

# Mark Scheme (Results)

Summer 2012

GCSE Physics  
5PH2H/01

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GCSE Physics 5PH2H/01 Mark Scheme – Summer 2012

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	A 1260 W		(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	substitution (1) $5040 = 240 \times 10 \times \text{height}$  transposition (1) $\text{height} = \frac{5040}{240 \times 10}$  evaluation (1) 2.1 (m)	substitution and transposition in either order   give full marks for correct answer, no working	(3)

Question Number	Answer	Acceptable answers	Mark
1(b)	no movement (in direction of force) / (work done=) weight $\times 0 = 0$	stationary it is not changing height is in same position  ignore ref to terminal velocity, force and acceleration	(1)

Question Number	Answer	Acceptable answers	Mark
1(c)	substitution (1) $240 \times 6.4$  evaluation (1) 1500  Unit (1) kg m/s      independent mark	1536  give (2) marks for correct answer, no working  Ns	(3)

Question Number	Answer	Acceptable answers	Mark
<b>2(a)(i)</b>	positive / + /plus /+ve /positively (charged)	accept poor spelling of positive	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(a)(ii)</b>	An explanation linking <b>two</b> from the following points <ul style="list-style-type: none"> <li>• repulsion / repels (1)</li> <li>• (because) same charge (1)</li> <li>• (force) greater than gravity (1)</li> </ul>	independent mark  positive charges repel each other (2) both positive so repel(2)  positive ball attracted to negative lid (2)	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</b>	An explanation linking the following points <ul style="list-style-type: none"> <li>• electrons move (1)</li> <li>• from ground to lid (1)</li> </ul>	negative charge moves  to neutralise positives	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)</b>	An explanation linking the following points <ul style="list-style-type: none"> <li>• discharged /earthed so falls(1)</li> <li>• charged again/at plate so rises/repels (1)</li> </ul>	pulled down by gravity  reached the plate and process repeats  ignore direction of charge flow – already assessed	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(d)</b>	<b>B</b>		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)</b>	Any <b>one</b> from the following points <ul style="list-style-type: none"> <li>• (overheating) in a computer (1)</li> <li>• (waste heat) in a light bulb (1)</li> <li>• (sparks/heat) in an electric motor (1)</li> </ul>	<b>Note:</b> any applicable example where dissipation of thermal energy is a clear disadvantage  (charge flowing) in a resistor	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)</b>	substitution (1) $500 = I \times 230$  transposition (1) $500/230$  evaluation (1) 2.2 (A)	substitution and transposition in either order    2.17 (A) / 2 (A)  give full marks for correct answer, no working	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)</b>	<b>D</b> joules per coulomb		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(d)</b>	An explanation linking <b>two</b> of the following points <ul style="list-style-type: none"> <li>• electron collision (1)</li> <li>• (in the/and the) lattice (1)</li> </ul>	allow hit, bump into for collide  atoms/electrons/molecules/ions  not between atoms	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(e)</b>	(Resistance =) 20 000 $\Omega$ (from graph) (1)  substitution (1) 0.0006 x 20 000  evaluation (1) 12 (V)	ecf if clear misread of R from graph  ignore powers of ten until evaluation  Give full marks for correct answer, no working	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)</b>	<p>A description including the following points</p> <ul style="list-style-type: none"> <li>• steam {drives/turns} turbine (1)</li> <li>• (which){drives/turns/powers} generator (1)</li> </ul>	<p>transfers ke to electrical energy rotates a magnet in coils or coils in magnet accept dynamo for generator</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)</b>	<p>A description including the following points</p> <ul style="list-style-type: none"> <li>• neutron {hits / splits / is absorbed by} uranium (nucleus) (1)</li> <li>• producing more neutrons (1)</li> <li>• at least one neutron can {hit / split / be absorbed by} other uranium (nuclei) (1)</li> </ul>	<p>full marks may be scored on a labelled diagram</p> <p>fired at other U (nuclei) or "process repeats"</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)</b>	<b>A</b> krypton-91		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(d)</b>	<p>An explanation linking the following points</p> <ul style="list-style-type: none"> <li>• removes electrons (1)</li> <li>• from atoms (1)</li> </ul>	<p>collides with atoms</p> <p>ignore references to <math>\beta</math> decay process (nucleus losing an electron)</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(e)</b>	<p>An explanation linking the following points</p> <ul style="list-style-type: none"> <li>nuclei are positively charged (1)</li> <li>need enough energy to overcome repulsion (1)</li> </ul>	<p>ignore references to high temp and pressure</p> <p>accept same charge accept protons for nuclei accept atoms</p> <p>and will repel each other</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(a)</b>	<b>A</b>		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b)</b>	<p>distance travelled = area under graph (1)</p> <p>substitution (1) <math>\frac{1}{2} \times 20 \times 2</math></p> <p>evaluation (1) 20 (m)</p>	<p>distance = average speed x time</p> <p>= <math>10 \times 2</math></p> <p>20 (m)</p> <p>allow (distance) = speed x time or <math>20 \times 2</math> for 1 mark</p> <p>give full marks for correct answer, no working</p>	<b>(3)</b>



