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Title: On the powers of integers and conductors of quadratic fields

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We consider non-zero integers of the maximal order $\mathcal{O} = O_F$ of the quadratic field $F = \mathbb{Q}(\sqrt{d})$ where $d \in \mathbb{Z}$ is square-free. Let p be an odd prime and $0 \neq \alpha \in O_F$. Using the embedding into $\mathrm{GL}(2, \mathbb{R})$ we obtain bounds for the first $\nu \in \mathbb{N}$ such that $\alpha^\nu \equiv 1 \bmod p$. For a conductor f, we then study the smallest positive integer $n = n(f)$ such that $\alpha^n \in \mathcal{O}_f$. We obtain bounds for $n(f)$ and for $n(fp^k)$. The most interesting case is where α is the fundamental unit of $\mathbb{Q}(\sqrt{d})$.

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