

FIZIKA 1

10.12.23

str 1

1) ^{PREMO} Enakomerno gibanje

#1) Avtomobil vozi skozi celotno naselje 3 minute. Vozil je s hitrostjo

$$45 \frac{\text{km}}{\text{h}}$$

a) Kako dolga pot vodi skozi naselje?

b) Kako dolgo bi vozil skozi naselje, če bi vozil po predpisih (50 km/h)?

c) Koliko sekund bi bil hitrejši, če bi vozil s hitrostjo 50 km/h?

$$v_1 = 45 \frac{\text{km}}{\text{h}}$$

$$t_1 = 3 \text{ min} = \frac{3}{60} \text{ min} = 0,05 \text{ h}$$

$$a) s = ?$$

$$b) t_2 (v_2 = 50 \frac{\text{km}}{\text{h}}) = ?$$

$$c) \Delta t = ?$$

$$a) s = v_1 \cdot t_1$$

$$s = 45 \frac{\text{km}}{\text{h}} \cdot 0,05 \text{ h}$$

$$s = 2,25 \text{ km}$$

$$c) \Delta t = t_1 - t_2$$

$$\Delta t = 3 \text{ min} - 2,7 \text{ min}$$

$$\Delta t = 0,3 \text{ min} \cdot (60 \text{ s})$$

$$\Delta t = 18 \text{ s}$$

$$b) s = v_2 \cdot t_2$$

$$t_2 = \frac{s}{v_2}$$

$$t_2 = \frac{2,25 \text{ km}}{50 \frac{\text{km}}{\text{h}}}$$

$$t_2 = 0,045 \text{ h} \cdot (60 \text{ min})$$

$$t_2 = 2,7 \text{ min}$$

$$\Delta t =$$

#2) Avtomobil vozi enakomerno s hitrostjo 100 km/h. Izračunaj, v kolikšnem času prevozi razdaljo 200 km?

$$v = 100 \frac{\text{km}}{\text{h}}$$

$$s = v \cdot t \quad | : v$$

$$s = 200 \text{ km}$$

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

$$t = ?$$

$$t = \frac{200 \text{ km}}{100 \frac{\text{km}}{\text{h}}}$$

$$t = 2 \text{ h}$$

#3) Bine se je odpravil v trgovski center, ki je oddaljen 40 km. kr. (2)

Prvo polovico poti je uziel s hitrostjo $130 \frac{\text{km}}{\text{h}}$, drugo polovico poti pa s hitrostjo 50 km/h . V kolikšnem času je prispel v trgovski center?

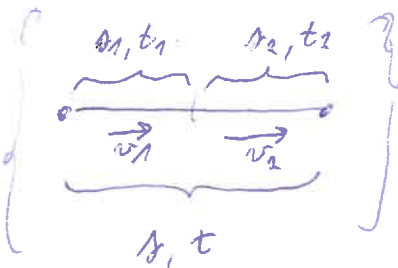
$$s = 40 \text{ km}$$

$$s_1 = \frac{s}{2} = \frac{40 \text{ km}}{2} = 20 \text{ km}$$

$$s_2 = \frac{s}{2} = \frac{40 \text{ km}}{2} = 20 \text{ km}$$

$$v_1 = 130 \frac{\text{km}}{\text{h}}$$

$$v_2 = 50 \frac{\text{km}}{\text{h}}$$



$$t_1 = \frac{s_1}{v_1} = \frac{20 \text{ km}}{130 \frac{\text{km}}{\text{h}}} = 0,154 \text{ h} = 9,23 \text{ min}$$

$$t_2 = \frac{s_2}{v_2} = \frac{20 \text{ km}}{50 \frac{\text{km}}{\text{h}}} = 0,4 \text{ h} = 24 \text{ min}$$

$$t = t_1 + t_2$$

$$t = t_1 + t_2$$

$$t = 1,54 \text{ h} + 4 \text{ h} = 0,154 \text{ h} + 0,4 \text{ h} = 0,554 \text{ h} = 33 \text{ min } 14 \text{ s}$$

a) $t = ?$

$$t = 0,554 \text{ h} = 5 \text{ h } 32,4 \text{ min} = 5 \text{ h } 32 \text{ min } 24 \text{ s}$$

b) $\bar{v} = ? \rightarrow \Delta t_1 < \Delta t_2 \rightarrow \boxed{\bar{v}} = \frac{\Delta s}{\Delta t} = \frac{s_1 + s_2}{\Delta t_1 + \Delta t_2} = \frac{(20 + 20) \text{ km}}{(0,154 + 0,4) \text{ h}} = \frac{40 \text{ km}}{0,554 \text{ h}} = \boxed{72,2 \frac{\text{km}}{\text{h}}}$

