Solution to Example 4:

\[ V_c = 30 \text{ms}^{-1} \]
\[ u_p = 0 \text{ms}^{-1} \]
\[ V_p = ? \]
\[ t = 50 \text{s}, \text{for police to catch car} \]

(a) 

\[ \begin{array}{c}
\text{Velocity (m/s)} \\
\hline
\text{Police} \\
\text{Car} \\
\text{30} \\
\text{50} \\
\text{0} \\
\text{Time (s)} \\
\end{array} \]

(b) For police to catch car, the distance travelled by police must equal distance travelled by car since beginning of the chase.

\[ \text{Area under police car graph} = \text{Area under car graph} \]
\[ \frac{1}{2} \times 50 \times V_p = 30 \times 50 \]
\[ \therefore V_p = 60 \text{ms}^{-1} \]

\[ \therefore \text{Police car reaches} 60 \text{ms}^{-1} \text{as it catches the car. (Wow - what a police car!)} \]

(c) From graph: 
\[ a_p = \frac{\Delta V}{\Delta t} = \frac{60}{50} = 1.2 \text{ms}^{-2} \]

Acceleration of police car is 1.2 ms\(^{-2}\) in direction of motion.