| Question | Scheme | Marks | AOs |
|---|---|---|---|
| **7 (a)** | $x^n \to x^{n+1}$ | M1 | 1.1b |
| | $\int \left(\frac{5}{2\sqrt{x}}+3\right)\mathrm{d}x = 5\sqrt{x}+3x$ | A1 | 1.1b |
| | $\left[5\sqrt{x}+3x\right]_1^k = 4 \Rightarrow 5\sqrt{k}+3k-8=4$ | dM1 | 1.1b |
| | $3k+5\sqrt{k}-12=0$ * | A1* | 2.1 |
| | | **(4)** | |
| **(b)** | $3k+5\sqrt{k}-12=0 \Rightarrow \left(3\sqrt{k}-4\right)\left(\sqrt{k}+3\right)=0$ | M1 | 3.1a |
| | $\sqrt{k}=\frac{4}{3},(-3)$ | A1 | 1.1b |
| | $\sqrt{k}=... \Rightarrow k=...$ oe | dM1 | 1.1b |
| | $k=\frac{16}{9}$, ~~9~~ | A1 | 2.3 |
| | | **(4)** | |
| | | | **(8 marks)** |

**Notes**

(a)

**M1:** For $x^n \to x^{n+1}$ on correct indices. This can be implied by the sight of either $x^{\frac{1}{2}}$ or $x$

**A1:** $5\sqrt{x}+3x$ or $5x^{\frac{1}{2}}+3x$ but may be unsimplified. Also allow with + *c* and condone any spurious notation.

**dM1:** Uses both limits, subtracts, and sets equal to 4. They cannot proceed to the given answer without a line of working showing this.

**A1*:** Fully correct proof with no errors (bracketing or otherwise) leading to given answer.

(b)

**M1:** For a correct method of solving. This could be as the scheme, treating as a quadratic in $\sqrt{k}$ and using allowable method to solve including factorisation, formula etc.

Allow values for $\sqrt{k}$ to be just written down, e.g. allow $\sqrt{k}=\pm\frac{4}{3},(\pm 3)$

Alternatively score for rearranging to $5\sqrt{k}=12-3k$ and then squaring to get $...k=(12-3k)^2$

**A1:** $\sqrt{k}=\frac{4}{3},(-3)$

Or in the alt method it is for reaching a correct 3TQ equation $9k^2-97k+144=0$

**dM1:** For solving to find at least one value for *k*. It is dependent upon the first M mark.
In the main method it is scored for squaring their value(s) of $\sqrt{k}$
In the alternative scored for solving their 3TQ by an appropriate method

**A1:** Full and rigorous method leading to $k=\frac{16}{9}$ only. The 9 must be rejected.