6-8

$$
\begin{aligned}
G_t - Q(S_t, A_t) &= R_{t+1} + \gamma G_{t+1} - Q(S_t, A_t) + \gamma Q(S_{t+1}, A_{t+1}) - \gamma Q(S_{t+1}, A_{t+1}) \\
&= \delta_t + \gamma \left[G(S_{t+1}, A_{t+1}) - Q(S_{t+1}, A_{t+1}) \right] \\
&= \delta_t + \gamma \delta_{t+1} + \gamma^2 [G(S_{t+2}, A_{t+2}) - Q(S_{t+2}, A_{t+2})] \\
&= \dots \\
&= \sum_{k=t}^{T-1} \gamma^{k-t} \delta_k
\end{aligned}
$$