#4) Leževnik se je priplazil 50 cm. Za to je porabil 8 min. Kolikšna je bila njegova hitrost?

$$s = 50 \text{ cm}$$

$$s = v \cdot t \quad | : t$$

$$t = 8 \text{ min}$$

$$v = ?$$

$$v = \frac{s}{t} = \frac{50 \text{ cm}}{8 \text{ min}} = 6,25 \frac{\text{cm}}{\text{min}} = 6,25 \frac{0,01 \text{ m}}{60 \text{ s}} = 0,001042 \frac{\text{m}}{\text{s}} = 10,42 \cdot 10^{-4} \frac{\text{m}}{\text{s}}$$

#5) Žan je v 30 min prevozil 8 km. Marko pa je pretekel 40 m v 10 sekundah. Kdo se je gibal hitreje?

$$s_z = 8 \text{ km} = 8000 \text{ m}$$

$$t_z = 30 \text{ min} = 1800 \text{ s}$$

$$s_M = 40 \text{ m}$$

$$t_M = 10 \text{ s}$$

Žan

$$v_z = \frac{s_z}{t_z}$$

$$v_z = \frac{8000 \text{ m}}{1800 \text{ s}}$$

$$v_z = 4,4 \frac{\text{m}}{\text{s}}$$

Marko

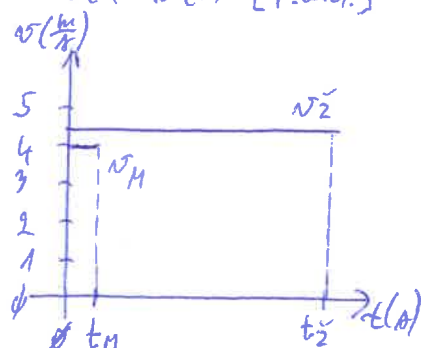
$$v_M = \frac{s_M}{t_M}$$

$$v_M = \frac{40 \text{ m}}{10 \text{ s}}$$

$$v_M = 4 \frac{\text{m}}{\text{s}}$$

$$v_z > v_M \quad \checkmark$$

Graf $v(t)$ [P.E.G.]



a) $v_z, v_M = ?$

b) graf $v(t)$

Premo Enakomerno gibanje

str. ③ 10.12.23

- #6) Izračunaj hitrost zvoka v zraku, če je v 3 sekundah naredi 1 km dolgo pot. Hitrost izrazi v $\frac{\text{km}}{\text{s}}$ in $\frac{\text{km}}{\text{h}}$.

~~$t = 3 \text{ s}$~~
 $s = 1 \text{ km} = 1000 \text{ m}$
 $v = ?$

$$s = v \cdot t \quad | : t$$

$$v = \frac{s}{t} = \frac{1000 \text{ m}}{3 \text{ s}} = \underline{\underline{333 \frac{\text{m}}{\text{s}}}} = 333 \frac{0,001 \text{ km}}{\left(\frac{1}{3600}\right) \text{ h}} = \underline{\underline{1199,9 \frac{\text{km}}{\text{h}}}}$$

- #7) Avtobus je v dveh urah prevozil 120 km dolgo pot. Izračunaj, s kolikšno povprečno hitrostjo je vozil.

