Question Number	Scheme	Marks
4(a)	3, 6, 9, 12	B1
	[P(black)=] $\frac{2}{7}$ and [P(white)=] $\frac{5}{7}$	B1
	$\left[\mathrm{P}(X=3)=\right]\left(\frac{5}{7}\right)^3$ or $\left[\mathrm{P}(X=12)=\right]\left(\frac{2}{7}\right)^3$	M1
	$\left[\mathrm{P}(X=6)=\right]3\times\left(\frac{5}{7}\right)^2\times\frac{2}{7}$	M1
	$\left[\mathrm{P}(X=9)=\right]3\times\frac{5}{7}\times\left(\frac{2}{7}\right)^2$	M1
	X : 3, 6, 9, 12 **P(*X* = *x*)** : $\frac{125}{343}$ (0.3644…), $\frac{150}{343}$ (0.4373…), $\frac{60}{343}$ (0.1749…), $\frac{8}{343}$ (0.0233…)	A1
		(6)
(b)	$\left("\frac{283}{343}"\right)^n < 0.05$ oe	M1
	$n > 15.57\ldots$ or $n > \frac{\log(0.05)}{\log\left("\frac{283}{343}"\right)}$ or $n > \log_{\left("\frac{283}{343}"\right)}(0.05)$	dM1
	$n = 16$	A1
		(3)

	Notes	**Total 9**
(a)	**B1**	for all 4 possible outcomes and no extras
	B1	for writing or using $\frac{5}{7}$ and $\frac{2}{7}$. May be implied by a correct probability for P(X = 6) or P(X = 9) or P(X = 3) **and** P(X = 12) Allow awrt 0.714 and awrt 0.286
	M1	for p^3 where 0 < p < 1 May be implied by $\frac{125}{343}$ or awrt 0.364 or $\frac{8}{343}$ or awrt 0.023
	M1	for $3\times p^2\times(1-p)$ where 0 < p < 1 May be implied by $\frac{150}{343}$ or awrt 0.437 or $\frac{60}{343}$ or awrt 0.175
	M1	for $3\times p\times(1-p)^2$ where 0 < p < 1 May be implied by $\frac{150}{343}$ or awrt 0.437 **and** $\frac{60}{343}$ or awrt 0.175 or 4 probabilities that add to 1
	A1	for all 4 probabilities correct and associated with the correct values. Need not be in a table but probabilities must be attached to the correct total. If decimals are used then they must be awrt 0.364, awrt 0.437, awrt 0.175 and awrt 0.023
(b)	**M1**	for $\left(1-"\frac{60}{343}"\right)^n < 0.05$ oe Condone =/⩽ instead of <
	dM1	Dependent on the previous M mark for n > awrt 15.6 or $n > \frac{\log(0.05)}{\log\left("\frac{283}{343}"\right)}$ ft their $\frac{283}{343}$ or $n > \log_{\left("\frac{283}{343}"\right)}(0.05)$ ft their $\frac{283}{343}$ or for the two trials between n = 15 and 16 Allow = instead of >/⩾. Condone </⩽
	A1	cao (do not allow an inequality)