# IGCSE DA Physics 4437 3F <br> Mark Scheme (Results) Summer 2008 

## IGCSE

IGCSE DA Physics 4437 3F

## 4437-3F MARK SCHEME

Abbreviations used in mark scheme:
OWTTE - or words to that effect
dop - depending on previous
ecf - error carried forward
ora - or reverse argument
sfs - start from scratch
UP - unit penalty

| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{1}(\mathbf{a}) \mathbf{( i )}$ | P | p |  | $\mathbf{( 1 )}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{1}(\mathbf{a})$ (ii) | Q | q |  | $\mathbf{( 1 )}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{1}$ (a)(iii) | Q and R | q and r <br> either <br> order |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{1 ( b ) ( i ) ~}$ | sloping |  | sloping <br> and <br> horizontal | $\mathbf{1}$ |
| straight |  |  |  |  |
| independent marks but |  |  |  |  |
| sloping and horizontal scores (0) |  |  |  |  |$\quad$| (2) |
| :--- |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :---: |
| $\mathbf{1}$ (b)(ii) | horizontal |  |  |  |
| ignore 'straight' |  |  | (1) |  |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :---: |
| $\mathbf{1}$ (c) | less distance (travelled in section R <br> than in section P) |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :---: |
| $\mathbf{2 ( a ) ( i ) ~}$ | long | allow <br> answers to <br> (i) and (ii) <br> in either <br> order |  |  |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{2}$ (a)(ii) | frayed |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 2 (b) | stray wire(s) |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{2 ~ ( c ) ( i ) ~}$ | plastic (casing) |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{2}$ (c)(ii) | small/low current |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 2 (d) | $*$ circuit breaker <br> $*$ double insulation | either one |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{3 ( a )}$ | energy | in either |  | $\mathbf{1}$ |
|  | information | order |  | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{3}$ (b) | D |  | wrong <br> order | $\mathbf{1}$ |
|  | C |  |  | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{3 ( c ) ( i ) ~}$ | cycles/waves |  | wrong | $\mathbf{1}$ |
|  | second/unit time |  | order | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{3}$ (c)(ii) | speed | velocity <br> (time) period <br> time to travel a <br> wavelength |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 3 (d)(i) | longitudinal |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 3 (d)(ii) | $20 \mathrm{~Hz}-20000 \mathrm{~Hz}$ |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 3 (d)(iii) | less than |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{4}$ (a)(i) | microphone |  |  | $\mathbf{( 1 )}$ |


| Question <br> Number | Correct Answer | Acceptable Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 4 (a)(ii) | kettle/iron/heater/ <br> (electric) fire/ <br> toaster/hairdryer/ <br> soldering iron | there are many other <br> examples <br> credit if the useful <br> energy transfer is <br> from electricity to <br> heat |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 4 (b) | any falling body |  | do not credit examples where <br> both falling and rising occur <br> e.g. child's swing or bungee <br> jump unless falling is <br> specified | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 4 (c) | heat | sound |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 4 (d) | total energy input <br> total energy output | in either <br> order <br> scores 2 or 0 |  |  |


| Question | Correct Answer | Acceptable | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| Number | Answers |  |  |  |
| 4(e) | kinetic |  |  | $\mathbf{1}$ |
|  | kinetic |  |  | $\mathbf{1}$ |
|  |  |  |  | $\mathbf{( 2 )}$ |

(Total 8 marks)

| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{5}$ (a)(i) | 100000 |  |  | $\mathbf{( 1 )}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 5 (a)(ii) | 500000 | $100000 \times 5$ <br> for (1) <br> mark |  | $\mathbf{2}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{5}$ (b)(i) | 330 | $400-70$ for <br> (1) mark |  | $\mathbf{2}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| 5 (b)(ii) | background (count/radiation) |  |  | $\mathbf{1}$ |
|  | random/variable/not constant |  |  | $\mathbf{1}$ |
|  |  |  |  | (2) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :---: |
| $\mathbf{5}$ (c) | cosmic rays/rocks/medical etc | any two <br> (1) each |  | (2) |

(Total 9 marks)

| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{6 ( a )}$ | yellow | 1 mark if |  | $\mathbf{1}$ |
|  | green | colours reversed |  | $\mathbf{1}$ |
|  |  |  |  | $\mathbf{( 2 )}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{6}$ (b)(i) | A infra-red |  | answers | $\mathbf{1}$ |
|  | B ultra violet |  | reversed | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | ---: |
| $\mathbf{6}$ (b)(ii) | B / ultra violet |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable Answers | Mark |
| :--- | :--- | :--- | :--- |
| 7(a)(i) | 0.8 (seconds) | $4 / 5$ second | $8 / 10$ second |


| Question <br> Number | Correct Answer | Acceptable Answers | Mark |
| :--- | :--- | :--- | :--- |
| 7(a)(ii) | 3.2 (seconds) | $31 / 5$ <br> allow ecf from (i) |  |

\begin{tabular}{|c|c|c|c|}
\hline Question Number \& Correct Answer \& Acceptable Answers \& Mark \\
\hline 7(a)(iii) \& one line horizontal line beyond 0.8 less steep slope down (to the x axis) dop \& \begin{tabular}{l}
two_separate lines or one of these lines \\
labelled 1 mark for each correct
\end{tabular} \& 1
1

