

Assessment Schedule – 2012**Mathematics and Statistics: Apply probability methods in solving problems (91267)****Evidence Statement**

Q	Expected Coverage			Achievement (u)	Merit (r)	Excellence (t)		
	Answers will vary depending on whether the candidate uses the tables or a graphing calculator.							
ONE (a)	0.43319			Probability found.				
(b)	10.56%			Percentage found.				
(c)	(40.33,41.67)			ONE end point.	BOTH end points given.			
(d)	Prob = 0.1056 1900 10.56% less than 40 g $0.1056 \times 18\,000 = 1900$			Percentage or equivalent found.	Expected number found.			
(e)(i)	The proportion weighing less than 40 g is 10.56%, which is considerably larger than the 4% claimed setting.			Comment appropriate.				
(ii)	For probability = 0.04 $Z = -1.75$ $1.75 = \frac{\mu - 40}{\sigma}$ Fix $\sigma = 0.8$ $1.75 \times 0.8 = \mu - 40$ $\mu = 41.401$ g Fix $\mu = 41$ $1.75\sigma = 41 - 40$ $\sigma = \frac{1}{1.75}$ Mean 41.401 g and SD = 0.571				Correct value found for Z.	Mean OR standard deviation found.		
(f)	The data is not bell shaped (not symmetrically distributed about a mean). It is bi-modal. Mean and median not the same. Most of the data is within 2 standard deviations. The mean is not 41.				Partial description given with TWO relevant comments.	Full description given.		
NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence	Attempt at one question	1 of u	2 of u	3 of u	2 of r	3 of r	1 of t	2 of t

Q	Expected Coverage	Achievement (u)	Merit (r)	Excellence (t)				
TWO (a)(i)	$0.95 \times 0.93 = 0.8835$	Correct solution.						
(ii)	$1 - 0.25 \times 0.05 = 0.9875$ OR $0.95 + 0.05 \times 0.75 = 0.9875$ May be found by adding up the 3 probabilities.	ONE probability correctly calculated.	Probability calculated.					
(iii)	$0.25 \times 0.6 = 0.15$			Correct probability.				
(b)(i)	0.084	Correct probability.						
(ii)	$0.12 \times 0.3 = 0.036$ $0.036 \times 250\ 000 = 9000$ customers	Probability calculated.	Expected number calculated.					
(iii)(A)	$0.084 + 0.88x = 0.1$ Probability (x) = 0.01818	Equation set up.	Probability calculated.					
(B)	Probability complained and left = $0.12 \times 0.7 = 0.084$ Probability a person left = 0.1 Probability that if they had left they had complained = $\frac{0.084}{0.1} = 0.84$		Minor error.	Correct solution.				
NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence	Attempt at one question	1 of u	2 of u	3 of u	2 of r	3 of r	1 of t	2 of t

Q	Expected Coverage	Achievement (u)	Merit (r)	Excellence (t)				
THREE (a)(i)	$\frac{572}{800} = 0.715$	Accept unsimplified answer.						
(ii)	$\frac{33}{228} = 0.1447$	Accept unsimplified answer.						
(iii)	$\frac{228}{800} \times 2000 = 570$		Correct solution.					
(iv)	Risk = $\frac{228}{800}$ = 0.285 2 in 7 is 0.2857 So risk is very close to 2 in 7.	Correct risk.	Valid comparison.					
(v)	Female risk = $\frac{195}{600} = 0.325$ Male risk = $\frac{33}{200} = 0.165$ Relative risk = 1.97 So newspaper report is wrong – risk is almost twice for female than male.	Correct risk for one gender.	Correct risks for both and insufficient conclusion.	Correct risks for both and sufficient conclusion.				
(b)(i)	$\frac{107}{501} = 0.214$	Correct risk.						
(ii)	Person under 40 risk = $\frac{107}{501} = 0.214$ Person over 40 risk = $\frac{121}{299} = 0.404$ Relative risk = 1.89 The risk is significantly higher for a person over 40 years old. About twice the risk. Claim is valid.	Risk for one age group calculated.	Correct risks for both and insufficient conclusion.	Correct risks for both and sufficient conclusion.				
NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence	Attempt at one question	1 of u	2 of u	3 of u	2 of r	3 of r	1 of t	2 of t

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 8	9 – 14	15 – 19	20 – 24