edexcel
advancing learning, changing lives

Mark Scheme (Results)
Summer 2008

GCE

GCE Salters Horners Physics (6756/01)

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

Mark scheme notes

Underlying principle

The mark scheme will clearly indicate the concept that is being rewarded, backed up by examples. It is not a set of model answers.

For example:

(iii) Horizontal force of hinge on table top

66.3 (N) or 66 (N) **and** correct indication of direction [no ue] [Some examples of direction: acting from right (to left) / to the left / West / opposite direction to horizontal. May show direction by arrow. Do not accept a minus sign in front of number as direction.]	✓	**1**

This has a clear statement of the principle for awarding the mark, supported by some examples illustrating acceptable boundaries.

1. Mark scheme format

1.1 You will not see 'wtte' (words to that effect). Alternative correct wording should be credited in every answer unless the ms has specified specific words that must be present. Such words will be indicated by underlining e.g. 'resonance'

1.2 Bold lower case will be used for emphasis.

1.3 Round brackets ( ) indicate words that are not essential e.g. "(hence) distance is increased".

1.4 Square brackets [ ] indicate advice to examiners or examples e.g. [Do not accept gravity] [ecf].

2. Unit error penalties

2.1 A separate mark is not usually given for a unit but a missing or incorrect unit will normally cause the final calculation mark to be lost.

2.2 Incorrect use of case e.g. 'Watt' or 'w' will **not** be penalised.

2.3 There will be no unit penalty applied in 'show that' questions or in any other question where the units to be used have been given.

2.4 The same missing or incorrect unit will not be penalised more than once within one question but may be penalised again in another question.

2.5 Occasionally, it may be decided not to penalise a missing or incorrect unit e.g. the candidate may be calculating the gradient of a graph, resulting in a unit that is not one that should be known and is complex.

2.6 The mark scheme will indicate if no unit error penalty is to be applied by means of [no ue].

3. Significant figures

3.1 Use of an inappropriate number of significant figures in the theory papers will normally only be penalised in 'show that' questions where use of too few significant figures has resulted in the candidate not demonstrating the validity of the given answer.

3.2 Use of an inappropriate number of significant figures will normally be penalised in the practical examinations or coursework.

3.3 Using g = 10 m s^{-2} will **not** be penalised.

4. Calculations

4.1 Bald (i.e. no working shown) correct answers score full marks unless in a 'show that' question.

4.2 If a 'show that' question is worth 2 marks then both marks will be available for a reverse working; if it is worth 3 marks then only 2 will be available.

4.3 **use** of the formula means that the candidate demonstrates substitution of physically correct values, although there may be conversion errors e.g. power of 10 error.

4.4 **recall** of the correct formula will be awarded when the formula is seen or implied by substitution.

4.5 The mark scheme will show a correctly worked answer for illustration only.

4.6 Example of mark scheme for a calculation:

'Show that' calculation of weight

Use of L × W × H ✓

Substitution into density equation with a volume and density ✓

Correct answer [49.4 (N)] to at least 3 sig fig. [No ue] ✓
[Allow 50.4(N) for answer if 10 N/kg used for g.]
[If 5040 g rounded to 5000 g or 5 kg, do not give 3rd mark; if conversion to kg is omitted and then answer fudged, do not give 3rd mark] **3**
[Bald answer scores 0, reverse calculation 2/3]

Example of answer:

80 cm × 50 cm × 1.8 cm = 7200 cm^3

7200 cm^3 × 0.70 g cm^{-3} = 5040 g

5040 × 10^{-3} kg × 9.81 N/kg

= 49.4 N

5. Quality of Written Communication

5.1 Indicated by QoWC in mark scheme, placed as first mark.

5.2 Usually it is part of a max mark.

5.3 **In SHAP marks for this are allocated in coursework only but this does not negate the need for candidates to express themselves clearly, using appropriate physics terms. Likewise in the Edexcel A papers.**

6. Graphs

6.1 A mark given for axes requires both axes to be labelled with quantities and units, and drawn the correct way round.

6.2 Sometimes a separate mark will be given for units or for each axis if the units are complex. This will be indicated on the mark scheme.

6.3 A mark given for choosing a scale requires that the chosen scale allows all points to be plotted, spreads plotted points over more than half of each axis and is not an awkward scale e.g. multiples of 3, 7 etc.

6.4 Points should be plotted to within 1 mm.

- Check the two points furthest from the best line. If both OK award mark.
- If either is 2 mm out do not award mark.
- If both are 1 mm out do not award mark.
- If either is 1 mm out then check another two and award mark if both of these OK, otherwise no mark.

