$(ab)^{-1} = a^{-1}b^{-1}$, Since $b^{-1}a^{-1} = a^{-1}b^{-1}$

Theorem: Cancellation laws hold good in a group.

If a, b, c are any element of G, then

$ab = ac \Rightarrow b = c$ (Left Cancellation law)

and $ba = ca \Rightarrow b = c$ (Right Cancellation law).

Proof:- $\because a \in G \Rightarrow \exists\ a^{-1} \in G$ such that $a^{-1}a = e = aa^{-1}$ where e is the identity of ...

Now, $ab = ac \Rightarrow a^{-1}(ab) = a^{-1}(ac)$ [Multiplying both sides on the left by a^{-1}]

$\Rightarrow (a^{-1}a)b = (a^{-1}a)c$ [by associativity]

$\Rightarrow eb = ec$ [$\because a^{-1}a = e$]

$\Rightarrow b = c$. [$\because e$ is identity]

Also $ba = ca \Rightarrow (ba)a^{-1} = (ca)a^{-1}$

$\Rightarrow b(aa^{-1}) = c(aa^{-1})$

$\Rightarrow be = ce \Rightarrow b = c$.