Rewarding Learning

General Certificate of Secondary Education
2013

Physics

Unit 2

Foundation Tier

[GPH21]

MONDAY 24 JUNE, MORNING

MARK SCHEME

General Marking Instructions and Mark Grids

Introduction
Mark schemes are intended to ensure that the GCSE examination is marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria that they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these marking instructions.

Quality of candidates' responses
In marking the examination papers, examiners should be looking for a quality response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking
Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, the examiners should seek the guidance of the Supervising Examiner.

Positive marking
Examiners must be positive in their marking, giving appropriate credit for description, explanation and analysis, using knowledge and understanding and for the appropriate use of evidence and reasoned argument to express and evaluate personal responses, informed insights and differing viewpoints. Examiners should make use of the whole of the available mark range of any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks
Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark scheme
Mark Schemes for questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

						AVAILABLE MARKS
1	(a)	(i)	**Transverse**			
			vibrates	[1]		
			perpendicular to line AB/up and down	[1]	[2]	
		(ii)	**Longitudinal**			
			vibrates	[1]		
			parallel to line AB/left and right/back and forwards	[1]	[2]	
		(iii)	**Transverse**			
			Any **named** em wave **or** water wave **or** wave on string	[1]		
			Longitudinal			
			Sound **or** Ultrasound	[1]	[2]	
	(b)	(i)	Amplitude = 2.5 (m)		[1]	
		(ii)	Wavelength = 8 (m)		[1]	
		(iii)	Frequency = 15/60 **or** 0.25	[1]		
			Hz – insist	[1]	[2]	
		(iv)	$v = f\lambda$ **or** 0.25×8 **or** $\frac{15}{60} \times 8$ e.c.f.s from **(ii)** and **(iii)**	[1]		
			= 2 (m/s)	[1]	[2]	
	(c)	(i)	Round trip halved			
			0.6, 1.3, 1.7, 2.4, 3.0 At least 4 correct		[1]	
		(ii)	Speed = 1.0/0.003	[2]		
			= 333 (m/s)	[1]	[3]	
			Failure to convert ms to s give maximum [1]			
		(iii)	Points plotted, using their values	[2]		
			Best fit straight line or curve consistent with their points	[1]	[3]	
			If maximum of two points inaccurate give [1]			
			A series of short lines give [0]			
		(iv)	0.48 to 0.52 – No e.c.f. from graph in **(iii)**		[1]	20

						AVAILABLE MARKS
2	(a)	(i)	Ray bent towards the normal in glass	[1]		
			Reflected ray at mirror so that i = r (judge by eye)	[1]		
			Emergent ray bent away from normal and parallel to incident ray	[1]	[3]	
		(ii)	In the glass the light slows Change of speed give [1]		[2]	
		(iii)	At reflection angle of incidence = angle of reflection		[1]	
	(b)		Move lens away from screen or vice versa until a sharp image seen Measure distance from lens to screen Give credit for information shown on any relevant diagram		[3]	
	(c)	(i)	Converging		[1]	
		(ii)	Ray from top parallel to Pr axis refracted to meet drawn ray at film	[1]		
			Focus marked where ray cut principal axis	[1]	[2]	
		(iii)	Measurement consistent with correct diagram 1.9 ± 0.1 cm		[1]	
		(iv)	Real, diminished		[2]	15

						AVAILABLE MARKS
3	(a)	(i)	Two cells in series	[1]		
			Two bulbs or lamps in series	[1]		
			Correct symbols	[1]		
			A working circuit	[1]	[4]	
			If not award symbol mark, maximum [1]			
			Not all symbols correct [2] maximum			
		(ii)	R = V/I	[1]		
			= 3.0/0.2	[1]		
			= 15	[1]		
			Ω (unit maximum)	[1]	[4]	
	(b)	(i)	Switch in series with power supply	[1]		
			Ammeter in series	[1]		
			Voltmeter in parallel with box	[1]		
			Variable resistor in series with power supply	[1]	[4]	
			Correct symbols required			
		(ii)	Not proportional	[1]		
			Graph is not a straight line passing through 0,0 **or** I does not double when V doubles **or** graph not a straight line **or** graph is a curve	[1]	[2]	
		(iii)	No	[1]		
			The gradient changes **or** at least **two** values of resistance calculated	[1]	[2]	
		(iv)	(Filament) bulb or lamp		[1]	
	(c)	(i)	Negative charges removed		[1]	
		(ii)	Electrons	[1]		
			from object to her	[1]	[2]	20

AVAILABLE MARKS

4 **(a)** **(i)** The N pole of the bar magnet repels the N pole of the compass **or** it attracts the S pole of the compass [1]

(ii) B to the right [1]
C to the right [1] [2]

(iii) S pole at the right end [1]

(b) **Indicative content**

1. A (momentary) deflection when magnet moved in
2. No deflection when magnet stationary
3. A (momentary) deflection when magnet moved out
4. When moved out deflection is larger
5. Direction is opposite

Response	Marks
Candidates describe in detail using good spelling, punctuation and grammar **all the main points** shown above. The form and style is of a high standard and specialist terms are used appropriately at all times.	[5]–[6]
Candidates describe in detail using good spelling, punctuation and grammar **any three points** shown above. The form and style is of a high standard and specialist terms are used appropriately at all times.	[3]–[4]
Candidates make some reference to **one or two of the main points** shown above using satisfactory spelling, punctuation and grammar. The form and style is of a satisfactory standard and they have made some reference to specialist terms.	[1]–[2]
Response not worthy of credit	[0]

[6]

(c) **(i)** a.c. reverses/changes direction [1]
repeatedly [1]
d.c. current is always in the same direction [1] [3]

(ii) d.c. battery/cell/lightning/d.c. generator [1]
a.c. mains/power stations/transformers/a.c. generator [1] [2]

15

					AVAILABLE MARKS
5	**(a)**	**(i)**	Big Bang	[1]	
		(ii)	12 to 15 **billion** years	[1]	
		(iii)	Light has a longer wavelength (than expected) **or** moved to red end of spectrum	[1]	
		(iv)	The Universe is expanding **or** These galaxies are moving away from us	[1]	
	(b)	1. Gas and dust cloud shrinks 2. This is due to gravity 3. It heats up 4. eventually hot enough for a star to shine 5. Small clumps form the planets	Any 3 of 5 for [3]		
		Evidence – all planets lie in same plane or orbit the Sun in the same direction		[4]	
	(c)	Any **two** of: communications/TV/weather/espionage/astronomy		[2]	10

					AVAILABLE MARKS
6	(i)	Left – Lithosphere	[1]		
		Top right – Crust	[1]		
		Bottom right – Mantle (upper)	[1]	[3]	
	(ii)	The (**crust** of the) Earth is made up of plates		[1]	
	(iii)	The plates are moving (slowly)	[1]		
		Some of the plates stick	[1]		
		then move suddenly **essential**	[1]	[3]	
	(iv)	Friction between moving plates	[1]		
		produces heat (to melt the rocks)	[1]		
		molten rock (magma) reaches the surface	[1]	[3]	10
				Total	**90**