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Self-similar values of quadratic forms: A remark on pattern and duality.

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Summary: Our text is Hendrik Lenstra's nice observation that $12^2 + 33^2 = 1233$. One notices readily that such a cute decomposition of $10^k a + b$ as a sum of two squares $a^2 + b^2$ is no more than rewriting the sum of squares $10^{2k}+1$ as a different sum $(10^k-2a)^2+(2b-1)$. But that does not hint at more radical generalization. We show here that much the same can be told with the sum of squares $x^2 + y^2$ replaced by an arbitrary quadratic form $f(x, y) = ux^2 + vxy + wy^2$, where u, v, and w are integers; and the cute representations now are of the shape $10^k a + b = f(a, b)$.

Classification: F60