

**MARK SCHEME for the October/November 2009 question paper
for the guidance of teachers**

5124 SCIENCE (PHYSICS AND CHEMISTRY)

5124/02

Paper 2 (Theory – Physics), maximum raw mark 65

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.

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Section A

- 1 (a)** use of gradient of graph (1)
1.6 (m/s²) (1) [2]
- (b)** use of $W = mg$ (1)
0.8 (N) OR $0.5 \times$ their (a) (1) [2]
- (c)** use of area under the graph OR ave. speed \times time (1)
0.8 (m) (1) [2]
- [Total: 6]**
- 2 (a)** micrometer (screw gauge) / vernier callipers [1]
- (b)** use of $m = VD$ (1)
use of 27 (cm³) as the volume (1)
203 / 202.5 (g) (1) [3]
- [Total: 4]**
- 3** moment calculated as 330 (Ncm) (1)
equating moments (1)
220 (N) (1) [3]
- [Total: 3]**
- 4 (a) (i)** kinetic / movement / mechanical to electrical (1)
(ii) electrical to light (1) [2]
- (b)** p.e. / work done per second = $mgh \div t$ (1)
3.0 (1) [2]
- [Total: 4]**
- 5 (a) 1.** great (er) amount of mercury (1)
more movement per degree / greater sensitivity (1) [2]
- 2.** faster conduction of heat (1)
faster response (1) [2]
- (b)** high / very low temperatures OR temperatures at a point (1)
changing temperatures (1)
(allow remote reading or little absorption of heat for 1 mark if 2 marks not scored above) [2]
- [Total: 6]**

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- 6 (a) vibrations are parallel to / in the same direction as the direction of energy transferred from particle to particle [1]
- (b) use of $\lambda = v/f$ (1)
0.75 (m) (1) [2]
- [Total: 3]**
- 7 (a) use of sines (1)
use of $\sin i / \sin r$ OR $0.719 \div 0.469$ (1)
1.53 (1) [3]
- (b) emergent ray refracted away from the normal (1)
parallel (by eye) to the incident ray (1) [2]
- [Total: 5]**
- 8 (a) use of $V = E/Q$ (1)
6 (V) (1) [2]
- (b) use of $I = Q/t$ (1)
1.5 (A) (1) [2]
- (c) use of $P = iV$ OR $E \div t$ (1)
9 (W) (allow ecf from incorrect (a) and (b) (1)) [2]
- [Total: 6]**
- 9 (a) electron [1]
- (b) 52 [1]
- (c) 38 [1]
- (d) 39 [1]
- [Total: 4]**
- 10 (a) smaller voltage shown (1)
lower frequency shown (1) [2]
- (b) varying magnetic field in the core (1)
changing field in secondary induces an e.m.f. (1) [2]
- [Total: 4]**

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Section B

- 11 (a)** circuit containing a power supply, wire, ammeter in series AND a voltmeter in parallel across the wire (1)
means of varying the p.d. / current e.g. rheostat, variable resistor or variable power supply (1)
set p.d. and measure current and voltage (1)
by reading the ammeter and voltmeter (1)
change the p.d. and repeat the measurement a number of times (1) [5]
- (b)** axes labelled with units (1)
straight line through the origin (1) [2]
- (c)** steeper line if I is the y-axis
OR less steep line if V is the y-axis (1)
resistance is less (1)
so greater current for a given voltage (1) [3]
- [Total: 10]**
- 12 (a)** place the magnet on a sheet of paper and draw round it (1)
place a plotting compass near the magnet (1)
mark the position of both ends of the plotting compass (1)
move the plotting compass and repeat (1)
join the dots (1)
(if iron filings method used, mark to max. 3 or max. 4 if plotting compass used to find the direction) [5]
- (b) (i)** steel bar placed inside coil and d.c. passed through coil (1)
- (ii)** magnet placed inside coil with a.c in coil (1)
(slowly) decrease current / remove magnet (1)
(this mark is dependant upon the previous mark being gained) [3]
- (c)** iron is easily magnetised / makes a strong electromagnet (1)
easily loses its magnetism (when current switched off) (1) [2]
- [Total: 10]**
- 13 (a)** method of heating ends of metal equally (1)
method of detecting if the metal is heated (1)
observe each for the same time (1)
observe what has happened with each rod (1)
identify which shows better conduction (1) [5]
- (b)** by molecular / particle vibration (1)
energy is passed from particle to particle along the rod (1) [2]
- (c) (i)** less heat loss by conduction and convection (1)
- (ii)** black is a good absorber of radiation (1)
so (more) rapid heating of the water (1) [3]
- [Total: 10]**