UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

5054 PHYSICS

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

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1 **(a)** use of spirit level / plumb line and set-square /
check height at two points on rule (at least 50 cm apart) same distance above the bench B1
allow answers on diagram

(b) checks strings at 50 cm ± *d* / measure both *d* from centre / ends of rule (B) B1

(c) **(i)** answers on Fig. 1.2 either side
eye level with rule B, looking towards B
accept between bench label and metre rule B label
above rule A, looking down close to end of rule A B1

OR answers on Fig. 1.3 either side
looking toward fixed rule A from end NOT B
eye drawn on top of rule A close to end B1

(ii) time several / *N* oscillations (allow $5 < N < 40$ if value given) **and** divide by *N* B1
repeat and average B1
use fiducial marker / time from centre / where speed max /
smooth swings e.g. no obstructions / same amplitude B1
ignore avoid parallax error / use stopwatch / plot graph of results

(d) **(i)** axes: labelled both quantity and unit; *T* on *y*-axis B1
scales: at least ½ grid in both directions and sensible
start at (10,1) *x*: 2 cm ≡ 5 cm *y*: 2 cm ≡ 0.2 or 0.25 s B1
plotting: neat, to ± ½ small square, max size dot 1 mm B1
not awarded if scale not sensible
reasonable attempt at smooth curve B1

(ii) doubling and halving attempted / $T \times d$ seen / $T \propto 1/d$ C1
numerical support for doubling and halving / two values $T \times d$ seen A1
must be correct use of data

(iii) long time to take readings / unstable swings / difficult to oscillate / rotate B1
allow *T* increases
ignore difficult to time / does not oscillate / rotate

[Total: 13]

2 **(a)** wall clock + only need to measure to nearest second / accurate enough /
time measured is large
stopwatch + easier to hold / closer to apparatus B1
ignore easier to use / read / reaction errors
NOT stopwatch as it is more accurate

(b) quantities time or *t* and temperature or θ or *T* B1
allow temperature change but no ecf to graph **(c)(i)**
units minutes or min (NOT m or s) and °C correct (NOT K) B1
allow *T* or *t* for either temperature or time, but not same for both

(c) **(i)** shape of curve correct B1
allow two straight lines joined by small curve
NOT just two straight lines
line starts from t = 0 and θ above 0 (room temp) B1
(approx) horizontal from (approx) t = 20 min at θ = 60°C B1
20 min and 60°C must be labelled

(ii) heat gained from heater = heat lost to surroundings / reaches equilibrium
heater not powerful enough B1

[Total: 7]

3 **(a)** 1.5 (N) cao B1

(b) 2.6 (cm) ± 0.05 (cm) B1

(c) measure *N* and ÷ *N* / repeat / check B1
vernier calliper / micrometer screw gauge B1

OR

rule (with millimetre markings)
measure pile of at least 10 coins and divide by 10 A2

(d) 7.4(348) (g/cm^3) ecf **(a)** and **(b)** B1

(e) allow ecf **(d)**
No + density is different
Yes + densities similar only if answer **(d)** 8.0 to 10.0 g/cm^3
Not sure + suitable comment, e.g. densities close but uncertainties in expt B1

[Total: 6]

4 **(a)** experiment that would work M0
diagram of apparatus A1
not if major error e.g. paperclips hanging from middle of magnet
how the apparatus is used (some detail required) A1
e.g. point of procedure or fair test
how it shows which is stronger A1
NOT plotting field lines with a compass

(b) use of repulsion to identify magnets / use of attraction to identify soft iron B1

[Total: 4]