Kinematics – Q3 [Problem/M] (12/6/23)

Two cars on a test track travel in adjacent lanes, in the same direction. At a particular point when the cars are level with each other, car A is travelling at $30mph$ whilst car B is travelling at $35mph$. Given that the two cars start braking at this point, and experience the same constant deceleration as each other throughout, at what speed will car B be travelling when car A comes to rest?

Solution

[It isn't necessary to convert to SI units: we can take the unit of displacement as miles and the unit of time as hours.]

For car A, applying $'v^2 = u^2 + 2as'$, $0 = 30^2 + 2as$.

For car B, $v^2 = 35^2 + 2as$

$= 35^2 - 30^2$ (as a & s are common to A and B)

$= (35 - 30)(35 + 30) = 5(65) = 25(13)$, where v is B's final speed.

So $v = 5\sqrt{13} = 18.0 \ mph$ (3sf)