Rewarding Learning

General Certificate of Secondary Education
2018

Science: Physics

Unit 2

Foundation Tier

[GPH21]

FRIDAY 22 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 of 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)	Longitudinal – vibrations/oscillations parallel (to wave/energy transfer) direction	[1]		
			Transverse – vibrations/oscillations perpendicular (to wave/ energy) transfer direction	[1]	[2]	
		(ii)	Transverse – em waves or water wave/s waves/waves on string or named em wave	[1]		
			Longitudinal – sound/ultrasound/p waves	[1]	[2]	
	(b)	(i)	Wavelength correctly labelled between two consecutive crests/troughs		[1]	
		(ii)	Amplitude correctly labelled peak to axis or trough to axis		[1]	
	(c)	(i)	Frequency = (10/2) = 5	[1]		
			Hz stand alone	[1]	[2]	
		(ii)	$v = f\lambda$	[1]		
			$= 5 \times 25$ allow ecf for frequency from **(i)**	[1]		
			= 125 1.25 m/s – give [4]	[1]		
			cm/s stand alone but consistent with λ unit	[1]	[4]	
			wrong physics [0]			
	(d)	(i)	From left to right X-rays Ultraviolet Infrared Radio [$\frac{1}{2}$] each round down		[2]	
		(ii)	Wavelength		[1]	
	(e)	(i)	Three waves so that angle of incidence = angle of reflection – threshold mark	[1]		
			same wavelength as incident waves	[1]	[2]	
		(ii)	Refracted towards the normal – threshold mark	[1]		
			Three waves parallel to each other	[1]		
			smaller wavelength and equal and perpendicular to direction than incident waves	[1]	[3]	20

*Threshold mark means the response must be correct before any further credit can be given.

AVAILABLE MARKS

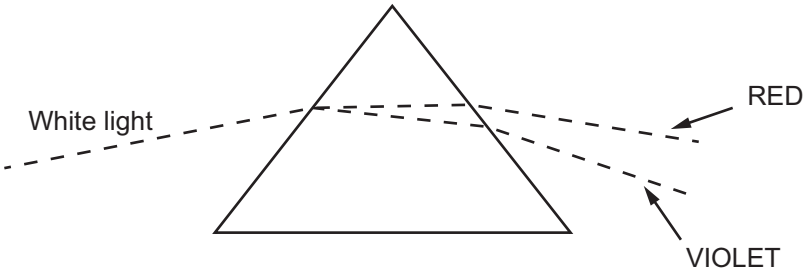
2 **(a)** **(i)** The same distance behind the mirror [1]

(ii) Ray 2 – threshold mark [1]
Angles incidence and reflection not equal
i > r or r < i
or Ray 2 appears not to come from image position [1] [2]

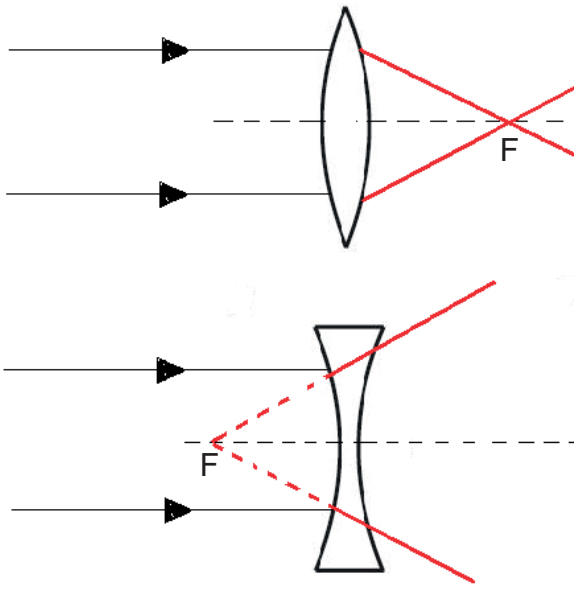
(b) **(i)** Ray P bends towards but not past the normal [1]
Ray Q passes undeviated [1]
Ray R bends away from the normal (to the right) [1] [3]

(ii) Ray P Speed decreases [1]
Ray Q speed increases [1]
Ray R speed increases [1] [3]

(c) Ray correctly labelled as below [1]



(d) Both diagrams correct – [1] each [2]



(e) **(i)** The object is not at infinity
or not distant
or rays entering the lens are not parallel [1]

