2023 Sec 3 WA3 Revision Worksheet (Marking Scheme)

Qn.	Answer	Marks	Remarks
1b	m values recorded to 3 s.f., no unit. 	1	Allow one error in s.f. calculation error -1

u / cm	v / cm	m
20.0	68.9	3.45
22.5	49.8	2.21
25.0	40.8	1.63
27.5	35.5	1.29
30.0	32.1	1.07
32.5	29.6	0.911

Qn.	Answer	Marks	Remarks
1c	● **Scale**: chosen allows for graph to cover at least ½ graph paper horizontally and at least ½ graph paper vertically between first and last plotted point. No odd scales. Values on both axes must be indicated for bottom left corner (intersection). ○ m: 0.4, 0.5 (per 2 cm interval) ○ v: 5 or 10 (per 2 cm interval) Note: **not** recommended to start from odd numbers ● **Points**: at least 5 points correctly plotted ● **Line**: best-fit line drawn correctly ● **Axes**: m on vertical axes and v on horizontal axes, labelling at equal intervals on axes including intersection (units must be present for v) A pencil line must be drawn for both axes.	1 1 1 1	
1d	● **Coordinates**: of two points (chosen to work out gradient) **shown on graph**, must span at least 50% the length of the best-fit line drawn, shown with large **Triangle** (dashed line should be used to draw triangle) ● Correct substitution of coordinates to calculate the gradient value of $G = 0.0645$ (within 10%) ± 0.006 G: 0.058 to 0.071 (ECF if students plotted axes the wrong way around) (units ignored)	1 1	accept 2 or 3 s.f. for this answer
1e	● $f = 1/G = 1/0.0645 = 15.5$ cm Should be same sig.fig. as **1d** ● allow ECF f: 14.0 to 17.2 cm is acceptable range	1	with units

1f	• using graph, **show dashed line** at m = 3.00 to show v = 62.0 cm	1	with units
	• $u = v / m$ = 62.0 / 3.0 = 20.7 cm or 21 cm	1	

Qn.	Answer	Marks	Remarks
2a	Digital /electronic mass balance	1	
2b	• <u>Measure the tennis ball at different positions</u> across its diameter and <u>take an average</u>. (If just stated as take several reading and find an average then only give 1m)	1 1	
2d	• Calculate $e = \sqrt{\dfrac{h}{d}} = \sqrt{\dfrac{22.8}{40.0}} = 0.755$ $e = 0.755$	1	should follow least s.f. of h and d ie 3 s.f. (do not penalise for 2 s.f.)
2e	*Any two of these suggestions:* • Take several *d* values **and plot graph**/ compare *e* values • *Repeated reading of h from same d and find an average* • Use video and play back slowly /pause /frame by frame analysis • Use of position/ motion/ ultrasound sensor (with data logger) *"photogate, light sensor, digital sensor" without further elaboration on how it is used.* • Mechanical method of release/hold ball against stop • Use of set square to ensure that the metre rule is normal (perpendicular) to the table *Reject* • *'use a set square'* • *'use a computer to improve the experiment'* • *'increase d' (air resistance may be present)*	2	type of sensors should be stated