CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0625 PHYSICS

0625/53 Paper 5 (Practical), maximum raw mark 40

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 AND OTHER MATTERS

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.

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 or she may be given marks indicated by e.c.f. provided his or her subsequent working is correct, bearing in mind his or her earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but **only** applies to marks annotated "e.c.f."

owtte means “or words to that effect”

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

OR indicates alternative answers, any one of which is satisfactory for scoring the mark.

AND indicates that both answers are required to score the mark.

Spelling Be generous about spelling and use of English. However, do not allow ambiguities, e.g. spelling which suggests confusion between reflection / refraction / diffraction or thermistor / transistor / transformer.

Significant figures Answers are generally acceptable to any number of significant figures ≥ 2, except where the mark scheme specifies otherwise.

Fractions These are only acceptable where specified.

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)** correct symbol for voltmeter shown AND shown connected in parallel [1]

(b) **(i)(ii)(iii)** table:
- p.d. values all < 3.0 V [1]
- current values all < 1.00 A AND increasing [1]
- p.d. values to at least 1 d.p., AND currents to at least 2 d.p. [1]

(c) *R* calculations correct AND decreasing [1]
correct unit (symbol or word) [1]
consistently 2 sig. figs. or consistently 3 sig. figs. [1]

(d) **(i)** statement matches results with any relevant values quoted [1]
justification matching statement [1]

(ii) R_3 should be $^1/_3 \times R_1$ owtte [1]

[Total: 10]

2 ray-trace:
- normal correct, near centre of **AB** [1]
- first pin distance at least 5.0 cm [1]
- first refracted line in correct place [1]
- second refracted line in correct place AND all lines thin, continuous and straight [1]

(d)(i)(ii) one measurement of *a* or *b* correct AND unit of cm or mm [1]
both measurements correct AND unit of cm or mm [1]

(iii) n_1 calculation correct and in range 1.3–1.8 [1]

(f) **(i)(ii)(iii)** *c* and *d* present AND n_2 within 10% of n_1 AND no unit for n_1 or n_2 [1]

(g) less reliable AND reference to smaller block depth owtte [1]
measuring smaller lengths gives greater (%) uncertainties owtte [1]

[Total: 10]

3 **(a)** **(ii)** any one from: [1]
- clamp rule
- rule close to spring
- ensure rule vertical
- avoidance of parallax errors (explained)
- use of set square / fiducial aid

(iv) l in cm and increasing [1]

(b) graph:
- axes both correctly labelled, with quantities and units [1]
- suitable scales [1]
- plots correct to within ½ small square [1]
- good best-fit straight line, single, thin, continuous line [1]

(c) l_0 matches candidate's graph [1]

(d)(i)(ii) l recorded AND W in range 3.0 to 3.8(N) [1]
indication on graph which matches candidate's values [1]

(e) any one from: [1]
- data only to 2 sig. figs.
- cannot plot / read graph to that accuracy
- cannot read rule to that accuracy

[Total: 10]

4 table:
- boiling tube with 40 cm^3, θ_C increasing [1]
- boiling tube with 20 cm^3, θ_C increasing at greater rate [1]
- both θ_H decreasing AND all θ values to at least 1 °C [1]
- units correct and consistent (symbols or words) [1]

(c) conclusion which matches temperature changes [1]

(d) any two from:
- volume / level of hot water
- initial temperature of hot water
- initial temperature of cold water
- same type of boiling tube
- room temperature / draughts / appropriate environmental condition [2]

(e) any two improvements relating to <u>apparatus</u>: [2]

- lid on beaker
- insulation on beaker
- lid / cotton wool in boiling tube
- thinner / metal walls on tube
- all cold water in boiling tube below hot water level
- greater contact area of tube
- use of water bath

explanation matching <u>first</u> improvement, including: [1]

- reduces loss of thermal energy from beaker
- reduces loss of thermal energy from boiling tube
- better thermal conduction
- not affected by variation in hot water temperature

[Total: 10]