MARK SCHEME for the May/June 2014 series

0625 PHYSICS

0625/21 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.
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 ≥ 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.
| 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 |
| 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 = 10 N | C1 |
|  | 200 g/0.2 kg | A1 |
| 3 (a) | bright specks OR spots/dots OR flashes of light 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]
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:
- larger (surface) area
- load/weight/force more spread out
- less pressure
- use of \( P = \frac{F}{A} \)

[Total: 5]

5  (a) 74°C  B1

(b) any three from:
- 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°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]
7 (a) (milli)ammeter OR galvanometer NOT ammeter  

(b) (i) nothing/stays the same/half-way  
(ii) nothing/stays the same/half-way  
(iii) nothing/stays the same/half-way  
(iv) it/arrow/pointer moves/goes/flicks OR current changes  
   left and right OR backwards and forwards  

(c) generator OR dynamo OR microphone  

[Total: 7]

8 (a) (i) nothing/zero/0  
(ii) \( V = IR \) or \( V/R \) in words, symbols or numbers  
   6/10  
   0.6  
   A OR amp(s) OR ampere(s)  
(iii) candidate’s (a)(ii)  

(b) (i) variable resistor OR rheostat  
   OR potential divider  
(ii) neat, correct circuit with one added component in series with lamp  
   correct symbol for variable resistor  

[Total: 9]

9 (a) idea of points to north (pole of Earth)  
   when freely suspended/float on water  
   OR  
   repels  
   a (known) N pole  

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

(c) (i) repulsive / repel 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]
12 (a)  17  

(b)  20  

(c)  17  

[Total: 3]