Question Number	Scheme	Marks
7. (a)	$P(X=3) = F(3) - F(2) = \frac{1}{38}$	M1
	$P(X=3) = \frac{7}{n} \times \frac{6}{n-1} \times \frac{5}{n-2}$	M1
	$\frac{7}{n} \times \frac{6}{n-1} \times \frac{5}{n-2} = \frac{1}{38} \rightarrow n(n-1)(n-2) = 7980$ (*)	M1 A1cso
		(4)
(b)	$21 \times 20 \times 19 = 7980$	B1cso
		(1)
(c)	$a = F(0) = P(X=0) = \frac{14}{21} \times \frac{13}{20} \times \frac{12}{19}$	M1
	$a = \frac{26}{95}$	A1
	$P(X=1)\ \ 3 \times \frac{14}{21} \times \frac{13}{20} \times \frac{7}{19} \left[= \frac{91}{190} \right]$ **or** $P(X=2)\ \ 3 \times \frac{7}{21} \times \frac{6}{20} \times \frac{14}{19} \left[= \frac{21}{95} \right]$	M1 M1
	$b = F(1) = P(X=0) + P(X=1) = "\frac{26}{95}" + "\frac{91}{190}"$ or $b = \frac{37}{38} - "\frac{21}{95}"$	dM1
	$b = \frac{143}{190}$	A1
		(6)
		[11]

	Notes
(a)	1st M1 for use of F(3) – F(2) Accept $\frac{1}{38}$
	2nd M1 product of 3 probabilities where the denominators are n, $(n-1)$ and $(n-2)$ and the numerators are decreasing k, $(k-1)$ and $(k-2)$ This may be seen as a single term in a longer expression.
	3rd M1 setting up equation for $P(X=3)$ = product of correct 3 probabilities without replacement
	A1cso fully correct solution with no errors seen
(b)	B1cso correctly evaluated product. Allow $21(21-1)(21-2) = 7980$
(c)	1st M1 product of 3 probabilities for $P(X=0)$ The three probabilities can be in any arrangement May be implied by $\frac{26}{95}$
	1st A1 $a = \frac{26}{95}$ oe must be clear this is the value for a
	2nd M1 product of 3 probabilities for $P(X=1)$ or $P(X=2)$ or $\frac{91}{190}$ or $\frac{91}{570}$ or $\frac{21}{95}$ or $\frac{7}{95}$ oe seen. Condone incorrect labelling. The three probabilities can be in any arrangement
	3rd M1 × 3 or adding the 3 sets of the 3 fractions or $\frac{91}{190}$ or $\frac{21}{95}$ Condone incorrect labelling
	4th dM1 their $P(X=0)$ + their $P(X=1)$ or $F(2) - P(X=2)$ (dep on 2nd M1 being scored)
	2nd A1 $b = \frac{143}{190}$ oe must be clear this is the value for b
	NB if $a = 0.273\ldots$ and $b = 0.7526$ implies the method marks.

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