Question Number	Scheme	Marks
4 (a)	$\mathrm{E}\left(\frac{1}{X}\right)=1\times\frac{1}{10}+\frac{1}{2}\times\frac{1}{5}+\frac{1}{3}\times\frac{3}{10}+\frac{1}{4}\times\frac{2}{5}=\frac{2}{5}$*	B1*
		(1)
(b)	$\mathrm{E}\left(\left(\frac{1}{X}\right)^2\right)=1^2\times\frac{1}{10}+\left(\frac{1}{2}\right)^2\times\frac{1}{5}+\left(\frac{1}{3}\right)^2\times\frac{3}{10}+\left(\frac{1}{4}\right)^2\times\frac{2}{5}\left[=\frac{5}{24}\right]$	M1
	$\mathrm{Var}\left(\frac{1}{X}\right)=\frac{5}{24}-\left(\frac{2}{5}\right)^2=\frac{29}{600}$	M1 A1
		(3)
(c) (i)	$\left[\mathrm{E}(Y)=\right]12$	B1
(ii)	$\left[\mathrm{Var}(Y)=\right]30^2\,'\mathrm{Var}\left(\frac{1}{X}\right)'=\frac{87}{2}$ or If y : 30 15 10 7.5 then $\left[\mathrm{Var}(Y)=\right]\frac{375}{2}-12^2=\frac{87}{2}$	M1 A1
		(3)
(d)	$\left[Y<20\Rightarrow\right]\frac{30}{X}<20\Rightarrow X>1.5$ or y : 30 15 10 7.5	M1
	$\mathrm{P}(Y<20)=\mathrm{P}(X>1.5)=\frac{9}{10}$	A1
	$\left[\mathrm{P}(X<3\mid Y<20)=\right]\frac{\mathrm{P}(X=2)}{\mathrm{P}(X>1.5)}=\frac{\frac{1}{5}}{'\left(\frac{9}{10}\right)'}=\frac{2}{9}$ or $\left[\mathrm{P}(X<3\mid Y<20)=\right]\frac{\mathrm{P}(Y=15)}{\mathrm{P}(Y<20)}=\frac{\frac{1}{5}}{'\left(\frac{9}{10}\right)'}=\frac{2}{9}$	dM1 A1 A1
		(5)
	Notes	**Total 12**

(a)	**B1***	Value given, so must see sight of a correct expression, with no incorrect working seen. (Allow equivalent expressions.)
(b)	**M1**	For attempt at an expression for $\mathrm{E}\left(\left(\frac{1}{X}\right)^2\right)$ with at least 3 correct terms (Allow equivalent expressions.) May be embedded in a correct expression for Var (X)
	M1	For a correct expression for $\mathrm{Var}\left(\frac{1}{X}\right)$ (Need not be simplified) ft a stated value of $\mathrm{E}\left(\left(\frac{1}{X}\right)^2\right)$
	A1	Cao Allow awrt 0.0483
(c) (i)	**B1**	For [E(Y)] = 12
(ii)	**M1**	For correct use of $30^2\,\mathrm{Var}\left(\frac{1}{X}\right)$ ft their $\mathrm{Var}\left(\frac{1}{X}\right)$ or $\frac{375}{2}-12^2$ (May be implied by $\frac{87}{2}$ oe)
	A1	For $\left[\mathrm{Var}(Y)=\right]\frac{87}{2}$ oe
(d)	**M1**	For a correct inequality for $Y<20$ or all 4 values of Y found (these may be seen in part (c))
	A1	For $\mathrm{P}(Y<20)=\frac{9}{10}$ (May be seen as the denominator (e.g 0.2 + 0.3 + 0.4 oe) in a ratio of probabilities and scores M1A1)
	dM1	Dependant on 1st M1 For $\frac{\mathrm{P}(X=2)}{\mathrm{P}(X>1.5)}$ or $\frac{\mathrm{P}(Y=15)}{\mathrm{P}(Y<20)}$ Allow $\frac{\mathrm{P}(1.5<X<3)}{\mathrm{P}(X>1.5)}$ or a correct ratio of probabilities ft $\mathrm{P}(Y<20)$
	A1	For a correct numerator
	A1	For $\frac{2}{9}$ oe (Allow a decimal answer that is 3sf or better e.g. 0.222)