**4** $f(x) = 2x^3 + px^2 + qx + 12 \quad p, q \in \mathbb{Z}$

Given that $(x + 3)$ is a factor of $f(x)$ and that when $f'(x)$ is divided by $(x + 3)$ the remainder is 37

(a) show that $p = 1$ and find the value of $q$

**(6)**

(b) hence factorise $f(x)$ completely

**(2)**

(c) show that the equation $f(x) = 0$ has only one real root.

**(2)**

**Question 4 continued**

**(Total for Question 4 is 10 marks)**