$$s = 120 \text{ km}$$

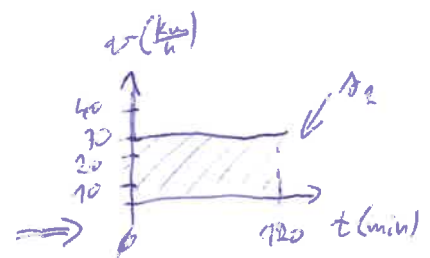
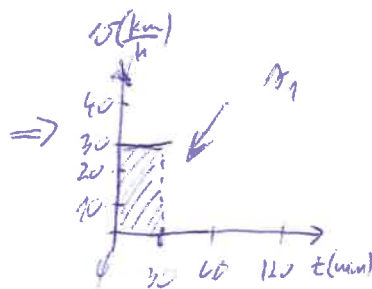
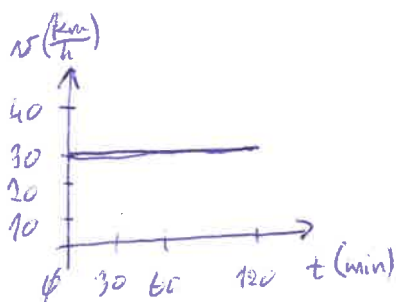
$$s = v \cdot t \quad | : t$$

$$t = 2 \text{ h}$$

$$v = ?$$

$$v = \frac{s}{t} = \frac{120 \text{ km}}{2 \text{ h}} = \underline{\underline{60 \frac{\text{km}}{\text{h}}}} = 60 \cdot \frac{1000 \text{ m}}{3600 \text{ s}} = \frac{600 \text{ m}}{36 \text{ s}} = \underline{\underline{16,7 \frac{\text{m}}{\text{s}}}}$$

- #8) Na grafu $v(t)$ označi in izračunaj, kolikšno pot je avtomobil opravil v pol ure in v dveh urah.



$$s_2 = v_1 \cdot t_2 = 30 \frac{\text{km}}{\text{h}} \cdot 2 \text{ h} = \underline{\underline{60 \text{ km}}}$$

$$s_1 = v_1 \cdot t_1 = 30 \frac{\text{km}}{\text{h}} \cdot 0,5 \text{ h} = \underline{\underline{15 \text{ km}}}$$

#9) Auto prevozi neko razdaljo v 4 urah. Če hitrost poveča za 20 km/h, prevozi isto razdaljo v 3 urah. Izračunaj obe hitrosti in dolžino prevoženega poti.

str. (4)

Enaka dolžina poti

$$t_1 = 4h$$

$$v_1 = x \frac{\text{km}}{h} = 60 \frac{\text{km}}{h}$$

$$s_1 = v_1 \cdot t_1$$

$$s_1 = x \cdot 4h$$

$$s_1 = 60 \frac{\text{km}}{h} \cdot 4h$$

$$s_1 = 240 \text{ km}$$

$$t_2 = 3h$$

$$v_2 = (x + 20) \frac{\text{km}}{h} = 80 \frac{\text{km}}{h}$$

$$s_2 = v_2 \cdot t_2$$

$$s_2 = (x + 20) \cdot 3$$

$$s_2 = (60 + 20) \frac{\text{km}}{h} \cdot 3h$$

$$s_2 = 80 \frac{\text{km}}{h} \cdot 3h$$

$$s_2 = 240 \text{ km}$$

$$s_1 = s_2$$

$$v_1 \cdot t_1 = v_2 \cdot t_2$$

$$x \cdot 4 = (x + 20) \cdot 3$$

$$x \cdot 4 = x \cdot 3 + 20 \cdot 3$$

$$x \cdot 4 = x \cdot 3 + 60$$

$$4x - 3x = 60$$

$$x = 60$$

#10) Avtomobil prevozi razdaljo med krajema A in B, ki sta medseboj oddaljena 70 km, v eni uri. Del poti prevozi enakomerno s hitrostjo 100 km/h, preostali del poti pa enakomerno s hitrostjo 60 km/h.

Kolikšni sta dolžini obeh delov poti?

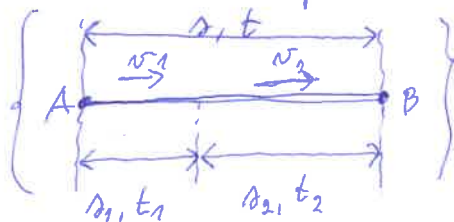
$$s = 70 \text{ km}$$

$$t = 1h$$

$$v_1 = 100 \text{ km/h}$$

$$v_2 = 60 \text{ km/h}$$

$$s_1, s_2 = ?$$



Cela pot:

$$s = s_1 + s_2$$

Cel čas:

$$t = t_1 + t_2$$

$$s = v_1 \cdot t_1 + v_2 \cdot t_2$$

$$t_2 = t - t_1$$

$$s = v_1 \cdot t_1 + v_2 \cdot (t - t_1)$$

(izračunamo čas t_1)

