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.

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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 ≥ 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)** **(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]

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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
level of water decreases ignore evaporation
} any 2 B2

[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]

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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

[Total: 6]

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

[Total: 8]

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

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(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]

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