(2) <br>
\hline
\end{tabular}

| Question <br> Number | Correct Answer | Acceptable Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 7(b)(i) | air (resistance) <br> mass of car <br> speed (of the car) <br> brakes <br> tyre pressure <br> area of tyre <br> streamlining | drag <br> weight <br> (force of) gravity <br> size <br> shape <br> velocity (of car) | wind <br> (resistance) <br> temperature | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Reject | Mark |
| :--- | :--- | :--- | :--- |
| 7(b)(ii) | intentionally straight vertical arrow <br> pointing downwards <br> from, above, below or through point X | arrow from middle of <br> car | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 8(a)(i) | infra red | i.r. <br> IR | microwaves <br> ultraviolet | $\mathbf{1}$ |
|  | allow phonetic spelling |  |  | (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 8(a)(ii) | gamma (rays/radiation) | Y <br> gama | X-rays | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 8(b)(i) | same speed (in a vacuum) <br> same velocity (in a vacuum) <br> or (travel at) speed of light <br> (travel at)velocity of light | travel through a <br> vacuum or empty <br> space | transverse | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 8(b)(ii) | water (waves)/waves <br> on water/tidal <br> waves/sea <br> waves/ocean waves | waves on (slinky) spring <br> shaken/moved up and <br> down or side to side <br> waves on a rope <br> moved up and down or <br> side to side <br> S waves <br> analogue wave <br> waves on a <br> CRO | $\mathbf{1}$ |  |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{8 ( b ) ( i i i ) ~}$ | $90^{\circ}$ | normal/ perpendicu <br> right angles <br> energy <br> independent <br> marks | information or <br> data <br> wavefront/front | crest/vibration/direction/ <br> pattern |
| $\mathbf{1}$ |  |  |  |  |


| Question <br> Number | Correct Answer | Acceptable <br> answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| 9(a)(i) | voltage $=$ current $\times$ resistance <br> or current $=$ voltage/resistance <br> or resistance $=$ voltage/current | $\mathrm{V}=\mathrm{IR}$ <br> $\mathrm{I}=\mathrm{V} / \mathrm{R}$ <br> $\mathrm{R}=\mathrm{V} / \mathrm{I}$ | $\mathrm{V}=\mathrm{C} \times \mathrm{R}$ | $\mathbf{1}$ |
|  |  |  | (1) |  |
| 9(a)(ii) | 4.5 nwn <br> volts or V or J/C or $\mathrm{JC}^{-1}$ or <br> $\mathrm{A} \Omega$ |  |  | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable Answers | Mark |
| :--- | :--- | :--- | :--- |
| 9(b) | decrease | Increase <br> decrease <br> scores 1 <br> increase <br> decrease <br> decrease <br> scores 1 <br> increase <br> increase <br> scores 1 | $\mathbf{1}$ |

(Total 5 marks)

| Question <br> Number | Correct Answer | Reject | Mark |
| :--- | :--- | :--- | :--- |
| $\mathbf{1 0 ( a ) ( \mathbf { i ) }}$ | (semiconductor)diode | LED <br> light emitting diode | $\mathbf{1} \quad$ (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{1 0 ( a ) ( i i ) ~}$ | 5050 | both required |  | $\mathbf{1} \quad$ (1) |


| Question Number | Correct Answer | Acceptable Answers | Reject | Mark |
| :---: | :---: | :---: | :---: | :---: |
| 10(a)(iii) | one cell is connected the wrong way | two cells cancel one another/not all facing the same way | battery | 1 |
|  | some of the voltage is across/used up by diode/component Y/ ammeter(s)/ (connecting) wire /switch | reference to resistance of these components /cells / whole circuit | voltage used up by/voltage across voltmeter/Iamp <br> voltmeter does not have infinite resistance <br> ignore reference to current and energy | 1 |


| Question <br> Number | Correct Answer | Acceptable Answers | Mark |
| :--- | :--- | :--- | :--- |
| $\mathbf{1 0}$ (b) | any three points |  |  |
| current increases |  |  |  |
| increases temperature |  |  |  |
| increases resistance |  |  |  |
| line or slope becomes less <br> steep | increases heat / <br> molecular movement | $\mathbf{1}$ |  |
| non-ohmic / I not proportional <br> to V/ <br> decrease rate of increase <br> /current levels off | (3) | $\mathbf{1}$ |  |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{1 1}$ (a)(i) | not moving (or vibrating) <br> none <br> zero | no kinetic energy <br> no momentum | a response <br> which suggests <br> any kind of <br> movement | $\mathbf{1}$ |


| Question <br> Number | Correct Answer | Acceptable Answers | Mark |
| :--- | :--- | :--- | :--- |
| $\mathbf{1 1}(\mathbf{a})($ (ii) | $-273\left({ }^{\circ} \mathrm{C}\right)$ | minus 273 <br> -273.15 | $\mathbf{1} \quad$ (1) |


| Question <br> Number | Correct Answer | Acceptable <br> Answers | Reject | Mark |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{1 1}$ (a)(iii) | 373 (K) | $373.15(\mathrm{~K})$ | $373^{\circ} \mathrm{C}$ | $\mathbf{1} \quad$ (1) |


| Question Number | Correct Answer | Reject | Mark |
| :---: | :---: | :---: | :---: |
| 11 (b) | particles knock /jostle /collide <br> smaller/invisible /air/water particles <br> cause a change of direction dop only as $3^{\text {rd }}$ mark | diffusion | $\begin{aligned} & 1 \\ & 1 \\ & 1 \end{aligned}$ |
|  |  |  | (3) |

(Total 6 marks)

