Question Number	Scheme	Marks
1. (a)(i)	$X \sim B(50, 0.4)$ $P(X = 26) = 0.9686 - 0.9427$ or ${}^{50}C_{26}\,(0.4)^{26}(0.6)^{24}$ awrt **0.0259**	M1 A1 (2)
(ii)	$P(X \geqslant 26) = 1 - P(X \leqslant 25)$ $= 1 - 0.9427 =$ awrt **0.0573**	M1 A1 (2)
(iii)	(From tables) $k =$ **19**	B1 (1)
(b)(i)	$J \sim N(240, 144)$ $P(X \leqslant 222) \sim P(J < 222.5) = P\left(Z < \frac{222.5 - 240}{\sqrt{144}}\right)$ $P(Z < -1.46) = 1 - 0.9279 =$ awrt **0.0721 – 0.0724**	M1A1 M1M1 A1 (5)
(ii)	n is large (oe) and p is close to 0.5	B1 (1) **[11 marks]**

	Notes
(a)(i)	M1 Use of tables or ${}^{50}C_{26}(p)^{26}(1-p)^{24}$ with $0 < p < 1$ allow alternative notations for ${}^{50}C_{26}$
	A1 awrt 0.0259 (correct answer scores 2 out of 2)
(ii)	M1 writing or using $1 - P(X \leqslant 25)$
	A1 awrt 0.0573 (calc 0.0573437….) (correct answer scores 2 out of 2)
(iii)	B1 19 cao $k \leqslant 19$ or $k \geqslant 19$ is B0
(b)(i)	1st M1 For writing or using N(240,…) (May be seen in standardisation)
	1st A1 For writing or using N(240, 144) (May be seen in standardisation)
	2nd M1 use of continuity correction 222 ± 0.5
	3rd M1 $\pm\left(\frac{222 \text{ or } 222.5 \text{ or } 221.5 - \textit{their mean}}{\textit{their sd}}\right)$ if distribution not clearly stated, then the mean and sd must be correct in the standardisation to score this mark
	2nd A1 awrt 0.0721 through to awrt 0.0724 (calc 0.0723743…)
	Answer in the range implies all previous marks unless clearly comes from wrong method
	[NB: Use of binomial distribution gives 0.0719]
(ii)	B1 both conditions required
	for n is large allow in words e.g. 'sample is large'
	allow 0.4 in place of p
	condone '$n > 30$' (or any number > 30)
	Ignore comments about np