



Mark Scheme (Results)

Summer 2012

GCSE Physics

5PH1F/01

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## GCSE Physics 5PH1F/01 Mark Scheme – Summer 2012

Question Number	Answer	Acceptable answers	Mark
1(a)	<b>A</b> 23 000 Hz		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)</b>	Any one from the following points <ul style="list-style-type: none"> <li>• sonar / ranging (1)</li> <li>• (medical) scanning(1)</li> <li>• medical treatment (1)</li> <li>• animal communication (1)</li> <li>• cleaning(1)</li> </ul>	<b>Accept</b>  foetal/tumours  shattering kidney stones /destroying cancer cells  dog whistles	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c)</b>	An explanation linking the following points <ul style="list-style-type: none"> <li>• a reference to frequency/pitch/hearing range (1)</li> <li>• (frequency/pitch) is high(er) for cats RA (1)</li> </ul> <p>[The points must be linked for the second mark]</p>	Accept Hz  Cat detects high(er) frequency/pitch for 2 mark  ignore incorrect value of frequency for ultrasound if a comparison made (tested in 1a)  cat can hear >20000 Hz (2)  humans cannot hear > 20000 Hz / ORA (2)  amplitude too low / too quiet is 1 mark only if no other marks awarded	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(d)(i)</b>	substitution (1) 340 x 0.047  evaluation (1) 16 (m)	15.9(8) (m)  give full marks for correct answer, no working	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(d)(ii)</b>	Any two from the following points <ul style="list-style-type: none"> <li>• Idea of speed (1)</li> <li>• correct difference identified e.g. sound slower RA (1)</li> </ul>	It/ infrared/light/em waves travel(s) faster/quicker scores 2 marks  Ignore references to time	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	<b>A</b> all the time		<b>(1)</b>

Question Number	Answer	Mark												
<b>2(b)</b>	<table border="1"> <thead> <tr> <th>radiation</th> <th>type</th> <th>transfer</th> </tr> </thead> <tbody> <tr> <td>alpha</td> <td>particle</td> <td>energy</td> </tr> <tr> <td>beta</td> <td>particle (1)</td> <td>energy</td> </tr> <tr> <td>gamma</td> <td>wave (1)</td> <td>energy (1)</td> </tr> </tbody> </table> <p>2 words in 1 box scores 0 for that box</p>	radiation	type	transfer	alpha	particle	energy	beta	particle (1)	energy	gamma	wave (1)	energy (1)	<b>(3)</b>
radiation	type	transfer												
alpha	particle	energy												
beta	particle (1)	energy												
gamma	wave (1)	energy (1)												

