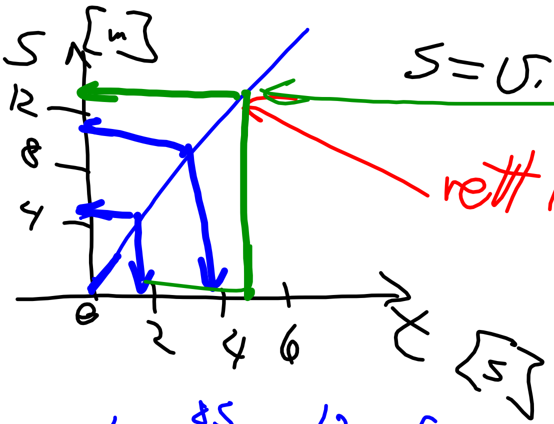
Fart

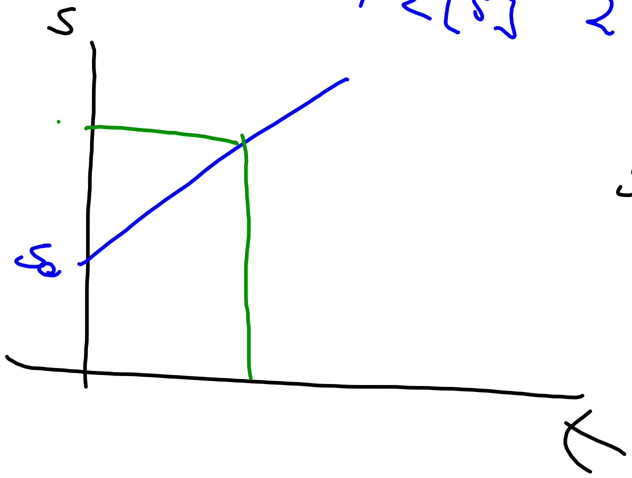
$v = \frac{\Delta s}{\Delta t} \approx \frac{s}{t}$

$s = v \cdot t = 4\,[m/s] \cdot 5\,[s] = 20\,[m]$



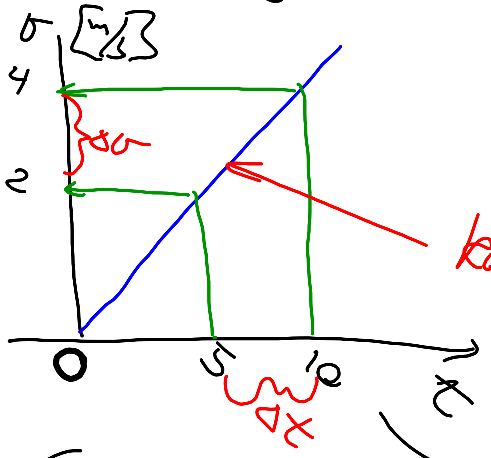
rett linje: konstant fart

$v = \frac{\Delta s}{\Delta t} = \frac{12-4\,[m]}{4-2\,[s]} = \frac{8}{2}\,m/s = 4\,m/s$



$s = s_0 + vt$

Akselerasjon (Farten forandres)



