Question #14618

Let the coordinates of the stone, thrown downward be y_1 and the stone, thrown upward be y_2. The general equation for a motion of an accelerated object is $y = y_0 + v_y t + \frac{g t^2}{2}$ .Hence, the equations for $y_{1,} y_2$ are: $y_1 = h - v_0 t - \frac{g t^2}{2,}$ $y_2 = v_0 t - \frac{g t^2}{2}$, where h is the height of cliff. In order to find the position, where the stones cross, $y_1 = y_2 \Rightarrow 2 v_0 t = h, t = \frac{h}{2 v_0}$ - this is the interval time from the beginning of motion, when stones cross. Finally, the height from the base of cliff is $D = \frac{v_0 h}{2 v_0} - \frac{g h^2}{8 v_0^2} = 2.67\, m$ (substituting the time we found into y_2).