

Physics B

General Certificate of Secondary Education

Unit **B651/01**: Unit 1: Modules P1, P2, P3 (Foundation Tier)

Mark Scheme for January 2013

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of doubt
	benefit of doubt not given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

Subject-specific Marking Instructions

Abbreviations, annotations and conventions used in the detailed mark scheme

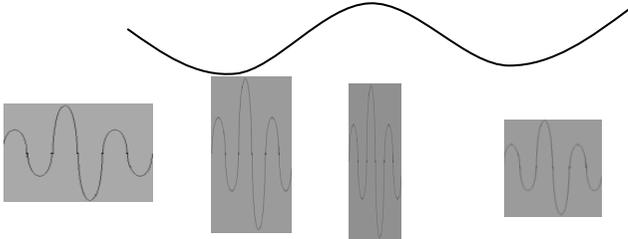
/	=	alternative and acceptable conventions used in the detailed mark scheme
(1)	=	separates marking points
allow	=	answers that cannot be accepted
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
()	=	words which are not essential to earn credit
<u> </u>	=	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument.

Question		Answer	Marks	Guidance
1	(a)	Y(1)	1	if answer line is blank allow correct answer indicated on graph
	(b)	W (1)	1	if answer line is blank allow correct answer indicated on graph
Total			2	

Question		Answer	Marks	Guidance
2		<p>any three from</p> <p>idea of energy supplied to water or from gas (1)</p> <p>temperature of water does not rise / stays at boiling point / 100 (°C) (1)</p> <p>temperature of potatoes increases (1)</p> <p>(as) they start at a lower temperature (than water) (1)</p>	3	<p>if water temperature rises above 100 (°C) in answer max 2 allow heat is supplied / gas burnt</p> <p>ignore references to water temperature rising</p> <p>allow potatoes become hot or are heated</p> <p>ignore potatoes boil</p>
Total			3	

Question			Answer	Marks	Guidance
3	(a)	(i)	infrared / IR (1)	1	
		(ii)	microwaves (1)	1	allow infrared / IR allow microwave and infrared but any other wave with microwave or infrared scores (0)
		(iii)	ultraviolet / UV (1)	1	
	(b)	(i)	S (1)	1	
		(ii)	300 000 000 (m / s) (2) but if answer is incorrect 50 000 000 x 6 (1)	2	allow 3×10^8 or 300×10^6 or other 'correct' standard form type of notation allow correct answer in km/s if this unit is clearly stated allow 30Mhz x 10
Total				6	

Question			Answer	Marks	Guidance
4	(a)		0.25 (2) but if answer is incorrect 15000 ÷ 60000 (1)	2	allow 25 % (2) if % clearly shown 25 on its own scores (1) allow 0.25% for 1 mark but if answer is incorrect 15000 ÷ 60000 x 100 (1) ignore any units other than % on answer line eg 0.25J or 0.25N scores (2)
	(b)		idea that it rises (1)	1	allow convection currents (formed) allow density changes / becomes less not more dense allow circulates ignore merely moves / spreads allow expands allow higher level answers in terms of particles having or gaining more energy and moving (further) apart
	(c)		reflected (1)	1	ignore bounces off
Total				4	

Question			Answer	Marks	Guidance
5	(a)	(i)	on (or) off / 0 (or) 1 (1)	1	both needed either order allow high (or) low allow examples eg 5V (or) 0V
		(ii)	idea of continuously variable / many or any or range of values (1)	1	allow correct diagram eg  ignore just more than two values not merely variable or changes values
	(b)		any one from available 24 / 7 (1) portable / AW (1) convenient / AW (1)	1	allow can be used away from device eg car or garage door allow can be used anywhere or in remote locations
Total				3	

Question			Answer	Marks	Guidance
6	(a)		movement / damage / destroys buildings / tsunami / flooding / cracks or lifting of Earth's surface (1)	1	ignore death or injury allow shakes / vibrates etc for movement ignore idea of earthquake moving tectonic plates
	(b)		seismometer / seismograph (1)	1	allow microphone / geophone
Total				2	

Question			Answer	Marks	Guidance
7	(a)	(i)	hair dryer (1)	1	if answer line is blank allow correct answer indicated in table
		(ii)	twice the power / idea of 2000 (W) compared to 1000 (W) (1)	1	allow 2 000 (W) = 2 x 1 000 (W)
	(b)		150 (pence) (2) but if answer is incorrect 2.5 x 4 x 15 (1)	2	allow £1.5 if answer clearly expressed in £ £150 (1) allow 2500 x 4 x 15 (1)
Total				4	

Question			Answer	Marks	Guidance
8	(a)		light (1) electrical (1)	2	allow sunlight but not Sun allow electricity / electric
	(b)		USE ✓'s IN THIS QUESTION advantages – max one from idea of low maintenance / running cost (1) no need for power (supply) cables / lines (1) no need for fuel / saves fossil fuels (1) long life (1) rugged / hard wearing (1) renewable energy source (1) no polluting waste (at point of use) / give out no greenhouse gases / do not cause pollution (1) can be used in remote locations (1)	2	allow cheap to run / energy (source) is free / saves money on electricity but not merely cheap / cost effective / reliable not just its renewable / reusable not just no or less pollution must include idea of emitted or given out ignore environmentally friendly / does not harm environment

