

Mark Scheme (Results)

Summer 2013

GCSE Physics (5PH1F)
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
1(a)(i)	☒ B seven		(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	☒ C red, orange, yellow		(1)

Question Number	Answer	Acceptable answers	Mark
1(b)	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="margin-right: 10px;">ultraviolet</div> <div style="margin-right: 10px;">→</div> <div>detecting forged bank notes</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="margin-right: 10px;">gamma rays</div> <div style="margin-right: 10px;">↘</div> <div>cooking</div> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">microwaves</div> <div style="margin-right: 10px;">↗</div> <div>detecting cancer</div> </div> <div style="margin-top: 10px; width: 100%;"> <div>three correct (2)</div> <div>one or two correct (1)</div> </div> </div>		(2)

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	<p>a suggestion from any two of the following: (areas of the hand) show</p> <ul style="list-style-type: none"> • Patches / (shaded) areas / brightness / colour(s) (1) • Indication of temperature / heat (1) 	<p>blood flow / veins / arteries / named part of hand</p> <p>thermal / hot / cold / warm / cool / hotter / colder / warmer / cooler</p> <p>any colour identified as hot or cold / any part of the hand identified as hot or cold (2)</p> <p>Ignore germs / bacteria / nerves</p>	(2)

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	<p>an explanation linking two of the following:</p> <p>X-rays {mutate / damage / harm / ionise} cells or DNA (1)</p> <p>the {energy / frequency / wavelength / penetration} is different (1)</p> <p>Correctly identified difference (1)</p>	<p>{kills/destroys} cells / causes cancer / tumours / ionising</p> <p>Penetrates the skin / body</p> <p>x-rays have {more energy / high(er) frequency / {short(er) / low(er)} wavelength / great(er) penetration} (2)</p> <p>RA for infrared</p> <p>Ignore power</p>	(2)

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	☒ A ultrasound waves have a frequency above 20 000 Hz		(1)

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	☒ C sonar		(1)

Question Number	Answer	Acceptable answers	Mark
2(a)(iii)	<p>a description including any two of the following:</p> <ul style="list-style-type: none"> • (ultrasound waves / pulses) go down (through the water) (1) • (ultrasound waves are) reflected off fish (1) • (reflected ultrasound waves) are received by boat (1) • time delay (shows how deep fish are) (1) 	<p>on diagram, wave or ray indicated as downwards idea of wave moving towards or hitting fish</p> <p>on diagram, waves or rays reflected off fish idea of wave bouncing off fish</p> <p>signal is timed</p> <p>ignore fish emitting ultrasound</p>	(2)

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	(number of waves =) 5 (1)		(1)

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	<p>Either $60 \div 5$ (1) or $60 \div$ (their answer to 2(b)(i)) (1)</p>	12 (cm) or ecf from number of waves	(1)

Question Number	Answer	Acceptable answers	Mark
2(c)	Substitution 1.7×8 (1) Evaluation 14 (cm/s) (1)	13.6 (cm/s) give full marks for correct answer, no working Power of 10 error max. 1 mark.	(2)

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	☒ C on a screen		(1)

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	<p>Explanation linking the following:- (measure) distance / length / from / line (1)</p> <p><u>lens</u> to image / screen / focal point (1)</p>	<p>how far away use ruler / tape measure measure u(object distance) and v(image distance)</p> <p>calculate focal length using $1/u + 1/v = 1/f$</p> <p>(measure) from lens to image (2)</p>	(2)

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	<p>A description including the following:</p> <ul style="list-style-type: none"> magnifies the image <u>refracts</u> the light 	<p>brings nearer / zooms in / looks closer / makes bigger / enlarges</p> <p>intermediate / real image</p>	(2)

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	☒ B energy		(1)

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	<p>Substitution $v = 1920/6.0$ (1)</p> <p>Evaluation (1) 320 (m/s)</p>	<p>300 (m/s) give full marks for correct answer, no working (2)</p> <p>Power of 10 error max. 1 mark.</p>	(2)

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	<p>Suggestions including the following:</p> <ul style="list-style-type: none"> • recognition of any difference in speed / velocity (1) • correct difference in speed (1) 	<p>e.g. sound travels faster / quicker than light (1)</p> <p>$c > v$ / $v < c$ / $c > 320$ (m/s)</p> <p>Light travels (much) faster (2) RA</p> <p>Ignore 'sound takes longer' or other references to time.</p>	(2)

