Question Number	Scheme	Marks
7 (a)	$\mathrm{E}(X) = 4\times15 - 3\times10[=30]$	M1
	$\mathrm{Var}(X) = 4^2\times5^2 + 3^2\times4^2[=544]$	M1
	So $X \sim \mathrm{N}(30,\ 544)$	
	$\mathrm{P}(X<40) = \mathrm{P}\left(Z < \dfrac{40-'30'}{'\sqrt{544}'}\right)\left[= \mathrm{P}\left(Z<0.428...\right)\right]$	M1
	$= 0.6664$ (Calculator gives 0.6659…) awrt 0.666	A1
		(4)
(b)	$\mathrm{E}\left(A+B+D\right) = 15+10+3\times20 = [85]$	M1
	$\mathrm{Var}(A+B+D) = 5^2+4^2+3\times\sigma^2 = [41+3\sigma^2]$	M1
	So $A+B+D \sim \mathrm{N}(85,\ 41+3\sigma^2)$	
	$\mathrm{P}\left(A+B+D<76\right) = \mathrm{P}\left(Z < \dfrac{76-85}{\sqrt{41+3\sigma^2}}\right) = 0.242$	
	So $\dfrac{-9}{\sqrt{41+3\sigma^2}} = -0.7$ or $\dfrac{9}{\sqrt{41+3\sigma^2}} = 0.7$ (Calculator gives –0.69988…)	M1 A1
	$3\sigma^2 = \left(\dfrac{-9}{-0.7}\right)^2 - 41$	dM1
	$\sigma = 6.437...$ awrt 6.44	A1
		(6)

	Notes	**Total 10**
(a)	**M1**	For a correct method to find $\mathrm{E}(X)$. May be implied by a correct standardisation expression.
	M1	For a correct method to find $\mathrm{Var}(X)$ Allow $\sqrt{544}$ oe or 23.3^2 or better. May be implied by a correct standardisation expression.
	M1	For standardising $(\pm)$ using their mean and their variance
	A1	awrt 0.666
(b)	**M1**	For a correct method to find $\mathrm{E}(A+B+D)$
	M1	For a correct method to find $\mathrm{Var}(A+B+D)$
	M1	For standardising $(\pm)$ using their mean and their standard deviation which is in terms of σ^2 and setting equal to –0.7 or better. Allow +0.7
	A1	For the correct equation
	dM1	Dependent on the previous M mark. For squaring and rearranging leading to an equation in σ^2
	A1	awrt 6.44 (Do not award if previous A mark was not awarded)

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