

11

$$\text{Let } u = 1 + \sqrt{x}$$

$$\Rightarrow dx = 2(u-1)du \text{ or } dx = \frac{du}{\frac{1}{2}x^{-\frac{1}{2}}} \text{ oe or } 2\sqrt{x}du$$

$$\int \frac{x}{1+\sqrt{x}} dx = \int \frac{2(u-1)^3}{u} du \text{ oe}$$

$$\int \frac{2(u^3 - 3u^2 + 3u - 1)}{u} du$$

$$\int 2\left(u^2 - 3u + 3 - \frac{1}{u}\right) du$$

$$\frac{2u^3}{3} - 3u^2 + 6u - 2\ln|u| + c$$

$$\frac{2(1+\sqrt{x})^3}{3} - 3(1+\sqrt{x})^2 + 6(1+\sqrt{x}) - 2\ln|1+\sqrt{x}| + c$$

oe

M1

1.1

A1

1.1

In terms of u

M1

1.1

For expanding cubic (allow one error)

M1

3.1a

Dividing by u

M1

1.1

3 of *their* terms correctly integrated to inc $\ln u$.

Constant term may be missing at this stage

A1

2.5

Correct answer in terms of x with constant term

Condone omission of modulus (since $1 + \sqrt{x}$, and hence u , must be positive)

[6]