## Answer on Question \#53207, Physics / Mechanics

A man of height 1.2 m walks away from a lamp hanging at height of 4 m above ground. If man walks with a speed of $2.8 \mathrm{~m} / \mathrm{s}$ determine velocity of the tip of mans shadow.

## Solution:



Let the lamp be at $A$ at height $H$ from the ground, that is $A B=H$. Let the man be initially at $B$, below the lamp, his height being equal to $B D=h$, so that the tip of his shadow is at $B$. Let the man walk from $B$ to $F$ in time $t$ with speed $v$, the shadow will go up to $C$ in the same time $t$ with speed $\mathrm{v}^{\prime}$ :

$$
\begin{gathered}
B F=v t \\
B C=v^{\prime} t
\end{gathered}
$$

From similar triangles EFC and ABC

$$
\begin{aligned}
& \frac{F C}{B C}=\frac{E F}{A B}=\frac{h}{H} \\
& \frac{v^{\prime} t-v t}{v^{\prime} t}=\frac{h}{H}
\end{aligned}
$$

or

$$
v^{\prime}=\frac{H v}{H-h}=\frac{4 * 2.8}{4-1.2}=4 \mathrm{~m} / \mathrm{s}
$$

Answer: $4 \mathrm{~m} / \mathrm{s}$

