Rewarding Learning

General Certificate of Secondary Education

GCSE Physics

Unit 1
Foundation Tier

[GPY11]

Assessment

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. 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.

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)	Straight line from (0,0) to (3,20)	[1]		
			Straight line from (3,20) of positive slope	[1]		
			Ending at (6,60)	[1]	[3]	
		(ii)	Straight line	[1]		
			From 0,0	[1]		
			Ending at 6,60	[1]	[3]	
			If lines are clearly freehand then deduct 1 mark once for parts **(i)** and **(ii)**			
	(b)	(i)	20 (m/s)		[1]	
		(ii)	2 (s)	[1]		
			It has stopped	[1]	[2]	
		(iii)	Height = area under graph or = average speed × time	[1]		
			$= \frac{1}{2} \times 2 \times 20$ or $\frac{1}{2}(0 + 20) \times 2$	[1]		
			= 20 (m)	[1]	[3]	
		(iv)	Rate of change of speed = gradient	[1]		
			= 20/2	[1]		
			= 10	[1]		
			m/s^2	[1]	[4]	
	(c)	(i)	Decelerating/retardation/slowing	[1]		
			Times between lines is increasing	[1]	[2]	
		(ii)	Speed = distance/time			
			Speed = 4/0.155	[1]		
			= 25.8 (m/s)	[1]	[2]	20

						AVAILABLE MARKS
2	**(a)**	**(i)**	W = mg or 50 × 10	[1]		
			W = 500 (N)	[1]	[2]	
		(ii)	Resultant force = 750 – 500 = 250 (N) (allow ecf for W from **(i)**)	[1]		
			Direction – Upwards	[1]	[2]	
		(iii)	F = m × a **or** $a = \frac{F}{m}$	[1]		
			$a = \frac{250}{50}$	[1]		
			(possible ecf from **(ii)**) for F			
			a = 5 (m/s^2)	[1]	[3]	
		(iv)	Mass of rocket decreases	[1]		
			Fuel is burned off	[1]	[2]	
	(b)		$P = \frac{F}{A}$	[1]		
			Area = 40 × 10 = 400 cm^2 **or** area = 0.4 × 0.1 = 0.04	[1]		
			$P = \frac{100}{400}$ P = 100/0.04 = 2500	[1]		
			P = 0.25 Pa	[1]		
			N/cm^2	[1]	[5]	
			Unit and numerical answer must be consistent			
	(c)	**(i)**	X at the 50 cm mark		[1]	
		(ii)	CM = ACM	[1]		
			W × 20 = 2 × 12 [1] each side	[2]		
			W = 1.2 (N)	[1]	[4]	
		(iii)	Left **or** in same direction as the pivot		[1]	20

						AVAILABLE MARKS
3	**(a)**	**(i)**	2 (cm^3)		[1]	
		(ii)	Student B – They read at the bottom of the meniscus		[1]	
		(iii)	34 (cm^3)		[1]	
	(b)	**(i)**	1 cm^3 of the liquid has a mass of 0.8 g	[1] [1]	[2]	
		(ii)	D = M/V = 240/320 = 0.75 (g/cm^3)	[1] [1] [1]	[3]	
	(c)	**(i)**	Strong forces between the particles		[1]	
		(ii)	Vibrational		[1]	10

AVAILABLE MARKS

4 **(a)** **(i)** PE = mgh [1]
PE = 5 × 10 × 3 [1]
= 150 [1] [3]

(ii) Efficiency = useful output energy/total input energy [1]
= 150/195 [1]
= 0.77 [1] [3]
For the answer line accept 77% but not 0.77%

(iii) Heat and sound [2]

(b) **(i)** Will run out/cannot be replaced in a human lifetime [1]

(ii) Any **two** from: coal/oil/gas [2]

(iii) Releases carbon dioxide – increased greenhouse effect – climate change
Releases sulphur dioxide – causes acid rain – deforestation
[1] for each point provided they are consistent with gas released [3]

(c) Indicative content

Method of transfer Conduction

Fair test Rods same length, same cross section area
Same amount of wax on the drawing pins
Identical drawing pins
Drawing pins equidistant from flame
} maximum of 2 points

Observation Drawing pin on the copper rod falls first

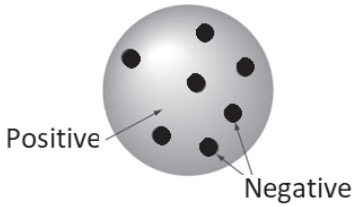
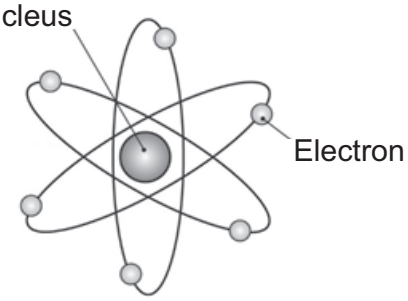
Conclusion Copper is the better conductor

Explanation Copper has free electrons
Energy is transferred by collisions

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]

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

20

				AVAILABLE MARKS
5	**(a)**		[1]	
	(b)	Nucleus 	[2]	
	(c)	**(i)** Name of the radiation / Nature of the radiation **Gamma (γ)** / EM wave of high energy Beta (β) / **Electron** **Alpha (α)** / Helium nuclei Accept symbols for gamma and alpha	[3]	
		(ii) Ionisation – removal of an electron from an atom [1] Danger – causes cell or DNA damage or causes cancer [1]	[2]	
	(d)	120 s = 2 half-lives or Activity = 1000/2 = 500/2 [1] = 250 cps [1]	[2]	10
			Total	**80**