Inverses of Z_m

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To test $\mathbb{Z}_m$ for inverses, we need to know if a has a multiplicative inverse, that is, whether there's another number a' such that $a' \cdot x = b \pmod{m}$. For example, in $\mathbb{Z}_9$, the inverse of 2 is 5 because $2 \cdot 5 = 1 \pmod{9}$. On the other hand, 3 does not have an inverse in $\mathbb{Z}_9$, because the equation $3 \cdot x = 1 \pmod{9}$ does not have a solution.