$$s = v_1 \cdot t_1 + v_2 \cdot t - v_2 \cdot t_1$$

$$v_1 \cdot t_1 - v_2 \cdot t_1 = s - v_2 \cdot t$$

$$(v_1 - v_2) \cdot t_1 = s - v_2 \cdot t$$

$$t_1 = \frac{s - v_2 \cdot t}{v_1 - v_2}$$

$$t_1 = \frac{70 \text{ km} - (60 \frac{\text{km}}{h} \cdot 1h)}{(100 - 60) \frac{\text{km}}{h}}$$

$$t_1 = \frac{70 - 60}{40} h = \frac{10}{40} h = \frac{1}{4} h$$

$$t_1 = 0.25 h$$

1. odsek:

$$s_1 = v_1 \cdot t_1$$

$$s_1 = v_1 \cdot \frac{s - v_2 \cdot t}{v_1 - v_2}$$

$$s_1 = 100 \frac{\text{km}}{h} \cdot 0.25h$$

$$s_1 = 25 \text{ km}$$

2. odsek:

$$s_2 = v_2 \cdot t_2$$

$$s_2 = v_2 \cdot (t - t_1)$$

$$s_2 = 60 \frac{\text{km}}{h} \cdot (1 - 0.25)h$$

$$s_2 = 60 \cdot 0.75 \text{ km}$$

$$s_2 = 45 \text{ km}$$

Premo enakomerno gibanje

16.1.24

str. 5

#11) Kolikšna je povprečna hitrost vozila?

a) Avtomobil prevozi polovico poti s hitrostjo $v_1 = 80 \text{ km/h}$, drugo polovico poti pa s hitrostjo $v_2 = 40 \text{ km/h}$.

$$v_1 = 80 \text{ km/h}$$

$$v_2 = 40 \text{ km/h}$$

$$s_1 = \frac{s}{2} = s_2$$

$$\bar{v} = ?$$

$$\left\{ \begin{array}{l} \Delta t_1 \neq \Delta t_2 \\ v_1 \neq v_2 \end{array} \right\}$$

Povprečna hitrost:

$$\bar{v} = \frac{s_{\text{celotna}}}{t_{\text{celotna}}} = \frac{s_1 + s_2}{t_1 + t_2}$$

$$\bar{v} = \frac{s_1 + s_2}{t_c} = \frac{2s_1}{t_c}$$

$$\bar{v} = \frac{2 \cdot s_1}{\left(\frac{s_1 \cdot (v_1 + v_2)}{v_1 \cdot v_2} \right)}$$

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

$$\bar{v} = 2 \cdot \frac{80 \frac{\text{km}}{\text{h}} \cdot 40 \frac{\text{km}}{\text{h}}}{(80 + 40) \frac{\text{km}}{\text{h}}}$$

$$\bar{v} = \frac{6400 \frac{\text{km}^2}{\text{h}^2}}{120 \frac{\text{km}}{\text{h}}}$$

$$\boxed{\bar{v} = 53,3 \frac{\text{km}}{\text{h}}}$$

① 2 odseka, polovična pot 2x

② čas odsekov ni znan

• Iz podatka za pot, kjer sta v obeh odsekih poti enako dolgi:

$$\begin{array}{l} v_1 \neq v_2 \\ v_1 \cdot \Delta t_1 = v_2 \cdot \Delta t_2 \end{array}$$

• Iz celotnega časa, razdelimo po odsekih:

$$t_c = \Delta t_1 + \Delta t_2 = \frac{s_1}{v_1} + \frac{s_2}{v_2}$$

(uporabimo metodo racionalizacije)

$$t_c = \frac{s_1 \cdot v_2 + s_2 \cdot v_1}{v_1 \cdot v_2} ; s_1 = s_2$$

$$t_c = \frac{s_1 \cdot v_2 + s_1 \cdot v_1}{v_1 \cdot v_2}$$

$$\boxed{t_c = \frac{s_1 \cdot (v_1 + v_2)}{v_1 \cdot v_2}}$$

b) Avtomobil vozi polovico časa s hitrostjo $v_1 = 80 \text{ km/h}$, drugo polovico časa pa s hitrostjo $v_2 = 40 \text{ km/h}$.

