6 A curve with equation $y = \mathrm{f}(x)$ is such that $\dfrac{\mathrm{d}^2y}{\mathrm{d}x^2} = 6\mathrm{e}^{3x} + 4x$. The curve has a gradient of 5 at the point $\left(0, \dfrac{5}{3}\right)$. Find $\mathrm{f}(x)$. [7]

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7 The first three terms, in ascending powers of x, in the expansion of $(2+ax)^n$ can be written as $64+bx+cx^2$, where n, a, b and c are constants.

(a) Find the value of n. [1]

(b) Show that $5b^2 = 768c$. [4]

(c) Given that $b = 12$, find the exact value of a and of c. [2]