



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018**

Physics
Assessment Unit AS 3B
(Theory)
assessing

**Practical Techniques
and Data Analysis**

[SPH32]
THURSDAY 14 JUNE, MORNING

**MARK
SCHEME**

			AVAILABLE MARKS
1	Regular Y axis scale, $> \frac{1}{2}$	[1]	8
	Regular X axis scale, $> \frac{1}{2}$	[1]	
	Axes labelled with quantity	[1]	
	Axes units included with solidus and consistent with values	[1]	
	Plotting points	[3]	
	Trend line	[1]	
	Reverse axes –1	[8]	
2	(a) 6.6 cm	[1]	4
	(b) (i) extreme fit accurate	[1]	
	(ii) new intercept	[1]	
	difference to 1 d.p. (ecf intercept)	[1] [2]	
3	(a) (i) negative answer	[1]	14
	consistent value from their large triangle	[1]	
	magnitude 4.9–5.1	[1]	
	Unit $A V^{-1}$ or Ω^{-1}	[1] [4]	
	(ii) $Ir = E - V$	[1]	
	$y = mx + c$	[1]	
	$I = -(1/r)(V) + E/r$	[1] [3]	
	(iii) gradient = $(-1)/r$	[1]	
	$r = 0.2$	[1] [2]	
	ecf from (a)(i)		
	(iv) (1) when $I = 0$, $V/r = E/r$	[1]	
	So the x-axis intercept = E	[1] [2]	
	(2) $E = 1.80 V - 1.81 V$	[1]	
	(b) current low/less	[1]	
	high current would damage cell/component/drain the cell	[1] [2]	
4	(a) the device measures to cm or 0.01 m	[1]	10
	Even for values $> 1 m$, still quoting to 1 cm.	[1] [2]	
	(b) 3.30 s (3.25–3.34)	[1]	
	All to one hundredth of a second/0.01 s	[1] [2]	
	(c) speed = distance/time	[1]	
	$5.00/3.73 = 1.34$	[1]	
	To 3 sig figs	[1] [3]	
	(d) ms^{-1} and m	[1]	
	square v unit correctly m^2s^{-2}	[1]	
	ms^{-2}	[1] [3]	

			AVAILABLE MARKS
5	(a)	$s = ut + \frac{1}{2} at^2$ $u = 0$ or $s = \frac{1}{2} at^2$ $g = 2s/t^2$ or plot s against t^2 , gradient = $\frac{g}{2}$	[1] [1] [1] [3]
	(b) (i)	(0.01/1.95) 100 or $\frac{0.02}{1.95}$ Value 0.5 % 1%	[1] [1] [2]
	(ii)	$g = 2s/t^2$ $g = 8.953$ To 2 sig figs 9.0 $2 \times 8 = 16$ doubling $16 + 0.5 = 16.5\%$ adding 16.5% of 9.0 = 1.5 to 1 d.p., max. 2 s.f. Min/max method g value, max s, min t, subtract. [4] equivalent	[1] [1] [1] [1] [4]
	(c) (i)	0.86 ms ⁻² (Diff in their g value and 9.81) 8.7% ($\frac{\text{Diff}}{9.81} \times 100\%$)	[1] [1] [2]
	(ii)	<ul style="list-style-type: none"> use automated timing light gates, etc. repeat timings, evaluate average time at a distance graphical procedure from a range of distances, or calculate 'a' values from range of distances and average 	[1] [1] [1] [3]
	Total		14
			50