Officer accelerates as soon as speeder passes

Catching up \( \Rightarrow \) Distance travelled by both are equal.

Let's say it takes a time \( t \)

\[
\frac{\text{Speeder}}{x_s} = V t
\]

\[
\frac{\text{Officer}}{x_0} = \frac{V^2}{2a} t + \frac{1}{2} at^2 = \frac{1}{2} at^2
\]

Both distances must be equal

\( a \) \( \Rightarrow \) \( x_s = x_0 \)

\( \Rightarrow \) \( V t = \frac{1}{2} at^2 \) \( \Rightarrow \boxed{t = \frac{2V}{a}} \)

\( b \) How far?

\( x_s = V t = V \times \frac{2V}{a} = \frac{2V^2}{a} \)

\( c \) Final speed of officer

\[ V_f = \sqrt{V_0^2 + at^2} = a \times \frac{2V}{ac} = 2V \]

When officer catches up, his velocity is twice that of the speeder.