

**NOVEMBER 2002**

**INTERNATIONAL GCSE**

**MARK SCHEME**

**MAXIMUM MARK : 80**

**SYLLABUS/COMPONENT : 0625/3**

**PHYSICS  
(EXTENDED)**



| Page 1 | Mark Scheme                        | Syllabus | Paper |
|--------|------------------------------------|----------|-------|
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Accept D & E  
marked on time  
axis

No labels -1

|        |  |                        |     |
|--------|--|------------------------|-----|
| 1 a    | BD correct, (straight line i.e. constant acceleration)<br>DE correct, ( constant speed or slightly reducing speed only)<br>EF correct, (speed reduced to zero, gradient steeper than BD)                                   | B1<br>B1<br>3 B1       | 3   |
| b(i)   | force = 2 (N)<br>work = (2 x 0.6) = 1.2 J*   | C1<br>A1               | 2   |
| (ii)   | k.e. = $0.5mv^2$<br>= $0.5 \times 0.2 \times 2.5 \times 2.5$<br>= 0.625 J*   | C1<br>C1<br>3 A1       | 5   |
| c      | velocity - vector, speed scalar<br>direction changes so velocity changes   | B1<br>2 B1             | 2   |
| d      | work done against friction<br>(more) friction on EF<br>(k)e. changed to heat<br>less k.e. changed to p.e.  | B1<br>B1<br>B1<br>3 B1 | M3* |
|        |  | QT                     | 13  |
| 2 a(i) | outline, ruler pivoted (at centre), mass one side, rock other side<br>quality set-up, each mass at (marked) point + labels   | C1<br>2 A1             |     |
| (ii)   | rod must be balanced before readings can be taken or record mass as 100 g<br>distances to pivot from rock and mass B1 distance pivot to mass B1<br>mass or 100 x distance to pivot = mass of rock x distance rock to pivot | B1<br>B2<br>3 B1       | 5   |
| b      | put water in cylinder, read value<br>insert rock until covered, read value<br>difference in values is volume of rock   | B1<br>B1<br>2 B1       | M2* |
| c      | density = mass/volume or 88/24<br>= $3.7 \text{ g/cm}^3$ * (accept $3\frac{2}{3} \text{ g/cm}^3$ )   | C1<br>2 A1             | 2   |
|        |  | QT                     | 9   |
| 3 a    | junction of two metals, other ends to meter/alternative arrangements<br>two metals named, meter labelled   | C1<br>2 A1             | 2   |
| b(i)   | meter calibrated in degrees or read value and use calibration chart  | B1                     |     |
| (ii)   | change in temp. causes change in voltage/current   | 2 B1                   | 2   |
| c      | high temperatures<br>rapidly changing temperatures (or low thermal capacity)<br>any valid physical reason e.g. distance reading needed, small site etc   | B1<br>B1<br>2 B1       | M2* |
|        |  | QT                     | 6   |
| 4 a(i) | $L = VIt(m_1 - m_2)$ exact for 2 eg. $VIt = (m_1 - m_2)L$ only 1 or $m_2 - m_1$  | 2 C1, A1               |     |
| (ii)   | = $12 \times 2 \times 3750 / 40$<br>= $2250 \text{ J/g}^*$ or $2.25 \times 10^6 \text{ J/kg}$  | C1<br>2 A1             | 4   |
| b      | (large) intermolecular forces in liquid / bonds<br>(great) energy needed to separate molecules of liquid   | B1<br>2 B1             | 2   |
|        |  | QT                     | 6   |

(accept 3.6)