Question Number	Answer	Acceptable answers	Mark
4(a)	<p>light → electrical → chemical energy energy (1) (1)</p>	These answers must be in the correct order	(2)

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	350 (J)	400 – 50 (J)	(1)

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	<p>Substitution $50 \div 400$ (1) or $\frac{50 \times 100}{400}$ (%)</p> <p>Evaluation 13(%) (1)</p>	<p>12.5(%), 0.125, 0.13 or 1/8</p> <p>Give full marks for correct answer, no working</p>	(2)

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	<p>An explanation linking the following points:</p> <p>black (1)</p> <p>(because)</p> <p>(good) absorber (of thermal radiation) (1)</p>	<p>{absorbs / takes in} heat radiation</p> <p>ignore references to: attract good emitter light dark / darker</p>	(2)

Question Number	Answer	Acceptable answers	Mark
4(c)(ii)	<p>an explanation linking any three of the following points:</p> <ul style="list-style-type: none"> • (bag / water) absorbs {thermal energy / heat / radiation} (1) • (bag / water) {radiates / emits} {thermal energy / heat / radiation} (1) • more heat radiated at higher temperature (1) • input and output are balanced (at steady temperature) (1) 	<p>idea of energy input e.g. "sun heats the bag up"</p> <p>idea of energy output</p> <p>idea of more heat lost (to surroundings) at higher temperature</p> <p>"absorbing heat at same rate as radiating heat" (3)</p> <p>ignore (sun) light / rays</p>	(3)

Question Number	Answer	Acceptable answers	Mark
5(a)	☒ B charge		(1)

Question Number	Answer	Acceptable answers	Mark
5(b)	Substitution 12×230 (1) evaluation 2800 (W) (1)	2760 (W) give full marks for correct answer, no working Power of 10 error max. 1 mark.	(2)

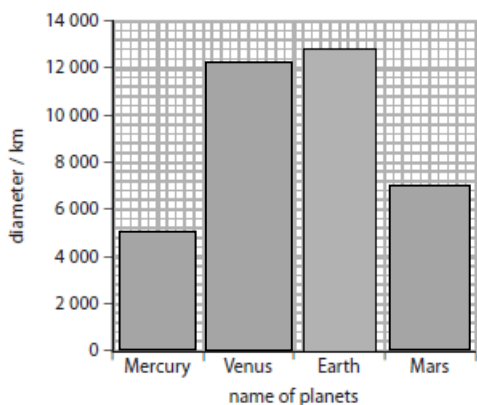
Question Number	Answer	Acceptable answers	Mark
5(c)	Conversion 0.4 (kW) (1) Substitution $0.4 \times 10 \times 15 \text{ (p)}$ (1) or $0.4 \times 10 \times 0.15 \text{ (£)}$ Evaluation 60 (p) or $\underline{\pounds}0.6$ (1)	give marks for correct answer, no working 60 (p) or $\underline{\pounds}0.6$ (3) $60,000 \text{ (p)}$ or $\underline{\pounds}600$ (2) 6 to any other power of 10 (1) $(400/40/4) \times 10 \times (15/0.15)$ gains one mark if no mark can be awarded for evaluation.	(3)

