Question 32221

Maximum height is achieved at the half of time of movement. At this point $h_{max}=\frac{v_0^2\sin^2\theta}{2g}$, where θ is the angle at which object was thrown. If maximum possible height is $25\,m$, then using last formula it is possible to find the angle under which ball must be thrown not to hit the ceiling (25m).

$h_{max}=\frac{v_0^2\sin^2\theta}{2g}\Rightarrow\sin^2\theta=\frac{2gh_{max}}{v_0^2}=0.3125$, which gives the angle $\sin\theta=0.56,\theta=34.05\,degrees$.

The horizontal distance is $l=\frac{v_0^2}{g}\sin 2\theta=148.45\,m$.