# MARK SCHEME for the May/June 2009 question paper

# for the guidance of teachers

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# 0625 PHYSICS

**0625/02**        Paper 2 (Core Theory), maximum raw mark 80

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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.

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

CIE is publishing the mark schemes for the May/June 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

**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 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.

**1** **(a)** 35      B1

**(b)** vehicles/time in any form, letters words or numbers    C1
700/35   e.c.f. **(a)**    C1
20   e.c.f. **(a)**    A1   [4]

**2** work        force of gravity on a body

how big the body is

mass      power of a given force

weight ÷ mass

weight      amount of matter in a body

force × distance moved

density  ——————  mass ÷ volume

the acceleration due to gravity    B1×3   [3]

**3** **(a)** 1500      B1

**(b)** second box ticked (use ✓ + ✗ = 0 for extras)    B1

**(c)** constant speed      B1

**(d)** award B1 from each of any 2 lines:

<u>increased</u> wind/air resistance  OR  headwind  OR  roof rack      )
rough(er) ground  OR  flat tyre  OR  <u>increased</u> road resistance/friction  )    B1 + B1
brakes applied                                                )

IGNORE increased speed/changed car shape/increased load
IGNORE driver decided to stop    [5]

**4** **(a)** 88 – 92      B1

**(b)** his **(a)**      B1

**(c)** 840   e.c.f. **(b)**      B1

**(d)** left level up <u>and</u> right level down    B1
L at 80 <u>and</u> R at 150    B1   [5]

**5** **(a)** **(i)** rapid/rapid heat transfer/gain  OR  rapid reading/response
NOT sensitivity/temperature transfer                                                          B1

      **(ii)** strength  OR  reduce chance of breaking  OR  to magnify the thread
ignore any mention of safety                                                                       B1

      **(iii)** sensitivity or equiv. (e.g. idea of large movement of thread)          B1

  **(b)** mercury  OR  alcohol                                                                                    B1

  **(c)** 0 <u>and</u> 100                                                                                          B1
°C on at least 1 temperature                                                                       B1          [6]

**6** **(a)** **(i)** decreasing  OR  getting lower/quieter/softer                                      M1

      **(ii)** amplitude/length of wave decreased  OR waves got smaller
NOT wavelength decreased                                                                           A1

  **(b)** **(i)** nothing  OR  constant                                                                        M1

      **(ii)** waves equally spaced  OR  wavelength/period/T constant                A1

  **(c)** **(i)** 12 – 14                                                                                              B1

      **(ii)** 1. 300 (waves, oscillations, vibrations) every second                   B1
         2. 1/300 (s)  OR  0.0033  OR  0.003 with indication of recurring 3     B1
         3. 1/his300 × his 12  OR  his (1/300)                                   C1
         0.04 (s)  e.c.f.                                                            A1

  **(d)** **(i)** yes/✓   )

      **(ii)** yes/✓   )         –1 e.e.o.o.                                    B2
             )

      **(iii)** no/✓   )                                                                               [11]

**7** **(a)** **(i)** 1. normal correct, by eye                            B1
                  2. $i$ correctly labelled                          B1

      **(ii)** $i = r$ in any recognisable form   accept incidence = refraction
              NOT sin $i$ = sin $r$   B0 for refraction, refrection, reflaction      B1

      **(iii)** V                                   B1

      **(iv)** none                                B1

    **(b)** be reasonably generous:
        correct inversion                              M1
        stem approx. parallel to card edge               A1    [7]

**8** **(a)** **(i)** iron (rod)                                 B1

      **(ii)** plastic (rod)                            B1

    **(b)** S  S  N                              B1

    **(c)** –    somewhere on or near rod D, near end C
           condone extra + or – signs unless contradict        B1

    **(d)** one needle pointing N, by eye               C1
        both needles pointing N, by eye           A1    [6]

**9** Apply max 1 un. pen. in **(a)** and **(b)** together.  Apply at first instance of unit penalty.

   **(a) (i)** 6 V                                                       B1

        **(ii)** 50 mA  OR  0.05 A                                       B1

   **(b)** $R = V/I$ in any form, letters, words, numbers  OR  $V/I$          C1
       6/50  OR  6/0.05  e.c.f. **(a)**  OR  0.12 Ω  (0.12 Ω gets 2, 0.12 gets 1)    C1
       120 Ω  c.a.o.  accept V/A instead of Ω                       A1

   **(c) (i)** increase resistance/ohms      OR  add another resistor
                                             OR  decrease e.m.f./voltage/p.d.      C1
           double resistance/ohms       OR  add another R (in series)
           OR  halve e.m.f./voltage/p.d.  OR  use 3 V cell/battery
           OR  remove one cell/battery  OR  use only 1 cell/battery       A1

        **(ii)** idea of breaking the circuit    OR  removing battery
             OR  make voltage zero       OR  switch off                     B1

   **(d) (i)** infinite  OR  <u>very</u> large (if figure quoted, must be ⩾25 A)
            NOT just "higher"                                          B1

        **(ii)** idea of damage but NOT "blows up"                     C1
            ammeter – coil burnt out  OR  pointer bent       )
            battery – overheats  OR  runs flat quickly       ) any 1      A1
            circuit – overheat/burn out/insulation melts    )
            NOT it trips out                                        **[11]**

**10 (a)** XY would move up/anticlockwise/motion reversed/pan moves down       B1

   **(b) (i)** 1.  sensible choice of $F$ scale   )                            B1
                                      ) both lost if scales reversed
              sensible choice of $I$ scale    )                         B1
           2.  4 points correctly plotted (± ½ small square)  –1 e.e.o.o.       B2
              – B0 if ridiculous scale on either axis (e.g. non-linear, 3, 7, 9 etc.)
              – can award both marks if scales interchanged but otherwise O.K.
              – if any blob clearly >1 square diameter, then –1 for each (max 2)
           3.  reasonable straight line through his points, including 0,0      B1

        **(ii)** 0.036 – 0.038  OR  his correct value ± 0.0005 (B0 if ridiculous scale)   B1

   **(c)** (electric) motor  OR  ammeter  OR  galvanometer  OR  voltmeter
       NOT generator/electronic balance                          B1   **[8]**

**11** For **(a)**, **(b)** and **(c)**, mark the names, not the box

    **(a)** CATHODE in bottom left box                                                    **B1**

    **(b)** UP & DOWN in top middle box                                             **B1**

    **(c)** GLOWS in bottom right box                                                 **B1**

    **(d)** battery shown connected across heater filament, any recognisable symbol
        ignore extra wires if it would work                                 **B1**

    **(e)** electrons   NOT  beta particles   NOT  positive electron       **B1**

    **(f)** vacuum ticked  (use ✓ + ✗ = 0 for extras)                     **B1**   **[6]**

**12** (1) electron(s)                   electromagnetic radiation/waves/rays    **B1 + B1**
    OR e (ignore any prefix or suffix)     NOT just rays etc.

    ~ 8000 units  OR <u>very</u> large       zero/nothing                     **B1 + B1**
                                    NOT small/almost nothing
                                    NOT – (dash)

    negative   allow – (dash)          no charge  OR zero/neutral       **B1 + B1**
                                    NOT negligible
                                  NOT – (dash)

    idea of <u>not very</u> (penetrating)     idea of <u>extremely</u> (penetrating)    **B1 + B1**
    OR stopped (but if a substance is   OR not stopped (but if a substance is
    mentioned, it must be appropriate,   mentioned, it must be appropriate)
    not air)
    NOT "not penetrating"            NOT very/strongly/highly penetrating
    NOT slowly penetrating         NOT very fast penetrating            **[8]**