Rewarding Learning

General Certificate of Secondary Education
2014

GCSE Physics

Unit 1
Foundation Tier

[GPH11]

THURSDAY 12 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 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.

1 (a) (i) Average speed = 100/9.58 [1]
= 10.44 (10.4) [1] [2]

AVAILABLE MARKS

(ii) His speed changes during the race/he has accelerated [1]

(iii) Indicative content
Timer starts when car passes camera 1
Timer stops when car passes camera 2
Time interval calculated/known
Distance between cameras is known/measured
Average speed = distance/time interval

Response	Mark
Candidates describe in detail using good spelling, punctuation and grammar **all the main points** shown above. 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 of the 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 **one or two 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) Distance = area under graph **or** Dist = Ave speed × time [1]
= $\frac{1}{2}(8) \times 20$ = $\frac{20}{2} \times 8$ [1]
= 80 (m) [1] [3]

(ii) Acceleration = slope or gradient [1]

= $\frac{20}{8} = 2.5$ [1]

Unit mark m/s^2 [1] [3] 15

						AVAILABLE MARKS
2	**(a)**	Energy cannot be created or destroyed (Both needed)			[1]	
	(b)	**(i)** Chemical			[1]	
		(ii) 40 (kJ) (useful heat energy) 24 (kJ) (electrical) 40–16 give [1] Allow e.c.f. from first answer	[1] [2]		[3]	
		(iii) Efficiency = $\frac{\text{useful output energy}}{\text{total input energy}}$ Work or power can be used in place of energy Output/input score [0]			[1]	
		(iv) 24/40 Allow e.c.f. from **(b)(ii)**. = 0.6 **or** 60% 0.6% score [0] but gains the substitution marks	[2] [1]		[3]	
		(v) Water			[1]	10
3	**(a)**	**(i)** W = 55 × 10 or W = mg 550 (N)	[1] [1]		[2]	
		(ii) Weight is the force due to gravity Mass is the amount of matter **or** mass does not change **or** weight can change **or** weight has direction or is a vector mass is a scalar			[1]	
	(b)	**(i)** Left to right: solid liquid gas			[3]	
		(ii) A = melting B = evaporation/vaporisation			[2]	
		(iii) State 1 more dense Particles are closer	[1] [1]		[2]	
	(c)	**(i)** 1 cm^3 of aluminium has a mass of 2.7 g			[1]	
		(ii) Measurements	length breadth width mass	$[\frac{1}{2}]$ each, round down	[2]	
		Calculations	volume = l × b × d density = $\frac{\text{mass}}{\text{volume}}$	[1] [1]	[4]	15

						AVAILABLE MARKS
4	**(a)**	**(i)**	Centripetal		[1]	
		(ii)	Towards the centre (of the circle)/centre seeking Towards person = [0]		[1]	
		(iii)	Tension (in the cable)		[1]	
		(iv)	The **direction** is changing **or** velocity is a vector $v = \frac{dist}{t}$ = [0]		[1]	
		(v)	Increases Decreases No effect/same	[1] [1] [1]	[3]	
	(b)	**(i)**	Momentum **change** = Force × Time or Ft = m(v – u) or any correct rearrangement of **Not** F = ma		[1]	
		(ii)	Momentum = Mass × Velocity Award equation mark if no further work shown = 0.06 × 50 = 3 (kg m/s)	 [1] [1]	 [2]	10
5	**(a)**	**(i)**	Moment = Force × Distance from pivot Perpendicular distance stated	[1] [1]	 [2]	
		(ii)	N m **or** N cm **or** N mm		[1]	
	(b)	**(i)**	Clockwise		[1]	
		(ii)	Moment = 10 000 × 8 = 80 000 (ignore unit)		 [1]	
		(iii)	ACM = CM W × 5 = 80 000 **or** W = 80 000/5 W = 16 000 (N)	[1] [1] [1]	 [3]	
		(iv)	W moves LEFT or further away – wrong direction ⇒ [0] Creating a larger moment/turning effect **or** Compensates for increased moment/turning effect of heavier boat Any mention of clockwise moment ⇒ [0] Idea of increasing force ⇒ [0]		[1] [1]	10

						AVAILABLE MARKS
6	**(a)**	**(i)**	Electron		[1]	
		(ii)	The nucleus		[1]	
		(iii)	Same number of electrons as protons **or** equal numbers of positive and negative charges		[1]	
		(iv)	7		[1]	
		(v)	Number of neutrons plus protons **or** number of nucleons		[1]	
		(vi)	8 Allow e.c.f. from **(iv)**		[1]	
		(vii)	Neutron		[1]	
	(b)	**(i)**	Electromagnetic wave = gamma ray Helium nucleus = alpha particle High speed electron = beta particle	[1] [1] [1]	[3]	
		(ii)	Alpha		[1]	
		(iii)	Beta		[1]	
		(iv)	Gamma		[1]	
	(c)	**(i)**	2 (days)		[1]	
		(ii)	20 No e.c.f. from **(i)**		[1]	
	(d)	**(i)**	(Nuclear) **fission** Must be correct spelling		[1]	
		(ii)	Neutron		[1]	
		(iii)	The uranium nucleus (particle 2) or plutonium – must name nucleus breaks (into small) nuclei (particle 3)/fragments/splits/fissions	[1] [1]	[2]	
		(iv)	The neutrons released in the breakup cause other (uranium) nuclei to fission No e.c.f. from **(ii)**		[1]	20
					Total	**80**