

Physics B

General Certificate of Secondary Education

Unit **B652/01**: Modules P4, P5, P6 (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 used in Scoris

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

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

- / = 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
- = 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)	positive negative (1)	1	both required in either order allow +ve / + (1) allow -ve / - (1)
	(b)	attracted / idea of moves towards (comb) (1)	1	allow stick to the comb (1) allow become polarised (1) not repels / moves away from comb ignore unqualified moves ignore becomes charged
	(c)	A / rod gained electrons (1)	1	more than one answer scores (0)
	(d)	any three from droplets have same charge (1) droplets repel (1) produce mist / fine spray / AW (1) object charged opposite to paint / AW (1) attracts paint (1) produces even coat / less waste / shadows painted / AW (1)	3	not paint stuck to object
			Total	6

Question		Answer	Marks	Guidance
2	(a)	gamma (1)	1	
	(b)	(i)	1	ignore damage skin allow cells mutate (1) allow kills cells (1) allow radiation poisoning / radiation sickness (1)
		(ii)	1	allow higher level answers – tracers / smoke alarms / thickness gauge / power station (1) ignore harming people ignore X-rays
	(c)	background radiation (1)	1	
Total			4	

Question		Answer	Marks	Guidance
3	(a)	earth (1)	1	allow correct answer ringed ticked or underlined if answer line is blank
	(b)		2	all correct (2) marks one or two correct (1) mark
Total			3	

Question		Answer	Marks	Guidance
4	(a)	high frequency / above 20kHz (1) above threshold of human hearing / AW (1)	2	not 'too high' allow can't be heard (1) too high to hear scores (1) too high a frequency to hear scores (2) not electromagnetic - if the two correct responses are given, followed by electromagnetic this scores (1)
	(b)	scans / breaking kidney stones / cleaning delicate equipment / measuring (speed of) blood flow in the body (1)	1	allow distance measuring and examples (1) allow treat soft tissue injuries (1) allow other known uses ignore cleaning equipment ignore see baby in womb
	(c) (i)	wavelength (1)	1	
	(ii)	rarefaction (1)	1	allow rarefraction (1)
Total			5	

Question		Answer	Marks	Guidance
5		uranium fission steam (2)	2	all 3 correct (2) 1 or 2 correct scores (1)
Total			2	

Question		Answer	Marks	Guidance
6	(a)	aerial (1)	1	
	(b)	reflected (1 st response) (1) atmosphere (2 nd response) (1)	2	
	(c) (i)	The radio waves from the two stations are overlapping (ticked) (1)	1	more than one answer ticked = 0
	(ii)	loud sound (1) quiet sound (1)	2	allow higher level answers in terms of constructive and destructive interference allow different loudnesses / volume changes (2) allow sound and no sound (2)
Total			6	

Question		Answer	Marks	Guidance
7	(a) (i)	medium (1)	1	allow transparent (1) not see through / clear ignore translucent
	(ii)	refraction (1)	1	allow dispersion (1)
	(iii)	violet (1)	1	allow blue (1) ignore purple
	(b) (i)	converging (1)	1	allow positive (1)
	(ii)	focal (1)	1	allow focus (1)
Total			5	

Question		Answer	Marks	Guidance
8	(a)	no direction or any direction / just size or magnitude (1)	1	allow 'direction does not matter' (1)
	(b)	(i) $v = u + at$ 22 (m / s) (2) but if answer incorrect ($v = 0 +$) 1.5×12 (1)	2	mark answer first
		(ii) 13 200 (1)	1	allow 600 x 22 (1) allow 600 x ecf (1) allow ecf (1)
Total			4	

Question		Answer	Marks	Guidance
9	(a)	any two from weather forecasting (1) spying (1) GPS (1) mapping (1) communication / TV / radio / telephone (links) (1)	2	allow military (1) allow scientific uses – e.g. space telescope / space research (1)
	(b)	(i) gravity (1)	1	allow weight / gravitational force (1) ignore Earth but Earth's mass (1)

Question		Answer	Marks	Guidance
	(ii)	idea of above same point on Earth / in a fixed position / AW (1)	1	look at part (ii) and (iii) together not just 'stays in same place' not just same speed as Earth allow above equator (1)
	(iii)	60 (hours) (1)	1	look at part (ii) and (iii) together allow reference to 24 hours in part (ii) if no answer in part (iii) if 24 hours in part (ii) but incorrect time in part (iii), it scores (0) for part (iii). But award other correct responses in part (ii). e.g. (ii) 24 hours above equator (1) ie (1) for above equator (iii) 365 days (0) as contradiction e.g. (ii) takes 24 hours to orbit (0) as credited in part (iii) (iii) 24 hours (1) e.g. (ii) takes 24 hours to orbit (NR) (iii) (1) as answer (24 hours) in part (ii)
Total			5	

Section C

Question		Answer	Marks	Guidance
10	(a)	any one from mixer / microwave / fan oven / washing machine / tumble drier / extractor fan (1)	1	any reasonable kitchen device using a motor (1) ignore unqualified oven e.g. allow freezer or fridge (1)
	(b)	(i)	1	ignore melting / fuse blowing allow spins more (1)
		(ii)	1	allow goes backwards (1) not merely goes forwards / changes direction
		(iii)	1	allow more powerful (1)
		(iv)	1	
Total			5	

Question		Answer	Marks	Guidance
11	(a)	(i)	1	more than one answer scores (0) accept answers from the list only
		(ii)	1	more than one answer scores (0) accept answers from the list only
		(iii)	1	more than one answer scores (0) accept answers from the list only
		(iv)	1	more than one answer scores (0) accept answers from the list only
		(v)	1	more than one answer scores (0) accept answers from the list only

Question		Answer	Marks	Guidance
	(b) (i)	potential divider (1)	1	allow voltage divider (1) allow potentiometer (1)
	(ii)	potential difference (1)	1	allow voltage / volts (1) ignore V_{out} ignore power ignore resistance
	(iii)	using a variable resistor / other device such as LDR or thermistor (1) in place of R_1 or R_2 (1)	2	allow change or replace resistors R_1 or R_2 (1)
Total			9	

Question		Answer				Marks	Guidance
12						2	all correct (2) any 2 or 3 correct (1) if 2 ticks in any line, mark line as wrong ignore extra ticks in top line
		Use	Isolating transformer	Step-up transformer	Step-down transformer		
		to light a 12V lamp from the mains			✓		
		output from a power station to the National Grid		✓			
		bathroom shaver socket	✓				
		mobile phone charger from the mains			✓		
electrical substation to a school			✓				
Total					2		

Question			Answer	Marks	Guidance						
13	(a)	(i)	<table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>(0)</td> <td>1</td> </tr> <tr> <td>(1)</td> <td>0</td> </tr> </tbody> </table> <p>(1)</p>	Input	Output	(0)	1	(1)	0	1	both needed for the mark
		Input	Output								
(0)	1										
(1)	0										
		(ii)	(0 means)- 0V / low voltage / off (1 means)- 5V / high(er) voltage / on (1)	1	both needed for the mark allow low / high (1) allow correct answers in terms of current / electron flow (1)						
	(b)	(i)	so that alarm stays on / AW (1)	1							
		(ii)	<u>Relay</u> (working as a switch) (1)	1	allow higher level answers in terms of controlling a larger current or mechanism of how a relay works						
Total				4							

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