Question Number	Scheme	Marks
7(a)	$\mathrm{E}(D) = x + 2$	M1
	$\mathrm{Var}(D) = \dfrac{\left((x+5)-(x-1)\right)^2}{12} \left[= 3\right]$	M1
	$\overline{D} \sim N\left(x+2,\ \dfrac{3}{n}\right)$	A1
		(3)
(b)	$"x+2" = 22.101 + "2"\ (= 24.101)$ or $"x+2" = 24.6 \Rightarrow 24.6 - "2"\ (= 22.6)$	M1
	$24.6 - "2.5758"\sqrt{\dfrac{"3"}{n}} = "24.101"$ oe	B1M1 dM1
	$n = 80$	A1cao
		(5)
	Notes	Total 8
(a)	M1 E(D) correct	
	M1 Correct method to find Var(D) Must be subtracting the correct way round but condone missing brackets	
	A1 for a fully correct distribution. Either states $\mathrm{N}\left(x+2,\ \dfrac{3}{n}\right)$ or accept e.g. "normal" with mean = $x+2$ and variance = $\dfrac{3}{n}$ oe Must be seen in (a)	
(b)	M1 For a correct method to find d using x as 22.101 in their $"x+2"$ from (a) or a correct method to find x by rearranging their $"x+2"$ to $x = 24.6 - "2"$ Implied by 24.101 or 22.6 or ± 0.499 oe $x + 2 = 24.6$ on its own is M0	
	B1 for awrt ± 2.5758 may be implied by an unrounded value for n of awrt 79.94	
	M1 for $24.6 \pm z\sqrt{\dfrac{\sigma^2}{n}}$ or $"22.6" \pm z\sqrt{\dfrac{\sigma^2}{n}}$ where $2.55 < \lvert z \rvert < 2.6$ (ft their mean and variance from (a) or may restart). May be part of an equation. **Their numerical variance does not have to be substituted in for this mark.** This mark can still be scored if it is equated inconsistently to 22.101 eg $24.6 - z\sqrt{\dfrac{\sigma^2}{n}} = 22.101$ oe eg $z\sqrt{\dfrac{\sigma^2}{n}} = 2.499$ or $\sqrt{\dfrac{\sigma^2}{n}} = \dfrac{4165}{4293}\ (= 0.970...)$	
	dM1 dep on both the previous M marks awarded. For setting up a valid equation (allow 22.101 instead of "24.101" provided it is correctly paired with "22.6"). **Their numerical variance must be substituted in for this mark.** $24.6 - "2.5758"\sqrt{\dfrac{"3"}{n}} = "24.101"$ or $"22.6" - "2.5758"\sqrt{\dfrac{"3"}{n}} = 22.101$ oe eg $"-2.5758" = \dfrac{"24.101" - 24.6}{\sqrt{\dfrac{"3"}{n}}}$ or $"2.5758"\sqrt{\dfrac{"3"}{n}} = "0.499"$	
	A1 cao dependent on seeing a correct equation but allow use of $z = 2.576$ so M1B0M1dM1A1 is possible. Note awrt 79.94 seen can imply B1	

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom