| Question Number | Scheme | | Marks |
|---|---|---|---|
| 7 (a) | $P(L \geqslant 4.5) \Rightarrow P(A \geqslant 20.25)$ | | |
| | $P(A \geqslant 20.25) = (30 - 20.25) \times \frac{1}{20}$ | | M1 |
| | $= 0.4875$ | | A1 |
| | | | (2) |
| (b) | $\text{Var}(L) = E(L^2) - E(L)^2$ | | |
| | $[E(L^2) = E(A)] = 20$ | | B1 |
| | | $g(L) = \begin{cases} \frac{L}{10} & \sqrt{10} \leqslant L \leqslant \sqrt{30} \\ 0 & \text{otherwise} \end{cases}$ | |
| | $E(L) = E(\sqrt{A}) = \frac{1}{20}\int_{10}^{30} \sqrt{a}\ \mathrm{d}A$ | $E(L) = \frac{1}{10}\int_{\sqrt{10}}^{\sqrt{30}} L^2\ \mathrm{d}L$ | M1 |
| | $= \frac{1}{20}\left[\frac{2}{3}a^{\frac{3}{2}}\right]_{10}^{30}$ | $\frac{1}{10}\left[\frac{l^3}{3}\right]_{\sqrt{10}}^{\sqrt{30}}$ | A1 |
| | $= 4.4231\ldots$ | | A1 |
| | $\text{Var}(L) = \text{"20"} - (\text{"4.4231..."})^2$ | | M1 |
| | $= 0.4358\ldots$ | awrt 0.436 | A1 |
| | | | (6) |

| | **Notes** | | **Total 8** |
|---|---|---|---|
| 7 (a) | **M1** | $(30 - 20.25) \times \frac{1}{20}$ | |
| | **A1** | cao (Allow 0.488 or $\frac{39}{80}$) | |
| (b) | **B1** | For 20 | |
| | **M1** | Attempt to integrate $\frac{1}{20}\int_{10}^{30} \sqrt{a}\ \mathrm{d}A$ or $\frac{1}{10}\int_{\sqrt{10}}^{\sqrt{30}} L^2\ \mathrm{d}L$ Ignore limits and accept any letter | |
| | **A1** | Fully correct integration. Accept any letter. Must have limits | |
| | **A1** | 4.42 or better | |
| | **M1** | Use of $\text{Var}(L) = E(L^2) - E(L)^2$ ft their $E(L^2)$ and $E(L)$ provided Var $(L) > 0$ | |
| | **A1** | awrt 0.436 | |

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