**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

# MARK SCHEME for the October/November 2011 question paper

# for the guidance of teachers

# 0625 PHYSICS

**0625/23**     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 must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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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".

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 <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.

Spelling    Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit.

Significant    Answers are acceptable to any number of significant figures ≥ 2, except if figures 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)** 25km        B1

    **(b)** **(i)** accelerating   OR   increasing speed        B1

        **(ii)** steady/constant speed        B1

        **(iii)** decelerating   OR   retarding   OR   slowing down        B1

    **(c)** less than        B1    [5]

**2** **(a)** Brownian (motion)        B1

    **(b)** bombardment by (water) molecules/particles/atoms        M1
         random   OR   from all directions        A1    [3]

**3** **(a)** strain/elastic/potential        B1

    **(b)** Y   OR   vertical   OR   straight down        B1

    **(c)** **(i)** **1.** number of oscillations/vibrations/swings        M1
               per second/unit time   NOT   in a certain time        A1
           **2.** displacement/distance from mean position        M1
               maximum        A1
               (note: XY or YZ score M1A1)

        **(ii)** decreases   or equivalent        B1

    **(d)** Y   OR   vertical   OR   straight down        B1    [8]

**4** **(a)** **(i)** liquid        B1

        **(ii)** gas/vapour        B1

        **(iii)** liquid        B1

    **(b)** condensation        B1

    **(c)** decreases   OR   given to the jug/surroundings   OR   changes to another form        B1    [5]

**5** **(a)** 30.98 – 30.72        C1
         0.26 (g)        A1

**(b)** $D = M/V$ in any form      C1
    candidate's 0.26/200      C1
    0.0013   e.c.f. from **(a)**      A1
    $g/cm^3$      B1   [6]

**6 (a) (i)** reflection OR wave bounces back      M1
    from large object/sea bed      A1

    **(ii)** speed = distance/time in any form      C1
       1500 × 0.8      C1
       1200 (m)      A1

    **(iii)** 600 (m) OR ½ × candidate's **(ii)**, correctly evaluated      B1

**(b)** line with positive gradient      M1
    straight line OR meets horizontal axis to right of graph origin      A1   [8]

**7 (a) (i)** image behind mirror      M1
    image same distance from mirror, by eye <u>and</u> image-object line
    perpendicular to mirror, by eye      A1

    **(ii)** (ignore any arrows)
       reflected ray reaching eye      B1
       direction of reflected ray coming from image      B1

**(b)** HIS      B1

**(c)** both rays straight on at first surface      B1
    **30° prism** ray refracted down in air at 2$^{nd}$ surface      B1
    **45° prism** ray reflected down in glass at 2$^{nd}$ surface      M1
         90° reflection, by eye      A1
         straight on at 3$^{rd}$ surface      A1   [10]

**8 (a) (i)** limit/control current OR adjust resistance      B1

    **(ii)** ammeter shows a reading      B1

    **(iii)** copper <u>and</u> iron ticked  –1 e.e.o.o.      B1

**(b) (i)** voltmeter NOT voltameter      B1

    **(ii)** voltmeter shown in parallel to heater
    (condone incorrect symbol if clear it is a voltmeter) NO e.c.f. from **(i)**      B1

**(c) (i)** top heater and switch correctly connected      B1
    middle 2 heaters and switch correctly connected      B1

**(ii)** R = V/I  in any form                                               C1
250/2.5                                                                       C1
100                                                                           A1
ohm  OR  $\Omega$                                                            B1

   **(iii)** smaller ticked                                    B1  [12]

**9** **(a)** **(i)** iron  OR  ferromagnetic                                 B1
unmagnetised (before being brought near magnet)  NOT non-magnetic            B1

   **(ii)** magnet                                            B1

**(b)** attracts (at first)  NOT  goes towards                               B1
repels after touching  OR  angle of thread increases as XY decreases         B1  [5]

**10** **(a)** **(i)** deflection (in one direction)                          M1
idea of momentary  OR  goes back to zero again                               A1

   **(ii)** idea of same as **(i)** but opposite direction      B1

**(b)** larger                                                              B1

**(c)** smaller                                                             B1

**(d)** nothing  OR  small oscillations about zero position  OR  blurred light spot   B1  [6]

**11** **(a)** **(i)** background
contaminated surfaces (any sort)
other radioactive material nearby       } any 1                               B1
radiation from rocks/soil
cosmic rays/radiation from space
radon gas from ground

   **(ii)** 136/4                                             C1
34 (counts/min)                                                              A1

**(b)** **(i)** alpha  OR  $\alpha$                                          B1

   **(ii)** 876 – (a figure between 131 and 136, inclusive)   C1
division by 4                                                                C1
185 – 186 (counts/min)                                                       A1  [7]

**12** **(a)** **(i)** 3                                                      B1

   **(ii)** 3  e.c.f. **(i)**                                 B1

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    **(iii)**  4                                                               B1

    **(iv)**  7  OR  candidate's **(i)** + **(iii)**, correctly evaluated                B1

**(b)**  7
   and
    3
   e.c.f. from **(ii)** and **(iv)**                                     B1    [5]