



*Rewarding Learning*

**General Certificate of Secondary Education  
2017**

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**GCSE Physics**

Unit 1  
Foundation Tier

**[GPH11]**

**MONDAY 19 JUNE, MORNING**

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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 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.

- 1 (a) (i) To the left of the starting post **or** moving left **or** reversing  
*different not acceptable* [1]
- (ii) 160 m [1]
- (iii) Average speed = distance/time [1]  
= 160/24 allow ecf for distance from (ii) [1]  
= 6.7 (m/s) [1] [3]
- (b) (i) Forward thrust **and** friction *both required* [1]  
Accept indication that forces balanced or in equilibrium
- (ii) They are equal **and** opposite *both required* [1]
- (iii)  $F = ma = 90 \times 0.2$  [1]  
= 18 (N) [1] [4]
- (c) Indicative content
1. Vary the mass of the trolley or adding 0.5kg masses accept weight
  2. Measure the distance (moved) – using the metre rule  
length of ramp
  3. Measure the time (to move this distance) – using the stopclock  
how long to move down ramp
  4. Repeat the **time** – ignore other quantities
  5. Calculate the **average** time
  6. Calculate (the average) speed
  7. (Graph of) mass (x-axis) and (average) speed (y-axis)  
axis not required

Response	Mark
Candidates describe in detail using good spelling, punctuation and grammar <b>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 or 4 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]

[6]

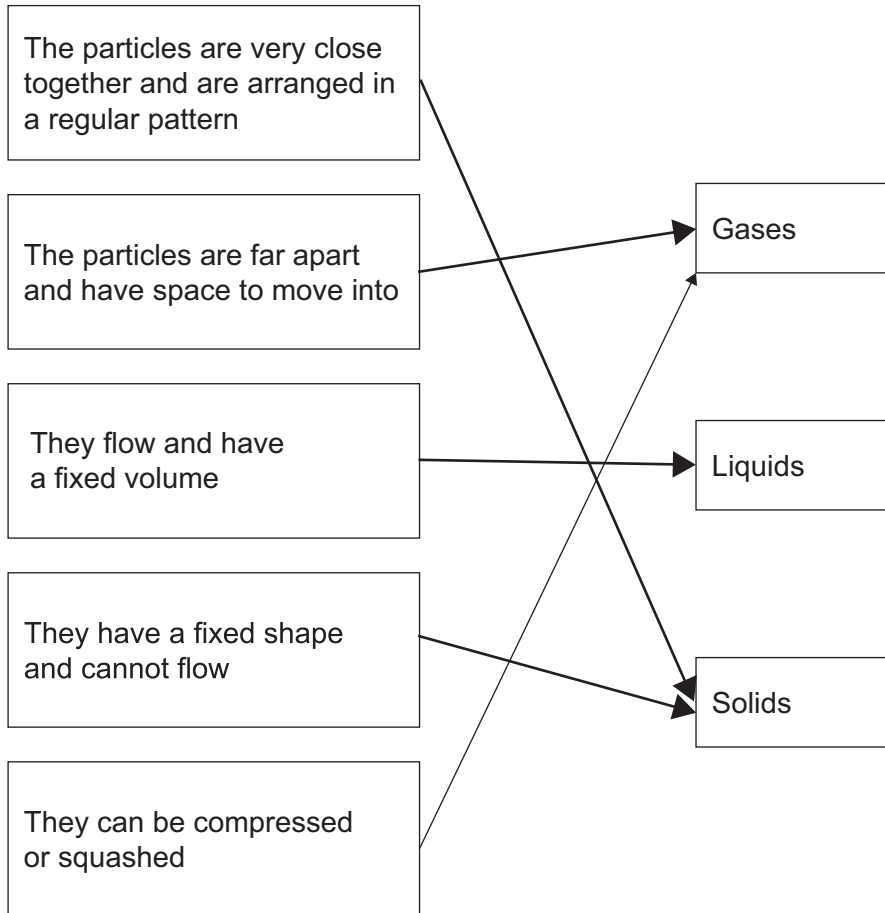
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AVAILABLE  
MARKS

