

Physics B

General Certificate of Secondary Education

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

Mark Scheme for June 2012

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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

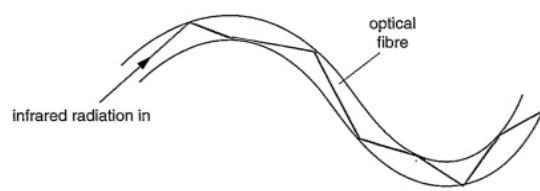
Annotation	Meaning
	Correct response
	Incorrect response
	Benefit of doubt
	Benefit of the doubt not given
	error carried forward
	Omission Mark
	Ignore
	reject
	contradiction



Subject-specific Marking Instructions

/	alternative and acceptable answers for the same marking point
(1)	separates marking points
allow	answers that can 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 gain 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	alternate wording
ora	or reverse argument

Question			Answers	Marks	Guidance
1	(a)	(i)			3 or 4 correct [2] 1 or 2 correct [1] 0 correct [0]
		(ii)	on the wall / inside the (outside) wall [1]	1	allow named examples e.g. (behind) radiator, on cavity wall blocks, with cavity foam insulation [1] ignore just reflects off the foil / reflects heat
	(b)	(i)	4.5 [1]	1	allow 4 years 6 months [1] allow 4 ½ years [1]
		(ii)	(air is a) good insulator / poor conductor / AW [1]	1	allow keeps it insulated [1] allow higher level answers e.g. (trapped air) does not convect / does not circulate / does not have convection currents [1] ignore stops heat escaping / traps heat
Total				5	

Question			Answers	Marks	Guidance
2	(a)	(i)	infrared / IR [1]	1	more than one answer scores [0]
		(ii)	microwave [1]	1	more than one answer scores [0]
		(iii)	skin cancer / sun burn [1]	1	allow sunstroke [1] allow named skin cancer e.g. melanoma [1] not just cancer allow premature aging of skin [1] allow burns skin [1] not just burns allow cataracts / eye damage / blindness [1] allow damage skin cells [1] not just damages cells
	(b)	(i)	(C) amplitude [1] (B) crest / peak [1] (A and D) wavelength [1]	3	ignore tip
		(ii)	2.4 [1]	1	mark the answer line first if answer line blank allow correct answer circled, underlined or ticked on list
Total				7	

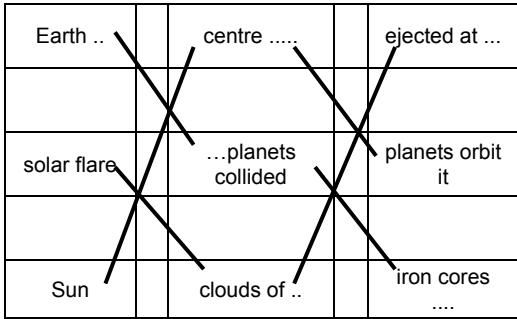
Question			Answers	Marks	Guidance
3	(a)	(i)	reflects from side(s) (internally) [1] with angle of incidence greater than or equal to critical angle [1] but total internal reflection / TIR [2]	2	<p>ignore bounce not refract / diffract</p> <p>not total internal refraction [0]</p> <p>allow correct diagrams only if the writing on the answer line is neutral, when written answer is incorrect diagrams cannot score</p> <p>award marks from a diagram with all reflections at the surface (no need for ray to emerge) and TIR correct by observation e.g.</p>  <p style="text-align: right;">[2]</p> <p>ray shown reflected from side with one or more reflection(s) [1]</p> <p>but</p> <p>for TIR angle of incidence = angle of reflection ($\geq 42^\circ$ approximately) [2]</p> <p>maximum 1 mark if more than seven reflections</p>

Question	Answers	Marks	Guidance
	<p>(ii)</p> <p>analogue is continuously variable / can have many values (within a range) / AW [1]</p> <p>digital can have two values or 2 states / off or on / 0 or 1 / high or low [1]</p>	<p>2</p>	<p>award one mark for analogue and one mark for digital e.g. digital has two values but analogue does not [1]</p> <p>allow has a range of values [1] ignore just vary / vary in amplitude / vary in frequency ignore analogue signals are waves</p> <p>allow a series of binary codes / a series of pulses [1] ignore idea that digital carry more information / interference is less not a range between 0 and 1 / 2 settings / 2 variables not can be turned or switched on and off not any two values</p> <p>allow higher level answers e.g. analogue signals can only send one signal at a time / ora [1] digital can be multiplexed / multiple signals can be sent at once [1] digital has a better output quality / ora [1]</p> <p>allow correct diagrams only if there is no writing on the answer line or the answer is neutral, if written answer is incorrect diagrams cannot score</p> <p>correct labelled diagram:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>analogue</p> </div> <div style="text-align: center;">  <p>digital</p> </div> </div> <p style="text-align: right;">[2]</p>

Question		Answers	Marks	Guidance
	(b)	portable [1] convenient [1]	2	<p>allow you can take it with you where ever you go [1]</p> <p>allow you can receive calls at any time / all the time [1]</p> <p>allow people can call you ay any time [1]</p> <p>allow examples of convenience e.g. mobile phone is available 24 hours a day or 24/7 [1]</p> <p>allow mobile phone is with her 24 hours a day but the office phone is only available in office hours [2]</p> <p>allow can be used where ever and when ever needed [2]</p> <p>as an extra marking point</p> <p>allow can be used for monitoring / sending messages / sending pictures / SMS [1]</p>
	(c)	(a laser produces a narrow) intense / monochromatic / parallel / AW [1] (beam of) (blue) light [1]	2	<p>allow concentrated [1]</p> <p>allow coherent / in phase / same wavelength / same frequency [1]</p> <p>ignore bright / straight</p> <p>allow radiation [1]</p>
Total			8	

