Q1. (2018)

a)

01.4	5.0 (s)	allow 5 (s)	1	AO2 6.5.4.1.5

b)

01.5	6.0 (m/s)	allow 6 (m/s)	1	AO2 6.5.4.1.5

c)

01.6		an answer of 1.2 scores **2** marks		AO2 6.5.4.1.5
	6.0 / 5.0	allow ecf from questions **01.4** and **01.5**	1	
	= 1.2 (m/s^2)		1	

Q2. (2018)

a)

07.2	any **one** from: • move the second light gate closer to the first • shorten the string length	allow use a taller table	1	AO3 6.5.4.2.2

b)

07.3		each mistake and its correction may be given in any order		AO3 6.5.4.2.2
	1.26667 (m/s^2) (is wrong)	allow (mean value calculated at) 0.20 (N)	1	
	give value to 2 significant figures	allow give value to 1 decimal place allow 1.3 (m/s^2)	1	
	6.7 (m/s^2) (is wrong)	allow (mean value calculated at) 0.98 (N) allow test 2 for 0.98 (N) or 7.2 is an anomaly	1	
	discard the anomalous result and recalculate the mean	allow repeat the anomalous test result and re-calculate the mean allow 6.4 (m/s^2)	1	

Q3. (2019)

a)

06.1		an answer of 7 (s) gains **2** marks		AO2 6.5.4.1.5	E
	(4 - 0) + (10 - 7) **or** 4 + 3 **or** 10 - 3		1		
	7 (s)		1		

b)

06.2		an answer of 0.2 (m/s^2) gains **2** marks		AO2 6.5.4.1.5	E
	gradient = $\frac{0-2}{24-14}$	allow readings from any two points correctly substituted	1		
	(-) 0.2 (m/s^2)	allow correct use of $a = \frac{\Delta v}{t}$	1		

Q4. (2020)

01.5	$a = \frac{12 - 0}{0.15}$ $a = 80\ (m/s^2)$		1 1	AO2 6.5.4.1.3

Q5. (2020)

04.1	gradient = $\frac{250 - 0}{50 - 0}$ speed = 5.0 m/s	allow any correct pair of values substituted allow 5 (m/) allow the use of s = v t	1 1	AO2 6.5.4.1.4

Q6. (2020)

a)

07.1	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO3
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	AO1
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	AO1
	No relevant content	0	6.5.4.2.2 RPA19
	Indicative content **<u>measurements</u>** • place one wooden block under the ramp • vary the height by placing a different number of wooden blocks • measure the height of the ramp using a metre rule • measure the distance travelled using a metre rule • measure time taken using light gates (and computer/datalogger) • measure time taken using a stopclock or ticker timer • release trolley from the same position each time • release the trolley without applying a force **<u>results</u>** • repeat at the same height and calculate a mean • repeat for different heights • calculate acceleration using a = (v-u)/t or a = $\frac{v^2 - u^2}{2s}$		

b)

07.2	all points plotted correctly	allow **1** mark for 3 points plotted correctly	2	AO2 6.5.4.2.2 RPA19
	height of ramp in metres on x-axis **and** acceleration in m/s^2 on y-axis)	both quantity and unit required for both axes	1	
	correct line of best fit		1	

Q7. (2021)

a)

07.3	gradient = $\frac{(4-0)}{(1.6-0)}$ acceleration = 2.5 m/s^2	 allow use of a = Δv / t	1 1	AO2 6.5.4.1.5

b)

07.4	constant deceleration	allow large deceleration allow decelerates to a stop	1	AO2 6.5.4.1.5

Q8. (2022)

03.5	$t = \frac{4.9}{9.8}$ t = 0.5 (s)	 allow 0.50 (s)	1 1	AO2 6.5.4.1.2

Q9. (2022)

05.6	$v^2 - 0^2 = 2 \times 5.0 \times 45$ $v^2 = 450$ **or** $v = \sqrt{450}$ v = 21.21320343 v = 21 (m/s)	 allow a correctly rounded value of v calculated using the correct equation	1 1 1 1	AO2 6.5.4.1.5

Q10. (2023)

02.1	the line is straight		1	AO2 6.5.4.1.4

Q11. (2023)

07.1	**Level 3:** The plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 6.5.4.2.2
	Level 2: The plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	
	Level 1: The plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content **method of varying force** • clamp a pulley onto the edge of the desk • attach a string to the trolley and place the string over the pulley • attach a mass holder to the string **or** • vary the height of the runway • use wooden blocks **measurements** • place a slotted mass on the mass holder • use $W = mg$ to calculate the force • mark the starting and finishing points of the trolley on the runway • measure the distance between the two marks with a metre rule • time how long it takes to travel between the two marks with a stopclock / timer • use $v = \frac{s}{t}$ and $a = \frac{\Delta v}{t}$ **or** • use light gate(s) to determine time and / or speed • computer calculates acceleration • repeat for different numbers of slotted masses allow a description of a method using a ticker timer		

Q12. (2024)

a)

01.6	20 (s)	allow an answer in the range 18 to 21 (s)	1	AO2 6.5.4.1.5

b)

01.7	46 (m/s)		1	AO2 6.5.4.1.5