We consider a variation on the domination number of a graph. Let $G$ be a graph, $S \subset V$ a subset of the vertices and $d(u, v)$ the distance between vertices $u, v$. Define

$$w_S(v) = \begin{cases} \sum \frac{1}{2^{d(u,v)-1}} & \text{if } v \notin S, \\ 2, & \text{if } v \in S \end{cases}$$

$S$ is an exponential dominating set if for all vertices $v$, $w_S(v) \geq 1$. The exponential dominating number, $\gamma_e(G)$ is the least number of vertices in an exponential dominating set. This idea was introduced in a recent paper of Dankelmann et al. Here we give results for the exponential dominating number for various classes of grid graphs. (Received September 19, 2010)