circ}\text{C}$  and centre of bulb B1
- [Total: 7]**
- 6 (a) (i)  $i$  and  $r$  both clearly correct B1
- (ii)  $i = r$  B1
- (iii) seeing over/around an obstacle B1
- (iv) image/ray moves/misses eye **OR** viewer can no longer see image/ray/anything **OR** viewer sees inside of tube **OR** angle of incidence/reflection changes B1
- (b) (i) 2 focal lengths indicated B1
- (ii) ray parallel to axis **AND** emergent ray goes through F1 B1
- refraction shown at centre line **OR** at each surface B1
- (iii) incident ray through principal focus **AND** emergent ray parallel to axis B1
- [Total: 8]**

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- 7 (a) (milli)ammeter **OR** galvanometer **NOT** ampmeter B1
- (b) (i) nothing/stays the same/half-way B1
- (ii) nothing/stays the same/half-way B1
- (iii) nothing/stays the same/half-way B1
- (iv) it/arrow/pointer moves/goes/flicks **OR** current changes M1
- left and right **OR** backwards and forwards A1
- (c) generator **OR** dynamo **OR** microphone B1

**[Total: 7]**

- 8 (a) (i) nothing/zero/0 B1
- (ii)  $V = IR$  or  $V/R$  in words, symbols or numbers C1
- 6/10 C1
- 0.6 A1
- A **OR** amp(s) **OR** ampere(s) B1
- (iii) candidate's (a)(ii) B1
- (b) (i) variable resistor **OR** rheostat
- OR** potential divider B1
- (ii) neat, correct circuit with one added component in series with lamp B1
- correct symbol for variable resistor B1



**[Total: 9]**

- 9 (a) idea of points to north (pole of Earth) M1
- when freely suspended/floating on water A1
- OR**
- repels (M1)
- a (known) N pole (A1)

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- (b) (i) repulsive/repel B1  
(ii) repulsive/repel B1  
(iii) attractive/attract B1

- (c) (i) 

S	N
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 B1  
(ii) attractive/attract B1  
(iii) attractive/attract B1

**[Total: 8]**

- 10 (a) iron B1
- (b)  $V_1/V_2 = N_1/N_2$  in words, symbols or numbers C1  
correct substitution C1  
12 (V) A1

**[Total: 4]**

- 11 (a) alpha **OR**  $\alpha$  B2  
beta **OR**  $\beta$   
gamma **OR**  $\gamma$   
in any order  
if two correct, 1 mark

- (b) (i) beta **OR**  $\beta$  B1  
(ii) alpha **OR**  $\alpha$  B1  
(iii) alpha **OR**  $\alpha$  B1

- (c) (i) 2 B1  
(ii) evidence of number of atoms halved twice B1  
 $6 \times 10^{10}$  B1  
(iii) candidate's (c)(ii) B1

**[Total: 9]**

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12 (a) 17 B1

(b) 20 B1

(c) 17 B1

**[Total: 3]**