1. In the figure below all thick lines have equal length. Express $\beta$ in terms of $\alpha$.

![Diagram with labeled angles $\alpha$, $\beta$, $\gamma$, and $\delta$.]

*Solution:* $\gamma$ is an exterior angle of $\triangle ABC$ and so $\gamma = 2\alpha$. From $\triangle BCD$ we have $\delta = 180^\circ - 2\gamma = 180^\circ - 4\alpha$. Thus $\beta = 180^\circ - \alpha - \delta = 180^\circ - \alpha - (180^\circ - 4\alpha) = 3\alpha$. 

![Diagram with labeled angles $\alpha$, $\beta$, $\gamma$, and $\delta$.]