Rewarding Learning

General Certificate of Secondary Education
2019

GCSE Physics

Unit 1
Foundation Tier

[GPY11]

THURSDAY 30 MAY, AFTERNOON

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) Statement 3 [1]

(ii) Acc = gradient
or = change in velocity(speed)/time or $a = \frac{v}{t}$
do not accept $a = \frac{v}{t}$ for partial credit [1]
= 80/20 or (80 – 0)/20 [1]
= 4.0 [1]
m/s^2 [1] [4]

(iii) F = ma [1]
= $8.9 \times 10^4 \times 4.0$ ecf from **(ii)** for acc [1]
= 3.6×10^5 (3.56×10^5) or 356,000 [1]
N [1] [4]

(b) Distance = area under graph [1]
= $5 \times 55 + \frac{1}{2}(55 \times 50)$ or $\frac{1}{2}(5 + 55) \times 55$ [2]
= 1650 (m) [1]
= 1.65 (km) [1] [5]

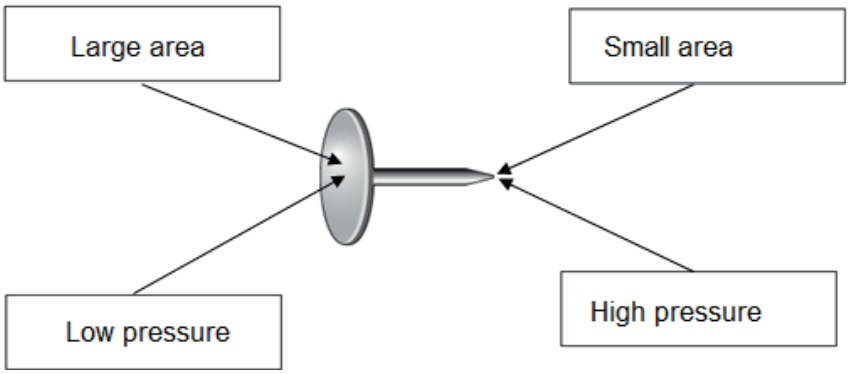
(c) Indicative content

Timer started at Camera 1/Marker 1 or Time recorded
Timer stopped at Camera 2/Marker 2 or Time recorded
If time interval too small or too short
Time interval too quick – give [0]
Speed calculated using d/t or 2000/t
Photograph identifies driver/car/not to mix up cars
Slows between the cameras
It only measures average speed

Response	Mark
Candidate describes 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]
Candidate describes 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]

20

					AVAILABLE MARKS
2	(a)	(i)	When there is balanced forces/absence of unbalanced forces or $F_{RES} = 0$ [1] constant speed/velocity or at rest (both required) [1]	[2]	
		(ii)	Resultant force = 5 (N) [1] Direction To the left or backward [1]	[2]	
		(iii)	No. The forces are not balanced/ or there is a resultant force	[1]	
	(b)	(i)	*The weight of an object is the* **FORCE** *on the object due to gravity* [1] *The* **MASS** *of an object is defined as the amount of* **MATTER** *in an object and is measured in* **KILOGRAMS** [1] [1]	[4]	
		(ii)	Weight = 10(N)	[1]	
		(iii)	Both reach the ground at **same time** – box ticked before second mark can be given [1] They fall at the same rate regardless of mass [1]	[2]	
	(c)	(i)	4 cm	[1]	
		(ii)	Extension = 10 cm [1] Length = 10 + 10 = 20 cm [1]	[2]	
	(d)	(i)	P = F/A [1] = 700/0.05 [1] = 14 000 (Pa) [1]	[3]	
		(ii)	 [1] per side	[2]	20

					AVAILABLE MARKS
3	**(a)**	Density = Mass/Volume or D = M/V	[1]		
	(b)	**(i)** Volume = 42 – 24 [1] = 18 (cm^3) [1]		[2]	
		(ii) Density = 153/18 [1] = 8.5 (g/cm^3) (possible ecf from **(ii)**) [1]		[2]	
		(iii) Lower brass gently or avoid splashes/read vol at eye level/ read to bottom of meniscus	[1]		
		(iv) Larger volume	[1]		
	(c)	**(i)** Spacing or distance between the atoms/molecules/particles [1] Is greater in the gas than in the solid [1]		[2]	
		or the converse comparison required Accept more tightly packed in solids [1] than in gases [1]			
		(ii) Spacing greater in the ice or converse	[1]		10
4	**(a)**	Block on left matt black surface [1] It is BETTER absorber (than shiny surface) [1]		[2]	
		or converse comparison required arguments in terms of conduction – give [0]			
	(b)	**(i)** (Install cavity wall) insulation, insulate wall	[1]		
		(ii) Rock/mineral wool/fibreglass wool/urea formaldehyde/polystyrene beads/foam (or equivalent)	[1]		
		do not accept “wool”			
	(c)	**(i)** W = F × d [1] = 500 × 3 [1] = 1500 (J) [1]		[3]	
		(ii) Energy in = useful energy out/efficiency (or equivalent) [1]			
		e.g. Eff = $\frac{\square E \square}{EI}$			
		= 2730/0.7 [2]			
		= 3900 (J) [1]			
		Alternative scheme for **(ii)**			
		Efficiency = $\frac{\text{energy out}}{\text{energy in}}$ [1]			
		$0.7 = \frac{2730}{\text{eff}}$ [1]			
		Energy in = $\frac{2730}{0.7}$ [1]			
		= 3900 [1]		[4]	
		(iii) **P** = Work/time (or equivalent) or $\square = \frac{w}{t}$ [1] = 2800/3.5 [1]			
		= 800 [1]		[3]	

					AVAILABLE MARKS
(d)	**(i)**	Strain or elastic do not accept potential		[1]	
	(ii)	$E_k = \frac{1}{2} mv^2$ or equivalent	[1]		
		$75 = \frac{1}{2} \times 0.2 \times v^2$ (1 subs mark per side)	[2]		
		$v^2 = 750$ or $v = \sqrt{750}$	[1]		
		$v = 27.4$ (m/s)	[1]	[5]	20
5 **(a)**	**(i)**	We cannot say when a particular nucleus will decay Decay unpredictable Do **not** accept "nothing we can do to make it happen/not happen"		[1]	
	(ii)	Radioactivity/radioactive decay		[1]	
	(iii)	Gamma	[1]		
		Alpha	[1]		
		Beta	[1]	[3]	
(b)	**(i)**	(in 8 hours) the activity decreases by half or number of nuclei count rate/radioactivity/mass Do **not** accept radiation		[1]	
	(ii)	2048 (cps)		[1]	
	(iii)	(24 hours) = 3 half lives Possible ecf from **(ii)**	[1]		
		activity falls to 1/8 × original activity	[1]		
		2144 → 1072 → 536 → 268 2096 → 1048 → 524 → 262			
		activity (= 1/8 × 2048) = 256 (cps) Evidence of halving is 2048 – 1024 give [1]	[1]	[3]	10
				Total	**80**