	_					<u>9709_w14_ms_71</u>		
	Page 4	Mark Scheme					Paper	
		Cambridge International A Level – Oc	tober/No	ven	1ber 2014	9709	71	
1		$N(-35, 60^{2} + 4 \times 28^{2}) = N(35, 60^{2} + 4 \times 28^{2})$ $\frac{0 - (-35)}{\sqrt{6736'}} (= 0.426) = \frac{0 - 35}{\sqrt{6736'}} (= -0.426)$ $\frac{1 - \Phi(``0.426")}{= 0.335 (3 \text{ sf})}$	B1 B1 M1 M1 A1	5	for $\pm(175 - 2 \times 105)$ or $\pm 35$ for $60^2 + 4 \times 28^2$ or $6736$ For standardising with their mean and variance. Allow without $$ For use of tables and finding area consistent with working			
			Total: 5					
2	(i)	(Bin) with $n > 50$ and mean (or $np$ ) < 5 Po(1.5) $1 - e^{-1.5}$ = 0.777 (3 sf)	B1 B1 M1 A1	4	Accept n 'lar Poisson with implied Poisson 1 – P allow 1 end e SR If zero sco 0.778 / 0.779	ge', p 'small correct mean P(X = 0); allo error ored use of H scores B1	, n stated or w incorrect $\lambda$ ; Bin leading to	
	(ii)	$3.5 \\ e^{-3.5} \left( \frac{3.5^4}{4!} + \frac{3.5^5}{5!} + \frac{3.5^6}{6!} \right) \\ = 0.398 (3 \text{ sf})$	B1 M1	3	Correct mean Poisson P(X = allow 1 end e	a stated or im = 4, 5, 6); all error	pplied ow incorrect $\lambda$ ;	
		- 0.398 (3 81)		5				
			Total: 7					
3	(a)	$\int_{0}^{0.5} (1.5t - 0.75t^{2}) dt  \text{o.e.}$ = $[0.75t^{2} - 0.25t^{3}]_{0}^{0.5}  \text{o.e.}$ = $\frac{5}{32} \text{ or } 0.156 \ (3 \text{ sf})$	M1 A1 A1	3	Attempt int for Correct integ	( <i>t</i> ) ration and lin	mits	
	(b) (i)	$\frac{1}{2}\pi a^2 = 1$ or $\pi a^2 = 2$ oe $a = \sqrt{\frac{2}{\pi}}$ or 0.798 (3 sf)	M1 A1	2	Attempt to fin	nd the area a	nd equate to 1	
	(ii)	0	B1	1				
	(iii)	Symmetry stated, seen or implied 0.8	M1 A1	2	Could be a di As final answ	agram ver		
			Total: 8					
4	(i)	$Var(P_s) = \frac{\frac{33}{150} \times \frac{150 - 33}{150}}{150}  (= 0.001144)$ $z = 2.576$ $\frac{33}{150} \pm z\sqrt[4]{0.001144'}$	M1 B1 M1		Seen. Accep Expression of	t 2.574 to 2.: f correct form	579 n. Any <i>z</i>	
		= 0.133 to 0.307 (3 sf)	A1	4	Must be an ir	nterval		

Page 5	Mark Scheme			Syllabus	Paper	
	Cambridge International A Level – O	ctober/Noven	nber 2014	9709	71	
(ii)	$\frac{19035}{150} (= 126.9 = 127(3 \text{ sf}))$ $\frac{150}{149} \left( \frac{4054716}{150} - \left( \frac{19035}{150} \right)^2 \right) \text{ o.e.}$ $= 11001.17 \text{ or } 11000(3 \text{ sf})$	B1 M1 A1 3	For use of a correct formula			
(iii)	4-digit nos. each digit 0-9 Ignore nos > 9526 Ignore repeats	B1 B1 B1 3	Some valid v random nos from valid m from valid m SR If zero sc method for d can score B1 NB Systemat scheme with generating a	Some valid way of generating 4 digit random nos from valid method from valid method SR If zero score, full explanation of method for drawing numbers out of a ha can score B1. NB Systematic sampling follows the scheme with first B1 for some way of generating a random starting point.		
		Total: 10				
5 (i)	$\frac{4.8}{\sqrt{40}}$	B1	or $\frac{4.8^2}{40}$ . According totals method	cept 4.8√40 c	or $4.8^2 \times 40$ for	
	$\frac{50.3 - 49.5}{\frac{4.8}{\sqrt{40}}} \qquad (= 1.054)$ $1 - \Phi(`1.054')$	M1 M1	For standardi ± Accept totals methods For use of tal consistent wi	ising with the method. No bles and find th their work	eir SD Accept mixed ing area ing	
	= 0.146 (3  sf)					
(ii) (a)	Looking for decrease	B1 1				
(b)	H <sub>0</sub> : Pop mean time spent (or $\mu$ ) = 49.5 H <sub>1</sub> : Pop mean time spent (or $\mu$ ) < 49.5 $\frac{1920}{40} - 49.5$ $\frac{4.8}{\sqrt{40}}$ (= -1.976) '1.976' > 1.555 (or '-1.976' < -1.555) There is evidence that mean time has decreased.	B1 M1 M1 A1 4	Not just "me For standardi Accept totals No mixed me For valid con 0.024 < 0.06 CWO. No co	an time spent ising. Allow method; CV ethods nparison (are ) ontradictions	$\frac{4.8}{40}$ f method. a comparison in conclusions	
(c)	Population normally distr so No	B1 1	Both needed			
		Total: 10				

9709\_w14\_ms\_71

					9709_w	14_ms_71		
Page 6	Mark Scheme Cambridge International A Level – October/November 2014				Syllabus	Paper		
					9709	$\Gamma$		
6 (i)	$\lambda = 4.65$	B1 M1		Poisson $P(X)$	$P(X=4)$ with any $\lambda$			
	$e^{-x} \frac{4!}{4!} = 0.186 (3 \text{ sf})$	A1	3	1 0100011 (21				
(ii)	$\lambda = 3.875$	B1		P(X=0, 1, 2)	)			
	$= e^{-3.875} \left( 1 + 3.875 + \frac{3.875}{2!} \right) = 0.257 (3 \text{ sf})$	M1 A1	3	Attempted, an As final answ	ny λ wer			
(iii)	$\lambda = 1.5$	B1						
	$1 - e^{-1.5} \left( 1 + 1.5 + \frac{1.5^2}{2!} \right)$	M1		1 - P(X = 0, 1) Attempted, at				
	= 0.191 (3  sf)	A1	3	As final answ	ver			
(iv)	He will reject H <sub>0</sub> .	B1	1					
		Total: 10						