Rewarding Learning

General Certificate of Secondary Education
2018

GCSE Physics

Unit 1
Foundation Tier

[GPH11]

FRIDAY 15 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.

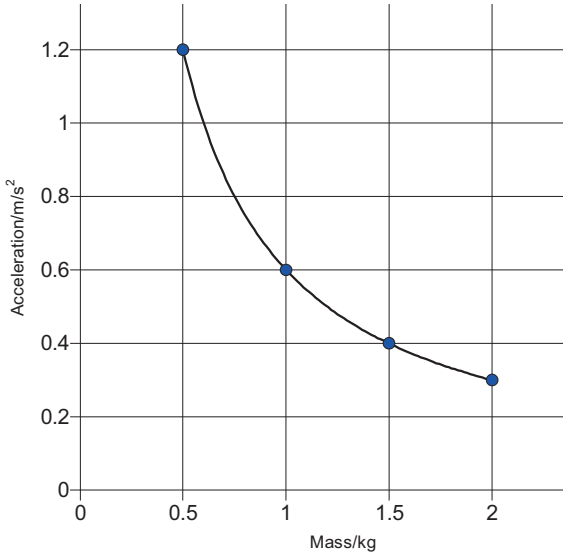
Awarding zero marks
Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

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)**	Constant speed	[1]		
		(ii)	Once	[1]		
		(iii)	(Average) speed = distance/time or $s = \frac{d}{t}$	[1]		
			= 300/100	[1]		
			= 3	[1]		
			m/s	[1]	[4]	
	(b)		Measure the time interval between each 1 m	[1]		
			If it is getting shorter the ball is accelerating	[1]		
			Repeat the timings and average	[1]	[3]	
	(c)	**(i)**	Velocity changes direction		[1]	
			or			
			Velocity is a vector			
		(ii)	Acceleration = velocity change/time or $a = \frac{v - u}{t}$			
			= 4/5	[1]		
			= 0.8 (m/s^2)	[1]	[2]	
		(iii)	Distance = area under the graph	[1]		
			= $\frac{1}{2}$ (4 × 5) + 4 × 10 + $\frac{1}{2}$ (4 × 5) or (10 + 40 + 10)	[1]		
			= 60 m	[1]	[3]	15

						AVAILABLE MARKS
2	**(a)**	**(i)**	*Friction is* a force and *is measured in* newtons	[1] [1]	[2]	
		(ii)	200 + 50 = 250(N)		[1]	
		(iii)	1250 – 250 = 1000(N)		[1]	
		(iv)	1000 = 750 × a a = 1000/750 = 1.3(3) (m/s^2) allow ecf from **(iii)**	[2] [1]	[3]	
		(v)	Weight = mg or = 750 × 10 = 7 500 (N)		[1]	
		(vi)	Because of the **force of gravity**		[1]	
	(b)	**(i)**	Both axes labelled with units Four points plotted (± 1 div) Smooth curve consistent with points For transposed axes or poor scale maximum deduction of [1]	[1] [2] [1]	[4]	



		(ii)	Acceleration DECREASES		[1]	
		(iii)	Repeat and average		[1]	15

						AVAILABLE MARKS
3	**(a)**	**(i)**	Mass of glass = 265 – 165 = 100 g	[1]		
			Volume = 100 – 60 = 40 cm^3	[1]		
			D = Density = Mass/Volume = (100/40) = 2.5 g/cm^3	[1]		
			or kg/m^3 if attempt to convert to kg and m^3		[4]	
			$D = \frac{M}{V}$ [1] if no further working			
		(ii)	Read to the bottom of meniscus/curve		[1]	
		(iii)	Place marble in without splashing		[1]	
	(b)		In water – molecules can move past each other	[1]		
			In glass molecules vibrate	[1]		
			about fixed position/cannot move freely	[1]	[3]	
	(c)		Explanation 100 °C to 4 °C volume decreases		[1]	10

AVAILABLE MARKS

4 (a) Indicative content

Apparatus:
Stopwatch/stopclock/timer
metre stick/rule(r)/tape measure
Measurements:
Height of staircase/height of riser and number of risers
or height of bench and number of step-ups
Time to run up stairs **or** time to complete step-ups
Calculation:
Work = weight × height or mgh or force × distance
Power = work/time
(Equations may be combined: power = weight × height/time gets both points)

Response	Mark
Candidates describe in detail using good spelling, punctuation and grammar **at least 5 points**. 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**. The form and style are of a high standard and specialist terms are used appropriately on some occasions.	[3]–[4]
Candidates make some reference to **one of the points** using good spelling, punctuation and grammar. 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]

(b) (i) Renewable or definition of renewable [1]

(ii) Produces a greenhouse gas/Produces carbon dioxide/ Contributes to global warming [1]

(iii) Chemical [1]

(c) (i) In the battery [1]

(ii) Light and Sound [2]

(d) Efficiency = energy output/energy input [1]
= 90/300 [1]
= 0.3 (30%) [1] [3]

15

					AVAILABLE MARKS
5	**(a)** (The point) where the weight of the object acts or appears to act			[1]	
	(b) **(i)** Clockwise moments = Anticlockwise moments or they equal the			[1]	
	(ii) Moment = force × distance	[1]			
	= 6 × 8	[1]			
	= 48	[1]			
	Direction = anticlockwise	[1]		[4]	
	(iii) 48 = W × 10 allow ecf from **(ii)**	[3]			
	W = 4.8 (N)	[1]		[4]	10
6	**(a)** **(i)** Subtract the background from the readings			[1]	
	(ii) Halving the count rate, e.g. 500 to 250	[1]			
	half-life = 1.6 $\pm$ 0.1 (1.4 or 1.8 give 1 mark only)	[2]		[3]	
	(b) **(i)** Gamma or γ	[1]			
	Only one that penetrates the body to the outside or escapes from body	[1]		[2]	
	(ii) The count rate would increase (close to the bleed) or highest/greatest reading			[1]	
	(iii) B	[1]			
	Would remain active long enough to give a reading	[1]			
	without causing too much cell damage	[1]			
	or				
	A short half-life not enough time get a reading and C too long a half-life would continue to damage cells			[3]	
	(iv) Protective clothing/as small a quantity as possible/keep large distance from the substance/reduce the time in proximity/do the task as quickly as possible			[1]	
	(c) (Nuclear) Fusion	[1]			
	(Nuclear) Fission	[1]			
	Spelling must be correct			[2]	
	(d) Same number of protons	[1]			
	Different number of neutrons	[1]		[2]	15
			Total		**80**