



Mark Scheme (Results)

Summer 2013

GCSE Physics (5PH3F)  
Paper 01

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

## Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(i)</b>	<input checked="" type="checkbox"/> <b>C</b> the same as the charge on the proton		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(ii)</b>	<input checked="" type="checkbox"/> <b>A</b> electrons		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(i)</b>	222	4 less/4fewer	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(ii)</b>	86	2 less/2fewer	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c)</b>	A description including <b>two</b> of: <ul style="list-style-type: none"> <li>• Kill/damage cells(1)</li> <li>• affecting DNA (1)</li> <li>• (causing) mutation (1)</li> <li>• by ionisation (1)</li> <li>• make cell reproduce rapidly (1)</li> <li>• cause cancer (1)</li> <li>• (radiation) burns (1)</li> <li>• (radiation) sickness (1)</li> </ul>		<b>(2)</b>


Question Number	Answer	Acceptable answers	Mark
1(d)	<p>An explanation linking any suitable precaution to a sensible reason:</p> <p>Eg lead/shielding (1) (because it) stops/absorbs radiation (1)</p> <p>Use of radiation meters (1) {measure/warn of} radiation received (1)</p> <p>put up signs (1) (to)keep people away from radiation (1)</p> <p>increasing distance (1) (to)reduce intensity (1)</p> <p>to reduce dose(1) by limiting the number of X-rays taken (1)</p>	<p>source locked away for shielding</p> <p>(worker) leaves room inverse square law</p>	<b>(2)</b>

Total mark question 1 = 8

Question Number	Answer	Acceptable answers	Mark
<b>2(a)(i)</b>	<input checked="" type="checkbox"/> <b>D</b> refraction		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(a)(ii)</b>	substitution: (1) power = $1/2$ evaluation: (1) 0.5 (D)	Award 2 marks for correct answer no working	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)(i)</b>	<input checked="" type="checkbox"/> <b>B</b>		<b>(1)</b>

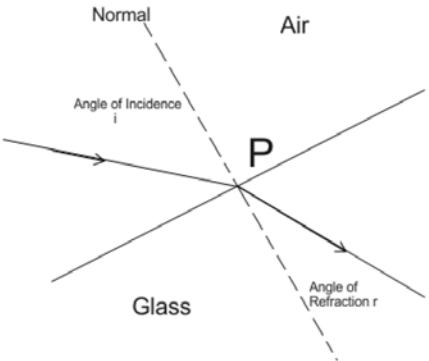
Question Number	Answer	Acceptable answers	Mark
<b>2(b)(ii)</b>	 in front of eye (1)	any other diverging lens (lens which is narrower at the centre than at the ends) Reject lens inside the eye	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)(iii)</b>	a description including any <b>two</b> from: <ul style="list-style-type: none"> <li>to spread out the light/ rays (1)</li> <li>to produce focused image (1)</li> <li>(focused image) on the retina (1)</li> </ul>	make image distance longer sharp/clear image back of eye	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)(iv)</b>	contact lenses (1)	<u>laser</u> surgery/ eye lens replacement	<b>(1)</b>

Total mark for question 2 = 8

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(i)</b>	An explanation linking: Angle (of incidence) in glass (1) greater than critical angle / $42^\circ$ (1)	Angle in air cannot be greater than $90^\circ$ for 1 mark  Glass has a higher refractive index than air for 1 mark	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(ii)</b>	 <p>angle <math>i</math> from normal in air (1) angle <math>r</math> from normal in glass (1)</p>	accept for 1 mark  angle $i$ in air <u>and</u> angle $r$ in glass/ <u>both</u> angles measured from normal	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(iii)</b>	<input checked="" type="checkbox"/> <b>C</b> speed decreases		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(i)</b>	<p>An explanation linking any three of the following:</p> <p>(Optical fibres) bend (1)            some fibres carry light to the inside of the patient (1)            some fibres transmit the reflected light (1)            light passes up/down fibres by TIR (1)            light is reflected inside the patient (1)            image is analysed by computer (1)</p>	<p>Accept suitable labelling on a Diagram</p> <p>Image projected on a screen</p>	<b>(3)</b>

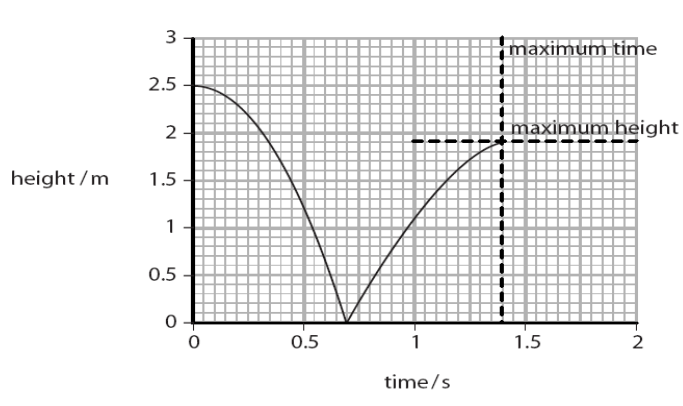
Question Number	Answer	Acceptable answers	Mark
<b>3(b)(ii)</b>	<p>Either</p> <p>Breaks/blasts/smashes (1)            Kidney stones (1)            or            Energy absorbed (1)            to help repair muscle tissue (1)            or            Use of gel (1)            to prevent loss of intensity (1)            or</p>	<p>bruising/clots            increases blood flow</p> <p>Allow (1) mark for suitable diagnosis e.g. prenatal scan</p>	<b>(2)</b>

