



# Mark Scheme (Results)

March 2012

GCSE Physics  
5PH1F/01

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**5PH1F/01 Mark Scheme**  
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Question Number	Answer	Acceptable answers	Mark														
<b>1(a)(i)</b>	<ul style="list-style-type: none"> <li>infrared (1)</li> <li>radio waves (1)</li> <li>2 marks if both correct i.e.</li> </ul> <table border="1" data-bbox="279 589 1197 703"> <tr> <td>gamma rays</td> <td>X-rays</td> <td>ultraviolet</td> <td>visible light</td> <td><b>infrared /IR</b></td> <td>microwaves</td> <td><b>radio (waves)</b></td> </tr> </table> <ul style="list-style-type: none"> <li>1 mark for one correct</li> <li>1 mark if answers interchanged i.e.</li> </ul> <table border="1" data-bbox="279 958 1211 1072"> <tr> <td>gamma rays</td> <td>X-rays</td> <td>ultraviolet</td> <td>visible light</td> <td><b>radio (waves)</b></td> <td>microwaves</td> <td><b>infrared /IR</b></td> </tr> </table>	gamma rays	X-rays	ultraviolet	visible light	<b>infrared /IR</b>	microwaves	<b>radio (waves)</b>	gamma rays	X-rays	ultraviolet	visible light	<b>radio (waves)</b>	microwaves	<b>infrared /IR</b>		<b>(2)</b>
gamma rays	X-rays	ultraviolet	visible light	<b>infrared /IR</b>	microwaves	<b>radio (waves)</b>											
gamma rays	X-rays	ultraviolet	visible light	<b>radio (waves)</b>	microwaves	<b>infrared /IR</b>											

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(ii)</b>	gamma (rays)	or symbol for gamma e.g. $\gamma$	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(i)</b>	<p>A description linking <b>one</b> of the following pairs</p> <ul style="list-style-type: none"> <li>• on items (1)</li> <li>• assist in identification (if stolen) (1)</li> <li>• on document/currency (1)</li> <li>• help to identify forgery (1)</li> <li>• write (on paper) (1)</li> <li>• secret message (1)</li> <li>• stamp / on (back of) hand (1)</li> <li>• as pass out for an event (1)</li> </ul>	<ul style="list-style-type: none"> <li>• named item</li> <li>• to identify (owner)</li> <li>• banknotes eq (1)</li> <li>• (to identify) genuine notes/forges (1)</li> <li>• write (message /note)(1)</li> <li>• (that) other people cannot see(1)</li> <li>• (print on) t-shirt (1)</li> <li>• shows up in club (1)</li> </ul> <p><b>Allow</b> to detect UV (radiation) for 1mark  <b>Ignore</b> uv light uses not on ink, e.g. forensic use on blood/ use in the dark (as it glows)/ etc.</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(ii)</b>	causes damage to (unprotected) eyes/skin/DNA/ cells (1)	blindness /(skin) cancer/(sun)burn (to skin)/mutations	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c)</b>	<p>A description linking <b>one</b> of the following pairs</p> <ul style="list-style-type: none"> <li>• (at the) airport /customs / docks / security checks (1)</li> <li>• for dangerous/illegal items (1)</li> <li>• checking welds (1)</li> <li>• to examine under the surface (1)</li> <li>• checking paintings eq (1)</li> <li>• to look for detail under the top paint layer (1)</li> <li>• X-ray telescopes/astronomy</li> <li>• to study/look at objects in space</li> <li>• check packaging e.g. cans/packages</li> <li>• (to see if) filled to correct level</li> <li>• sterilising (1)</li> <li>• food/hospital equipment (1)</li> </ul>	<p>statement of recognised application</p> <p>detail of how it works/ how it is used</p> <ul style="list-style-type: none"> <li>• to scan { luggage / people/ vehicles} (1)</li> <li>• (check) for things that are not meant to be there e.g. liquids, knives, guns, explosives, drugs etc (1)</li> </ul> <p>checking pipes/engines/aircraft/structures etc</p> <p>for cracks</p> <p><b>IGNORE</b> idea of X-ray vision</p> <p>e.g. stars/ galaxies/ space/black holes/neutron stars/planets</p> <p>for 'foreign' objects</p> <p>killing bacteria</p> <p><b>NOT</b> to scan (the body) for broken bones</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	a description including any <b>two</b> of the following <ul style="list-style-type: none"> <li>• (shine) light/image from (lens(es)/ window) on(to) card (1)</li> <li>• move the card/lens (1)</li> <li>• (to give) sharp/clear image (1)</li> <li>• measure (distance) from lens to card/focal point (1)</li> </ul>	ignore any other measurements	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)(i)</b>	refraction	refracted /refracting/refract  <b>ignore</b> converging  <b>NOT</b> reflection/reflected reflecting/reflacting	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)(ii)</b>	any change of direction (by eye) no arrow required (1)  allow slight bends/bumps if freehand line/ mark 1 <sup>st</sup> cm of ray	ignore discontinuities/gaps at boundary ignore extra lines ignore reflected rays	<b>(1)</b>

