4C Roots of Quartics

Patterns spotted for polynomials in general:

	Quadratics	Cubics	Quartics
Sum of 'singles'			
Sum of 'doubles'			
Sum of 'triples'			
Sum of 'quadruples'			

1. The equation $x^4 + 2x^3 + px^2 + qx - 60 = 0$, $x \in \mathbb{C}$, $p, q \in \mathbb{R}$, has roots α, β, γ and δ. Given that $\gamma = -2 + 4i$ and $\delta = \gamma^*$:

a) Show that $\alpha + \beta - 2 = 0$ and that $\alpha\beta + 3 = 0$

b) Hence, find all the roots of the equation and the values of p and q.