Question Number	Scheme	Marks
1 (a)	[Mean =] 2.95	B1
	[Variance =] $\frac{2091}{180}-("2.95")^2$	M1
	= 2.914…. (s^2 =2.930…) awrt 2.91 (2.93)	A1
		(3)
(b)	The mean is close to the variance	B1
		(1)
(c)	W~ Po(3)	
(i)	$\left[\mathrm{P}(W \ldots 3)=\right]1-\mathrm{P}(W \,„\, 2)$ = 0.5768 awrt 0.577	M1 A1
(ii)	$\left[\mathrm{P}(4<W<8)=\right]\mathrm{P}(W \,„\, 7)-\mathrm{P}(W \,„\, 4)$ or $\mathrm{P}(W=5)+\mathrm{P}(W=6)+\mathrm{P}(W=7)$	M1
	= 0.1728… awrt 0.173	A1
		(4)
(d)	X~N(21,21)	B1
	$\left[\mathrm{P}(X<19)=\right]\mathrm{P}\left(Z \,„\, \frac{18.5-21}{\sqrt{21}}\right)[=-0.5455...]$ or $\left[\mathrm{P}(X>23)=\right]\mathrm{P}\left(Z \ldots \frac{23.5-21}{\sqrt{21}}\right)[=0.5455...]$	M1M1A1
	= 0.2912 (calc 0.29268…)*	A1*cso
		(5)
(e)	Y ~ B(13, "0.29")	M1
	$\left[\mathrm{P}(Y=5)=\right]\ {}^{13}C_5("0.29")^5(1-"0.29")^8$ = 0.170465 (calc 0.17317…) awrt 0.17	M1 A1
		(3)

	Notes	**Total 16**
(a)	**B1**	cao allow exact equivalents
	M1	Ft their mean. Using $\frac{\sum fx^2}{180}-(\text{their mean})^2$ or $\frac{180}{179}\left(\frac{\sum fx^2}{180}-(\text{their mean})^2\right)$ Allow with a square root – may be implied by awrt 1.71
	A1cso	awrt 2.91 (2.93)
(b)	**B1**	cao – Allow equivalent wording. Allow mean = variance. If no values/non compatible values calculated, then B0. Condone the use of 'closed' for 'close'
(c)(i)	**M1**	for $1-\mathrm{P}(W \,„\, 2)$ or 1 – 0.4232
	A1	awrt 0.577
(ii)	**M1**	for $\mathrm{P}(W \,„\, 7)-\mathrm{P}(W \,„\, 4)$ **or** $\mathrm{P}(W=5)+\mathrm{P}(W=6)+\mathrm{P}(W=7)$ **or** 0.9881 – 0.8153 **or** 0.1008 + 0.0504 + 0.0216
	A1	awrt 0.173
(d)	**B1**	for writing or using N(21,21). May be seen in a standardisation expression.
	M1	for standardisation (±) using their mean and sd. Allow 17.5, 18, 18.5, 19, 19.5, 22.5, 23, 23.5, 24, 24.5
	M1	for using 19 ± 0.5 or 23 ± 0.5
	A1	~~for~~ a fully correct standardisation expression Implied by awrt ±0.546
	A1*	awrt 0.291 or 0.293 from correct working seen
(e)	**M1**	for writing or using B(13, 0.29) ft their 0.29 (Must be 2 sf or better) or for $(p)^5(1-p)^8$ ft their 0.29 (Must be 2 sf or better) . Condone B(0.29, 13)
	M1	for ${}^{13}C_5(p)^5(1-p)^8$ oe with $0<p<1$ Allow 1287 for ${}^{13}C_5$
	A1	awrt 0.17 (0.17168 from using 0.2912)