CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0625 PHYSICS

0625/33 Paper 3 (Extended 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 May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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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. 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 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.** For example, if an equation carries a C mark and the candidate does not write down the actual equation but does correct substitution or working which shows he knew the equation, then the C mark is scored. A C mark is not awarded if a candidate makes two points which contradict each other. Points which are wrong but irrelevant are ignored.

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, with the correct unit and an acceptable number of significant figures, all the marks for that question are normally awarded. It is very occasionally possible to arrive at a correct answer by an entirely wrong approach. In these rare circumstances, do not award the A marks, but award C marks on their merits. An A mark following an M mark is a dependent mark.

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.

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

o.w.t.t.e. means "or words to that effect".

Spelling Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit. However, do not allow ambiguities, e.g. spelling which suggests confusion between reflection / refraction / diffraction or thermistor / transistor / transformer.

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.

Ignore indicates that something which is not correct or irrelevant is to be disregarded and does not cause a right plus wrong penalty.

ecf meaning "error carried forward" is mainly applicable to numerical questions, but may in particular circumstances, but rarely, be applied in non-numerical questions. This indicates that if a candidate has made an earlier mistake and has carried an incorrect

value forward to subsequent stages of working, marks indicated by ecf may be awarded, provided the subsequent working is correct, bearing in mind the earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but **only** applies to marks annotated ecf.

Significant figures

Answers are normally acceptable to any number of significant figures ≥ 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. No deduction is incurred if the unit is missing from the final answer but is shown correctly in the working.

Fractions Allow these only where specified in the mark scheme.

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1 (a) (i) A marked between t = 0 and t = 6.0 s B1

(ii) B marked between t 6.0 s and t = 7.0 s B1

(iii) C marked on clearly curved section before t = 14 s B1

(b) (i) (a =)$\Delta v / t$ **OR** 30 / 1 **OR** 15 / 0.5 etc. **OR** triangle on graph / tangent C1

(**ignore** – sign) 25 m / s^2 < a < 35 m / s^2 A1

(ii) (F =)ma **OR** 750 × 30 e.c.f. from **(b)(i)** C1

2.2 / 2.25 / 2.3 × 10^4 N e.c.f. from **(b)(i)** A1

(c) acceleration / rate of change of speed is zero **OR** speed is constant **OR** air resistance / backwards force equal and opposite to driving / forwards force B1

[Total: 8]

2 (a) (if no diagram, max. mark is 3)
measuring / graduated cylinder B1

water **AND** initial reading **OR** known volume
alternative method: water **AND** filled eureka can owtte B1

immerse stone **AND** final reading
alternative method: immerse stone **AND** catch overflow B1

final reading – initial reading
alternative method: reading on measuring cylinder B1

(b) (i) mass, **NOT** with other quantity B1

(ii) (ρ =)m / V in symbols or words B1

(c) attach weight to wood
OR different liquid
OR push down with stick M1

accuracy mark must match method
subtract volume of weight from total volume
OR new liquid less dense than wood
OR no part of stick in water / thin stick A1

[Total: 8]

3 (a) (immediately below / above the / at) 50 cm mark **OR** at pivot B1

(b) (i) anticlockwise moment = clockwise moment **OR** $45 \times 0.40 = 25 \times W$ C1

0.72 N A1

(ii) 0.072 kg **OR** 72 g e.c.f from **(b)(i)** B1

(c) (i) no net moment **OR** two moments cancel C1

moment due to weight of rule cancels moment due to weight of apple A1

(ii) weight of the rule / it is bigger B1

[Total: 7]

4 (a) (i) molecules in random arrangement B1

molecules similar distance apart B1

(ii) molecules in random arrangement **AND** further apart B1

(b) (i) gas ringed / indicated B1

(ii) more room for molecules **OR** molecules fit into gaps **OR** there are gaps between molecules B1

no repulsive forces between molecules **OR** (repulsive) forces between molecules smaller **OR** pressure on walls smaller **OR** only small force / pressure required B1

[Total: 6]

5 (a) (m =) Pt / l **OR** $460 \times 180 / 2.3 \times 10^6$ **OR** $82\,800 / 2.3 \times 10^6$ C1

