



A ball is thrown upward at $t = 0$ from the ground at O . It reaches a maximum height $y_{OA} = h$ at A when $t = t_{OA}$. The point B is at $y_{OB} = \frac{2h}{3}$. Find the ratio of the times t_{AB} and t_{OA} ; i.e., find $\frac{t_{AB}}{t_{OA}}$.

A) $\frac{t_{BA}}{t_{OA}} = \frac{1}{3}$

B) $\frac{t_{BA}}{t_{OA}} = \sqrt{\frac{1}{3}}$

C) $\frac{t_{BA}}{t_{OA}} = \sqrt{\frac{2}{3}}$

Based on time reversal symmetry,

$$\frac{t_{BA}}{t_{OA}} = \frac{t_{AB}}{t_{AO}}.$$

Using $s = \frac{1}{2} a t^2$, we have

$$t = \sqrt{\frac{2s}{g}}.$$

So, we have

$$\frac{t_{AB}}{t_{AO}} = \sqrt{\frac{AB}{AO}} = \sqrt{\frac{(h/3)}{h}} = \frac{1}{\sqrt{3}}.$$

Answer **B**.

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