Question Number	Scheme	Marks
6. (a)	[E(A) =] $1\times0.4 \quad + \quad 4\times0.2 \quad + \quad 5\times0.25 \quad + \quad 7\times0.15$ $= \underline{\mathbf{3.5}}$ **(*)**	M1 A1cso (2)
(b)	$\left[\mathrm{E}(A^2)=\right]1\times0.4 \quad + \quad 4^2\times0.2 \quad + \quad 5^2\times0.25 \quad + \quad 7^2\times0.15$ [= 17.2] Var(A) = E(A^2) – [E(A)]^2 = 17.2 – 3.5^2 $= \underline{\mathbf{4.95}}$	M1 M1 A1 (3)
(c)	(Discrete) uniform (distribution)	B1 (1)
(d)	By symmetry $k = 6$	B1 (1)
(e)	$\left[\text{Sam has } Z=\frac{3.5-4}{3}=-\frac{1}{6} \text{ and}\right]$ Tim needs $\frac{3.5-A}{4}<-\frac{1}{6}$ so $A > 4.166..$ So prob = 0.25 + 0.15 = **0.4**	M1 A1 (2)
(f)	Need largest possible $\mu = 7$ and smallest possible $\sigma = 1$ P($X > 3.5$) is then $\mathrm{P}\left(Z>\frac{3.5-7}{1}\right)$ = P($Z > -3.5$) = **0.9998** (tables) or 0.999767…(calc)	B1, B1 M1 A1 (4)
(g)	[Need $A = 7$ and $B = 1$ (or ft from (f)) so] P($A = 7$)×P($B = 1$) or "0.15"×0.25 = **0.0375**	M1 A1cso (2) **[15]**

	Notes
(a)	M1 for an attempt at E(A) – at least 3 correct products seen A1cso for 3.5 or exact equivalent with no incorrect working seen and M1 scored
(b)	1st M1 for an attempt at E(A^2) – at least 3 correct products 2nd M1 for use of E(A^2) – [E(A)]^2 ft their value for E(A^2)
ALT	**M2** for $(-2.5)^2\times0.4 + (0.5)^2\times0.2 + (1.5)^2\times0.25 + (3.5)^2\times0.15$ (at least 3 correct products) A1 for 4.95 or an exact equivalent e.g. $\frac{99}{20}$
(c)	B1 for uniform (continuous uniform is B0)
(d)	B1 for stating $k = 6$ with a suitable reason e.g. mention of symmetry or full calculation
(e)	M1 for a suitable calculation for A e.g. $\frac{3.5-A}{4}<-\frac{1}{6}$ or stating $A = 5$ or 7 or $A >$ awrt 4.2 (o.e.) A1 for 0.4 (must be based on some correct calculation seen)
(f)	1st B1 for $\mu = 7$ may be implied from a standardisation with 3.5 seen 2nd B1 for $\sigma = 1$ may be implied from a standardisation with 3.5 seen M1 for attempting correct probability i.e. P(Z … or X…) ft standardisation using 3.5, their $\mu \neq 4$ and their $\sigma \neq 3$ but their μ and σ must be "possible" values or P($Z > -3.5$) A1 for 0.9998 or better
(g)	M1 for "0.15"×0.25 ft their value of A from (f) A1cso for 0.0375 or exact equivalent e.g. $\frac{3}{80}$ (Must clearly come from $A = 7$ and $B = 1$ in (f))

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