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

↑ symbol for akselerasjon

konstant a: rett linje

$a = \frac{\Delta v}{\Delta t} = \frac{4-2}{10-5} = \frac{2}{5} \frac{m/s}{s}$

$= 0{,}4 \ m/s^2$

Gjennomsnitt akselerasjon

$\bar{a} = \frac{\Delta v}{\Delta t}$

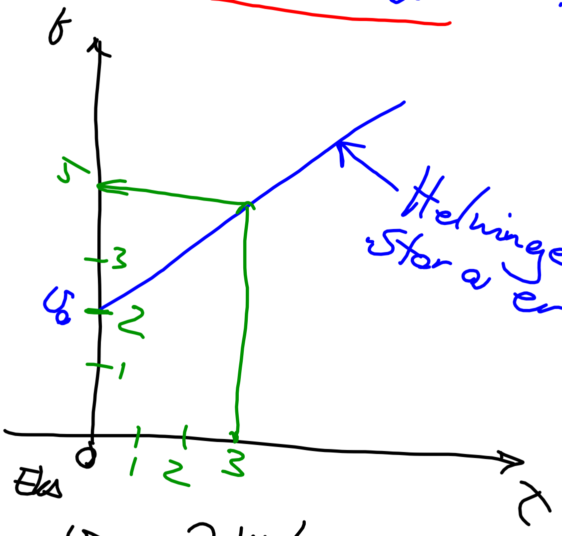
Momentan akselerasjon

$a = \frac{\Delta v}{\Delta t} \rightarrow \Delta t \rightarrow 0$

$v = a \cdot t$

↓ hvis det er en startfart: v_0

$v = v_0 + at$



Helningen sier hvor stor a er

Eks

$v_0 = 2 \ m/s$

$a = 1 \ m/s^2$

$t = 3 \ s$

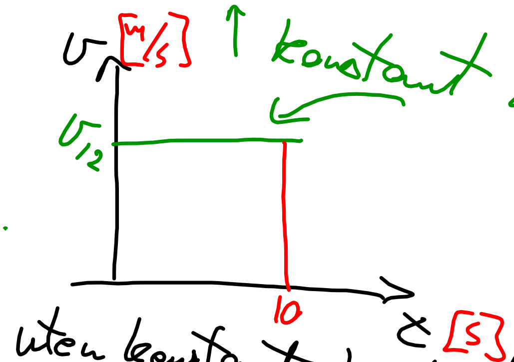
$v = v_0 + a \cdot t$

$v = 2[m/s] + 1[m/s^2] \ 3[s]$

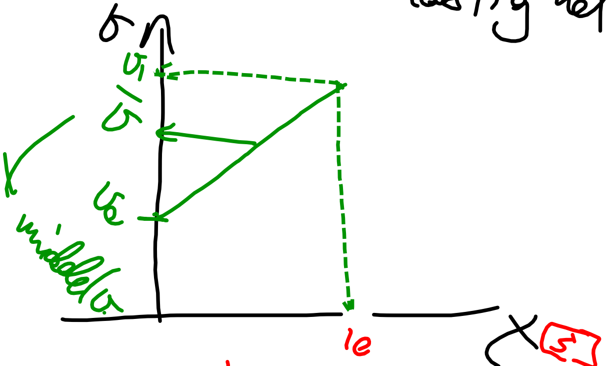
$= 5 \ m/s$

For å finne s uten konst. hastighet v —

$s = v \cdot t$



uten konstant hastighet kan middelhastigheten brukes



$$\bar{v} = \frac{v_1 + v_2}{2}$$

$$s = \bar{v} \cdot t = \frac{v_1 + v_2}{2} \cdot t$$

Eks: Konst fart: $v_{12} = 5\ m/s$

Etter $t = 10\ s \Rightarrow s = v \cdot t = 5\ m/s \cdot 10\ s$

$= 50\ m$

Formler

1) $v = v_0 + a \cdot t$

2) $s = v_0 \cdot t + \frac{1}{2} a t^2$

3) $s = \frac{v_0 + v}{2} \cdot t$

4) $2a \cdot s = v^2 - v_0^2$

Utledning av formel 2):

a) $v = v_0 + at$ b) $s = \frac{v+v_0}{2} \cdot t$

a → b

$s = \frac{v+v_0}{2} \cdot t = \frac{(v_0+at)+v_0}{2} \cdot t = \frac{(2v_0+at)}{2} \cdot t$

$s = v_0 \cdot t + \frac{1}{2} a \cdot t^2$

$s = \frac{(v+v_0)}{2} \cdot t = \frac{((v_0+at)+v_0)}{2} \cdot t = \frac{(2v_0+at)}{2} \cdot t$

$v = v_0 + at$

$s = \left(\frac{2v_0}{2} + \frac{at}{2}\right) t = v_0 \cdot t + \frac{a \cdot t^2}{2}$

Utledning av formel 4)

$v = v_0 + at$

$v - v_0 = at$

$t = \frac{v - v_0}{a}$

$s = \frac{v + v_0}{2} \cdot t$

$2s = (v + v_0) \cdot t$

$= v \cdot t + v_0 \cdot t$

setter inn for t

$2s = v \cdot t + v_0 \cdot t = v \cdot \left(\frac{v - v_0}{a}\right) + v_0 \left(\frac{v - v_0}{a}\right)$

$2as = v(v - v_0) + v_0(v - v_0) = v^2 - v \cdot v_0 + v_0 \cdot v - v_0^2$

$2as = v^2 - v_0^2 = v^2 - v_0^2$

Oppgaveløsning

1.07

a) $\bar{v} = \frac{\Delta s}{\Delta t} = \frac{25\,[m]}{4{,}0\,[s]} = 6{,}25\,[m/s]$

$= 6{,}3\,[m/s]$

b) $t = \frac{s}{v} = \frac{35 \cdot 10^3\,[m]}{7{,}0\,[m/s]} = 5{,}0 \cdot 10^3 \left[\frac{m}{m/s}\right]$

$s = 35\,km$

$v = 7{,}0\,m/s$

$v = \frac{s}{t} \Rightarrow t = \frac{s}{v}$

$= 5{,}0 \cdot 10^3\,[s]$ $\left[\frac{1 \cdot s}{(1/s) \cdot s} = s\right]$