

Physics B

General Certificate of Secondary Education

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

Mark Scheme for June 2011

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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.

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The **Abbreviations, annotations and conventions** used in the detailed Mark Scheme are:

/	=	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	ultraviolet / UV (1)	1	
		ii	sunblock / sun (tan) cream or lotion (1)	1	allow cover up / wear a hat / wear clothing / keep out of midday sun / exposure or time in the sun / after-sun
	b	i	infrared / IR (1)	1	
		ii	water/fat (1)	1	
	c	i	B (1)	1	
		ii	space / vacuum (1)	1	allow air / gas / named gas (1)
		iii	300 000 000 (m/s) (2) but if answer is incorrect 30 000 000 x 10 (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	8	

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>c.wall £100 d.glazing £ 300 l. ins. £ 40 all 3 correct (in table or any other place in answer) (1)</p> <p>yes / blank no mark</p> <p>double glazing / B / it saves more than the other two (1)</p>	2	<p>if table is blank no mark unless correct figures given elsewhere in the answer</p> <p>allow d. glazing saves 3 times as much as c. wall (1)</p> <p>allow d. glazing saves 7.5 times as much as l. ins (1) not merely saves the most</p> <p>ignore merely saves £300 but allow correct comparison eg d.g. saves £300 rather than £100 or £40 (1) B saves £300 A only saves £100 and C £40 (1) ie comparison needed for second mark allow ecf if answer is no with correct explanation using figures in table for (1) mark eg £100 / £30 / £40 answer no.... c.w. saves the most (1)</p>
	b	lowest payback time (1)	1	<p>allow short / low / small / fast / quick /AW payback time allow idea of quickest return on money spent / less time to pay it off /save money on longer timescale allow idea of only has a 3 year payback time allow cannot afford d.g. and c.w. is the next best in terms of money saved</p>
		Total	3	

Question			Expected Answers	Marks	Additional Guidance
3			any three from: idea of energy supplied to water / from gas (1) temperature of water stays at boiling point / 100 (°C) (1) temperature of potatoes increases (1) (as) they start at a lower temperature (than water) (1)	3	If water temp rises above 100 then max 2 allow heat is supplied / gas burnt (1) ignore ref to water temperature rising allow potatoes heat up (1) ignore potatoes boil
Total				3	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	on (or) off / 0 (or) 1 (1)	1	both needed either order allow high (or) low
		ii	analogue (1)	1	
	b	i	B (1)	1	if answer line is blank allow correct answer indicated on diagram
		ii	any one from: available 24 / 7 (1) portable (1) convenient (1)	1	allow can be away from the device eg car doors and garage allow can be used anywhere or in remote locations
Total				4	

Question			Expected Answers	Marks	Additional
5			colder / cooler (1) infrared / IR(1)	2	allow cold / cool / more dense not just heat
Total				2	

Question		Expected Answers	Marks	Additional Guidance
6	a	✓ - - ✓ ✓ (2)	2	If more than three answered -1 for each incorrect answer to zero 3 correct 2 marks 2 correct 1 mark
	b	current or electrons or it flows / travels / goes in one direction (1)	1	allow does not change direction / has a constant direction / does not change from +ve to -ve allow only goes one way round a circuit allow does not alternate ignore diagrams unless explained ignore voltage not stays constant
	c	Sun's (energy) (1)	1	allow Sun / sunlight / heat from Sun ignore just light / solar
Total			4	

Question		Expected Answers	Marks	Additional Guidance
7	a	(i) coal/oil/gas(1)	1	not petrol / diesel
		(ii) methane (1)	1	If no answer on the line allow correct answer circled or underlined in the list
	b	(i) to change the voltage / current (1)	1	allow to step up voltage or current allow to step down voltage or current
		(ii) to transport/carry electrical energy /electricity / power (to factories / homes etc) (1)	1	allow to connect power station to consumers / AW (1) not just supply electricity not to connect pylons / to carry electricity to pylons
	c	60 / 59.8 (W) (2) but if incorrect 0.26 x 230 (1)	2	allow 60(W) (2)
Total			6	

