



General Certificate of Secondary Education

Science: Physics

Unit 2
Foundation Tier

[GPY21]

Assessment

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are 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 which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE Physics

Candidates must:

- AO1** Demonstrate knowledge and understanding of scientific ideas, scientific techniques and procedures;
- AO2** Apply knowledge and understanding of scientific ideas, scientific enquiry, techniques and procedures; and
- AO3** Analyse information and ideas to interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.

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, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for 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. Candidates can be awarded full marks for an answer if they have not shown a method. The advice to show clearly is to allow partial credit to be awarded.

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. If the starting point for a response is clearly incorrect Physics then award 0.

Marking Calculations

In marking answers involving calculations, examiners should apply the 'own figure rule' so that candidates are not penalised more than once for a computational error.

Types of mark schemes

Mark schemes for tasks or 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.

- 1 (a) (i) Longitudinal [1]
(ii) 256 (waves in 1 second) [1]
(b) (i) Wavelength = 50 cm [1]
(ii) $v = f\lambda$ [1]
= 40×0.5 or 40×50 [1]
= 20 = 2000 [1]
m/s cm/s [1] [4]
Unit and numerical answer must be consistent
 40×50 without explanation give 0
Allow ecf for λ from (b)(i)

(c)

	Increases	Decreases	Says the same
Speed		✓	
Wavelength		✓	
Frequency			✓

[3]

- (d) **Indicative content:**
Ultrasound has a frequency greater than 20 kHz
The ultrasound is reflected
So that the echo can be detected
The time between the emitted and reflected ultrasound
The speed of US in water
Distance = $\frac{1}{2} \times \text{Round Trip Time} \times \text{Speed}$ or $d = \frac{s \times t}{2}$

Response	Mark
Candidates describe in detail using good spelling punctuation and grammar 5 or more 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 spelling punctuation and grammar at least 3 or 4 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 1 or 2 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]

5 points award 6 marks, 3/4 points award 4 marks, [6]
1/2 points award 2 marks

- (e) (i) A = X-ray B = Microwave C = Radio [3]
(ii) Gamma rays have a short wavelength/higher frequency [1]
Or have more energy/more penetrating/more ionising

AVAILABLE
MARKS

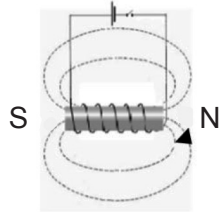
20

2	<p>(a) (i) A virtual image cannot be projected on a screen or rays of light appear to come from it or rays do not pass through it Imaginary give 0</p> <p>(ii) Any three from:</p> <ul style="list-style-type: none"> • Erect/upright same way up as object • Same size as object • Same distance behind mirror as object is in front • Laterally inverted <p>1 mark each</p> <p>(b) (i) 50°</p> <p>(ii) 31°</p> <p>(iii) Slows down/speed reduces change of speed give 0</p> <p>(iv) Graph C</p> <p>(c) (i) Long sight or hypermetropia</p> <p>(ii) Eye lens cannot be made thick enough or eyeball too short or lens too weak</p> <p>(iii) Converging (or convex) lens</p> <p>(iv) Two rays converge and meet at a point behind retina or appear to meet</p> <p>(v) Rays from the lens are less divergent converges inside the eye and meet on the retina</p> <p>(d) (i) Any two from:</p> <ul style="list-style-type: none"> • Ray from top of O passes through optical centre without refraction • Ray from top of O parallel to PA refracts through F • Ray from top of O through F refracts parallel to PA <p>1 mark each (Contradictions or erroneous rays award 1 mark for rays) (No arrows on the rays maximum penalty 1 mark)</p> <p>(ii) Image labelled where converging rays meet or ↓ (inverted arrow)</p> <p>(iii) Inverted smaller</p>	<p>[1]</p> <p>[3]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1] [2]</p> <p>[1] [2]</p> <p>[1] [2]</p> <p>[2]</p> <p>[1]</p> <p>[1] [2]</p>
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AVAILABLE MARKS
20

			AVAILABLE MARKS	
3	(a) (i)	$V = 6 \text{ (V)}$	[1]	20
		(ii) Current = 0.4A	[1]	
	(b) (i)	Voltmeter reads 6V	[1]	
		(ii) $R = V/I$ or $V = IR$	[1]	
		$R = \frac{6}{2}$ allow ecf from (i)	[1]	
		$R = 3 \text{ (}\Omega\text{)}$	[1] [3]	
		(iii) $Q = I \times T$	[1]	
		$Q = 2 \times 30$	[1]	
		$Q = 60 \text{ (C)}$	[1] [3]	
	(c) (i)	$P = IV$ or $I = P/V$	[1]	
		$I = 2250/240$	[1]	
		$I = 9.4 \text{ (3) (A)}$	[1] [3]	
		(ii) Select fuse rating of 13 A Allow ecf from (i)	[1]	
	(d) (i)	Diagram completed to show both switches in up or both in down position.	[1]	
		(ii) Lamp can be controlled (turned on and off) from two positions.	[1]	
	(e) (i)	Measure of Energy	[1]	
	(ii) Cost = kw \times hours \times C.P.U.	[1]		
	Cost = $2.2 \times 1.5 \times 17$ or No. of kWhrs = $2.2 \times 1.5 = 3.3$	[1]		
	Cost = 56p allow 56.1 Cost = $3.3 \times 17 = 56\text{p}$	[1] [3]		
	Accept £0.56 but not £56			
(f)	Double insulation	[1]		

4 (a) (i) Polarity



[1]

(ii) Direction of field lines N to S
If conflicting arrows give 0

[1] [2]

(b) (i) Waveform B

[1]

(ii) It does not change direction/go positive and negative
Is all positive or does not go negative

[1]

(c) (i) (Soft) iron

[1]

(ii)

Action	Observation (1 to 4)
The switch in the circuit connected to coil A is closed and left closed.	A
The switch in the circuit connected to coil A remains closed	C
The switch in the circuit connected to coil A is now opened and left open.	A
The switch in the circuit connected to coil A is opened and closed repeatedly.	D

[4]

AVAILABLE
MARKS

9

5 (a)	The Big Bang occurred 14 million years ago		
	Evidence for the Big Bang comes from the Red Shift	✓	
	The Big Bang marked the creation of our Solar System		
	As a result of the Big Bang space is expanding	✓	[2]

More than 2 ticks deduct 1 mark for each

- (b) (i) A = comet [1]
 B = asteroids [1]
 C = Earth [1] [3]

- (ii) Gravity [1]

- (c) (i) Looking at the light which passes through the planet's atmosphere
 or spectroscopy
 or light from the planet [1]

- (ii) Distance is too great
 or Spacecraft too slow (at present)
 or Time to get there too long [1]

- (iii) The distance light travels in one year [1]
 [1] [2]

- (d) Any **one** from:
 • Communications/TV/Weather forecasting
 • Photography/Spying
 (1 × [1]) [1]

Total

AVAILABLE MARKS

11

80