UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

5054 PHYSICS

5054/42 Paper 4 (Alternative to Practical), maximum raw mark 30

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 must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** to obtain uniform temperature/heat spread (uniformly) throughout oil B1 [1]

(b) temperature increase is slow/temperature change small/heats up slowly/
oil doesn't become **too** hot/prevent overheating
oil has low specific heat capacity/heats up quickly/oil has high boiling point/
higher boiling point than water/above 110 °C/may break thermometer B1 [1]

(c) **(i)** axes: correct way round, labelled quantity and unit B1
scales: more than ½ page, sensible 2 cm ≡ 2 s and 2 cm ≡ 10 °C B1

points plotted accurately to within ½ small square; dots ⩽ ½ small square B1
reasonable attempt at smooth curve of best fit neatly drawn B1 [4]

(ii) if line on graph not extrapolated to 80 °C 13.3 s ± 0.2 s unit required
if reasonable extrapolation, correct value read from graph unit required B1 [1]

(iii) 110 °C/100 °C unit required B1 [1]

(d) **temperature** of oil will have changed/decreased B1 [1]

(e)

using two people to take the measurements	✓
pouring the oil quickly after taking its temperature	✓

B1 B1 [2]

[Total: 11]

2 **(a)** time several/*N* oscillations (allow 5 ⩽ *N* ⩽ 40 if value given) **and** divide by *N* B1
repeat reading **and** average B1

any one from
view perpendicular to swing
time from centre/use fiducial marker/view at bottom of ruler/where speed max
smooth swings/same amplitude B1 [3]

(b) **(i)** initially *T* decreases (as *d* increases) B1
(then) *T* increases (as *d* increases) B1 [2]
minimum *T* at *d* = 20 cm scores 2 allow just *T* increases for one mark

(ii) 1.58 to 1.70 (s) unit NOT required B1 [1]

(iii) at centre of mass of ruler/no moment/in equilibrium/balanced/does not move
ruler will not oscillate/swing
ruler spins/rotates
T too large/very large B1 [1]

[Total: 7]

© UCLES 2010

3 **(a)** **(i)** slow reactions stopping stopwatch/started stopwatch early
faulty stopwatch/string wound incorrectly B1 [1]

(ii) 4.488 C1
4.49 accept 4.5 c.a.o. 3 / 2 s.f. only A1 [2]

(b) 15 / 14.8 / 14.9 / % unit required no s.f. penalty e.c.f. **(a) (ii)** B1 [1]

(c) use a marker at 1 m/metre rule vertical/avoid parallax error/rule close to string/
parallax error described accurately B1 [1]

[Total: 5]

4 **(a)** so can be replaced (exactly) if moved/knocked/so rays can be drawn through
the block/to know where the ray changes direction/marks air-glass boundary B1 [1]

(b) views P_1 and P_2 through block M0
puts P_3 and P_4 **in line with** P_1 and P_2 B1 [1]

(c) **(i)** ray drawn accurately within block with ruler B1 [1]

(ii) normal drawn correctly
direction from centre of block B1 [1]

(iii) 34° ± 3° B1 [1]

(d) i = 0/arrives along normal/90° to surface/passes through centre of block B1 [1]

(e) ray 3 completed to match ray 1 inside block e.c.f. **(c)** B1 [1]

[Total: 7]

© UCLES 2010