Assessment Schedule – 2005

Statistics & Modelling: Calculate confidence intervals for population parameters (90642)

Evidence Statement

	Achievement Criteria	Q	Evidence	Code	Judgement	Sufficiency
Achievement	Calculate confidence intervals for population parameters.	1	$z = 1.96$ 9.35 ± 0.20 or $9.15 < \mu < 9.55$	A	Accept any rounding more than 1 sig. fig. for all three intervals. Accept intervals written in equivalent forms.	**Achievement:** 2 × code A.
		2	$z = 1.645$ 3.72 ± 0.09 $3.63 < \mu < 3.81$	A		
		3(a)	$z = 1.96$ $p = 0.663$ leading to 0.663 ± 0.095 or $0.568 < \pi < 0.758$	A		
Achievement with Merit	Demonstrate an understanding of confidence intervals.	3(b)	Eg: There is a 95% probability that the interval contains the population proportion, that in the long term 95% of such intervals will contain the population proportion.	M	Or equivalent. Do not accept a statement that applies a probability to the population proportion (eg "There is a 95% probability that π lies in this interval").	**Achievement with Merit:** **EITHER** As for Achievement **plus** 2 × code M. **OR** 3 × code M.
		3(c)	$z = 1.96$ Using π as 0.663, $n = 344$ Using π as 0.5, $n = 385$	M A	Accept either approach. Must round up.	
		4(a)	$z = 2.575$ SE = 0.201 Interval is: 1.38 ± 0.52 or $0.86 < \mu_1 - \mu_2 < 1.90$	M A	Accept any rounding more than 1 sig. fig. for the interval. Accept intervals written in equivalent forms.	
		4(b)	Results suggest that there is a difference because the interval does not contain 0.	M A	Or equivalent. **Must** be consistent with (a).	
Achievement with Excellence	Analyse estimates of population parameters.	5	$z = 2.576$ n_p / n_s / SE / width 40 / 40 / 0.201 / 1.036 50 / 30 / 0.194 / 1.004 60 / 20 / 0.202 / 1.044 70 / 10 / 0.243 / 1.256 Min. width is given by sampling 50 'power' batteries and 30 'super' batteries.	E M A (if a CI found)	Must establish, with reasoning, that a 50/30 split gives a minimum interval width. Must have calculations for 50/30 and 60/20, as well as using the results of Q4. Accept any correct theoretical approach (eg use of calculus).	**Achievement with Excellence:** As for Merit **plus** code E.

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
Solve straightforward problems involving probability. 3 × A	Solve probability problems. **Achievement** *plus* 2 × M *or* 3 × M	Apply probability theory. **Merit** *plus* 1 × E