2 The cubic equation $x^3 + bx^2 + cx + d = 0$, where $d \neq 0$, has roots α, β, γ such that $\gamma = \frac{1}{\beta}$.

(a) Show that $\beta + \frac{1}{\beta} = d - b$. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) Show also that $\beta + \frac{1}{\beta} = \frac{1-c}{d}$. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) It is given that $b = 3$, $c = -3$ and $d > 0$.

(i) Find the value of d. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Find the value of $\alpha^2 + \beta^2 + \gamma^2$. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....