Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

Question number	Answer	Additional guidance	Mark
(a)	An answer that combines the following points of understanding to provide a logical description: • measurement of time between(or at) two positions using suitable timing equipment (1) • measurement of suitable distance along the runway with metre rule (1) • measurement of vertical height to starting position (1) • repeats AND averages AND use of a correct equation (1)	allow stopwatch, light gates minimum is 0.5 m metal tape measure average speed = distance/time OR average speed = (speed at A − speed at B)/2	(4)

Question number	Answer	Additional guidance	Mark
(b)(i)	Substitution of correct data from graph and mass conversion (1) $0.5 \times 0.65 \times (0.61)^2$ Answer (1) 0.12 (J)	maximum of 1 mark if mass in g used allow tolerance of ±0.2 for speed	(2)

Question number	Answer	Additional guidance	Mark
(b)(ii)	• Tangent to the graph at $h = 0.1$ (1) • Answer in the region 3.5 to 3.6	either seen on graph or suitable pairs of values of Δv and Δh	(2)

Question number	Answer	Mark
(b)(iii)	An answer that combines points of interpretation/evaluation to provide a logical description: • for each change in height, as the height increases the speed of the trolley increases • the greatest change in speed is between the change in height from 0.04 m to 0.9 m	(2)

Question number	Answer	Additional guidance	Mark
(c)	An answer that combines the following points to provide a logical description of the plan/method/experiment: • identifies control variables (1) • uses at least 3 different surfaces (1) • calculates average speed for each surface and repeats (1)	constant height, constant slope, constant starting points and same length of surface	(3)

Q2.

	Answer	Acceptable answers	Mark
(i)	horizontal arrow (judge by eye), pointing to the right **anywhere** on the diagram 		(1)
(ii)	substitution: (1) 130 000 × 75 evaluation: (1) 9 750 000 (kgm/s)	give full marks for correct answer, no working Ignore minus sign	(2)

	(Ns)	9.75×10^6 (kgm/s) (Ns)	
(iii)	9 750 000 kgm/s	same value as answer to (b)(ii) Ignore minus sign	**(1)**