Question Number	Indicative Content		Mark									
QWC	*5(d)	A discussion including some of the following points	(6)									
		<table><tr><th>Energy saving lamp</th><th>Filament lamp</th></tr><tr><td>Advantages<ul style="list-style-type: none">Saves energy / uses energy more efficientlyCost efficientLasts longerLower power (needed)Less fossil fuels burntCool to touchEfficiency 20%Lasts 9000 hours longerLasts 10 times longerProduces 4 times as much light energy for every 100J of electrical energy supplied.More readily availableDisadvantages<ul style="list-style-type: none">Higher initial costMay contain harmful gasesTakes longer to reach maximum brightnessNot such a bright lightCosts 5 times as muchCosts £1.20 more</td><td>Disadvantages<ul style="list-style-type: none">Wastes more energyLess efficientShorter lifetimeHigher power (needed)More fossil fuels burntGets very hotOnly 5% efficientWastes 95% of energy suppliedUses 4 times as much powerLess readily available Advantages<ul style="list-style-type: none">Costs less to buyDo not contain harmful gasesLights immediatelyBright light</td></tr></table>		Energy saving lamp	Filament lamp	Advantages <ul style="list-style-type: none">Saves energy / uses energy more efficientlyCost efficientLasts longerLower power (needed)Less fossil fuels burntCool to touchEfficiency 20%Lasts 9000 hours longerLasts 10 times longerProduces 4 times as much light energy for every 100J of electrical energy supplied.More readily available Disadvantages <ul style="list-style-type: none">Higher initial costMay contain harmful gasesTakes longer to reach maximum brightnessNot such a bright lightCosts 5 times as muchCosts £1.20 more	Disadvantages <ul style="list-style-type: none">Wastes more energyLess efficientShorter lifetimeHigher power (needed)More fossil fuels burntGets very hotOnly 5% efficientWastes 95% of energy suppliedUses 4 times as much powerLess readily available Advantages <ul style="list-style-type: none">Costs less to buyDo not contain harmful gasesLights immediatelyBright light					
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Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> A limited description of one advantage or one disadvantage e.g. energy saving lamps last a long time/ filament lamps get very hot <p>OR</p> <p>A correct value quoted from information with no comparison.</p> <ul style="list-style-type: none"> The answer communicates ideas using simple language and uses limited scientific terminology Spelling, punctuation and grammar are used with limited accuracy 	
2	3 - 4	<ul style="list-style-type: none"> A simple description of two different advantages / disadvantages e.g. energy saving lamps cost more but last longer / filament lamps have a short life time and use more power <p>OR</p> <p>Correct values quoted from table and used to provide two comparisons without calculations</p> <ul style="list-style-type: none"> The answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately Spelling, punctuation and grammar are used with some accuracy 	
3	5 - 6	<ul style="list-style-type: none"> A detailed description of two different advantages / disadvantages using a quantitative comparison. e.g. energy saving lamps cost 5 times more but last 10 times longer. / Energy saving lamps produce 4 times as much light energy for every 100J of electrical energy supplied and are much more efficient. / Energy saving lamps last 9,000 hours longer than and they use less power. The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately Spelling, punctuation and grammar are used with few errors 	

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	Milky Way	Accept any spelling	(1)

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	☒ D white dwarf		(1)

Question Number	Answer	Acceptable answers	Mark
6(b)(i)	 <p>Mercury 4 900 km Venus 12 100 km Mars 6 800 km</p> <p>Three correct (2) One or two correct (1) + or – one square Judge by eye</p>		(2)

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	<p>Correct information from table 1.52 (1)</p> <p>Conversion to kilometres $(1.52) \times 150\,000\,000$ (1)</p>	<p>Seen anywhere in the answer</p> <p>Incorrect information shown to be used correctly (1)</p> <p>Correct answer, no working scores full marks $228\,000\,000 / 2.28 \times 10^8$ (km)</p> <p>228 to any power of 10, allow 1 mark if no other mark awarded.</p> <p>$225\,000\,000 / 2.25 \times 10^8$ (km), allow max 1 mark if no working shown.</p>	(2)

Question Number	Indicative Content	Mark
QWC	<p>*6(c)</p> <p>A description including some of the following points</p> <p>In Solar System</p> <ul style="list-style-type: none"> • Use of telescopes • Search for evidence of conditions needed for life e.g. water/oxygen/bacteria on other planets • Manned missions (to the Moon) • Unmanned missions/probes to other planets e.g. Mars, Jupiter, Saturn, Mercury • Landers / robots / rovers sample soil • Information transmitted back to Earth <p>Throughout the Universe</p> <ul style="list-style-type: none"> • Search for extra-terrestrial intelligence (SETI) • Use radio telescopes • Search for (regular pattern of) radio signals • Search for other planetary systems • Discovery of other planetary systems (capable of supporting life) • Broadcasting signals/ sending out messages (to extra terrestrial intelligences) 	(6)
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • A limited description giving a (named) way of searching for evidence e.g. SETI OR using telescopes OR send messages to space OR spacecraft • The answer communicates ideas using simple language and uses limited scientific terminology • Spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • A simple description of any TWO of the searches for evidence e.g. space probes go to other planets and telescopes are used OR radio telescopes and looking for radio waves from space. • The answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • Spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • A detailed description of searches for evidence within AND outside the solar system e.g. Unmanned space probes go to other planets and radio telescopes search for radio signals from space. • The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • Spelling, punctuation and grammar are used with few errors

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