The polynomial $p(x)$ is defined by

$$p(x) = 2x^3 + ax^2 - 3x - 4,$$

where a is a constant. It is given that $(x - 4)$ is a factor of $p(x)$.

(a) Find the value of a and hence factorise $p(x)$. [4]

(b) Show that the equation $p(e^{3y}) = 0$ has only one real root and find its exact value. [3]