Question Number	Scheme	Marks
6(a)	$\left(2\times\frac{a}{a+7}\times\frac{1}{4}\times\frac{3}{4}\right)+\left(\frac{a}{a+7}\times\frac{1}{4}\times\frac{1}{4}\right)=\frac{63}{256}$ or $\frac{a}{a+7}\times\left(1-\left(\frac{3}{4}\right)^2\right)=\frac{63}{256}$ or $\frac{a}{a+7}\times\left[\left(\frac{1}{4}\right)^2+2\times\frac{1}{4}\times\frac{3}{4}\right]=\frac{63}{256}$	M1 M1
	$\frac{a}{7+a}=\frac{63}{256}\div\frac{7}{16}$ or $\frac{a}{7+a}=\frac{9}{16}$ $\quad\therefore a=9$ *	A1*
		(3)
(b)	Range (R) 0, 5, 10 (and 15)	B1
	Bag: $\mathrm{P}(20)=\frac{9}{16}$ and $\mathrm{P}(5)=\frac{5}{16}$ and $\mathrm{P}(10)=\frac{2}{16}$	B1
	$\left[\mathrm{P}(R=0)=\right]\frac{5}{16}\times\frac{1}{4}\times\frac{1}{4}+\frac{2}{16}\times\frac{3}{4}\times\frac{3}{4}$	M1
	$\left[\mathrm{P}(R=5)=\right]2\times\frac{5}{16}\times\frac{1}{4}\times\frac{3}{4}+\frac{5}{16}\times\frac{3}{4}\times\frac{3}{4}+2\times\frac{2}{16}\times\frac{1}{4}\times\frac{3}{4}+\frac{2}{16}\times\frac{1}{4}\times\frac{1}{4}$	M1
	$\left[\mathrm{P}(R=10)=\right]\frac{9}{16}\times\frac{3}{4}\times\frac{3}{4}$	M1
	R: 0, 5, 10, 15 r: $\frac{23}{256}$, $\frac{89}{256}$, $\frac{81}{256}$, $\frac{63}{256}$	A1cao
		(6)

	Notes		Total 9
(a)	**M1**	For use of $\frac{a}{a+7}$ in an equation	
	M1	Setting up a correct equation to find the value of a	
	A1*	$a=9$ with at least one further correct line of working	
(b)	**B1**	For the 3 ranges 0, 5 and 10 and no extra incorrect ones or all extras have probability of 0	
	B1	For the correct 3 probabilities written or used for the bag $\frac{2}{16}$ and/or $\frac{5}{16}$ may be implied by a correct answer for $\mathrm{P}(R=0)$ or $\mathrm{P}(R=5)$ and $\frac{9}{16}$ may be implied by a correct answer for $\mathrm{P}(R=10)$	
		NB p and q must be consistent for the next 3 method marks	
	M1	A correct method to find one probability for $\mathrm{P}(R=0)$ or $\mathrm{P}(R=5)$ or $\mathrm{P}(R=10)$ allow $p\times q\times q+r\times(1-q)\times(1-q)$ or $2\times p\times q\times(1-q)+p\times(1-q)\times(1-q)+2\times r\times q\times(1-q)+r\times q\times q$ or $m\times(1-p)\times(1-p)$ where m, p, q and r are probabilities. (May be implied by $\frac{23}{256}$ or $\frac{89}{256}$ or $\frac{81}{256}$)	
	M1	A correct method to find two probabilities from $\mathrm{P}(R=0)$ or $\mathrm{P}(R=5)$ or $\mathrm{P}(R=10)$ allow $p\times q\times q+r\times(1-q)\times(1-q)$ or $2\times p\times q\times(1-q)+p\times(1-q)\times(1-q)+2\times r\times q\times(1-q)+r\times q\times q$ or $m\times(1-p)\times(1-p)$ where m, p, q and r are probabilities. (May be implied by 2 from $\frac{23}{256}$ or $\frac{89}{256}$ or $\frac{81}{256}$)	
	M1	A correct method to find all 3 probability for $\mathrm{P}(R=0)$ and $\mathrm{P}(R=5)$ and $\mathrm{P}(R=10)$ allow $p\times q\times q+r\times(1-q)\times(1-q)$ or $2\times p\times q\times(1-q)+p\times(1-q)\times(1-q)+2\times r\times q\times(1-q)+r\times q\times q$ or $m\times(1-p)\times(1-p)$ where m, p, q and r are probabilities. (May be implied by $\frac{23}{256}$ and $\frac{89}{256}$ and $\frac{81}{256}$) or these 3 probabilities that sum to $\frac{193}{256}$	

	A1	Correct ranges with correct associated probabilities attached. All extras must have an associated probability of 0 (Does not have to be seen in a table) **NB Allow decimal answers correct to 3 decimal places** $\frac{23}{256} = 0.090$ $\frac{89}{256} = 0.348$ $\frac{81}{256} = 0.316$ $\left[\frac{63}{256} = 0.246\right]$