Question Number	Answer	Acceptable answers	Mark
<b>2(c)</b>	<p>Any <b>two</b> from the following points</p> <ul style="list-style-type: none"> <li>sterilising food (1)</li> <li>sterilising medical equipment(1)</li> <li>detection of cancer(1)</li> <li>treatment of cancer(1)</li> </ul>	<p>cleaning water</p> <p>PET scan gamma camera</p> <p>Radiotherapy</p> <p>Industrial uses eg Measuring thickness Tracers (Gamma) telescopes</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(d)</b>	<p>A description including the following points</p> <ul style="list-style-type: none"> <li>travel at the same speed (1)</li> <li>in a vacuum/space (1)</li> </ul>		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3 (a)</b>	<b>B</b>		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3b(i)</b>	<p>A description including <b>three</b> of the following points</p> <ul style="list-style-type: none"> <li>• reflection (of light) at (either) mirror (1)</li> <li>• (the curved mirror) focuses the light (1)</li> <li>• (mirror) inverts (1)</li> <li>• (lens / eyepiece) magnifies image (1)</li> <li>• image is formed where the light rays cross (1)</li> </ul>	<p>Bounces for reflects</p> <p>flips it over/turns over</p> <p>lens/eyepiece refracts light</p> <p>Image is real(1)</p> <p>Accept for 1 mark if no other mark awarded: (Telescope) reflects <u>and</u> refracts light (1)</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(ii)</b>	<p>An explanation including two from</p> <ul style="list-style-type: none"> <li>• collects more light (1)</li> <li>• produces a magnified/bigger image (1)</li> <li>• shows more detail (1)</li> <li>• shows stars the naked eye is unable to see (1)</li> <li>• can observe stars day and night (1)</li> </ul>	<p>brighter</p> <p>looks closer/zooms in</p> <p>makes it clearer/better</p> <p>see further/more (stars)</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(i)</b>	transverse (wave)	mechanical	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(ii)</b>	<b>C</b> move up and down a bigger distance		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(iii)</b>	substitution (1) 4 x 0.5  evaluation (1) 2 (m/s)	give full marks for correct answer, no working Accept power of ten error for 1 mark eg. 0.2, 20, 200, 2000	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)</b>	<b>C</b> energy transferred per second		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(i)</b>	substitution (1) 0.25 x 230  evaluation (1) 58 (W)	accept 57 to 58, and 60 (W) give full marks for correct answer, no working	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(ii)</b>	A description including the following points <ul style="list-style-type: none"> <li>• (rate) of flow (1)</li> <li>• (of) charge (1)</li> </ul>	per second/flows/flowing  electrons/ions/coulombs/C  IGNORE electricity/amps/A	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(i)</b>	(current) it is reduced	gets smaller/ decreases/ slows down/ drops/ lower	<b>(1)</b>



Question Number	Answer	Acceptable answers	Mark
<b>4(c)(ii)</b>	<p>conversion of watts to kilowatts (1)</p> <p>substitution (1) 0.0005 x 48 x 26</p> <p>evaluation (1) 0.62(4)(p)</p> <p>Note: 0.0005 x 48 x 26 scores 2 (conversion and substitution marks)</p>	<p>This is a 'show that' so marks are only awarded if working is shown.</p> <p>For no conversion of power but otherwise correct, 0.5 x 48 x 26 (1)</p> <p>624 (p) (1)</p> <p>Any other power of ten error in power or cost seen in substitution 1 mark maximum</p> <p>Answers with no working get zero marks.</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(iii)</b>	<p>Any <b>one</b> of the following points</p> <ul style="list-style-type: none"> <li>• ideas of energy conservation (1)</li> <li>• ideas of <b>atmospheric</b> polluting effects (1)</li> <li>• ideas of possible dangers (1)</li> <li>• reduces life of parts (TV) (1)</li> </ul>	<p>wastes energy (if left on) RA (NOT wastes electricity)</p> <p>CO<sub>2</sub> / SO<sub>2</sub> production/global warming/acid rain/greenhouse gases</p> <p>fire hazards/overheating /safer(when off)</p> <p>Ignore ozone layer references</p>	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(a)</b>	<b>B</b> elastic potential energy		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b)(i)</b>	0.3(J) (1)	0.5-0.2 (J)	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b)(ii)</b>	substitution (1) 0.2 ÷ 0.5  evaluation (1) 0.4 / 40(%) / $\frac{2}{5}$	Give full marks for correct answer with no working	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b)(iii)</b>	Any two of the following <ul style="list-style-type: none"> <li>• thermal/heat (1)</li> <li>• (idea that energy is) dissipated/spreads out (1)</li> <li>• to the surroundings (1)</li> </ul>	Ignore transferred to  Atmosphere/air  <b>Accept</b> makes surroundings warmer (2) Ignore lost	<b>(2)</b>

