The parabola $y = -x^2 + 4$ has vertex labelled $P$ and intersects the $x$-axis at the points labelled $A$ and $B$. The parabola is translated from its original position so that its vertex moves along the line $y = x + 4$ to the point $Q$. In this new position, the parabola intersects the $x$-axis at the points labelled $B$ and $C$. Determine the coordinates of $C$. 