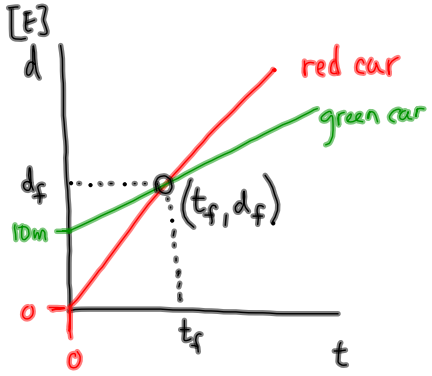
Chase Problems

Red Car: $\vec{v} = 25\text{m/s [E]}$ and $\vec{d}_i = 0\text{m}$

Green Car: $\vec{v} = 15\text{m/s [E]}$ and $\vec{d}_i = 10\text{m [E]}$

Where and when will the Red Car pass the Green Car?
(d_f) (t_f)



Red Car

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

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

$\vec{d}_f - \vec{d}_i = \vec{v}(t_f - t_i)$

$\vec{d}_f = \vec{v}\, t_f$

$\vec{d}_f = 25\text{m/s [E]}\, t_f$

$(y = mx + b)$

Green Car

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

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

$\vec{d}_f - \vec{d}_i = \vec{v}(t_f - t_i)$

$\vec{d}_f - 10\text{m [E]} = 15\text{m/s [E]}\, t_f$

$d_f = 15\text{m/s [E]}\, t_f + 10\text{m [E]}$

$(y = mx + b)$

$5x = 2x + 1$

$-(15\text{m/s})t_f \quad -(15\text{m/s})t_f$

$25\text{m/s [E]}\, t_f = 15\text{m/s [E]}\, t_f + 10\text{m [E]}$

$-2x \quad -2x$

$15x = 2x + 3$

$13x = 3$

$10\text{m/s [E]}\, t_f = 10\text{m [E]}$

$t_f = \frac{10\text{m [E]}}{10\text{m/s [E]}}$

$t_f = 1\text{s}$

$\vec{d}_f = 25\text{m [E]}\, t_f$

$\vec{d}_f = 25\text{m/s [E]}\,(1\text{s})$

$\vec{d}_f = 25\text{m [E]}$

$\frac{\text{m}}{\text{s}} \cdot \text{s}$

The red car will pass the green car after 1s and the cars will be 25m [E] of the reference point.

If you use $y = mx + b$

- y: the final position
- m: velocity
- x: time
- b: initial position