Question Number	Indicative content	Mark
<b>QWC</b>	<p><b>*5(c)</b> A description including some of the following points</p> <p><b>Forms of energy</b></p> <ul style="list-style-type: none"> <li>• gravitational potential energy</li> <li>• kinetic energy</li> <li>• elastic potential energy</li> <li>• heat(thermal) and sound</li> </ul> <p><b>Location of energy</b></p> <ul style="list-style-type: none"> <li>• gravitational potential energy of mass as it rises</li> <li>• kinetic energy of mass as it moves</li> <li>• Elastic potential energy stored in spring</li> <li>• Heat/sound dissipated to surroundings</li> </ul> <p><b>Linked ideas</b></p> <ul style="list-style-type: none"> <li>• As the pendulum falls, gravitational potential energy changes to kinetic energy.</li> <li>• the kinetic energy from the pendulum ends up as heat, warming the surroundings.</li> <li>• the elastic potential energy in the clockspring becomes kinetic energy of the pendulum to keep the pendulum swinging.</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b>	no rewardable material
<b>1</b>	<b>1-2</b>	<ul style="list-style-type: none"> <li>• a limited description including the name of one form of energy that is involved in the pendulum swing eg. the pendulum has kinetic energy.</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 description of the pendulum swing indicating where the energy can be found <b>OR</b> a simple transfer eg. When the pendulum is moving it has kinetic energy / the pendulum is high at the side of the swing so it has gravitational potential energy / As the pendulum swings it loses heat to the air / kinetic energy changes to potential energy / KE to PE.</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 description of an energy transfer indicating where the energy can be found <b>and</b> where the transfer takes place eg. as the pendulum swings to and fro, gravitational potential energy changes to kinetic energy / kinetic energy is dissipated as heat and sound to the surroundings</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>	<b>D</b> Universe		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(a)(ii)</b>	Milky Way		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)(i)</b>	A description including: <ul style="list-style-type: none"> <li>• change in wavelength / frequency (1)</li> <li>• Correct change(s) (1)</li> </ul>	wavelength increases (2) frequency decreases (2)	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)(ii)</b>	An explanation linking <b>two</b> of the following points <ul style="list-style-type: none"> <li>• red shift (1)</li> <li>• universe expanding (1)</li> <li>• (cosmic) microwave (background)(radiation) (1)</li> </ul>	Accept initials (eg CMB)	<b>(2)</b>

Question Number	Indicative content	Mark
<b>QWC</b>	<p><b>*6(c)</b> A description including some of the following points</p> <p>Life cycle of a star similar of mass similar to that of our sun</p> <p>a. nebula / stellar nursery</p> <ul style="list-style-type: none"> <li>• clouds of dust and gas</li> <li>• pulled together or collapsed by gravitational forces</li> </ul> <p>b. Our sun / main sequence</p> <ul style="list-style-type: none"> <li>• stable state</li> <li>• hydrogen being converted to helium, nuclear fusion</li> <li>• huge amounts of heat and light produced</li> <li>• continues for many millions of years</li> </ul> <p>c. red giant</p> <ul style="list-style-type: none"> <li>• hydrogen runs out</li> <li>• star expands</li> <li>• star gets colder</li> <li>• uses up all its helium</li> <li>• outward forces decrease</li> </ul> <p>d. white dwarf</p> <ul style="list-style-type: none"> <li>• eventually collapses</li> <li>• due to own gravity</li> <li>• becomes much smaller and very dense</li> </ul> <p>e. Sequence:</p> <ul style="list-style-type: none"> <li>• Nebula / stellar nursery</li> <li>• (Protostar)</li> <li>• Star (main sequence)</li> <li>• Red Giant</li> <li>• White Dwarf</li> <li>• (Black Dwarf)</li> </ul> <p>ignore references to planetary nebula)</p> <p>Credit is given for correctly labelled diagrams.</p>	<b>(6)</b>
<b>Level</b>	<b>0</b>	no rewardable material
<b>1</b>	<b>1-2</b>	<ul style="list-style-type: none"> <li>• a limited description including naming one of the stages (star alone is insufficient) e.g. A star can be a red giant</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 description including two consecutive stages in the correct sequence OR a description of one of the stages e.g. a nebula forms a (main sequence) star / Nebulae are clouds of dust and gas</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 description including naming three consecutive stages in the correct order AND a description of one stage e.g. A nebula is a cloud of gas and dust that forms a star which then becomes a red giant.</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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