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

Question Number	Answer	Acceptable answers	Mark
<b>2(c)(ii)</b>	A		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(d)</b>	A description including any <b>two</b> from the following <ul style="list-style-type: none"><li>• (four) object(s) /star(s)(near Jupiter) (1)</li><li>• orbiting Jupiter/planet (1)</li><li>• moon(s) (1)</li></ul>	Galileo's observations of phases of Venus also supported heliocentrism. Accept for 2 marks  (4) moon(s) of Jupiter = 2 marks Jupiter had (4) moon(s) = 2 marks	<b>(2)</b>

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

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(i)</b>	both points correctly plotted (1)	allow +/- half square	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(ii)</b>	smooth curve (1) ( does not need to go through all points i.e. can miss out top section)	allow slight discontinuities/double lines/ thick lines  NOT dot to dot /two straight lines	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(iii)</b>	temperature from 34 °C to 39 °C inclusive (1)		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(iv)</b>	21(°C) (1)	22( °C ) /23(°C )	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(i)</b>	it/black is a good absorber of heat /energy/radiation/IR (1) i.e. it absorbs/takes in more infrared/IR	<b>allow</b> it/black absorbs/takes in heat  <b>ignore</b> attracts/emitter/conductor <b>NOT</b> (so it ) cools down quickly	<b>(1)</b>



Question Number	Answer	Acceptable answers	Mark
<b>3(c)(ii)</b>	substitution (1) $9000 \div 20$  evaluation (1)  450 (W)	ignore powers of 10 until evaluation  e.g. $90 \div 2$ gains 1 mark 45 gains 1 mark  give full marks for correct answer, no working	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(iii)</b>	substitution (1) $9000 \div 18\ 000 ( \times 100\% )$  evaluation (1)  50 (%)	ignore powers of 10 until evaluation  e.g. $90\ 000 \div 1800$ gains 1 mark 5 gains 1 mark  0.5 or $\frac{1}{2}$ or half gains both marks  give full marks for correct answer, no working	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(i)</b>	A		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(ii)</b>	<p>A description including any <b>two</b> of the following</p> <ul style="list-style-type: none"> <li>• above the/no atmosphere (1)</li> <li>• above the clouds / no clouds/no weather (1)</li> <li>• image is clearer/ more detailed/ not distorted/not blurred (1)</li> <li>• no light pollution (1)</li> <li>• no absorption (by atmosphere) of other named radiations e.g. X-rays (1)</li> </ul>	<p>no air/dust/pollution</p> <p>can see further /wider field of view/can use anytime <b>IGNORE</b> it is closer (to the stars/planets)</p> <p><b>IGNORE</b> references to improving understanding / knowledge of space</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(i)</b>	<p>Either <b>one</b> of the following</p> <ul style="list-style-type: none"> <li>• radio (waves) (1)</li> <li>• microwaves (1)</li> </ul>		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(ii)</b>	<p>a description including any <b>two</b> of the following</p> <ul style="list-style-type: none"> <li>• collect more information / waves /data (1)</li> <li>• greater resolution /detail/ magnification (1)</li> <li>• other regions of the EM spectrum are used (1)</li> </ul>	<p>mention of specific data e.g. black holes/ red shift discover /new planets/stars/ galaxies etc</p> <p>(see) clearer/better images /closer view (can) see further (into space)/ smaller objects</p> <p>accept idea that they are not restricted to light e.g. (can) detect radiation /radio waves (from Big Bang/stars)/CMB</p> <p><b>IGNORE</b> any references to "hearing".</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(i)</b>	(cloud of) dust and/or gases (1)	<p>Accept hydrogen/helium</p> <p>Accept idea that it is where stars/planets are formed</p> <p>Ignore rocks/smoke</p>	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(ii)</b>	<p>A description linking <b>three</b> of the following</p> <ul style="list-style-type: none"> <li>• when nebula reaches a critical mass (1)</li> <li>• nebula collapses/contracts (1)</li> <li>• (due to) gravitational attraction (1)</li> <li>• (gets) hot/ (makes) heat (1)</li> <li>• forms a protostar (1)</li> <li>• emits/produces light /radiation(1)</li> </ul>	<p>correct sequence is not required</p> <p>when nebula or dust/gas cloud is big (enough)</p> <p>gases/dust/nebula come together/pulled together/spiral /move faster</p> <p>gravity/gravitational (potential) energy</p> <p>transformed into thermal energy</p> <p>ignore starts to burn/explodes/friction</p> <p>starts nuclear reaction/fusion/ hydrogen turns into helium/new elements</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
5(a)	D		(1)

