Rewarding Learning

General Certificate of Secondary Education
2024

Physics

Practical Skills Assessment
Unit 3
Booklet B

Higher Tier

[GPY34]

MONDAY 24 JUNE, MORNING

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.

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.

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.

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.

Levels of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- ***Threshold performance:*** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- ***Intermediate performance:*** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- ***High performance:*** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication
Quality of written communication (QWC) is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form.
These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level A: Quality of written communication is excellent.
Level B: Quality of written communication is good.
Level C: Quality of written communication is basic.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Level A (Excellent): The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) are of a sufficiently high standard to make meaning clear.

Level B (Good): The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) are sufficiently competent to make meaning clear.

Level C (Basic): The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) may be such that intended meaning is not clear.

1 (a) (i) 2 cm^3 [1]

(ii) B reads at eye level/ bottom of the meniscus [1]

(iii) 38 (cm^3) [1] [3]

(b) (i)

Quantity	Dependent	Independent	Controlled
Mass	✓		
Volume		✓	
Liquid			✓

[3]

(ii) X axis volume/cm^3 [1]
Y axis Mass /g [1]
5 points [$\frac{1}{2}$]each round down [2]
Straight line through 5 points [1]

(iii) Mass of measuring cylinder = 40g
Quality [2]
Consistent with their graph [$\frac{1}{2}$]

(iv) Mass of liquid 80 − 40 = 40 g ecf **(iii)** [1]
Density = mass/volume [1]
= 40/50 [1]
= 0.8 [1]
g/cm^3 [1] [15]

Or Gradient = $\frac{(80-40)}{50}$ = 0.8

AVAILABLE MARKS

18

					AVAILABLE MARKS
2	**(a)**	Metre rule, metre stick, half metre rule, measuring tape	[1]		
		Balance/scales	[1]	[2]	
	(b)	**(i)** mass = 58 kg or W = mg	[1]		
		weight = 58 × 10	[1]		
		= 580 N	[1]		
		(ii) work done = 0.125 × 580 × 50	[3]		
		= 3625	[1]		
		J	[1]		
		allow ecf from **(i)**			
		3625 4/5 +Nm 5/5			
		362500 4/5 +Ncm 5/5			
		3625000 4/5 +Nmm 5/5			
		WD = 0.125 × 580 × 50 3/4 with J 4/5			
		J or Nm stand alone only if a conversion attempted			
		(iii) P = W/t	[1]		
		= 4000/25	[1]		
		= 160	[1]		
		W	[1]	[12]	
	(c)	Repeat and average	[1]	[1]	
	(d)	Different weights/masses/heavier/lighter/do not weigh same	[1]	[1]	16

						AVAILABLE MARKS
3	(a)	(i)	Not formed by real rays/rays do not pass through it or Cannot be formed on screen/displayed or Not formed by real rays	[1]		
		(ii)	The marked with X in the correct position 3 large divisions behind the mirror	[1]		
		(iii)	Ray 3 threshold Evidence of extrapolation back to image or words Evidence that i = r	[1] [1]	[4]	
	(b)	(i)	Path of ray inside glass block (must be ruled)	[1]		
		(ii)	Angles of incidence and refraction marked between incident ray, the refracted ray and the normal	[1]		
		(iii)	Labels on both axes with units, Y-axis D/cm, X-axis i/° and scales 6 points including the origin round down Line of best fit Transposed –[1]	[2] [3] [1]		
		(iv)	Gradient = D/I = e.g. 6/50 point must be on line = 0.12 cm/° or cm/degree stand alone accept the gradient for transposed graph	[2] [1] [1]	[12]	
	(c)	(i)	Meets the glass at 90° or angle of incidence is 0/along normal	[1]		
		(ii)	Angle of refraction marked in the air between normal and exit ray	[1]		
		(iii)	(Weak) reflected ray inside the glass block so that angle of incidence = angle of reflection by eye	[1] [1]		
		(iv)	Total internal reflection or Angle of incidence is greater than critical angle	[1]	[5]	21

						AVAILABLE MARKS
4	**(a)**	**(i)**	Ammeter reading = 2.4 A	[1]		
		(ii)	Votmeter reading = 1.1 V	[1]		
		(iii)	R = V/I = 1.1/2.4 = 0.46 Ω allow ecf for I and V	[1] [1] [1]	[5]	
	(b)	**(i)**	Two bulbs in series Must use correct symbols	[1]		
		(ii)	X – axis number of bulbs Y – axis current/A	[1] [1]		
		(iii)	The graph is a curve or as number of bulbs increases, the current decreases is not a straight line passing through 0,0	[1]		
		(iv)	0.19 0.19 = 3.2/4r r = 4.2 –[1] if not 1 decimal place Or 0.8/ 0.19 } is worth [3] r = 4.2	[1] [1] [1]	[7]	
	(c)	**(i)**	Current = 0.8 A ± 0.1A	[1]		
		(ii)	R = 3.2/0.8 = 4.0 (Ω) allow ecf for current from **(i)**	[1] [1]	[3]	15
				Total		**70**