

# Mark Scheme June 2007

GCE O Level

GCE O Level Physics  
7540

GCE PHYSICS 7540/ 01

1.

- (a) 14 N UP 1  
also allow 13.72 N or 13.734 N  
allow Newton, Newtons,  $\text{kg m/s}^2$ ,  $\text{kg ms}^{-2}$ , n, newton, newtons
- (b) Vertical downward arrow (above or below) between left edge of 1  
head and right tip of tail labelled weight or W or 14 N or mg or Mg  
Ignore extra arrows unless they contradict.
- (c) (i) 'same as or equal to (a)' or 14 or 13.72 or 13.734. Ignore units 1
- (ii) Vertical upward arrow (above or below) within wingspan labelled 1  
lift(force) or L(F)  
Ignore extra arrows unless they contradict.
- (d) (wings have) large(r) area/smaller birds small(er) area 1  
(small movement) produces large enough/correct force/ 14N 1  
ignore movements of smaller birds

Total 6 marks

2.

- (a)  $10 \text{ m/s}^2$  UP / g Ignore minus sign e.g.  $-10 \text{ m/s}^2$  1  
ALLOW 9.8, 9.81,  $\text{ms}^{-2}$ ,  $980 \text{ cm/s}^2$
- (b) (i) acceleration/(rate of)change of velocity/speed with time 1  
allow 'deceleration'
- (ii) large/big/great/uniform/constant/maximum at start 1  
getting smaller/reducing/decreasing (with time) 1  
becoming zero /stops accelerating 1  
Max 2
- (c) distance (travelled)/displacement 1
- (d) curve or line from origin on or below first 1  
levelling off below first line and above time axis 1

Total 7 marks

3.

- (a)  $\text{KE} = \frac{1}{2} \times 1200 \times 0.2^2$  1  
 $= 24 \text{ J or kgm}^2\text{s}^{-2} \text{ or Nm UP}$  1  
(Correct answer without working gains both marks)
- (b) (i)  $\text{GPE} = 1200 \times 10 \times 2.8$  1  
 $= 33\,600 \text{ J UP (32928 J for 9.8) (32961.6 for 9.81)}$  1  
(Correct answer without working gains both marks)
- (ii) time =  $2.8 / 0.2$  1  
 $= 14 \text{ s UP}$  1  
(Correct answer without working gains both marks)
- (iii) Power =  $33\,600 / 14$  (ecf/ecf) 1  
 $= 2400 \text{ W or J/s UP (2352 W for 9.8) (2354.4 for 9.81)}$  1  
Correct answer without working gains both marks. For ecf  
working must be shown to score either mark)

OR  $(33600 + 24) / 14 = 2401.7 \text{ W scores 2}$

$(2353.7)(2354.4)$

Total 8 marks

4.

- |     |  |            |        |
|-----|--|------------|--------|
| (a) | Point/ place/ position /where<br>weight or mass (seems to ) act(s)   | gravity(0) | 1<br>1 |
| (b) | <sup>i</sup><br>X in shaded area on diagram of A, B or C   |            | 1      |
| (c) | Increase weight / mass / density<br>within base (or shaded area)/ at bottom of cup / at X / there<br>'heavy base' scores 2<br>plumb line methods score 0 |            | 1<br>1 |
| (d) | tips/ topples/ falls over easily/ due to slight force OWTTE<br>drink spills or falls out or leaks  |            | 1<br>1 |

Total 7 marks

5.

- |     |  |   |
|-----|--|---|
| (a) | (air) molecules (do not) expand            | 1 |
|     | (air) molecules (do not) become less dense | 1 |

- |     |   |   |
|-----|---|---|
| (b) | (air molecules ) move faster/more vigorously/gain energy        | 1 |
|     | collide (with walls) more frequently / harder / with more force | 1 |
|     | move <u>further</u> apart                                       | 1 |

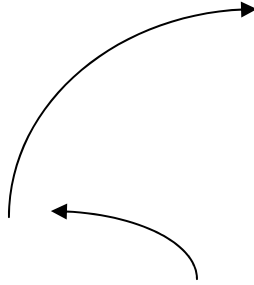
any two points

mark answers to (b) if seen in (a)

Total 4 marks

6.

- (a) arrow on each wire pointing towards top 1  
(electrons are) negative (charges) 1  
flow/move (from earth) to positive 1



- (b) (i)  $0.0005 \times 3$  1  
 $= 0.0015 \text{ C or As}$  UP 1
- (ii)  $20\,000 \times 0.0015$  ECF or SFS 1  
 $= 30 \text{ J or Ws}$  UP 1

Total 7 marks

7.

- |     |   |   |
|-----|---|---|
| (a) | diode or rectifier or valve<br>ignore 'forward biased', 'reverse biased' or 'semiconductor' | 1 |
| (b) | '+' on left    '-' on right   | 1 |
| (c) | <u>8</u> (V) No UP  | 1 |
| (d) | p.d. proportional to $R$ (for the same current) / voltage is doubled                        | 1 |
| (e) | (i) <u>20</u> ( $\Omega$ ) No UP  | 1 |
|     | (ii) 6 V UP   | 1 |
| (f) | (i) correct use of voltmeter  | 1 |
|     | (ii) <u>extremely/very</u> high/ infinite resistance<br>ignore reference to current         | 1 |

Total 8 marks

- 8.
- |     |      |  |   |
|-----|------|--|---|
| (a) | (i)  | perpendicular to the paper / out of paper but not 'into paper'<br>accept 'upward(s)' but not 'towards top of page'                               | 1 |
|     | (ii) | not charged/uncharged/neutral  | 1 |
| (b) |      | parallel to paths (or lines)/ upward(s) / downward(s) /top to<br>bottom/ bottom to top/parallel to the direction of (motion of)<br>the particles | 1 |
| (c) |      | Particle slows down / less energy / acquires more charge /<br>loses mass<br>Or magnetic field (strength) <u>increased</u>                        | 1 |

Total 4 marks



9. (a) (i) not radioactive /does not decay / does not emit (ionising) radiation 1
- (ii) same number of protons/atomic number/element 1
- different number of neutrons/mass number/nucleon number/atomic mass 1
- (b) (i) .....0..... .....121..... 1  
 .....-1..... .....51..... 1
- 0 and -1 scores 1  
 121 and 51 scores 1
- (ii) no difference 1

Total 6 marks

- 10.
- |     |  |             |
|-----|--|-------------|
| (a) | Longitudinal<br>Ignore 'wave' and 'motion'   | 1           |
| (b) | 336 / 384<br>= 0.875 m UP<br>accept 0.88 m but not 0.87m or 0.9 m  | 1<br>1      |
| (c) | (i) natural, normal or own frequency (of wire /object) not paper<br>equals frequency of (tuning) fork<br>(leads to) increased/high/large/ amplitude or vibration of wire | 1<br>1<br>1 |
|     | (ii) change tension /length /mass /thickness/area<br>not change type of wire<br>to change the (natural)frequency of the wire (allow increase or decrease)                | 1<br>1      |

Total 8 marks

11. (a)

converging lens		diverging lens
magnified		diminished
virtual		virtual

1  
1

scores 1

scores 1

mark *vertically*

(b) (i) Real ignore position, size, inverted 1

(ii) 1. diminished / smaller / no change /reduced ignore inv 1

2. virtual / no change /same  
ignore 'blurred' 1

Total 5 marks

Total for paper: 70 marks