a bus start from rest with an acceleration of 1m/s^2.a man who is 48 meter behind the bus is moving with a uniform velocity of 10m/s. then the minimum time after which the man will catch the bus?

Solution

The distance that man travelled (relative to the bus):

$$S_{Man} = S_0 + v * t,$$

where $S_0 = 48\ m, v = 10\frac{m}{s}$, t is the minimum time after which the man will catch the bus.

The distance that bus travelled:

$$S_{Bus} = \frac{at^2}{2},$$

Where $a = 1\frac{m}{s^2}$, t is the minimum time after which the man will catch the bus.

The distances of man and bus are equal to each other, because the man will catch the bus.

So

$$S_{Man} = S_{Bus} \leftrightarrow \frac{at^2}{2} = S_0 + v * t.$$

We have quadratic equation for t:

$$\frac{1 * t^2}{2} = 48 + 10 * t \rightarrow \frac{1}{2}t^2 - 10 * t - 48 = 0 \rightarrow t = 24\ s.$$

Answer: 24s.