			AVAILABLE MARKS		
2	(a)	Ticks at			
		Wind	[1]		
		Tidal	[1]		
		Wood	[1]	[3]	
	(b)	(i)	91 (J)		[1]
			(ii) Light 95 (J)	[1]	
			Heat 5 (J)	[1]	[2]
		(iii)	9J = 0.95 of input energy	[1]	
			Input energy = $9/0.95$	[1]	
			= 9.5 (J)	[1]	[3]
(c)	(i)	$E_p$ gained = $mgh$ or $E_p = F \times d$	[1]		
		= $0.5 \times 10 \times 0.75$	[1]		
		= 3.75 (J)	[1]	[3]	
	(ii)	Sight of average time = 3.8 [1]			
		Power = energy gain/time or equivalent	[1]		
		Take the average time (3.8) = $3.75/\text{average time}$	[1]		
		= 0.98 (1 W)	[1]	[3]	
		$\frac{3.75}{3.5} \frac{3.75}{4.1} \frac{3.75}{3.8}$ sight of any 2 = [2]			
		Allow average power method			
		Allow ecf for energy from (c)(i)			
3	(a)	(i)	Momentum = $mv$ or $p = mv$ or equivalent or $0.06 \times 4$	[1]	
			Momentum = $0.06 \times 4 = 0.24$	[1]	
			kg m/s	[1]	[3]
	(ii)	Change in momentum = $Ft$ or equivalent	[1]		
		Change in momentum = $0.6 \times 0.3$	[1]		
		= 0.18 (unit not required)	[1]	[3]	
	(b)	(i)	$E_k = \frac{1}{2}mv^2$	[1]	
			= $\frac{1}{2} \times 1800 \times 15^2$	[1]	
			= 202 500 (J)	[1]	[3]
	(c)	(i)	Work = force $\times$ distance	[1]	
= $5000 \times 40$			[1]		
= 200 000 (J)			[1]	[3]	
(ii)		Heat and Sound both required		[1]	
(d)	(i)	Gravitational $E_p = 75$ (J)	[1]		
		$E_k = 0$	[1]	[2]	
				15	
				15	

- 4 (a) (i) D [1]
- (ii) A, B and C all three required [1]
- (iii) Density = mass/volume or  $D = M/V$  [1]  
 $= 2/6$  [1]  
 $= 0.33$  [1]  
 $\text{g/cm}^3$  [1] [4]

(b)

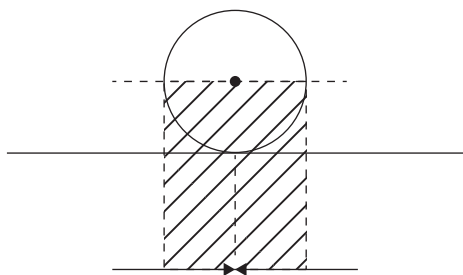


[4]

AVAILABLE MARKS

10

- 5 (a) (i)  $ACM = CM$  (required for second mark)  
when a lever is in equilibrium/balanced [1]  
[1] [2]
- (ii) **P** clearly labelled at the base of the front wheel [1]  
See below for acceptable position
- (iii)  $9000 \times 1 = \text{Load} \times 4.5$  [1] per side [2]  
Load = 2000 (N) [1] [3]
- (b) (i) Increase [1]
- (ii) No change [1]
- (iii) To the right or closer to the cab or [1]  
Inwards, towards digger, closer to pivot  
The moment is reduced or kept the same [1] [2]

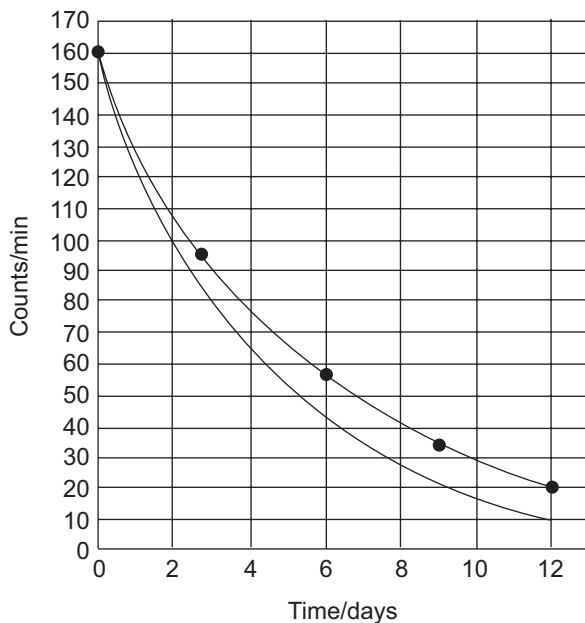


P anywhere in shaded region

AVAILABLE MARKS

10

- 6 (a) (i) neutron [1]  
 proton [1]  
 electron [1] [3]
- (ii) Equal numbers of protons and electrons [1]
- (b) (i) Radioactive materials in the surroundings/cosmic rays/radon gas radiation from sun or in the air **not** acceptable [1]
- (ii) (Unaffected by the aluminium) B [1]  
 (Completely absorbed by paper) C [1] [2]
- (iii) A = beta [1]  
 B = gamma [1]  
 C = alpha [1] [3]
- (c) (i) Points – 4 or 5 points give [2], 3 points give [1],  $\pm 1$  Div  $\uparrow$  or  $\leftrightarrow$  less than 3 points give [0] [2]  
 Smooth curve – generous but not point to point or straight line [1] [3]



- (ii) 4 days  $\pm 0.2$  days [1]
- (iii) Curve to the left and below first curve (see above) up to 6 days and starting at 0, 160 [1]  
 lines crossing (except at (0, 160)) award [0]

**Total**

15

**80**

AVAILABLE  
MARKS