$$v_1 = 80 \text{ km/h}$$

$$v_2 = 40 \text{ km/h}$$

$$\left\{ \begin{array}{l} \Delta t_1 = \Delta t_2 \\ v_1 \neq v_2 \end{array} \right\}$$

$$\bar{v} = ?$$

Povprečna hitrost:

$$\bar{v} = \frac{s_{\text{celotna}}}{t_{\text{celotna}}} = \frac{s_1 + s_2}{\Delta t_1 + \Delta t_2} = \frac{s_c}{2 \cdot \Delta t_1}$$

$$\boxed{\bar{v} = \frac{(v_1 + v_2) \cdot \Delta t_1}{2 \cdot \Delta t_1}} = \boxed{\frac{v_1 + v_2}{2}}$$

$$\boxed{\bar{v} = \frac{1}{2} \cdot (80 + 40) \frac{\text{km}}{\text{h}}} = \boxed{\frac{120 \text{ km}}{2 \text{ h}}} = \boxed{60 \frac{\text{km}}{\text{h}}}$$

Aritmetična
sredina

Celotna pot:

$$s_c = s_1 + s_2$$

$$s_c = v_1 \cdot \Delta t_1 + v_2 \cdot \Delta t_2 ; \Delta t_1 = \Delta t_2$$

$$s_c = v_1 \cdot \Delta t_1 + v_2 \cdot \Delta t_1$$

$$s_c = (v_1 + v_2) \cdot \Delta t_1$$

#12) Avtomobil prvih 50 km vozi s hitrostjo $80 \frac{\text{km}}{\text{h}}$, nato 10 min stoji, potem pa še pol ure vozi s hitrostjo $90 \frac{\text{km}}{\text{h}}$. str. 6

a) Kolikšno pot prevozi?

b) Koliko časa traja vožnja?

c) Kolikšna je bila njegova povprečna hitrost?

d) Nariši grafa $v(t)$ in $s(t)$.

[P.E.G.] ODSEKI:

(1) $s_1 = 50 \text{ km}$
 $v_1 = 80 \frac{\text{km}}{\text{h}}$
 $t_1 = ?$

$$t_1 = \frac{\Delta s}{v_1}$$

$$t_1 = \frac{50 \text{ km}}{80 \frac{\text{km}}{\text{h}}}$$

$$t_1 = 0,625 \text{ h}$$

(2) $t_2 = 10 \text{ min} = 0,167 \text{ h}$
 $s_2 = 0$
 $v_2 = 0$

(3) $t_3 = 0,5 \text{ h}$
 $v_3 = 90 \frac{\text{km}}{\text{h}}$
 $s_3 = ?$
 $s_3 = v_3 \cdot t_3$
 $s_3 = 90 \frac{\text{km}}{\text{h}} \cdot 0,5 \text{ h}$
 $s_3 = 45 \text{ km}$

a) Celotna pot:

$$s_c = s_1 + s_2 + s_3$$

$$s_c = (50 + 0 + 45) \text{ km}$$

$$s_c = 95 \text{ km}$$

b) Čas vožnje:

$$t_c = t_1 + t_2 + t_3$$

$$t_c = (0,625 + 0,167 + 0,5) \text{ h}$$

$$t_c = 1,292 \text{ h}$$

c) Povprečna hitrost:

