The polynomial $\mathrm{p}(x)$ is defined by

$$\mathrm{p}(x) = 4x^3 + 16x^2 + 9x - 15.$$

(a) Find the quotient when $\mathrm{p}(x)$ is divided by $(2x + 3)$, and show that the remainder is -6. [3]

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(b) Find $\displaystyle\int \frac{\mathrm{p}(x)}{2x + 3}\,\mathrm{d}x$. [2]

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(c) Factorise $p(x) + 6$ completely and hence solve the equation

$$p(\operatorname{cosec} 2\theta) + 6 = 0$$

for $0° < \theta < 135°$. [5]