• Unit convection

1 km = 1000 m   ÷1000 → 1 km = 1000 m / 1000
1 mi = 1.6 km $\frac{1}{1000}$ km = 1 m
1 Hour = 60 min   ÷1.6 → 1 mi = 1.6 km / 1.6
1 min = 60 s $\frac{1}{1.6}$ mi = 1 km
1 kg = 2.2 lb   ÷60 → 1 min = 60 s / 60
1 kg = 1000 g $\frac{1}{60}$ min = 1 s
30 m/s = x mi/h   ÷60 → 1 hr = 60 min / 60
$\quad$ = 60 mi/h $\frac{1}{60}$ hr = 1 min

$1 m = \frac{1}{1000}$ km

$1 km = \frac{1}{1.6}$ mi

$1 m = \frac{1}{1000} \cdot \frac{1}{1.6} = \frac{1}{1600}$ mi

$1 s = \frac{1}{60} \cdot \frac{1}{60} = \frac{1}{3600}$ hr

$30 \frac{m}{s} = 30 \cdot \frac{1 m}{1 s} = 30 \cdot \frac{1}{1600} / \frac{1}{3600} = 30 \cdot \frac{\overset{15}{\cancel{36}}}{\overset{}{\cancel{16}}} \times 2$

$= \frac{15 \cdot 9}{2} = \frac{135}{2}$ mi/h $= 67.5$ mi/h

$\left(\dfrac{\frac{1}{16} \cdot 16 \cdot 36}{\frac{1}{36} \cdot 16 \cdot 36} = \frac{36}{16} \right)$

36 km/h ⇒ x m/s ?

$36 \text{ km/h} = 36 \cdot \frac{1 km}{1 h} = 36 \cdot \frac{1000}{3600} = 36 \cdot \frac{10}{36} = 10 \frac{m}{s}$

• Significant figures

36 ⇒ 2 significant figures

0.01542 ⇒ 4 significant figures
(x underline)

0.1055 ⇒ 4 sig

38.600 ⇒ 5 sig
38.5995 – 38.600
38.55 – 38.6
64 000 000 ⇒ 6.4 · 10⁷ or 6.4 E7

$\boxed{Ex = 10^x}$

38.015 ⇒ 5 sig
721 000 000 ⇒ 7.21 × 100 000 000 = 7.21 × 10⁸
$\qquad\qquad$ 7.21 E 8

• Velocity

0s 5s 10s ...

0m 50m 100m 150m ...
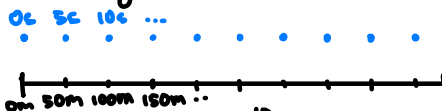
$V = \frac{\Delta s}{\Delta t} = \frac{(50m - 0m)}{(5s - 0s)} = \frac{50m}{5s} = 10 \; m/s$

B
A

0   50 75 100 150 200 225
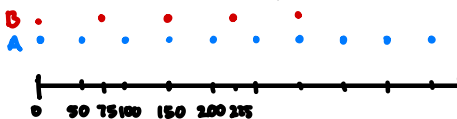
Which is faster?

$V = \Delta s / \Delta t = (75m - 0m)/(5s - 0s) = \frac{75m}{5s} = 15 \; m/s$

Pack ———30m———→ ice cream

-30 ... 0 10 20 ... 50
B ——5s——→
←——10s——
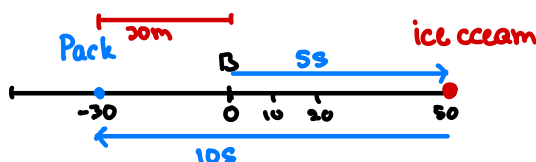
$V_1 = \Delta s / \Delta t = \frac{50 - 0}{5s} = \frac{50m}{5s} = 10 \; m/s$

$V_2 = \Delta s / \Delta t = \frac{(-30 - 50)}{10s} = \frac{-80m}{10s} = -8 \; m/s$

$\Delta t \cdot V = \frac{\Delta s}{\Delta t} \cdot \Delta t$

$\Delta t \cdot V = \Delta s \quad (s_f - s_i)$

15 m/s t = 40s →

0 ————————————

$S_f = \Delta t \cdot V = 40s \cdot 15 \frac{m}{s} = 600 \; m$

car ← 40 m/s   Δt = 6s

|—————0—————| 220
|—0 = 20m
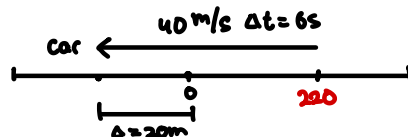
$\Delta s = \Delta t \cdot V$

$-20m - S_i = 6s \cdot -40 \frac{m}{s}$

$-S_i = -240m + 20m$

$-S_i = -220m$

$S_i = 220m$