Total mark for question 3 = 10



Question Number	Answer	Acceptable answers	Mark
<b>4 (a)(i)</b>	2.5 (m)	Allow answers between (and including) 2.45 & 2.55	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4 (a)(ii)</b>	0.7 (s)	Allow answers between (and including) 0.68 & 0.72	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4 (a)(iii)</b>	 <p>height / m</p> <p>time / s</p> <p>maximum time</p> <p>maximum height</p> <p>line:</p> <p>same shape as original (1)</p> <p>peak at 1.9 m (1)</p> <p>time taken &lt; 0.7 s (1)</p>	Ignore any part of the graph after the peak	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4 (a)(iv)</b>	An explanation linking: <u>energy</u> lost (1) in collision with ground / air resistance (1)	Inelastic collision worth (2) as sound or heat	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4 (b)(i)</b>	<p>shown using data Any two from kinetic energy before = <math>12.5 + 0</math> (=12.5) (1) kinetic energy after = <math>4.5 + 8</math> (=12.5) (1)</p> <p>Kinetic energy is the same before and after the collision (1)</p>	Kinetic energy is conserved/no energy lost	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4 (b)(ii)</b>	cyclotron (1)	named particle accelerator accept CERN	<b>(1)</b>

Total mark for question 4 = 10

Question Number	Answer	Acceptable answers	Mark
<b>5 (a)(i)</b>	<input checked="" type="checkbox"/> <b>A</b> on the finger		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5 (a)(ii)</b>	infrared (1)	red light	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5 (a)(iii)</b>	89/60 (1) 1.5 (beats/second) (1)	1.48 (beats/second) Allow 1.49 1.483333etc Accept correct answer no working for 2 marks	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5 (a)(iv)</b>	1/1.5 (1) 0.67(s) (1)	ecf 1/ 89 one mark only Accept correct answer no working for 2 marks	<b>(2)</b>

Question Number		Indicative Content	Mark
<b>QWC</b>	<b>* 5(b)</b>	<p>A description including some of the following points:</p> <p>what the information / signal is</p> <ul style="list-style-type: none"> <li>• electrical signals</li> <li>• small difference in potential (mV) between one part of the body and another</li> <li>• signal changes as the heart beats</li> <li>• are started in the heart (right atria)</li> <li>• caused by nervous impulse</li> <li>• action potentials</li> </ul> <p>signal in</p> <ul style="list-style-type: none"> <li>• electrodes attached to the skin</li> <li>• water in the body conducts electricity / signal</li> <li>• at least two electrodes used</li> <li>• electrodes conduct electricity / contain gel</li> </ul> <p>signal out</p> <ul style="list-style-type: none"> <li>• shows heart rate on a screen / paper</li> <li>• shows a waveform on a screen / paper</li> <li>• receives small signals which have to be amplified</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 e.g. it shows your heart beat on a screen</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 e.g. it shows if your heart is working properly by measuring heart beat which you can see on a screen</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 e.g. connects electrodes/wires on the skin to measure (electrical) signals of the heart in order to assess the heart beat/heart performance/heart condition</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) (i)</b>	volume in range 9.0 – 10.5 (cm <sup>3</sup> ) (1) pressure in range 1.5 – 1.7 (kPa) (1)		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6 (a) (ii)</b>	<input checked="" type="checkbox"/> <b>D</b> 296 K		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6 (a) (iii)</b>	Volume in range 4 – 8 (cm <sup>3</sup> )	Any value between 4 (cm <sup>3</sup> ) and 8 (cm <sup>3</sup> )	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6 (a) (iv)</b>	Substitution (1) 2.2 x 10.8 ÷ 0.2  Evaluation (1) 119 (cm <sup>3</sup> )	118.8 (cm <sup>3</sup> )  give full marks for the correct answer, no working	<b>(2)</b>

Question Number		Indicative Content	Mark
<b>QWC</b>	<b>*6(b)</b>	<p>An explanation including some of the following points:</p> <p>particles in gas</p> <ul style="list-style-type: none"> <li>• move rapidly</li> <li>• throughout container</li> <li>• collide with each other</li> <li>• collide with walls/lid of container</li> <li>• exerting a force</li> </ul> <p>particles in solid</p> <ul style="list-style-type: none"> <li>• in fixed positions</li> <li>• vibrate</li> <li>• do not reach lid</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 e.g. particles in the copper do not touch the lid / particles in the oxygen do touch the lid</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 e.g. particles in a gas can move freely and collide with the lid</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 e.g. particles in a gas can move freely and collide with the lid but particles in a solid vibrate about fixed positions so cannot reach the lid</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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