Question			Answers	Marks	Guidance
4	(a)	(i)	transfer / converts.....electrical [1] direct current / dc / DC [1]	2	allow change or turn for transfer ignore transport for transfer both needed
		(ii)	30 (W) [2] but if answer is incorrect 12 x 2.5 [1]	2	
	(b)		convection [1] turbine [1]	2	allow (wind) mill or aero / wind generator [1] ignore (wind) machine
			Total	6	

Question		Answers	Marks	Guidance
5	(a)	gamma / γ [1]	1	
	(b)	(i) idea of thickness of aluminium (cooking foil) has increased [1]	1	allow idea of more beta (β) particles being absorbed (by thick foil) / less beta (β) particles penetrating (thick foil) [1] allow any suitable suggestion about the aluminium thickness being increased e.g. rollers have moved apart / pressure from rollers is less [1]
		(ii) alpha (α) would be stopped / alpha (α) would not get through or penetrate (foil or air) [1]	1	allow alpha (α) gets stopped by paper / stopped by material [1] ignore not strong enough
		(iii) any one from: use of tongs [1] keeping a safe distance away [1] short exposure time [1] monitoring with radiation badges [1] idea of shielding during or after use [1]	1	ignore handle with care / wash hands / wear gloves / wear goggles allow avoid contact / reduce contact [1] ignore just use lead
		Total	4	

Question		Answers	Marks	Guidance
6	(a)	 <p>[2]</p>	2	1 mark for all lines between object and first statement correct 1 mark for all lines between first statement and second statement correct
	(b)	<p>rock crater [1]</p> <p>tail [1]</p>	2	<p>both needed</p> <p>allow iron for rock</p> <p>allow (in)dent / holes for crater</p> <p>ignore collisions</p> <p>ignore dust</p> <p>ignore fire(s)</p>
		Total	4	

Question		Answers	Marks	Guidance
7		<p>produced in power stations / power plants [1]</p> <p>correctly named energy source [1]</p> <p>or</p> <p>idea of national grid / cables and pylons connecting power station and consumers [1]</p> <p>then linked to example of consumers [1]</p>	3	<p>ignore references to renewable energy plants e.g. wind farms</p> <p>named energy sources: fossil fuel or coal or oil or gas or nuclear but if a list all must be correct [1]</p> <p>allow uses coal in a power station [2]</p> <p>allow description of system of cables and pylons [1]</p> <p>ignore just uses wires</p> <p>examples of consumers: homes / factories / offices / farms / shopping centres / towns / hospitals / people [1]</p> <p>ignore customers / electricity companies</p>
Total			3	

Question		Answers	Marks	Guidance
8		<p>answer 1 give off their own light / are very hot / give off lots of energy [1]</p> <p>answer 2 cloud of gas or hydrogen or dust or matter [1]</p> <p>answer 3 galaxy [1]</p>	3	<p>allow they are very bright [1]</p> <p>allow ball of gas [1]</p> <p>allow nebula [1]</p> <p>allow named galaxy eg Milky Way / Andromeda [1]</p> <p>not constellation</p>
Total			3	

Question		Answers	Marks	Guidance
9	(a)	petrol (and) diesel [1]	1	both required either order allow LPG instead of either answer
	(b)	(i) A [1]	1	allow 10 (km/litre) [1] more than one answer scores [0]
		(ii) 40 (litres) [1]	1	
		(iii) use of battery [1]	1	allow by charging [1] ignore engine
		Total	4	

Question		Answers	Marks	Guidance
10	(a)	Jane [1]	1	more than one answer scores [0] if answer line blank allow correct answer circled, ticked or underlined in list
	(b)	Andy [1]	1	more than one answer scores [0] if answer line blank allow correct answer circled, ticked or underlined in list
	(c)	Nick [1]	1	more than one answer scores [0] if answer line blank allow correct answer circled, ticked or underlined in list
		Total	3	

Question		Answers	Marks	Guidance
11	(a)	weight [1]	1	allow gravity [1] not mass
	(b)	drag (greater) or air resistance (greater) [1] Dan is less streamlined / Dan is less aerodynamic / ora [1]	2	allow air friction (greater) [1] ignore air force (is greater) ignore upthrust / upward force (is greater) allow Dan has a larger surface area / ora [1]
Total			3	

Question		Answers	Marks	Guidance
12	(a)	E [1]	1	more than one answer scores [0] if answer line blank allow correct answer circled, ticked or underlined in list
	(b)	600 kg Citroen [1]	1	allow 600 kg [1] allow Citroen [1]
	(c) (i)	54 000 (J) [2] but if answer incorrect 450 x 120 scores [1]	2	
	(ii)	both have same force and distance [1]	1	both required either order allow both have 450 N (of force) and (travel) 120m
	(d)	greatest mass / greatest weight / heaviest and greatest speed / greatest velocity [1]	1	both required either order
Total			6	

Question		Answers	Marks	Guidance
13	(a)	73 (m) [1]	1	allow 18 + 55 [1]
	(b) (i)	distance puts on the brakes / starts to brake [1]	1	both required allow amount not time allow realises they need to brake
	(ii)	any two from: alcohol drugs tiredness illness lack of concentration distractions older slower reaction distractions [1]	1	two correct for one mark allow examples of distraction e.g. children crying / radio / mobile phone
	(c)	any two from: wet / icy / slippery road surface bald tyres / low tread tyres / poor grip on tyres going down hill increased mass / load [1]	1	two correct for one mark ignore poor weather / poor road condition allow old tyres / poor tyres (limit of acceptability) ignore bad tyres ignore any mention of brakes
Total			4	

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