

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the October/November 2006 question paper

0625 PHYSICS

0625/03 Paper 3 (Extended Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and students, 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.

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

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

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UNIVERSITY of CAMBRIDGE
International Examinations

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- 1 (a) (i) $t = v/g$ or $32/10$
 $= 3.2 \text{ s}$ C1
A1
- (ii) straight line starting at zero, inclined line joining 0,0 and 3.2, 32, accept c.f. from time (i) C1
A1
- (iii) 2.4 kg A1 [5]
- (b) (i) take volume of water before use
(totally) immerse stone and take new volume
(Not clearly measured before and after C1) B1
B1
- (ii) hang rock from balance and take reading B1
- (iii) density = mass/volume B1
- (iv) need to tie "sinker" or cork or press cork down
need volume with sinker then volume with sinker and cork or just completely submerge cork B1 [6]
- [Total: 11]
- 2 (a) limit of proportionality (allow elastic limit) B1 [1]
- (b) force is proportional to extension or in terms of doubling B1 [1]
- (c) (up to Q extension proportional to force applied)
Q to R extension/unit force more however expressed B1 [1]
- (d) $k = \text{force}/\text{extension}$ or $8/2$ or other correct ratio
 $= 4.0 \text{ N/mm}$ C1
A1 [2]
- [Total: 5]
- 3 (a) p.e. lost $= mgh$ or $1 \times 10 \times 7$
 $= 70 \text{ J}$ C1
A1 [2]
- (b) $70 = 0.5 \times m \times v^2$ or ecf
 $v^2 = 140$ or $2 \times \text{p.e.}$
 $v = 12 \text{ m/s}$ C1
C1
A1 [3]
- (c) some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion B1 [1]
- [Total: 6]
- 4 (a) (i) 1 is 20°C
2 is $15 \pm 1^\circ\text{C}$, need both correct for a mark A1
- (ii) more heat lost at higher temperature B1 [2]
- (b) heat in = 60×210 or Wt or $12\,600 \text{ (J)}$
heat in water = $m \times s \times \Delta\theta$ or $75 \times s \times 40$
 $s = 12600/75 \times 40$
 $= 4.2 \text{ J/g } ^\circ\text{C}$ C1
C1
C1
A1 [4]
- (c) outline correct, two wires with clear junction and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals M1
A1 [2]
- [Total: 8]

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- 5 (a) (i) conduction B1
(ii) particles/atoms/ions vibrate or electrons move and carry energy pass on energy from one particle to the next B1 B1 [3]
- (b) four surfaces facing one heat source B1 suitable detector e.g. thermometer behind surface-read all 4 B1 precaution e.g. equal distance/time B1 (Can not score last two marks if experiment is totally wrong) [3]
- [Total: 6]
- 6 (a) completed path B1 [1]
(b) any two correct, -1 each incorrect virtual, inverted, same size as object B2 [2]
(c) angle of incidence zero/at right angles/along normal B1 [1]
(d) $1.5 = V_a/V_g = 3 \times 10^8/V_g$ C1
 $V_g = 2 \times 10^8$ m/s A1 [2]
(e) angle of incidence = 45° , so angle of reflection = 45° , so ray turns through 90° B1 OR angle i> angle c B1 so totally internally reflects [2]
- [Total: 8]
- 7 (a) straight not circular or WTTE waves not same wavelength/same distance apart waves should extend into shadow area (more) any 2 B2 [2]
(b) diagram showing large flat piece with circular edges (ignore any wavelength changes) but straight part must be (very) nearly equal to slit width M1
A1 [2]
(c) speed = 1.2×8 C1
= 9.6 cm/s A1 [2]
- [Total: 6]
- 8 (a) switch in correct position B1 [1]
(b) (i) rheostat/variable resistance symbol drawn B1
(ii) dot and R in line to 12 W lamp B1 [2]
(c) Question deleted
(d) $R = V/I$ or $12/3$ C1
= 4Ω A1 [2]
(e) (i) parallel circuit/all lamps connected separately across the 12V B1
(ii) 4 A A1 [2]
- [Total: 7]

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- 9 (a) (i) connections one to each plate
top one to +ve , bottom one to -ve
(New PSU drawn C1) M1 A1 [2]
- (ii) electrons negatively charged
one plate positively charged, one negatively charged
electrons attracted to +/repelled by – B1 B1 B1 [3]
- (b) (i) time base applied to X plates stated or described B1
- (ii) a.c. or varying voltage applied to Y plates B1 [2]
- (c) 2 full waves, (equal about centre line) B1 [1]
- [Total: 8]**
- 10 (a) A – resistor B – LDR C – transistor D – lamp (-1 each incorrect) B2 [2]
- (b) C B1 [1]
- (c) resistance of LDR low in light, high in dark
increase of resistance/potential in circuit cause transistor to conduct ($V_{be} > 0.6$ V)
switches lamp on B1 B1 B1 [3]
- [Total: 6]**
- 11 (a) (i) atoms interact with by particle/photon not radiation
electron(s) removed to form ions B1 B1
- (ii) much greater mass or size/slower speed/more ion pairs/cm/larger charge B1 [3]
- (b) (i) any 2 correct B2
- (ii) e.g. foil thickness described/outline diagram
foil too thick less reading/notes on diagram to show method
other examples will occur, must have two clear points:
e.g. 1. gamma rays aimed at cancer (not just radiation)
focused on tumour
e.g. 2. fission of heavy nucleus (accept named nuclide)
leads to more fissions/chain reaction B1 B1 [4]
- [Total: 7]**