



Rewarding Learning

**General Certificate of Secondary Education
2014**

GCSE Physics

Unit 2

Foundation Tier

[GPH21]

MONDAY 23 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.

- 1 (a) (i) So the phones can be **fairly** compared [1]
- (ii) Very close to legal limit (for adults), so smaller SAR for children **or** Children get a larger dose/children's skulls are thinner/children's bodies are still developing/children's brains are smaller/absorbs more energy/smaller body mass/smaller brain/child more affected (health) [2]
- (iii) Use an earphone/earpiece (to keep mobile phone far from head) [1]
or use text messages/hands-free/use loudspeaker mode/less often
- (b) (i) **Reflection**
Frequency Same
Wavelength Same
Speed Same [3]
- (ii) **Refraction**
Frequency Same
Wavelength Decreases/smaller
Speed Decreases [3]
- (c) (i) Transverse [1]
- (ii) Vibrations/oscillations [1]
perpendicular/at 90° to direction of energy transfer/wave direction [1] [2]
- (iii) $v = f\lambda$ [1]
 $= 1.3 \times 2700$ [2]
 $= 3510 \text{ (m/s)}$ [1] [4]
- (d) (i) Ultraviolet [1]
- (ii) 10 minutes [1]
- (iii) $300 - 150 = 150 \text{ (minutes)}$ [1]

AVAILABLE
MARKS

20

- 2 (a) (i) (Focal length) is the distance between optical centre of lens and the (principal) focus or focal point. [1]
- (ii) Ray from top of object
 1. Through centre of lens – no deviation – to film [1]
 2. Parallel to the axis – refracted at lens – meets first ray on film [1]
 3. Image correctly and clearly identified on film [1]
 Ruler used and an arrow (correct direction) on at least one ray [1] [4]
- (iii) Rays of light pass through it or it can be projected on a screen [1]
- (b) (i) Normal drawn and angle of incidence marked [1]
- (ii) Normal drawn and angle of refraction marked [1]
- (iii) Both rays refracted downwards } both required [1]
 Red above, violet below }
- (c) (i) It is not a straight line **or** doubling of values not present [2]
- (ii) Calculations, e.g. $\frac{5.5}{20} = 0.28$ and $\frac{18}{40} = 0.45$ [2]
or $\frac{20}{5.5} = 3.63$ and $\frac{40}{18} = 2.2$
or $\frac{20}{40} = 0.5$ and $\frac{5.5}{18} = 0.3$
or $\frac{40}{20} = 2$ and $\frac{18}{5.5} = 3.3$
or $2 \times 20 = 40$ $2 \times 5.5 \neq 11$ Does not double
- Not a constant ratio [1] [3]
- Accept angles other than 20 and 40
- (iii) Ray passes through no deviation [1]

AVAILABLE
MARKS

15

			AVAILABLE MARKS		
3	(a) (i)	Ammeter in series with wire	[1]	[3]	
		Variable resistor in series with wire	[1]		
		Voltmeter in parallel with wire	[1]		
		If any one symbol wrong max [2]			
	(ii)	To prevent the wire heating/allow wire to cool	[1]	[2]	
		Heat affects the resistance/temperature affects resistance	[1]		
	(iii)	Straight line through origin		[1]	
	(iv)	60/80 of 12	[1]	[2]	
		9 (Ω)	[1]		
	(b)	(i)	Power or energy used per second or 960 J/s		[1]
		(ii)	$P = IV$ or $I = P/V$	[1]	[3]
			$960 = 240 \times I$	[1]	
$I = 960/240 = 4$ (A)			[1]		
(iii)		$R = V/I$ or $P = V^2/R$ possible e.c.f. from (ii) for I value	[1]	[3]	
$= 240/4$ $960 = 240^2/R$	[1]				
$= 60$ (Ω) $R = 240^2/960 = 57\,600/960 = 60$ (Ω)	[1]				
(iv)	Electrons (moving along the wire) collide with atoms	[1]	[2]		
	Atoms gain energy (heat)	[1]			
(c)	(i)	Elements are in series		[1]	
	(ii)	Two elements in parallel	[1]	[2]	
		Switch in series with at least one element Must be a working circuit or both in series with 2-way switch for one element	[1]		
				20	

4	(a)	(i) Alternating (current)	[1]	
		(ii) Direct (current)	[1]	
	(b)	(i) Trace repeatedly crosses time axis or repeatedly changes from + to – or changes direction	[1]	
		(ii) Time interval or distance between peaks or troughs does not change, waves equally spaced wavelength $\Rightarrow 0$	[1]	
		(iii) Any curve/line or variation that does not cross the time axis	[1] [1]	[2]
		(iv) d.c. source – battery/cell/battery charger	[1]	
		(v) a.c. source – mains/transformer/laboratory PSU	[1]	
	(c)	(i) Deflections (Left) Right Right Left	[1] [1] [1]	[3]
		(ii) Current in opposite directions or similar statement	[1]	
		(iii) No deflection No magnetic field lines cut/requires movement of magnet	[1] [1]	
		(iv) Electrical generator/transformer/microphone/magnetic tape	[1]	

AVAILABLE MARKS
15

- 5 (a) Moon [1]
Earth [1] [2]
- (b) (i) It is too distant or spacecraft too slow and takes more than a lifetime to reach [1]
- (ii) Radio/TV signals [1]
- (c) Indicative content
1. Gases
 2. Hydrogen (and helium) and dust
 3. Gravity shrinks the gas cloud/pressure increases/causes spiralling
 4. A large clump forms at centre/density increases
 5. Centre heats up **or** temperature rises (to x million degrees)
 6. Nuclear fusion starts

Response	Mark
Candidates describe in detail using good spelling, punctuation and grammar at least 5 points shown above and the precaution is clearly stated. 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 spelling, punctuation and grammar at least 3 points shown above. The form and style are 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 are of a satisfactory standard and they have made some reference to specialist terms.	[1]–[2]
Response not worthy of credit.	[0]

[6]

10

- 6 (a) (i) 1 = crust
2 = mantle
3 = outer core
4 = inner core
[1] each [4]
- (ii) Crust }
Inner core } any 2 [2]
Mantle }
- (iii) Nickel [1]
- (iv) Lithosphere [1]
- (b) (Tectonic activity means) the Earth plates move [1]
Earthquake is due to them suddenly moving or jolting or lurch after being stuck [1] [2]

10

Total

90