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|  |      |   |
|--|------|---|
| 5 a(i) C marked vertically under/at any peak (including on axis) | B1   |   |
| R marked on NEXT trough (either way)                             | 1 B1 |   |
| (ii) half a wavelength   | 1 B1 | 3 |
| b $f = v/w$ or $340/1.3$   | C1   |   |
| = 260 Hz*  | 2 A1 | 2 |
|  | QT   | 5 |

|   |                    |   |
|---|--------------------|---|
| 6 a(i) $43 \pm 1^\circ$   | 1 A1               |   |
| (ii) angle r for this ray is $90^\circ$   | B1                 |   |
| or marked c → angle c is angle i (in denser medium) ( <del>giving angle r = <math>90^\circ</math></del> ) | 2 B1               | 3 |
| b(i) $3 \times 10^8$ m/s*   | 1 A1               |   |
| (ii) speed in air/speed in medium   | <del>1 M1</del>    |   |
| = 1.5 (no up for $^\circ$ )   | 2 <del>M1</del> A1 |   |
| (iii) angle i = $0^\circ$ / along normal / at $90^\circ$ to surface                                       | 1 B1               |   |
| (iv) increased/more/larger  | 1 B1               | 5 |
|   | QT                 | 8 |

|   |      |    |
|---|------|----|
| 7 a(i) steel  | 1 A1 |    |
| (ii) insert bar in coil (switch on, leave, switch off)            | 1 B1 |    |
| (iii) to control/measure current or stop circuit/coil overheating | 1 B1 | 3  |
| b(i) $R = 12/4$   | C1   |    |
| = 3 ohms*   | 2 A1 |    |
| (ii) $P = 12 \times 4$  | C1   |    |
| = 48 W*   | 2 A1 |    |
| (iii) $E = 48 \times 5$   | C1   |    |
| = 240 J*  | 2 A1 | 6  |
| c(i) 5 (V)  | 1 A1 |    |
| (ii) sum of p.d.'s = circuit supply p.d.                          | C1   |    |
| above + detail eg across each component/ in closed circuit etc    | 2 A1 | 3  |
|   | QT   | 12 |

|  |      |   |
|--|------|---|
| 8 a (magnetic field) from left to right/ N to S                      | 1 B1 | 1 |
| b(i) movement at right angles/between poles, up or down              | C1   |   |
| (vertically) down, stated or reference to arrow on diagram or label  | 2 A1 |   |
| (ii) mention of Fleming's L.H.R. or interacting fields               | C1   |   |
| full explanation leading to correct direction e.g. what fingers show | 2 A1 | 4 |

|   |         |   |
|---|---------|---|
| c use coil instead of single wire                             | B1      |   |
| mount coil on bearings  | B1      |   |
| arrange suitable contacts e.g. slip/slit rings and commutator | 2 B1 M2 |   |
|   | QT      | 7 |

|        |                                    |          |       |
|--------|------------------------------------|----------|-------|
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|  |  |             |    |    |  |
|--|--|-------------|----|----|--|
| mark<br>on diag  | 9 a(i) curve upwards between plates                                      |             |    | C1 |  |
|  | curve upwards between plates + straight line                             | 2           | A1 |    |  |
|  | (ii) top +, bottom -   | 1           | B1 |    |  |
|  | (iii) to left, arrow and C marking any point on the beam between X and P | 1           | B1 | 4  |  |
|  | b cathode/heater, labelled   |             | B1 |    |  |
|  | anode labelled   |             | B1 |    |  |
|  | correct arrangement of cathode with anode cylinder                       |             | B1 |    |  |
|  | suitable power supplies to heater/ anode-cathode (either to score)       | 4           | B1 | 4  |  |
|  |  |             | QT | 8  |  |
|  | 10 a half-life 4 days*   | 1           | A1 | 1  |  |
| b at least two points worked out   |  | M1*         |    |    |  |
| suitable curve completed   | 2  | A1          | 2  |    |  |
| c by 20 days little radioactivity left, after 1 day about 85% left               | 1  | B1          | 1  |    |  |
| d ${}^A_Z X \rightarrow {}^0_{-1} e + {}^A_{Z+1} Y$ top line, A1/ bottom line A1 | 2  | A2          | 2  |    |  |
|  |  | QT          | 6  |    |  |
|  | or ${}^0_{-1} \beta$ (not e or $\beta$ alone)                            |             |    |    |  |
|  |  | PAPER TOTAL | 80 |    |  |