0.036 kg **OR** 36 g A1

(b) (i) any two from:
(surface) area
draught
temperature (of water / room)
humidity of air B2

(ii) any two from:
evaporation at any temperature / below boiling point
evaporation (only) at the surface
evaporation influenced by surface area / draught / temperature / humidity (not if given in **(b)(i)**) B2

[Total: 6]

6 **(a)** **(i)** A **OR** left hand thermometer B1

(ii) E **AND** longest length and smallest range / more length per degree / liquid moves more per degree / increases the most per degree B1

(b) any two from:
narrow bore / tube
large amount of liquid / mercury / ethanol / alcohol / bulb
liquid with large expansivity **OR** ethanol instead of mercury B2

(c) 80 (°C) **OR** 80 / 120 **OR** 18 / 120 C1

12 cm A1

[Total: 6]

7 **(a)** vibrations **OR** compressions **AND** rarefactions M1

vibrations parallel to direction of travel (of wave energy)
OR compressions move in direction of travel (of wave energy) A1

(b) **(i)** (λ=)v / f **OR** 6100 / 7500 **OR** 6100 / 7.5 C1

0.81(33333) m **OR** 813(33333) mm A1

(ii) **1.** decreases B1

2. same answer as **1.** B1

[Total: 6]

8 **(a)** **(i)** two rays from lamp to mirror **AND** one good (i ≈ r) reflected ray B1

two good reflected rays **AND** rays traced back above mirror B1

labelled / clear image located at intersection **AND** in correct position B1

(ii) any two from:
virtual
(longitudinally) inverted
same size (as lamp) **OR** same distance (from mirror) B2

(b) light reflected back / down **OR** not wasted **OR** room brighter **OR** more light etc. B1

[Total: 6]

9 (a) at least **three** vertical lines between the plates B1

equally spaced **OR** some curvature at the ends B1

at least one correct (upwards) arrow **AND** none wrong B1

(b) (i) (I=) Q/t **OR** 0.000 000 042 / 0.000 000 035 **OR** $4.2 \times 10^{8} / 3.5 \times 10^{8}$ C1

1.2×10^{n} for any n C1

1.2 A A1

(ii) contains electrons C1

electrons are free to move A1

[Total: 8]

10 (a) (P=)VI **OR** 230×3.5 C1

805 / 810 W A1

(b) (I_Y=)7.0 (A)
alternative method: (R_X=)V/I **OR** 230 / 3.5 **OR** 66 / 65.7(1429) C1

(I_{Tot}=)10.5 (A)
alternative method: ((R_Y=) 230 / 7.0 **OR** 66 / 2 **OR** 65.7(1429) / 2 **OR** 33 / 32.9 / 32.85714) C1

(R=)V/I **OR** 230 / 10.5
alternative method: (R=)$R_1R_2/(R_1 + R_2)$ **OR** 2159 / 98.57
OR $1/R = 1/R1 + 1/R_2$ **OR** $1/R = 1/65.7 + 1/32.9$ C1

22 / 21.9(0476) Ω A1

[Total: 6]

11 (a) (i) (V_2=)V_1N_2/N_2 **OR** $230 \times 2000/40\,000$ C1

11 / 11.5 / 12 V A1

(ii) any three from:
alternating / changing magnetic field (in core)
(magnetic field) transferred (**allow** conducted) to coil Q
changing flux linkage / in Q
e.m.f. / voltage induced in Q B3

(b) (i) diode B1

(ii) it conducts in (only) one direction B1

[Total: 7]

12 (a) (high voltage allows) low/less reduced current B1

($P=$)I^2R **OR** IV OR ($E=$)I^2Rt **OR** IVt **OR** depends on current heating effect owtte B1

low / less / reduced heating effect / heat generated (allow lost) / more efficient / cheaper etc.
(**NOT** with reduced resistance) B1

(b) (i) (cross-sectional) area 4× larger **OR** resistance inversely proportional to area **OR** smaller resistance C1

reduced to ¼ A1

(ii) cables heavier **OR** more / stronger pylons or more material in cable B1

[Total: 6]