Name of the Student:_____

Max. Marks : 23 Marks   **Time : 23 Minutes**

Mark Schemes

Q1.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO3** • graph starts at zero • graph increases to a maximum at 2 s • graph stays constant for 2.6 s • graph decreases to zero at 6 s • graph stays at zero after 6 s • graph decreases steeply until 5 s • graph decreases less steeply until 6 s • graph at zero between 6 and 7s **AO2** • velocity is zero at time zero • velocity increases/train accelerates until 2 s • velocity is constant for 2.6 s • velocity decreases/train decelerates until 6 s • deceleration changes at 5 s • acceleration is gradient of graph • velocity zero between 6 and 7 s	(6) AO2 AO3

Level	Mark	Descriptor
	0	• No awardable content
Level 1	1–2	• Interpretation and evaluation of the information attempted but will be limited with a focus on mainly just one variable. Demonstrates limited synthesis of understanding. (AO3) • The description attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. (AO2)
Level 2	3–4	• Interpretation and evaluation of the information on both variables, synthesising mostly relevant understanding. (AO3) • The description is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. (AO2)
Level 3	5–6	• Interpretation and evaluation of the information, demonstrating throughout the skills of synthesising relevant understanding. (AO3) • The description is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. (AO2)

Q2.

Question Number	Answer	Additional guidance	Mark
	a description to include 3 points from:		(3) AO 2 2
	• measure a distance (at the bottom) / use mark(er)s (certain distance apart) (1)	use a light gate (or equivalent sensors idea) not over whole slope for this mark point	
	• starting timer (at first mark(er)) (1)	use of video / (speed) camera /interrupts the light beam	
	• stopping timer (at 2nd mark(er)) OR measures a time (interval) (1)	accept any time measured for this mp including data logger OR timer / stopwatch	
	• (use speed) = distance/time (1)		

Q3.

Question number	Answer	Additional guidance	Mark
(i)	A plan including four of the following measurement of appropriate distance (1) measurement of appropriate time (1) use of speed = $\dfrac{distance}{Time}$ (1) detail (1) e.g. repeat and average, use ruler/stop clock, mark a line near the top and bottom of liquid		(4) AO3

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking **two** from: add more lines (at equal distances)(1) measure the time of fall for each distance (1) compare the times (1)	use longer test tube / use different heights of liquid / use different sections of the liquid e.g. {equal times =constant speed} / {shorter time = acceleration}	(2) AO3

Q4.

	Answer	Acceptable answers	Mark
	substitution into given equation (1) 1.3 x 300 000 evaluation (1)	Power of 10 error max 1 mark 3.9 × 10⁵ (km) 2 marks for correct	(2)

	390 000 (km)	numerical answer with no working shown Ignore any unit given by candidate.	

Q5.

Question number	Answer	Additional guidance	Mark
(i)	0.45 (s) (1)	Allow any value ≥ 0.4 and ≤ 0.5	**(1)**

Question number	Answer	Additional guidance	Mark
(ii)	An explanation that combines improvement of the experimental procedure (1 mark) and justification/reasoning which must be linked to the improvement (1 mark) • take pictures more frequently (1) • in order to determine exact time of the release. (1)	other responses may be acceptable	**(2)**

Question number	Answer	Additional guidance	Mark
(iii)	Substitution (1) F = 7.26 x 20.6 Evaluation (1) 150 (N)	Accept 149.6 (N) full marks will be awarded for correct numerical answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
(iv)	Rearrangement (1) v = a x t Substitution (1) v = 23 x 0.48 Evaluation (1) 11 (m/s)	Accept 11.04(m/s) full marks will be awarded for correct numerical answer without working	**(3)**