

## MARK SCHEME for the May/June 2007 question paper

### 5054 PHYSICS

5054/04

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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- 1 (a) (i) 10 to 20 oscillations [1]
- (ii) T too small / time measured larger / gives time on stopwatch about 10s / not too long to take readings / large number may lose count / error in T is  $1/N$  error in t / good comment on reaction time  
NOT just makes T more accurate [1]
- (b) check for error in timing/ practice increases competence / **average** gives more accurate time / increases sf in T [1]
- (c) paper clip moving fastest / time when passing fiducial marker  
NOT makes T more accurate [1]
- (d) oscillations too fast to count/ time too small to measure [1]
- (e) axes, correct way round, labelled quantity and unit scales; more than  $\frac{1}{2}$  page, sensible  
5 points plotted accurately  $\pm \frac{1}{2}$  small square  
best fit curve drawn, neatly [4]

**[Total: 9]**

- 2 (a) (i) normal drawn perpendicular to mirror where ray arrives [1]
- (ii)  $59^\circ$  to  $60^\circ$  unit required [1]
- (b) (i) reflected ray drawn accurately from mirror and through  $P_3$  and  $P_4$  [1]
- (ii) reflected ray drawn accurately from mirror and through  $P_5$  and  $P_6$  [1]
- (iii)  $40 \pm 1$  [1]
- (iv) 2 ecf (b) (iii) / 20 **no unit** [1]
- (v) repeat experiment for different value of z  
additional detail, e.g. compares new c to original c  
at least two additional values of z  
plots graph of y against z [2]

**[Total: 8]**

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- 3 (a)** quantities: temperature and time **NOT** temperature change  
units: °C and seconds (s) or minutes (min not m) [2]
- (b) (i)** y-axis labelled temperature or temperature change, x-axis labelled time  
(allow symbols for quantities)
- (ii)** correct curve shape for y-axis label
- (iii)** for y = temperature, values 90° and 20° marked on temperature axis,  
and line starts at 90°, ends at 20°  
OR for y = temperature change, value 70° marked on temperature change axis,  
and line from 0 to 70°  
unit required on axes labels or on values on axes  
ignore curve shape [3]
- (c)** temperature continuously changing / only one temperature at each time [1]
- (d)** any two clear practical details e.g.  
at least 1/3 thermometer immersed  
avoid parallax when reading thermometer (any explanation must be correct)  
use of two people  
heat above 90° and start stopwatch as temp reaches 90°  
read from top of mercury meniscus  
mercury column in line with scale  
stir water  
large number of readings taken  
stopwatch close to thermometer  
external factors constant [2]
- [Total: 8]**
- 4 (a) (i)** newton meter / spring balance / force meter
- (ii)** 4.6 to 4.9 1 dp only
- (iii)** 1.5 or 1.6 [3]
- (b)** 6.9 cm ecf (a) (ii) and (iii) **NOT** one sf [1]
- (c)** water on the block will change the weight / time needed to dry cube [1]
- [Total: 5]**