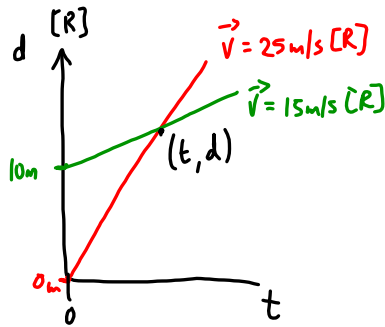


Chase Problems

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 $\vec{d}_i = 10 \text{ m [R]}$



When and where will the red car pass the green car?

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

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

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

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

$(y = mx + b)$
 ↑ velocity ↑ start position

Green Car

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

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

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

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

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

$(y = mx + b)$

$d_{\text{green}} = d_{\text{red}}$

$(15 \text{ m/s [R]})t + 10 \text{ m [R]} = (25 \text{ m/s [R]})t$

$15t + 10 = 25t$

$10 = 10t$

$t = 1 \text{ s}$

$\vec{d} = (15 \text{ m/s [R]})(1 \text{ s}) + 10 \text{ m [R]}$

$\vec{d} = 15 \text{ m [R]} + 10 \text{ m [R]}$

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

It takes 1s for the red car to pass the green car.

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

Check:

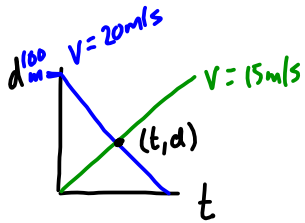
$\vec{d} = (25 \text{ m/s [R]})(t)$

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

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

← Same answer.

$\frac{m \cdot s}{s \cdot 1} = m$



$$y = mx + b$$

$$d = -(20 \text{ m/s})t + 100 \text{ m}$$

$$d = (15 \text{ m/s})t + 0$$

$$-(20 \text{ m/s})t + 100 \text{ m} = (15 \text{ m/s})t$$

$$-20t + 100 = 15t$$

$$\frac{\text{m}}{\text{m/s}} \frac{100}{35} = \frac{35t}{35}$$

$$t = 2.9 \text{ s}$$

$$d = -20t + 100$$

$$d = -20(2.9) + 100$$

$$d = 43 \text{ m}$$

check:

$$d = 15t$$

$$d = 15(2.9)$$

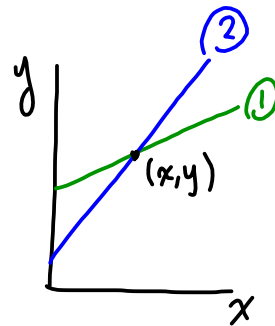
$$d = 43 \text{ m}$$

The cars will meet at 43 m from origin

Example:

$$y = 2x + 4 \quad \textcircled{1}$$

$$y = 5x + 1 \quad \textcircled{2}$$



Using substitution (comparison):

Sub $x=1$ into $\textcircled{1}$:

$$y = 2x + 4$$

$$y = 2(1) + 4$$

$$y = 6$$

$$2x + 4 = 5x + 1$$

$$3 = 3x$$

$$3x = 3$$

$$x = 1$$

The lines intersect at $(1, 6)$