Rewarding Learning

General Certificate of Secondary Education
2022

GCSE Physics

Unit 1
Foundation Tier

[GPY11]

TUESDAY 7 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.

COVID-19 Context
Given the unprecedented circumstances presented by the COVID-19 public health crisis, senior examiners, under the instruction of CCEA awarding organisation, are required to train assistant examiners to apply the mark scheme in case of disrupted learning and lost teaching time. The interpretation and intended application of the mark scheme for this examination series will be communicated through the standardising meeting by the Chief or Principal Examiner and will be monitored through the supervision period. This paragraph will apply to examination series in 2021–2022 only.

					AVAILABLE MARKS
1	**(a)**	(Average) speed = Distance/time or symbols	[1]		
		= 400/50	[1]		
		= 8 (m/s)	[1]	[3]	
	(b) **(i)**	**(**Distance) = area under graph or = ave speed × time	[1]		
		= $\frac{1}{2} \times 9 \times 3$ = $\frac{1}{2}$ (9 + 0) × 3	[1]		
		= 13.5 (cm) = 13.5 (cm)	[1]	[3]	
	(ii)	Rate of change of speed = Change of speed/time	[1]		
		= 9/3	[1]		
		= 3 cm/s^2	[1]	[3]	
		or			
		Rate of change of speed = slope of the graph			
		= 9/3			
		= 3 (cm/s^2)			
	(c) **(i)**	When in equilibrium (balanced)	[1]		
		About the same point or pivot	[1]		
		Clockwise moments equal anticlockwise moments	[1]	[3]	
	(ii)	ACM = CM			
		4 × 30 = W × 40	[2]		
		W = 3 (N)	[1]	[3]	
	(iii)	To the right or towards the pivot		[1]	
	(d)	A sharp knife blade has a small (contact) area	[1]		
		So it has a large pressure	[1]	[2]	18

				AVAILABLE MARKS
2	**(a)**	Weight down [1] Reaction up [1] They are equal [1]	[3]	
	(b)	**(i)** Constant speed	[1]	
		(ii) 50 (N) [1] To the LEFT [1]	[2]	
	(c)	F = ma [1] 1200 = 2000 × a [1] a = 0.6 (m/s^2) [1]	[3]	
	(d)	F = ke or k = F/e or k = gradient [1] k = 8/16 [1] = 0.5 [1] Unit = N/cm [1]	[4]	
	(e)	The point Where the weight of the bus acts The lower the CoG the more stable the bus The width of the base/distance across the bus wheel to wheel This raises the CoG The weight acts outside the base/wheel This causes a turning effect		

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] 19

3 **(a)** Density = Mass/Volume or D = M/V [1]
= 120/(235 − 220) [2]
= 8 [1]
Unit g/cm^3 [1] [5]

(b) **(i)**

Statement	
The particles have large gaps between them and are entirely free to move.	Gas
The particles are mainly touching but have small gaps between them.	Liquid
The particles have strong forces between them.	Solid

[1]
[1]
[1] [3]

(ii) Electron [1]
Collisions with other particles [1] [2]

AVAILABLE MARKS

10

					AVAILABLE MARKS
4	**(a)**	Two words only circled MASS and POWER (deduct [1] for each word circled greater than 2)		[2]	
	(b)	Diagram C	[1]		
		Work = Force $\times$ distance or PE = mgh	[1]	[2]	
	(c)	**(i)** Energy can be changed from one form to another	[1]		
		The total amount of energy does not change	[1]	[2]	
		Energy cannot be created or destroyed (worth 2 marks)			
		(ii) Output energies LIGHT SOUND HEAT	[3]		
		HEAT	[1]	[4]	
		(iii) Efficiency = Useful output energy/Total input energy	[1]		
		0.75 = Useful output energy/200	[1]		
		Useful output energy = 150 (J)	[1]	[3]	
	(d)	**(i)** $E_p = mgh$	[1]		
		$= 200 \times 10 \times 40$	[1]		
		$= 80\,000$ (J)	[1]	[3]	
		(ii) $E_k = \frac{1}{2} mv^2$	[1]		
		$= \frac{1}{2} \times 200 \times 20^2$	[1]		
		$= 40\,000$ (J)	[1]	[3]	
	(e)	Can A	[1]		
		The matt black is the better radiator	[1]	[2]	21

5 **(a)**

Name of particle	Position in atom	Relative Electrical charge	Relative Mass
proton	*In the nucleus*	*+1*	*1*
neutron	**In the nucleus**	**0**	**1**
electron	**Orbits the nucleus**	**–1**	$\frac{1}{1836}$

[$\frac{1}{2}$] each round up [3]

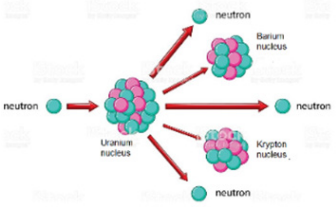
(b) **(i)** Background radiation [1]

(ii) Surroundings, e.g. rocks, people, cosmic ray [1]

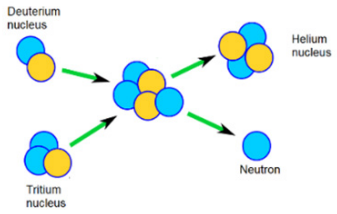
(iii) Range (0) to 2.5 or 3.0 cm [1]

(c) Any **two** from:
Protective clothing
Handle at a distance, e.g. tongs
Minimise exposure [2]

(d) Nuclear Fission [1]
Power station/
Generating electricity [1]



Nuclear Fusion [1]
Source of a star's energy [1] [4]



Total

Source: Chief Examiner

AVAILABLE MARKS

12

80