5 $\mathrm{p}(x) = 6x^3 + ax^2 + 12x + b$, where a and b are integers.

$\mathrm{p}(x)$ has a remainder of 11 when divided by $x-3$ and a remainder of -21 when divided by $x+1$.

(a) Given that $\mathrm{p}(x) = (x-2)Q(x)$, find $Q(x)$, a quadratic factor with numerical coefficients. [6]

(b) Hence solve $\mathrm{p}(x) = 0$. [2]

6 **(a)** Find the unit vector in the direction of $\begin{pmatrix} 5 \\ -12 \end{pmatrix}$. [1]

(b) Given that $\begin{pmatrix} 4 \\ 1 \end{pmatrix} + k\begin{pmatrix} -2 \\ 3 \end{pmatrix} = r\begin{pmatrix} -10 \\ 5 \end{pmatrix}$, find the value of each of the constants k and r. [3]

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