CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge International General Certificate of Secondary Education

MARK SCHEME for the March 2015 series

0625 PHYSICS

0625/22 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.

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NOTES ABOUT MARK SCHEME SYMBOLS & OTHER MATTERS

B marks are independent marks, which do not depend on other marks. For a B mark to be scored, the point to which it refers must be seen specifically in the candidate’s answer.

M marks are method marks upon which accuracy marks (A marks) later depend. If a candidate fails to score a particular M mark, then none of the dependent A marks can be scored.

C marks are compensatory marks in general applicable to numerical questions. These can be scored even if the point to which they refer are not written down by the candidate, provided subsequent working gives evidence that they must have known it.

A marks 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. A marks are commonly awarded for final answers to numerical questions. If a final numerical answer, eligible for A marks, is correct, all the C marks for that question are normally awarded. An A mark following an M mark is a dependent mark.

Brackets ( ) 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 Underlining indicates that this must be seen in the answer offered, or something very similar.

OR / or This indicates alternative answers or words, any one of which is satisfactory for scoring the marks.

AND Both answers or words must be given for credit to be awarded.

e.e.o.o. This means "each error or omission".

o.w.t.t.e. This means “or words to that effect”.

c.a.o. This means “correct answer only”.

Not/NOT This 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.

e.c.f. This means "error carried forward". If a candidate has made an earlier mistake and has carried an incorrect value forward to subsequent stages of working, marks indicated by e.c.f. may be awarded, provided the subsequent working is correct, bearing in mind the earlier mistake. This prevents a candidate from being penalised more than once for a particular mistake, but only applies to marks annotated e.c.f.

Significant figures Answers are normally acceptable to any number of significant figures \( \geq 2 \). Any exceptions to this general rule will be specified in the mark scheme.
Units Deduct one mark for each incorrect or missing unit from an answer that would otherwise gain all the marks available for that answer: maximum 1 per question.

Fractions Allow these only where specified in the mark scheme.
1. (a) (force of) gravity/gravitation OR (its) weight B1

(b) about the same B1

(c) one straight line with positive gradient starting at origin B1

(d) area under graph B1

[Total: 5]

2. (a) (i) extension clearly marked on Fig. 2.1 B1

(ii) (vertical) rule drawn on Fig. 2.1 B1

(b) (distance to) intercept on length axis clearly indicated B1

(c) newton OR N B1

[Total: 4]

3. (a) accept viable alternatives in each case

(loud)speaker OR bell OR buzzer OR other suitable device B1

(dry) cell OR battery B1

toaster OR electric fire/heater OR electric kettle OR other suitable device B1

motor OR named device containing a motor B1

(b) (i) total energy remains constant OR energy cannot be created or destroyed o.w.t.t.e. B1

(ii) energy dissipated/transferred to surroundings/wires OR some energy is wasted OR heating OR thermal energy OR increased internal energy B1

idea that ‘wasted energy’ o.w.t.t.e. = difference between input and useful output energies OR similar argument B1

[Total: 7]

4. (a) Y B1

(b) XY B1
(c) ray to X
continuing straight on after lens
OR
ray through correctly positioned principal focus on left of lens
continuing parallel to principal axis after lens
image at intersection of candidate’s ray with printed ray from A

(d) at surface(s) (of lens)

[Total: 6]

5 (a) (i) 1. X OR Y
2. Z
(ii) C marked between incident/reflected ray and normal on Y

(b) (i) three straight line wavefronts drawn, no discontinuities and bent in any
direction
wavefronts bent down at boundary and closer together
refracted wavefronts parallel
(ii) refraction

[Total: 7]

6 (a) echo / reflection (of sound)

(b) quieter
amplitude AND changed

(c) (i) stopwatch/stopclock/millisecond timer
(ii) distance ÷ time in any form e.g. 480 ÷ 3
960 ÷ 3 OR evidence that double distance used or time halved
320 (m/s) c.a.o.

[Total: 7]

7 (a) potential difference

(b) (i) charge
(ii) 1. 36 (Ω)
2. \( V = IR \) in any form OR \( V + R \)  
\[ 12 \div 36 \]  
0.3 OR 0.33  
A OR amp(s) OR ampere(s)  

(iii)  
\[ 0.33 \times 18 \]  
5.94(V) OR 6 (V)  

(c) if one lamp fails both go out OR cannot control lamps independently OR lamps not as bright  

[Total: 10]  

8 (a) (i) any clear example of useful expansion, e.g. thermometer, bimetallic strip, fitting metal tyre  
relevant point relating to stated example  

(ii) any clear example where expansion causes problem e.g. overhead cables, bridges, railway tracks  
relevant point relating to stated example  

(b) vibrate less OR move more slowly  
move closer together (on average)  

(c) (i) balloons get larger/expand  

(ii) any three from:  
space between molecules/atoms/particles increases  
molecules/atoms/particles move faster  
relevant mention of collisions with balloon wall  
pressure increases  
pressure/force on inside of walls becomes greater than on outside  

[Total: 10]  

9 (a) any four from:  
reference to magnetic field  
wire cuts (magnetic) field (lines)  
current perpendicular to field (lines)  
force(s) on (sides of) coil OR turning effect  
current in opposite directions (in two long wires)  
force/turning effect opposite direction on two (long) sides  
force perpendicular to current / force perpendicular to field  

(b) increase number of turns OR increase current OR increase strength of magnet  

[Total: 5]
10 (a) (2 positives) repel AND (2 negatives) repel attract attract B1 B1

(b) (i) positive OR + (ve) B1
(ii) hanging (with thread) vertical B1

(c) metal OR named metal OR graphite B1

[Total: 6]

11 (a) decreases at decreasing rate o.w.t.t.e. B1 B1

(b) (i) answer in range 106 to 107 (s) B1
(ii) 2 B1

(c) candidate's (b)(i) ÷ 2
53 OR 53.5 (s) ecf (b)(i) C1 A1

(d) candidate's answer to (c) B1

[Total: 7]

12 (a) (i) orbit(s) OR orbitals OR shells OR in rings OR outside the nucleus B1
(ii) nucleus B1
(iii) nucleus B1

(b) note: mark all question parts together. Award B1 for two correct. No credit for only one correct.
(i) proton(s) B2
(ii) electron(s)
(iii) neutron(s)

(c) protons AND electrons, either order B1

[Total: 6]