Question Number	Scheme	Marks
2 (a)	$\mathrm{B}\left(25, \frac{1}{5}\right)$	B1
		(1)
(b)(i)	$[M =]4X-(25-X)\quad[=5X-25]$	B1
(ii)	$\mathrm{E}(M)=\text{'5'}\mathrm{E}(X)-\text{'25'}$	M1
	$\mathrm{E}(X)=np=25\times\frac{1}{5}=5$	M1
	$\mathrm{E}(M)=5\times5-25=0$ *	A1*
		(4)
(c)	$M\ldots30\Rightarrow\text{'5'}X-\text{'25'}\ldots30[\Rightarrow X\ldots11]$	M1
	$[\mathrm{P}(X\ldots\text{'11'})=1-\mathrm{P}(X,,\ \text{'10'})]=1-\text{'0.9944'}$	M1
	$=0.0056$ awrt 0.0056	A1
		(3)
(d)	Y □ B(50, 0.5)	
	$\mathrm{P}(n<Y,,\ 30)=0.9328$	M1
	$\mathrm{P}(Y,,\ 30)-\mathrm{P}(Y,,\ n)=0.9328$	M1
	$\mathrm{P}(Y,,\ n)=0.0077$	M1
	$n=16$	A1
		(4)
	Notes	**Total 12**

(a)	**B1**	Correct distribution fully specified. Allow in words e.g. Binomial with n = 25 and p = 0.2 Must be seen in part (a)
Mark parts (b)(i) and (b)(ii) together		
(b)(i)	**B1**	For a correct expression for M Allow unsimplified
(ii)	**M1**	For either $\text{'5'}\mathrm{E}(X)-\text{'25'}$ or $\mathrm{E}(M)=5\times\left(25\times\frac{1}{5}\right)-25$ or $\text{'4'}\mathrm{E}(X)-1(\text{'25'}-\mathrm{E}(X))$ This must be an **expectation** statement with the expectation stated in symbol or in words. 5×5 – 25 = 0 or 4×5 – 1×20 = 0 on its own is M0
	M1	For sight of $25\times\frac{1}{5}$ or stating E(X) = 5
	A1*	Fully correct solution with $\mathrm{E}(M)=0$ stated. This may be stated in words. The answer is given so no incorrect working can be seen
SC		M1M1 [Expected number of marks (per question) =] $4\times\frac{1}{5}-1\times\frac{4}{5}$ A1 therefore E(M)=0
(c)	**M1**	For substitution of their M into a linear inequality in terms of X implied by $X\ldots11$
	M1	For use of correct probability statement from their '11'
	A1	awrt 0.0056 (calc 0.0055549…)
(d)	**M1**	For a correct probability equation (implied by 2nd M1)
	M1	For $\mathrm{P}(Y,,\ 30)-\mathrm{P}(Y,,\ n)=0.9328$ or $0.9405-\mathrm{P}(Y,,\ n)=0.9328$
	M1	For $\mathrm{P}(Y,,\ n)=0.0077$
	A1	Cao
SC		$\mathrm{P}(n<Y,,\ 30)=0.9328$ $\mathrm{P}(Y,,\ 30)-\mathrm{P}(Y,,\ n-1)=0.9328$ $\mathrm{P}(Y,,\ n-1)=0.0077$ scores M1M0M1A0