Question Number	Answer	Acceptable answers	Mark
5(b)	<p>A description including <b>two</b> of the following</p> <ul style="list-style-type: none"> <li>• (bat) emits /sends /makes (ultra)sound /it / signal/wave(1)</li> <li>• signal/wave /(ultra)sound reflects/bounces(back)/rebounds (off moth/prey) (1)</li> <li>• bat's (ears) detect reflected (ultra)sound (1)</li> <li>• reflection is used to estimate distance (to moth) (1)</li> </ul>	<p>On diagram idea of something emitted e.g. line (with arrow) from anywhere on /near bat or outgoing waves</p> <p>On diagram idea of something reflected e.g. line with arrow from anywhere on /near moth or reflected waves (from moth)</p> <p>idea of reflection detected e.g. bat hears the reflected (ultra)sound/wave/signal</p> <p>idea of bat analyses data e.g. bat times how long (it takes) for reflected wave to get back</p> <p><b>Ignore</b> idea that it listens for noises from prey</p>	(2)

Question Number	Indicative content	Mark
<b>QWC</b>	<p><b>*5(c)</b></p> <p>A description linking some of the following</p> <ul style="list-style-type: none"> <li>• ultrasound does not cause damage to (healthy) cells / ORA</li> <li>• idea of real-time image with ultrasound</li> <li>• ultrasound uses non-ionising radiation</li> <li>• idea that (consultant) can change image position during ultrasound scan</li> <li>• 3D image possible with ultrasound</li> <li>• ultrasound safer for consultant</li> <li>• ultrasound machines more portable</li> <li>• ultrasound can be used to measure blood flow rates</li> <li>• ultrasound gives detail of soft tissue</li> <li>• X-rays are more suitable for bony structures</li> <li>• X-rays produce higher resolution images</li> <li>• X-rays are more suitable for parts of body containing gas (lungs, intestines)</li> </ul> <p>This list is not exhaustive. Give credit for other plausible suggestions</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 with no comparison or contrast ie describes a use/fact about ultrasound OR X-rays eg Ultrasound can be used to look at a foetus (unborn child)</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 description giving some attempt at comparison or contrast ie describes a use of ultrasound AND X-rays eg Ultrasound can be used to look at a fetus. X-rays are used to detect broken bones OR Ultrasound can be used to look at a fetus because it's safer (than X-rays)</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 with clear comparison and/or contrast ie describes a use of ultrasound AND X-rays, one of which is detailed, AND a clear comparison Ultrasound can be used to monitor a fetus. In ultrasound the waves reflect off soft tissue. X-rays (are used to look at bones because they) are absorbed by bones OR Ultrasound can be used to monitor a fetus. In ultrasound the waves reflect off soft tissue. X-rays are used to look at bones but not used for fetus because they can damage DNA/cause mutations of cells</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>5 (d)</b>	substitution (1) $5000 \times 0.000\ 003$  evaluation (1) $0.015$ (m)  evidence of dividing by 2 (1) $(5000 \div 2) \times 0.000003$  $7.5 \times 10^{-3}$ (m) scores 3 marks	ignore powers of 10 until evaluation  e.g. $5000 \times 0.0003$ etc gains 1 mark or $.15 / 1.5 / 15$ etc gains 1 mark  $1.5 \times 10^{-2} / 0.015$ gains 2 marks  $7.5 / 0.75 / 0.075$ etc gains 2  $0.0075$ (m) scores 3 marks  give full marks for correct