Question		Expected Answers	Marks	Additional Guidance
8	a	they are hot (1) they give out light (1)	2	allow nothing between them and Earth to absorb light allow are on fire / burning(1) allow they shine not bright(er) / sparkles not reflect light
	b	any two from: food water oxygen warmth	2	
	c	any two from: spying / military mapping weather (forecasting / monitoring) scientific research / monitoring GPS	2	allow monitoring only once unless qualified
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
9	a	destroy or damage or kill cells / cause mutations in cells (1)	1	allow cause cancer / radiation sickness / radiation burns
	b	use tongs / lead barriers / limit exposure time (1)	1	ignore any examples of protective clothing eg goggles / gloves allow remote handling
	c	become charged / become positive / become negative (1)	1	allow higher level answers such as gain / lose electrons but reject loses all of its electrons or charged by loss / gain of protons not charged by nuclear decay not just becomes an ion but allow becomes a positive / negative ion
	d	landfill sites if low level waste specified / encase or vitrified in glass / reprocessed / stored in steel / concrete / lead / sealed containers / idea of (storage) deep underground (1)	1	ignore dumped or buried in the sea allow strong containers but not merely containers not merely buried but allow (stored) in mines ignore references to earthquake sites or leaking into groundwater
		Total	4	

Question			Expected Answers	Marks	Additional Guidance
10	a	i	increases speed / acceleration / AW (1)	1	ignore changes allow moves through the water easier
		ii	less fuel is used (1)	1	no ecf
	b		wedge / streamlined / AW (1)	1	allow pointed allow description from labelled diagram allow aerodynamic, narrow, thin
	c		thrust from the engines is equal to the drag – first box (1)	1	more than one tick scores (0)
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
11	a		distance (1) time (1)	2	either order
		b	tick in last box (1)	1	more than one tick scores 0
	c		acceleration (1)	1	allow deceleration / retardation not m/s ²
			Total	4	

Question		Expected Answers	Marks	Additional Guidance
12	a	force moving an object (1)	1	if answer line is blank, allow correct answer ticked, circled or underlined in list
	b	180 (2) but if answer not correct 540x20/60 (1)	2	allow correct steps in calculation eg 540 x 20 then their answer ÷ 60 [1] allow 540 ÷ 60 = 9 (W) [1] not merely 9 on its own
	c	potential (1) kinetic (1)	2	must be this order
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
13	a	<p>braking — danger to brake (1) thinking — brake to stop (1) danger to stop</p>	2	
	b	force (1)	1	
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
14	a	<p>any two from: change shape (1)</p> <p>energy absorbed or dissipated or converted or transferred(1)</p> <p>allows driver or passenger to move forward more slowly (1)</p> <p>reduce injury / saves driver or passenger lives / AW (1)</p>	2	<p>allow squashed / compressed / deflates</p> <p>allow released/ relinquished/ but not lost</p> <p>ignore stops passenger / driver hitting dashboard or going into or through window / windscreen</p> <p>ignore ideas of safety or less harmful</p> <p>allow higher level answers eg increased collision / impact time or distance (1)</p> <p>reduced acceleration (1)</p> <p>reduced force (on person) (1)</p> <p>but increased time to absorb / dissipate / convert energy [2]</p>
	b	<p>seat belt / crumple zone or area / anti-roll bar / safety cage or reinforced frame / side impact bars (1)</p>	1	<p>allow padded dashboards / collapsing steering wheel / AW / laminated windscreens / child seats / AW</p> <p>allow areas that would crumple eg bumpers / wings / engine compartment</p>
	c	<p>any one from: electric windows (1) cruise control (1) paddle shift controls (1) adjustable seating (1)</p>	1	<p>allow automatic windscreen wipers / fog lights / air conditioning (1)</p>
		Total	4	

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