$\mathbf{a}(t) = 2\,\mathbf{i} + 6t\,\mathbf{j} + 12t^2\,\mathbf{k} \quad\Rightarrow\quad \mathbf{v}(t) = \int (2\,\mathbf{i} + 6t\,\mathbf{j} + 12t^2\,\mathbf{k})\,dt = 2t\,\mathbf{i} + 3t^2\,\mathbf{j} + 4t^3\,\mathbf{k} + \mathbf{C}$, and $\mathbf{i} = \mathbf{v}(0) = \mathbf{C}$,
so $\mathbf{C} = \mathbf{i}$ and $\mathbf{v}(t) = (2t{+}1)\mathbf{i}{+}3t^2\,\mathbf{j}{+}4t^3\,\mathbf{k}$. $\mathbf{r}(t) = \int [(2t+1)\mathbf{i} + 3t^2\,\mathbf{j} + 4t^3\,\mathbf{k}]\,dt = (t^2+t)\,\mathbf{i} + t^3\,\mathbf{j} + t^4\,\mathbf{k} + \mathbf{D}$.
But $\mathbf{4j} - \mathbf{3k} = \mathbf{r}(0) = \mathbf{D}$, so $\mathbf{D} = \mathbf{4j} - \mathbf{3k}$ and $\mathbf{r}(t) = (t^2+t)\,\mathbf{i} + (t^3+4)\,\mathbf{j} + (t^4-3)\,\mathbf{k}$.