4 Given that $\int_0^{2a+1} \frac{8}{4x+3}\,\mathrm{d}x = \ln 16$, find the exact value of the constant a. [5]

5 **(a)** In the expansion of $(1+kx)^{15}$, where k is a constant, the coefficient of x^3 is $-29\,120$. Find the value of k. [2]

(b) Find the term independent of y in the expansion of $\left(8y^2 - \frac{1}{2y}\right)^{12}$. [2]

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6 The polynomial p is such that $\mathrm{p}(x) = ax^3 + 11x^2 + bx + c$, where a, b and c are integers.
It is given that $\mathrm{p}'(0) = 12$.
It is also given that $x + 3$ is a factor of p.
When p is divided by $x - 1$ the remainder is 16.

Find the values of a, b and c. [6]

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