

PH2HP

Question 1

question	answers	extra information	mark
1(a)	gravitational / gravity / weight	do not accept gravitational potential	1
1(b)	accelerating	accept speed / velocity increases	1
	the distance between the drops increases		1
	but the time between the drops is the same	accept the time between drops is (always) 5 seconds accept the drops fall at the same rate	1
1(c)(i)	any one from: <ul style="list-style-type: none"> • speed / velocity • (condition of) brakes / road surface / tyres • weather (conditions) 	accept specific examples, eg wet / icy roads accept mass / weight of car friction is insufficient reference to any factor affecting thinking distance negates this answer	1

Question 1 continues on the next page . . .

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Question 1 continued . . .

question	answers	extra information	mark
1(c)(ii)	75 000	allow 1 mark for correct substitution, ie 3000×25 provided no subsequent step shown or allow 1 mark for an answer 75 or allow 2 marks for 75 k(+ incorrect unit), eg 75 kN	2
	joules / J	do not accept j an answer 75 kJ gains 3 marks for full marks the unit and numerical answer must be consistent	1
Total			8

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Question 5

question	answers	extra information	mark
5(a)	more streamlined	accept decrease surface area	1
	air resistance is smaller (for same speed)	accept drag for air resistance friction is insufficient	1
	so reaches a higher speed (before resultant force is 0)	ignore reference to mass	1
5(b)(i)	1.7	allow 1 mark for correct method, ie $\frac{5}{3}$ or allow 1 mark for an answer with more than 2 sig figs that rounds to 1.7 or allow 1 mark for an answer of 17	2
5(b)(ii)	7.5	allow 1 mark for correct use of graph, eg $\frac{1}{2} \times 5 \times 3$	2
5(b)(iii)	air (resistance)	accept wind (resistance) drag is insufficient friction is insufficient	1
Total			8

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Question 1

question	answers	extra information	mark
1(a)	(produces) a force from water on the boat		1
	in the forward direction	accept in the opposite direction this must refer to the direction of the force not simply the boat moves forwards an answer produces an (equal and) opposite force gains 1 mark	1
1(b)(i)	1.5	allow 1 mark for correct substitution, ie $\frac{16-4}{8}$ or $\frac{12}{8}$ provided no subsequent step shown	2
	m/s ²	ignore sign	1
1(b)(ii)	102 or their (b)(i) × 68 correctly calculated	allow 1 mark for correct substitution, ie 1.5 × 68 or their (b)(i) × 68 provided no subsequent step shown	2
1(b)(iii)	greater than	reason only scores if greater than chosen	1
	need to overcome resistance forces	accept named resistance force accept resistance forces act (on the water skier) do not accept gravity	1
Total			9

Question number	Answer	Additional guidance	Mark
7(a)	<p>An answer that combines the following points of understanding to provide a logical description:</p> <ul style="list-style-type: none"> • 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) 	<p>allow</p> <p>stopwatch, light gates</p> <p>minimum is 0.5 m metal tape measure</p> <p>average speed = distance/time OR average speed = (speed at A – speed at B)/2</p>	(4)

Question number	Answer	Additional guidance	Mark
7(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
7(b)(ii)	<ul style="list-style-type: none"> 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
7(b)(iii)	An answer that combines points of interpretation/evaluation to provide a logical description: <ul style="list-style-type: none"> 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
7(c)	An answer that combines the following points to provide a logical description of the plan/method/experiment: <ul style="list-style-type: none"> 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)

J249/03

Mark Scheme

June 20XX

Question	Answer	Marks	AO element	Guidance
24 (a)	Tangent drawn to the line at 5 seconds (1) Correct values read-off from triangle created (1) Correct value of acceleration calculated 4.0 (m/s ²) (1)	3	2.2 2.2 2.1	ALLOW 3.6–4.5 m/s ²
(b)	Evidence of counting squares technique (1) Correct distance calculated 32 (m) (1)	2	2 x 1.2	ALLOW 30–35 m
(c)	Part X: <ul style="list-style-type: none"> Speed increases so drag increases (1) resultant force reduces so acceleration is reduced(1) Drag force approaches the weight until weight = drag and she moves at a terminal velocity (1) Part Y: <ul style="list-style-type: none"> Speed decreases as drag > weight (1) Larger resultant force gives a high deceleration to reach terminal velocity (1) At Y larger surface area (from the parachute) gives drag=weight at a lower speed than part X / ORA (1) 	6	6 x 2.1	Each set of 3 points must be in a logical order.