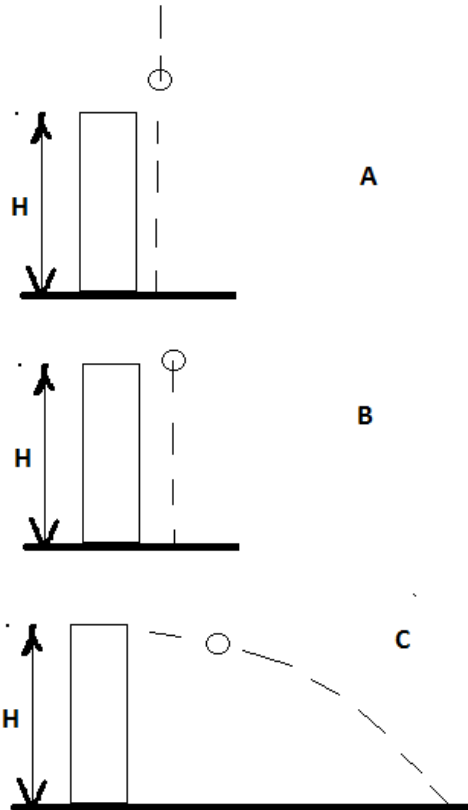


Answer on question 61223 - Physics - Mechanics | Relativity

There is a tower of height H a boy throws a ball from the tower in upward direction and it reaches the ground in time T_1 , another boy throws a ball from the tower in direction parallel to the ground. It reaches the ground in time T_2 Another boy just leaves the ball from the top of the tower and it takes time T to reach the ground. Find T with respect to T_1 and T_2 .

Solution



Let's answer on this question using the figure above. It is shown all 3 cases. When a boy throws a ball in upward direction (it takes time T_1 , see fig.A), time $T_1 > T$, because the ball moves additional way in compare to case B. In the case C, when a ball was thrown in horizontal direction, there is no additional force in ground direction (besides the gravity force), hence time $T_2 = T$.

Using the law of conservation energy for case B we can write: $\frac{v^2}{2} = mgH \rightarrow v = \sqrt{2gH} = \frac{H}{T} \rightarrow$

$$T = \sqrt{\frac{H}{2g}}.$$

Answer $T_1 > T = T_2, T = \sqrt{\frac{H}{2g}}.$