Question Number	Answer	Acceptable answers	Mark
5(c)	<p>An explanation linking the following points</p> <ul style="list-style-type: none"> <li>• velocity is a vector (1)</li> <li>• (whereas) speed is not (1)</li> </ul>	<p>velocity has magnitude and direction  velocity has direction</p> <p>speed is a scalar  speed has {no direction}/{magnitude only}</p> <p>allow for 2 marks  velocity is speed in a straight line  velocity = <math>\frac{\text{displacement}}{\text{time}}</math></p> <p>NOTE answers in terms of momentum must still refer to vectors or direction to gain credit</p>	(2)

Question Number	Indicative Content	Mark
<b>QWC</b>	<p>*5(d)</p> <p>An explanation linking some of the following</p> <p><b>Forces acting</b></p> <ul style="list-style-type: none"> <li>• weight down</li> <li>• air resistance up (opposing motion)</li> </ul> <p><b>Forces during fall</b></p> <ul style="list-style-type: none"> <li>• weight constant</li> <li>• air resistance increases with speed</li> <li>• resultant force = <math>W - R</math></li> </ul> <p><b>Effect on shape of graph</b></p> <ul style="list-style-type: none"> <li>• at start, resultant force is large so acceleration large / gradient steep</li> <li>• mid resultant force decreasing so acceleration decreasing / gradient decreasing</li> <li>• terminal velocity, resultant force is zero so acceleration zero / gradient zero</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b>	No rewardable content
<b>1</b>	<b>1 -2</b>	<ul style="list-style-type: none"> <li>• a limited explanation linking a few facts from the indicative content. E.g. at terminal velocity, forces are equal so constant speed.</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>
<b>2</b>	<b>3 -4</b>	<ul style="list-style-type: none"> <li>• a simple explanation linking some of the indicative content to the shape of the graph e.g At the start weight &gt; air resistance so acceleration and at the end weight = air resistance so no acceleration.</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>
<b>3</b>	<b>5 -6</b>	<ul style="list-style-type: none"> <li>• a detailed explanation linking most of the indicative content to the complete shape of the graph e.g. At the start weight &gt; air resistance so acceleration. Then air resistance increases (with speed) so acceleration decreases. At the end weight = air resistance so no acceleration.</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>

Question Number	Answer	Acceptable answers	Mark
<b>6(a)</b>	An explanation linking the following points <ul style="list-style-type: none"> <li>• small percentage / amount of material (1)</li> <li>• activity level low / less than background (1)</li> </ul>	radiation/radioactivity for activity within safe limits	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)(i)</b>	<b>B</b> 50 days		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)(ii)</b>	12.5	10 - 15	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(c)</b>	An explanation linking the following points <ul style="list-style-type: none"> <li>• time for halving (1)</li> <li>• clear as to what is halving (1)</li> </ul>	<b>Allow</b> for atoms: isotope / element / nuclei / (radioactive) substance / particles / (radioactive) material / radiation / count rate / Bq / activity / radioactivity time for half of the atoms to decay (2)  time for the activity / count rate to drop to half (of original value) (2)  time for ½ of it to decay (1)	<b>(2)</b>

Question Number		Indicative Content	Mark
<b>QWC</b>	<b>*6(d)</b>	<p>A discussion including some of the following points</p> <p>Model components related to actual machine</p> <ul style="list-style-type: none"> <li>• lamp – radioactive source (<math>\beta</math>- source)</li> <li>• sensor (LDR) – Geiger counter arrangement</li> <li>• card – liquid in bottle</li> </ul> <p>Interaction of components related to working of machine</p> <ul style="list-style-type: none"> <li>• rising of card - more liquid in bottle</li> <li>• rising of card – less light <ul style="list-style-type: none"> <li>– higher resistance</li> <li>– smaller current / reading</li> <li>– circuit switches on if too much light</li> </ul> </li> <li>• greater absorption gives less radiation to detect</li> <li>• machine discards bottle if too little liquid, model does not</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b>	No rewardable content	
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited discussion comparing some of the indicative content. E.g. two of the lamp, sensor and card are related to the source (Geiger) counter and liquid respectively.</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple discussion comparing parts of the process. E.g. Two of the lamp, sensor and card are related to the source Geiger counter and liquid respectively. The rising of the card gives more liquid in the bottle.</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>	
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed discussion of the whole process. E.g. the lamp, sensor and card are related to the source Geiger counter and liquid respectively. The rising of the card gives more liquid in bottle. Too much light/ radiation getting through starts the alarm.</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>	



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