answer, no working	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(a)</b>	B		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)(i)</b>	<p>an explanation linking <b>three</b> of the following</p> <ul style="list-style-type: none"> <li>• (waves cause) float to move (up and down)(1)</li> <li>• (this causes) magnet to move (in and out of coil) (1)</li> <li>• (hence) magnetic field (of magnet) (1)</li> <li>• cuts across/links/ interacts wire in coil (1)</li> <li>• <u>inducing/generating</u> potential difference across ends of coil (1)</li> </ul>	<p>magnet moves (in the coil)</p> <p><b>Allow</b>{ current/voltage/volts/am ps} <u>induced/generated</u> in coil</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)(ii)</b>	<p>a description including <b>two</b> of the following</p> <ul style="list-style-type: none"> <li>• increase the number of turns on the coil (1)</li> <li>• use a more powerful magnet (1)</li> <li>• use full scale device (1)</li> </ul>	<p>more coils (of wire) ignore bigger coil</p> <p>stronger/more magnets <b>Ignore</b> bigger magnet</p> <p><b>Allow</b> idea of more/bigger/ faster waves</p>	<b>(2)</b>



Question Number	Indicative content	Mark
<b>QWC</b>	<p><b>*6(c)</b></p> <p>A discussion linking some of the following</p> <p><b>Advantages of tidal power</b></p> <ul style="list-style-type: none"> <li>• renewable energy source</li> <li>• reduction in greenhouse gases/atmospheric pollution ( compared to fossil fuel)</li> <li>• reduces reliance on fossil fuels</li> <li>• conserves stocks of fossil fuels</li> <li>• predictable source of energy</li> <li>• regular/reliable supply of energy</li> <li>• barrages at different areas would give energy supply at different times</li> </ul> <p><b>Disadvantages of tidal power</b></p> <ul style="list-style-type: none"> <li>• does not give continuous supply of energy</li> <li>• destruction of plant/animal/bird habitats</li> <li>• problems with passage of ships</li> <li>• affects migration of fish</li> <li>• high capital cost /very long payback time</li> <li>• pollution caused from producing /transporting building materials</li> <li>• visual pollution</li> </ul> <p>This list is not exhaustive. Give credit for other plausible suggestions</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>• there is limited discussion of the advantages or disadvantages of tidal power ie gives one advantage OR one disadvantage of tidal power. e.g. tidal power is not available 24 hours a day/ The barrage will save fuel for motorists going to the town on the other side ( of the estuary)</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>• there is some discussion of the advantages and disadvantages of tidal power ie gives one advantage AND one disadvantage of tidal power e.g. an advantage of tidal power is that it uses a renewable energy resource and a disadvantage is that they damage birds' habitats</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>• there is detailed discussion of the advantages and disadvantages of tidal power ie gives one advantage AND one disadvantage of tidal power, one of which is detailed, AND a clear link to another method e.g. tidal power stations are a good idea because they use a renewable energy resource and will help to conserve fossil fuel stocks. However, it causes problems for migrating fish</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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