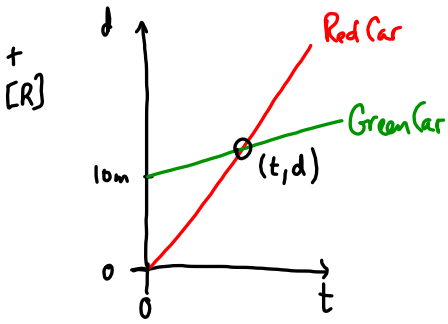
Chase Problems

Red Car: $\vec{v} = 25\text{m/s [R]}$ and $\vec{d_i} = 0\text{m}$

Green Car: $\vec{v} = 15\text{m/s [R]}$ and $\vec{d_i} = 10\text{m [R]}$

Where and when will the red car pass the green car?



Red Car

$v = \frac{\Delta d}{\Delta t}$

$\Delta d = v\,\Delta t$

$d - 0 = (25\text{m/s [R]})(t - 0)$

$d = (25\text{m/s [R]})t + 0$

$(y = mx + b)$

m ↑ velocity; b ↑ initial position

Green Car

$v = \frac{\Delta d}{\Delta t}$

$\Delta d = v\,\Delta t$

$d - 10 = (15\text{m/s [R]})(t - 0)$

$d - 10 = (15\text{m/s [R]})t$

$d = 15\text{m/s [R]}\,t + 10\text{m}$

$y = mx + b$

Using substitution:

$25t = 15t + 10$

$10t = 10$

$t = \frac{10\text{m}}{10\text{m/s}}$

$t = 1.0\text{s}$

Substituting $t = 1\text{s}$ into the equation for the red car:

$d = (25\text{m/s [R]})t$

$d = (25\text{m/s [R]})(1\text{s})$

$d = 25\text{m [R]}$

The red car will pass the green car after 1.0s at 25m [R] of the origin.

* Be careful with your units!
* Watch out for directions!