(ii) At least three ratios calculated,

e.g. $\frac{10}{10} = 1$ $\frac{15}{7.5} = 2$ $\frac{20}{6.7} = 3$ [1]

Ratio of U/V not constant [1] [2]

15

AVAILABLE MARKS

3 (a) (i) Electrons [1]

(ii) Its electrons are not free to move/has no free electrons [1]

(b) (i) 6Ω [1]

(ii) 2Ω [1]

(iii) V = IR = 0.5 × 12 [1]
= 6 V [1] [2]

(iv) I = P/V [1]
= 55/12 [1]
= 4.6 (A) 5A is worth [2] [1] [3]

(c) Indicative content

Name and colour of the three wires

Colour and name linked
Earth – green and yellow
Live – brown
Neutral – blue

All three must be correct give [2]
Two correct give [1]
One correct give [0]

Role of the earth wire ([1] each)
If the live wire should touch the metal body
The earth wire provides a (low resistance) path for the current/conducts current to earth
This protects the **user** from (electric) shock or electrocution

Role of the fuse ([1] each)
If the current (voltage [0]) becomes too great the fuse melts/blows/breaks
NOT shorts
The circuit is broken
The appliance is protected (from damage), wiring (from damage) overheating

Response	Mark
Candidates describe in detail using good SPG **at least 5 points** shown above. The form and style are of a high standard and specialist terms are used appropriately at all times.	[5]–[6]
Candidates describe in detail using good SPG **at least 3 points** shown above. The form and style are of a high standard and specialist terms are used appropriately on some occasions.	[3]–[4]
Candidates make same reference to **one of the points** shown above using good SPG. The form and style are of a satisfactory standard but there is limited use of specialist terms.	[1]–[2]
Response not worthy of credit	[0]

[6]

				AVAILABLE MARKS
(d)	**(i)**	They need swapped or ammeter in series with cell and voltmeter is parallel with the wire (turn around or reversed give [0])	[1]	
	(ii)	To allow the current to flow for a short time/in between readings/for a few seconds/turn off between readings or expts	[1]	
	(iii)	Straighten it or attach it to a metre rule	[1]	
	(iv)	Put the lengths in increasing/decreasing order or in order	[1]	
	(v)	Units or ALL named units V, A, Ω	[1]	20

						AVAILABLE MARKS
4	(a)	(i)	N S		[1]	
		(ii)	N S		[1]	
		(iii)	Stronger magnetic field or indication of this		[1]	
	(b)	(i)	Electromagnetic induction/EM induction		[1]	
		(ii)	Pointer momentarily moves (left or right) or moves and returns to zero	[1]		
			No deflection/stays at zero/nothing/none	[1]		
			Pointer momentarily deflects in opposite direction to action 1	[1]		
			Pointer momentarily deflects in same direction as action 3 or opposite direction to action 1	[1]	[4]	
	(c)	(i)	Top – Step up transformer	[1]		
			Bottom Step down transformer	[1]	[2]	
		(ii)	a.c.		[1]	
	(d)	(i)	Left to right Step up Step down		[1]	
		(ii)	Left to right High Low		[1]	
		(iii)	(High voltage) reduces the current	[1]		
			this reduces energy losses (in the cables)	[1]	[2]	15

						AVAILABLE MARKS
5	(a)	(i)	Red shift (doppler effect give [0])		[1]	
		(ii)	It (the galaxy) is moving away		[1]	
		(iii)	The Big Bang		[1]	
		(iv)	12–15 BILLION years ago 12 000–15 000 million years		[1]	
	(b)	(i)	A cloud/collection of gas (and dust) or hydrogen		[1]	
		(ii)	Planets orbit in same plane Planets move in same direction	[1] [1]	[2]	
		(iii)	1 = Asteroids 2 = Neptune 3 = Venus 4 = Saturn [$\frac{1}{2}$] each round down		[2]	
		(iv)	They are rocky/outer planets are gaseous		[1]	10
6	(a)		1. Crust 2. Mantle 3. Outer Core 4. Inner Core	[1] [1] [1] [1]	[4]	
	(b)		Plates move/slide/rub against/meet Plates stick (NOT subducts) Plates lurch/jolt/jerk/sudden movement	[1] [1] [1]	[3]	
	(c)		Oceanic plate subducts/moves/submerges below continental plate Friction melts rocks/magma or lava forms due to friction Molten rock/magma/lava flows/rises out through gaps	[1] [1] [1]	[3]	10
					Total	**90**