

Physics B

General Certificate of Secondary Education

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

Mark Scheme for January 2011

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Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
allow	=	answers that can be accepted
()	=	words which are not essential to gain credit
<u> </u>	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	B (1)	1	if answer line is blank allow correct answer ticked circled or underlined in the list
		(ii)	D (1)	1	if answer line is blank allow correct answer ticked circled or underlined in the list
	(b)		<u>energy</u> (1)	1	
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
2			air (1) insulator (1)	2	allow gas / oxygen / any sensible named gas
			Total	2	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		0.25 (2) but if answer is incorrect 30000 ÷ 120000 (1)	2	allow 25 % (2) if % clearly shown 25 on its own or 25 J or 25N (1) allow ¼ (1) allow 0.25% for 1 mark but if answer is incorrect (30000 ÷ 120000) 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 dense not more dense allow circulates ignore merely moves / spreads allow expands not heat rises
	(c)		reflected (1)	1	not bounces off
			Total	4	

Question	Expected Answers	Marks	Additional Guidance
4	<p>USE ✓'s IN THIS QUESTION</p> <p>any three from: idea that microwaves (m.w.) pass through plastic or glass (1)</p> <p>idea that m.w. reflect off side of oven / metal or onto food (1)</p> <p>reflected by door or mesh / cannot penetrate or escape through door or mesh (1)</p> <p>idea of danger of harm to humans or health if m.w. escape (through door or gaps) (1)</p> <p>conduction/convection to centre of food (1)</p>	3	<p>ignore pass a few cm into food and references to water (absorbing)</p> <p>allow plastic or glass or container do not reflect (m.w.) allow ORA eg metal containers reflect (m.w.)</p> <p>allow bounces or rebounds ignore reflects heat or IR</p> <p>allow bounces or rebounds off door allow gaps in mesh prevent diffraction of microwaves to outside of oven ignore reflects heat</p> <p>maximum of 1 mark for “bounces” for points 2 and 3</p> <p>allow burns (the skin) ignore causes cancer ignore to make it safer or it is harmful on its own ignore just m.w. escape</p> <p>allow description of food particles passing on k.e. or description of convection current</p>
	Total	3	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	digital (1)	1	if answer line is blank allow correct answer ticked circled or underlined in the list
		(ii)	idea of continuously variable / many / range of values or lots of values (1)	1	Allow any value / varies between two values / varies between 0 and 1 not just variable or varying values allow constantly variable signals allow more values or more than two values allow varies in amplitude ignore fluctuates and references to frequency
	(b)		reflection (1)	1	if answer line is blank allow correct answer ticked circled or underlined in the list
	(c)	(i)	✓ in second box (1) in second box (EM waves all travel at the same speed) (1)	1	zero if more than one box ticked
		(ii)	portable or convenient / can be used in remote locations / anywhere (there is signal) (1)	1	allow available 24 hours a day / 24-7 / all the time(1)
		(iii)	increased the speed / made it quicker / AW (1)	1	allow idea of a code idea of sending more complex or longer messages allow idea that light travels faster than other methods ignore further
			Total	6	

Question			Expected Answers	Marks	Additional 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		Expected Answers	Marks	Additional Guidance
7	(a)	light (and) heat (1) light (1) electricity (1) turbine (1)	4	both needed any order
	(b)	daytime any one from: energy / IR / light / radiation (from the Sun) enters the room / AW (1) energy / IR / light / radiation from the Sun absorbed by walls or room or objects or ground (in room) AW (1) night time heat / IR / energy radiated (back into room) / AW (1)	2	allow Sun's rays / waves ignore collects or stores energy ignore heat allow heat / IR emitted or given out (back into room) ignore releases heat / IR / energy allow higher level answers eg long(er) wavelength(s) reflected by glass (back into room) longer wavelength(s) given out by objects (in the room)
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	any one from: coal (1) oil (1) peat (1) (natural) gas (1)	1	allow fossil fuel not petrol allow Uranium
	(b)	any one from: wood (1) straw (1) manure / dung (1)	1	allow biomass
	(c)	radioactive [1]	1	allow ionising ignore toxic / poisonous
	(d)	7.2 (2) but if answer not correct 12 x 5 x 0.12 (1)	2	allow 7 (2) allow 7200 (p) (1) allow £7.20 (p) (1)
		Total	5	

Question		Expected Answers	Marks	Additional Guidance	
9	(a)	any two from: water / drink / liquid (1) food (1) oxygen / air (1)	2	allow higher level answers eg protection from radiation / space suit allow medicines	
	(b)	any one from: temperature (1) magnetic field (1) radiation (1) gravity (1) atmosphere or oxygen content (1) weather / climate (1) composition of surface or planet / AW (1)	1	allow light levels allow presence of water allow biological content or is life there allow planets mass or size or density ignore film / video ignore environmental conditions allow see if there is water on the planet ignore samples of rock	
	(c)	(i)	ice [and] dust (1)	1	both needed either order not rock but allow powdered rock
		(ii)	on a (possible) collision course with Earth / AW (1)	1	allow passes close to Earth
		Total		5	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	explosion (1) expanding / AW (1)	2	allow higher level answers eg expansion from a point (2)
	(b)	collision between (old) Earth and planet / asteroid (1) idea of debris forms new Earth and Moon (1)	2	allow collision with NEO allow collision between two planets allow broke up to form new Earth and Moon.
		Total	4	

Question			Expected Answers	Marks	Additional Guidance
11	(a)	(i)	increases / AW (1)	1	allow accelerates (1)
		(ii)	gravitational potential energy (1)	1	allow GPE (1) allow PE (1) allow gravitational (1) allow potential (1)
		(iii)	gravity / weight (1)	1	not just 'g' allow gravitational
	(b)		idea of making herself streamlined / aerodynamic (1)	1	eg pull arms in (1) eg use diving position (1) allow reduce drag (1)
	(c)	(i)	drag / air resistance (1)	1	allow (air)friction (1) ignore upthrust / pressure / wind
		(ii)	Upwards / up (1)	1	allow against gravity (1) allow arrow pointing upwards
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
12			any 3 from: radar (1) two pictures taken (1) distance measured from lines on road (1) time measured between flashes or photos (1)	3	allow sensor detects speeding car (1) speed = distance / time scores (1) allow camera flashes twice allow camera uses a set/fixed time
			Total	3	

Question		Expected Answers	Marks	Additional Guidance
13	(a)	25000 (Watts) (2) but if answer incorrect 50000 ÷ 2 or 50kJ ÷ 2 (1)	2	
	(b)	(i) (the seatbelts are:) stretched / damaged / won't stretch again / elastic limit reached / AW (1)	1	not snapped (0) allow dangerous / not safe / weakened / anchorage damaged / no longer work (1)
		(ii) any one from: crumple zone / air bag / steering wheel (1)	1	allow bonnet / any other parts of car that may crumple eg bumpers / headrest
	(c)	Safety cage / side impact bars / roll(over) bars AW (1)	1	
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
14	(a)	4 (m/s ²) (2) but if answer is incorrect (11 – 3) ÷ 2 or 8 ÷ 2 (1)	2	
	(b)	kinetic energy quadruples (1)	1	if answer line is blank allow correct answer ticked, circled or underlined
	(c)	(i) kinetic energy doubles (1)	1	if answer line is blank allow correct answer ticked, circled or underlined
		(ii) more mass / AW (1)	1	allow greater weight / load (1) allow greater air resistance (1)
		(iii) to provide a larger force AW (1)	1	allow so that the caravan doesn't push into the back of the car/push the car forward / AW
		Total	6	

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