6.5 For a line mark there must be a thin continuous line which is the best-fit line for the candidate's results.

6756 Unit Test PSA6

Question Number	Answer	Mark
1 (a) i	Upthrust / U up Weight / W / mg down [do not accept gravity] Tension / T / F up [Ignore any incorrect arrows]	**1** **1** **1**
(a) ii	use of U = weight of liquid displaced / $v\rho g$ recognition of T and W opposite direction [ecf from diagram] answer = 0.067 (m^3) eg V . 9.81 . 1000 (=) 678 – 20 or 658 Volume = 0.067 m^3 [note 678/9.8.1000 =1]	**1** **1** **1**
(b)	Rate of decay (of source)/ rate of disintegrations/emissions "rate" can be replaced by per second or (unit) time Accept $A = dN/dt$ or λN if N, λ , t defined	**1**
(c) i	The 2 should not appear in the calculation (or cancel) Answer = 0.042 m^3 eg 4530/108 x 10^{-3} = 0.042 m^3	**1** **1**
(c) ii	Same amount/activity of tritium in body and standard Isotope fully dispersed (round body water) No drinks / addition /excretion in the time Background has been taken into account No other radioactive substance in body Tritium not absorbed by other parts of body	**1** **1** **1** **1** **1** **1** **2 Max**
(d)	Length/height of body/position between contacts Size of emf/pd/voltage attached to body cross section area of (sections) body / volume/width of body body temperature surface/skin/contact resistance metal implants	**1** **1** **1** **1** **1** **1** **3 max**
(e)	90 degree phase shift starts at negative (max) value of Voltage	**1** **1**
(f)	(i) Due to changing/alternating magnetic field / cutting flux /Faraday's law Bodywater is a conductor / induced voltages / eddy currents (ii) Currents have their own magnetic fields reduce (original) flux / oppose (original) flux lenz's law	**1** **1** **1** **1** **1** **2 max**
	(iii) Reduced amplitude Change of phase No change in frequency	**2 Max**
		22

Question Number	Answer	Mark
2 (a)	0.01 mA / 10^{-5} A / 0.005 0.005 mA	**1** **2** **2 max**
(b) i	compare with y = mx +c / gradient will equal *k* / straight line graph	**1**
(b) ii	Values of $1/I^2$ and $1/f^2$ [look for 10^{-8} appearing in $1/f^2$] $1/mA^2$ or $1/A^2$ [units can appear in table or graph] s^2 / Hz^{-2} Scales (points occupy more than half grid) Points Straight line fit	**1** **1** **1** **1** **1** **1**
(c)	Attempt to find gradient Large triangle – more than half graph line – evident from numbers 1.7-2.1 x 10^{14} ($A^{-2}s^{-2}$) / 1.7-2.1 x 10^{8} ($mA^{-2}s^{-2}$)	**1** **1** **1**
(d)	Identify $1/I^2$ intercept Square root and x *V* Answer with unit 4.8 x10^6 - 7 x 10^6 or 4.8-7 2200 – 2700 or 2.2 – 2.7 x 0.2 440 - 540 Ω	**1** **1** **1**
(e)	Body water (ratio) is lower than usual Dry contact with skin (More resistance implies) more fat Resistance also dictated by body shape [can be implied] Detail: long legs / thinner arms / tall(could give larger resistance)/ Teacher is female/	**1** **1** **1** **1** **1** **3 max**
		18

Question Number	Answer	Mark
3 (a)	$^{18}_{8}O$ + $^{1}_{1}p/H$ equals $^{18}_{9}F$ + $^{1}_{0}n$ [omitting the n with everything else correct = 1]	**1** **1** **1**
(b)	Accelerated through 19 x 10^6 V / MV Using linear accelerator / cyclotron / particle accelerator / recognisable description	**1** **1**
(c)	Time taken for half the original quantity/ nuclei /activity to decay Long enough for (cancer/tumour/body to absorb) and still be active/detected Will not be in body for too long	**1** **1** **1**
(d)	Use of $E = mc^2$ Use of $E = hf$ Use of $v = f\lambda$ λ = 2.4 x10^{-12} m eg 9.11 x 10^{-31} x 9 x 10^{16} (x2) f = 8.2 x 10^{-14} / 6.6 x 10^{-34} ecf λ= 3 x10^8 / 1.2 x10 ^{20} ecf	**1** **1** **1** **1**
(e)	Conservation of momentum Before momentum = 0 so + for one photon and – for other	**1** **1** **1** **2 max**
		14

Question Number	Answer	Mark
4 (a)	Tera - 10^{12} Frequency – no of oscillations per second em waves travel at speed of light Visible light has higher freq/shorter wavelength compared to IR Shock wave would produce longitudinal/compressions/rarefractions in crystal (Reflections off moving reflector) = Doppler shift/effect/ref diagram decrease usually means reflector moving away from wave/observer Detail eg faster moving = larger shift Carrier wave is light /IR Carrier wave modulated with signal Frequency division multiplexing (Optical fibres transmit light) by total internal reflection	**1** **1** **1** **1** **1** **1** **1** **1** **1** **1** **1** **1** **6 max**
		6
	Total for paper	**60**