Question			Answer	Marks	Guidance
			<p>disadvantages – max one from no or low power at night / dull or cloudy weather (1)</p> <p>idea of low power output (1)</p> <p>idea of overshadowed by buildings or trees / dirt / snow on surface (of cells) reduces or stops output (1)</p>		<p>allow power / energy needs to be stored in a battery allow no sun no electricity or power allow idea of only working well or efficiently in sunlight allow will not work without sunlight / in low light levels ignore unspecified references to weather eg weather not reliable / bad weather (0)</p> <p>ignore references to cost ignore visual pollution</p>
	(c)	(i)	<u>solar flare</u> (1)	1	not solar wind or 'flare' on its own
		(ii)	telecomms. / t.v. signals / weather prediction / spying / military / navigation systems / sat. nav. / GPS (1)	1	<p>allow named scientific use eg Hubble / space telescope / international space station allow (scientific) research allow mapping / idea of photographing the Earth or ground eg for crop monitoring or prospecting for minerals</p>
			Total	6	

Question			Answer	Marks	Guidance
9	(a)		move magnet / AW or move coil / AW (1)	1	
	(b)		direct (current) / dc / DC (1)	1	
			Total	2	

Question		Answer	Marks	Guidance
10	(a)	1 alpha (particles) 2 beta (particles) 3 gamma (rays)	2	any order all three correct = (2) marks 1 / 2 correct = (1) mark if answer lines blank allow correct answers ticked circled or underlined in list
	(b)	gamma / γ (1)	1	allow correct answer ringed ticked or underlined in list if answer line is blank but must indicate that it is the answer for (b) not (a)
	(c)	ionised / an ion (1)	1	allow become charged / ions formed allow idea of loses or gains electrons but not loses all electrons ignore references to speed of collision not ionic
Total			4	

Question		Answer	Marks	Guidance
11	(a)		3	all 4 correct (3) 2 or 3 correct (2) 1 correct (1)
	(b)	(huge) explosion / expansion (1)	1	allow Big Bang ignore as a cloud of gas
Total			4	

Question		Answer	Marks	Guidance
12	(a)	measuring tape / trundle wheel (1) stopwatch / stopclock (1)	2	allow metre wheel but not metre rule / stick not merely clock, watch or timer
	(b)	6.25 (m / s) (2) but if answer is not correct 200 ÷ 32 (1)	2	allow 6.3 (2) allow 6 on answer line if working and initial answer 6.25 / 6.3 (2) allow 6.2 (1)
	(c)	(i) W – X (1)	1	if answer line is blank allow correct answer ticked circled or underlined or indicated on graph
		(ii) Y (1)	1	if answer line is blank allow correct answer ticked circled or underlined or indicated on graph
Total			6	

Question		Answer	Marks	Guidance
13	(a)	change in speed / speeding up / slowing down / AW (1)	1	allow change in direction
	(b)	3.6 (2) but if answer is incorrect 9 ÷ 2.5 (1)	2	allow 4 on answer line if working is correct and answer is 3.6
	(c)	idea of greater speed change (in same time) / 2.5 seconds) (1)	1	allow reaches or gets to or has a higher speed / reaches 15 m / s (in 2.5 seconds) but not just travels at a greater or higher speed / travels more distance in same time allow acceleration = 15 ÷ 2.5 / 6 for P

Question		Answer	Marks	Guidance
	(d) (i)	thinking + braking distance or = 36 (m) (1)	1	allow description of the two distances being added eg distance travelled whilst reacting / putting brakes on plus distance with brakes applied (1)
	(ii)	slippery road / wet or icy road / poor or worn brakes / worn or bald tyres (1)	1	any one but a list containing any incorrect answers score (0) allow other road conditions eg leaves on road. allow increased mass / load of car ignore unqualified references to weather / road conditions / brakes / tyres / how worn tyres are eg because of the tyres (0) but tyres have poor grip (1) eg weather conditions (0) but when its raining (1)
Total			6	

Question		Answer	Marks	Guidance
14		down: 1 kinetic (1) 5 solar (1) across: 2 (height) 3 converts (1) 4 diesel (1)	4	allow incorrect spelling if answer is recognisably correct allow correct answers beside clues or clearly identified in answer space
Total			4	

Question	Answer	Marks	Guidance
15 (a)	<p>any two from</p> <p>ABS (brakes)</p> <p>electric windows cruise control</p> <p>paddle shift control / example of adjustable seats / steering</p> <p>seat-belts</p> <p>air bags</p> <p>side impact bars</p> <p>safety or roll cage</p> <p>gains the first mark</p> <p>position sensors (1)</p> <p>then</p> <p>description of purpose of one feature gains second mark</p> <p>eg ABS is to help (driver) avoid a crash (2)</p> <p>eg safety cage is to protect driver / passenger or reduce injuries in a crash (2)</p> <p>eg seat belts keep person in seat or reduce injuries / force or impact or lock (2)</p> <p>eg electric windows /cruise control / adjustable seats or steering allow driver to concentrate on driving (2)</p> <p>eg air bags reduce injuries / force on person / stop driver hitting steering wheel or window (2)</p>	2	<p>allow bumpers</p> <p>allow side or headlights</p> <p>allow brake lights</p> <p>ignore references to active and passive</p>
(b)	<p>watts</p> <p>work</p> <p>higher</p> <p>fuel</p>	2	<p>allow <u>W</u></p> <p>4 correct = (2)</p> <p>2 / 3 correct = (1)</p> <p>only 1 correct = (0)</p>
	Total	4	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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