The direct (or tensor) product of graphs obeys a limited cancellation property. Lovász proved that if $C$ has an odd cycle then $A \times C \cong B \times C$ if and only if $A \cong B$, but cancellation can fail if $C$ is bipartite. We investigate the ways cancellation can fail. Given a graph $A$ and a bipartite graph $C$, we classify the graphs $B$ for which $A \times C \cong B \times C$. Further, we give exact conditions on $A$ that guarantee $A \times C \cong B \times C$ implies $A \cong B$. 