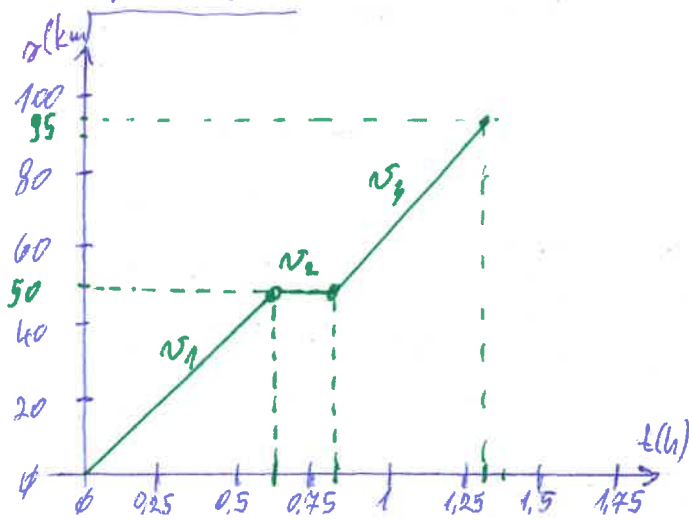
$$(t_1 \neq t_2 \neq t_3)$$

$$\bar{v} = \frac{s_c}{t_c} = \frac{s_1 + s_2 + s_3}{t_1 + t_2 + t_3}$$

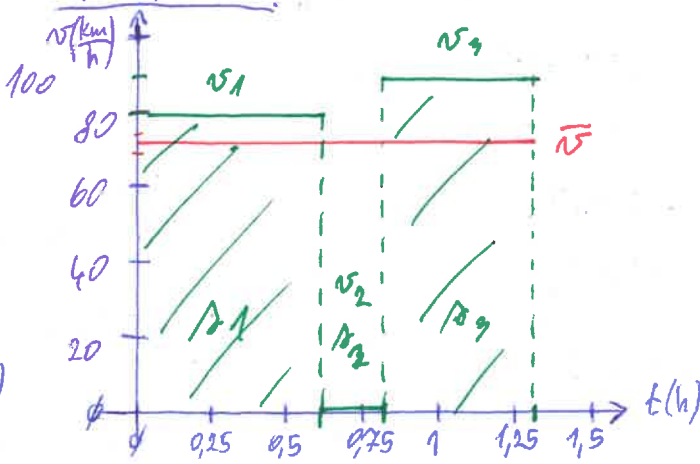
$$\bar{v} = \frac{95 \text{ km}}{1,292 \text{ h}}$$

$$\bar{v} = 73,53 \frac{\text{km}}{\text{h}}$$

d) Graf $s(t)$:



Graf $v(t)$:



13) Nariši grafa $v(t)$ in $s(t)$, kjer kolesar prevozi v dveh odsekih.

ODSEKI:

(1) $\Delta t_1 = 1h$

$$v_1 = \frac{25 \text{ km}}{h}$$

$$\downarrow$$

$$s_1 = 25 \text{ km}$$

(2) $\Delta t_2 = 2h$

$$v_2 = 10 \frac{\text{km}}{h}$$

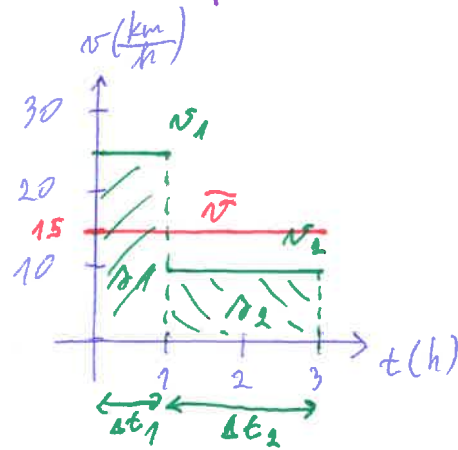
$$\downarrow$$

$$s_2 = v_2 \cdot \Delta t_2$$

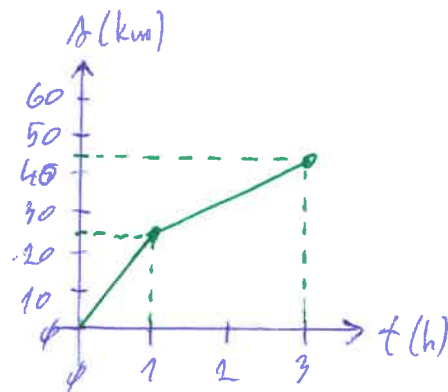
$$s_2 = 10 \frac{\text{km}}{h} \cdot 2h$$

$$s_2 = 20 \text{ km}$$

Graf $v(t)$:



Graf $s(t)$:



- Celotna pot: $s_c = s_1 + s_2$
 $s_c = (25 + 20) \text{ km}$
 $s_c = 45 \text{ km}$

- Celoten čas: $t_c = \Delta t_1 + \Delta t_2$
 $t_c = 1h + 2h$
 $t_c = 3h$

- Povprečna hitrost: $\bar{v} = \frac{s_c}{t_c} = \frac{s_1 + s_2}{\Delta t_1 + \Delta t_2}$

$$\bar{v} = \frac{45 \text{ km}}{3h}$$

$$\bar{v} = 15 \frac{\text{km}}{h}$$

