New Specification

Rewarding Learning

General Certificate of Secondary Education
2018

GCSE Physics

Unit 1
Foundation Tier

[GPY11]

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)	600 – 200	[1]		
			400 (m)	[1]	[2]	
		(ii)	Car A	[1]		
			It stopped for some time or			
			slopes are not the same	[1]	[2]	
		(iii)	(Average) speed = distance/time	[1]		
			= 600/40	[1]		
			= 15	[1]		
			m/s	[1]	[4]	
		(iv)	Straight line	[1]		
			From 0, 0 to 20, 600	[2]	[3]	
	(b)	(i)	Measure time the interval between each 1 m	[1]		
			If it is getting shorter the ball is accelerating	[1]	[2]	
		(ii)	Repeat the timings **and** average		[1]	
	(c)	(i)	Acceleration = velocity change/time	[1]		
			= 12/4	[1]		
			= 3 (m/s^2)	[1]	[3]	
		(ii)	(Distance) = area under the graph	[1]		
			= $\frac{1}{2}(4 \times 12)$	[1]		
			= 24 (m)	[1]	[3]	20
			Alternative			
			Distance = average speed × time			
			= 6 × 4			
			= 24 (m)			

						AVAILABLE MARKS
2	(a)	(i)	*Friction is* **a force**/it is not a form of energy	[1]		
			and *is measured in* **newtons**/is not measured in kg	[1]	[2]	
		(ii)	F = ma	[1]		
			= 1500 × 1.2	[1]		
			= 1800 (N)	[1]	[3]	
		(iii)	Weight = mg or = 1500 × 10	[1]		
			= 15000 (N)	[1]	[2]	
	(b)	(i)	3 cm		[1]	
		(ii)	ext = 6 cm	[1]		
			length = 10 + 6 cm or 13 + 3 = 16 cm	[1]	[2]	
	(c)	(i)	The point	[1]		
			Where weight acts	[1]	[2]	
		(ii)	A weight acts to produce an anti-clockwise moment	[1]		
			B weight acts to give a clockwise moment	[1]	[2]	
	(d)	(i)	ACM = CM or $F_1 \times d_1 = F_2 \times d_2$			
			25 × 35 = F × 5	[2]		
			F = 175 (N)	[1]	[3]	
		(ii)	P = F/A	[1]		
			= 180/5	[1]		
			= 36 (N/cm^2)	[1]	[3]	20

					AVAILABLE MARKS
3	(a)	(i)	(85g) given 50 cm^3 125 g 40g [$\frac{1}{2}$] each round up	[2]	
		(ii)	Density = Mass/volume or D = M/V (no ecf from **(i)**) [1] = 40/50 [1] = 0.8 [1] g/cm^3 or kg/m^3 if consistent with the number [1]	[4]	
		(iii)	Read to (the bottom of) meniscus or bottom of curve Read at eye level	[1]	
	(b)		In water – molecules slide past each other [1] In glass molecules vibrate [1] about fixed position [1]	[3]	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 force × distance or mgh

Power = work/time or $\frac{WD}{t}$

(Equations may be combined: power = weight × height/time gets both points or $\frac{mgh}{t}$)

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 **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]

[6]

(b) (i) $E_p = mgh$ [1]

$= 0.5 \times 10 \times 1.5$ [1]

$= 7.5$ (J) [1] [3]

(ii) $E_k = \frac{1}{2} mv^2$ [1]

$= \frac{1}{2} \times 0.5 \times 4^2$ or $\frac{1}{2} \times 0.5 \times 16$ [1]

$= 4.0$ (J) [1] [3]

(c) Efficiency = energy output/energy input [1]

= 90/300 [1]

= 0.3 (30%) [1] [3]

If unit included [–1] e.g. J

(d) (i) Both upward curves/lines **start at the same point** and copper above glass [1]

(ii) Electrons [1]

(iii) Collisions with atoms/molecules/ions/particles [1]

(iv) Atoms vibrate [1]

Vibrations pass from atom to atom [1] [2]

20

						AVAILABLE MARKS
5	(a)	(i)	Subtract the background from the readings		[1]	
		(ii)	half-life = 1.4 to 1.6 1.3 or 1.7 give [1] or if evidence is halving		[2]	
	(b)	(i)	(Nuclear) Fission		[1]	
		(ii)	A large nucleus/uranium/plutonium/thorium is breaking into smaller ones		[1]	
		(iii)	Generating electricity		[1]	
	(c)	(i)	(Nuclear) Fusion		[1]	
		(ii)	(Isotopes) of hydrogen or named, e.g. deuterium and tritium (The element) helium	[1] [1]	[2]	
		(iii)	In stars or sun		[1]	10
					Total	**80**