CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2013 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 October/November 2013 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) (i) 7 minutes 20 seconds   B1

       (ii) 440 (s)   C1
             division by 40   C1
             11 (s)   A1

     (b) (speed =) distance/time in any form   C1
          75/15   C1
          5 (m/s)   A1
          Note: 6.8 (m/s) gains 2 marks as correctly using time 11(s) from **(a)**

                                                  [Total: 7]

2 (a) (D =) mass/volume   C1
         476/35   C1
         13.6 OR 13 600   A1
         g/cm^3 OR kg/m^3 B1
         note: if value calculated, unit must agree with value)

     (b) top box ticked (mass of water is less than mass of mercury)   B1

     (c) (i) middle box ticked (stays the same)   B1

         (ii) top box ticked (decreases)   B1

                                                   [Total: 7]

3 (a) turning effect   OR   force x distance (between force and pivot)   B1

     (b) (i) equal (magnitude) accept the same size/balanced   B1
              note: no turning effect is insufficient
              opposite direction   B1
              note: CW moment = ACW moment scores both marks

         (ii) **1**. at pivot (however expressed) e.g. idea of where plank in contact with log   B1
               2. upwards accept up, vertically is insufficient   B1

   **[Total: 5]**

4 (a) number of (complete) vibrations/oscillations/waves   M1
per second/unit time   A1
note: rate of oscillations/vibrations scores both marks

(b) (i) particles/air/solid vibrates/is moved   OR prongs push/collide with air molecules   B1
reference to/idea of (sound) waves   B1
idea of pressure/longitudinal/compressions/rarefactions (transmitted through air)   B1

(ii) amplitude decreases o.w.t.t.e. e.g. smaller vibration of prongs   B1
NOT slower vibrations / frequency decreases / less vibrations

(iii) pitch   C1
lower pitch / octave lower ignore lower/less sound NOT louder/quieter   A1

[Total: 8]

5 (a) thermometer   B1

(b) reduce heat loss/transfer   B1
accept keeps heat in/insulates

(c) balance OR scales, condone scale / weighing machine, accept measuring cylinder   B1
find mass of empty beaker/container/apparatus, accept measure volume of water   B1
find mass of beaker/container/apparatus + water, accept look up density of water   B1
subtract the two masses, accept use M = D x V   B1
note: allow weight/weigh instead of mass, ignore if subtraction gives negative mass

(d) bubbles (ignore "of air")
(water) vapour accept "steam" or equivalent
temperature/thermometer reading stops rising   any 2   B2
level of water decreases ignore evaporation

[Total: 8]

6 (a) (i) refraction
accept refracted ray, ignore bends   B1

(ii) 45 (°) condone no/incorrect unit   B1

(b) (i) refracted down at first surface   B1
refracted down at 2nd surface   B1

(ii) X marked above point where candidate's blue light hits screen   B1

[Total: 5]

7 (a) (i) focal length indicated ± 0.2 cm   B1

     (ii) either principal focus clearly indicated   B1

  (b) diminished   B1
      inverted   B1
      image distance less   B1

  (c) any correct ray with appropriate refraction either at centre line or at <u>both</u> surfaces   B1

<div align="right">

[Total: 6]

</div>

8 (a) clockwise from top:

 right   B1

 left   B1

 right OR accept left if top compass is left   B1

sloping away from letter N any angle from up to   B1

  (b) no effect   B1
      no effect   B1
      attracts   B1
      attracts   B1

<div align="right">

[Total: 8]

</div>

9 (a) resistor   B1

  (b) (i) 6.0 V OR 6 V, unity penalty applies   B1

     (ii) 6.0 V OR 6 V, unity penalty applies unless penalised in **(i)**, no e.c.f. from **(i)**   B1

     (iii) 250 mA OR 0.25 A, unit penalty applies unless penalised in **(i)** or **(ii)**   B1

  (c) $(R =)$ V/I C1
      6/0.25 OR 6/250   C1
      24 OR 0.024   A1
      Ω OR ohm(s) OR kΩ (note: if value calculated, unit must agree with value)   B1

   (d) **(i)** decreases   B1

         (ii) increases   B1

       (iii) unchanged   B1
              accept no effect/none

                                                           [Total: 11]

10 **(a)** motors correctly connected in parallel across output   B1

    (b) $V_1/V_2 = N_1/N_2$ in any form   C1
              suitable substitution e.g. $18/240 = N_1/4800$ C1
              360   A1

    (c) will run at reduced speed   NOT   will not work   B1
              accept will work/turn slowly
                                                        [Total: 5]

11 **(a)** **(i)** 210 and 122 and 72   B1

         (ii) 40–60 (s)   C1
                45–55 (s)   A1

    (b) background (radiation) OR any suitable example of background radiation   B1
              accept radiation in the environment
                                                        [Total: 4]

12 **(a)** 84   B1

    (b) 128   B1

    (c) **(i)** 84 or candidate's **(a)**   B1

         (ii) orbits OR shells OR outside nucleus   B1

    (d) 208   B1
              82   B1

                                                         [Total: 6]