14. (a) Use the substitution $u = 3^x$ to show that

$$\int_0^2 \frac{3^x}{\left(1 + 3^x\right)^3} \, dx = k \int_p^q \frac{1}{\left(1 + u\right)^3} \, du$$

where k, p and q are constants to be found.

(3)

(b) Hence, using algebraic integration, find the exact value of

$$\int_0^2 \frac{3^{x+2}}{\left(1 + 3^x\right)^3} \, dx$$

(5)