



General Certificate of Secondary Education  
2015

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**GCSE Physics**

Unit 1

Foundation Tier

[GPH11]

FRIDAY 12 JUNE, AFTERNOON

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**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) Displacement is distance moved in a certain direction  
or Displacement is a vector, distance is not [1]
- (ii) Accelerating Constant speed Decelerating [3]
- (b) (i) The distance or gap between the balls is increasing [1]
- (ii) Ave speed = distance/time [1]  
= 1.2/0.5 no marks for use of "g" [1]  
= 2.4 (m/s) [1] [3]
- (iii) Final speed =  $2 \times 2.4 - 0$  [1] per sub [1] per side of equation [2]  
= 4.8 (m/s) [1] [3]  
Allow **ecf** for average speed
- (iv) Rate of change of speed = Change of speed/time [1]
- Accept  $a = \frac{v-u}{t}$  or  $\frac{u-v}{t}$   
only if progressed and ignore -ve  
Not  $a = \frac{v+u}{t}$
- Could use:  
 $v^2 = u^2 + 2as$  [1]  
 $a = \frac{4.8^2 - 0}{2 \times 1.2}$  [1]  
= 9.6 [1] m/s<sup>2</sup> [1]
- or**
- $s = \frac{1}{2}at^2$  [1]  
 $1.2 = \frac{1}{2} \times a \times (0.5)^2$  [1]  
 $a = 9.6$  [1] m/s<sup>2</sup> [1]
- (4.8 - 0)/0.5 [1]  
= 9.6 [1]  
m/s<sup>2</sup> [1] [4]
- Allow **ecf** for final speed
- 2 (a) (i) Kinetic [1]  
Sound [1]  
Electrical [1] [3]
- (ii) Efficiency = useful output energy/total input energy [1]  
= 300/1000 = 0.3 [1] [2]
- (b) (i) Cut-in marked and Cut-off marked [2]  
Must be identified on speed axis
- (ii) Maximum efficiency = 0.51 to 0.52 Accept 0.505 → 0.524 [1]  
Ratio = 0.3 [1] [2]

AVAILABLE  
MARKS

15

**(c) Indicative content**

1. Measure the weight (do not accept force) lifted or mention of a known weight
2. Measure the (vertical) height it is raised or distance lifted etc.
3. Determine the time taken for one lift or the time to complete a number of lifts, if consistent with their calculation of power.
4. Calculate the work done = weight × distance  
or = weight × distance × (number of lifts)
5. Power = work done/time

Response	Mark
Candidates describe in detail using good spelling, punctuation and grammar <b>all 5 points</b> 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 <b>3 points</b> 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 <b>one or two of the main points</b> 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]

AVAILABLE  
MARKS

- 3 (a) (i) Density = mass/volume [1]
- $$D = \frac{M}{V} \text{ give [0], unless symbols explained.}$$
- (ii) Density = 30/60 [1]  
= 0.5 (g/cm<sup>3</sup>) [1] [2]
- (b) (i) Fill/pour water into cylinder [1] }  
Fill bottle [1] } use of sand gets [0]  
Read difference [1] } [3]  
Read volume of water/take reading
- (ii) Read volume of water in measuring cylinder (**required**) [1] } If cylinder  
Place bottle in cylinder [1] } filled only  
Note the difference in the levels [1] } 2nd mark  
available [3]
- (iii) Subtract the volume of inside from the volume of bottle [1]  
**or** Volume of bottle filled with sand – volume of sand  
Must be in correct order vol (ii) – vol (i) [1] [10]

			AVAILABLE MARKS		
4	(a)	(i) Prevents passenger being thrown forward against windscreen or similar response or increases (collision) time and decreases force/deceleration	[1]	15	
		(ii) Airbag or crumple zone or steel cage or ABS or stability control, or traction control	[1]		
		(iii) Momentum = mass $\times$ velocity or $p = mv$ [1] = $48 \times 15$ Numerical ans must [1] = 720 be consistent with unit [1] kg m/s or Ns [1]	[4]		
	(b)	(i) Friction [1] between tyres and track [1]	[2]		
		(ii) Towards centre of circle/track	[1]		
	(c)	(i) Increases [1] Decreases [1] Increases [1] Stays the same [1]	[4]		
		(ii) Tangent at bung carefully drawn to the right [1]	[2]		
	5	(a)	(i) P marked clearly on shoulder		[1]
(ii) The bucket			[1]		
(iii) ACM = CM [1] $200 \times 0.5 = 80 \times d$ [1] $d = 1.25 \text{ m}$ [1] Distance from <b>X</b> = 0.25 m [1]			[4]		
<b>or</b>					
ACM = CM $200 \times 0.5 = 80(1.5 - \mathbf{X})$ } [3] $\mathbf{X} = 0.25 \text{ m}$ [1]					
(b)		(i) G clearly marked in base or more towards base in lower half of vertical tube	[1]		
		(ii) Wide base or large base area [1] Heavy base [1] provides a low CoG Any 3 [1] C of G in centre	[3]		

			AVAILABLE MARKS	
6	(a) (i)	Proton, Neutron and Electron (3 × [1])	[3]	
	(ii)	${}^3_2\text{He}$ both figures required and in the correct position	[1]	
	(b) (i)	Fission – correct spelling essential	[1]	
	(ii)	<p><b>Reasons must be consistent with their choice</b>            e.g. <b>Yes</b> – is a long term energy supply, would provide long term employment, employment of technical skilled persons, employment during the construction process, reduces the demand for fossil fuels/conserves fossil fuel stocks/lots of energy from little fuel/reliable cost arguments → [0], efficiency → [0], No CO<sub>2</sub> → [0]            But SO<sub>2</sub> → [1]</p> <p><b>No</b> – produces toxic waste, terrorist attack, could increase radiation in the area, possibility of leakage/high decommissioning cost/radioactive waste causes cancer or <b>just</b> radioactive waste explosion [0] <b>Detail</b> required potential for disaster (2 × 1)</p>	[2]	
	(c)	It will <b>strip/remove</b> electrons off atoms only remove or add electrons → [0]	[1]	
	(d) (i)	Gamma – must be stated to get 2nd mark (Only) gamma will pass through the steel/alpha and beta will not pass through the steel Accept source Most penetrating – [0]	[1] [1]	[2]
	(ii)	<p>If the steel is too thick the detector registers a reduction/if the steel is too thin the detector registers an increase – this point required</p> <p>The control unit increases the pressure or force on the rollers/the control unit decreases the pressure or force on the rollers</p> <p>Constant reading means constant thickness } give [1] so constant pressure</p>	[1] [1]	[2]
	(e)	1 day = 24 hr = 2 half-lives 200 → 100 → 50 If evidence of halving give [1] if answer not present	[1] [2]	[3]
<b>Total</b>				<b>15</b>
<b>Total</b>				<b>80</b>