$$V_{av} = \frac{\text{Total distance}}{\text{Total Time}} = \frac{S}{t}$$

$1 \min = 60 \sec$
$S = S$
$\frac{S}{S} = 1$

Name ___3___

$\frac{1\min}{60\sec} = 1$

$\frac{60\sec}{1\min} = 1$

GRAPHS OF MOTION 1

1. A racer covered a 4500 m course in 18 minutes. Calculate the velocity in meters per second.

$$V = \frac{S}{t} = \frac{4500m}{18\min} \times \frac{1\min}{60\sec} = \frac{4500m}{1080s} = \boxed{4.17 \frac{m}{s}}$$

$\frac{60\sec}{1\min} = 1$

2. Jane ran at a constant speed of 2.75 m/s for 30 minutes. How far did she run in meters? Km?

$$V = \frac{S}{t} \text{ SO } S = Vt = (2.75 \, m/s)(1800s) = \boxed{4950m}$$
$$\boxed{4.95 Km}$$

3. A photon of light travels at 3×10^8 m/s (the speed limit of the universe). If it takes light about 9 minutes to reach Earth from the sun, what is the Earth-Sun distance?

$$S = Vt = (3 \times 10^8 m/s)(540s) = 1620 \times 10^8 m$$
$$= \boxed{1.62 \times 10^{11} m}$$

4. Does this graph of a trip by a car represent a real situation? Explain.
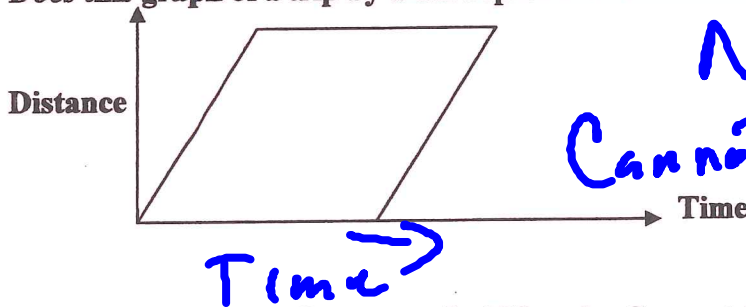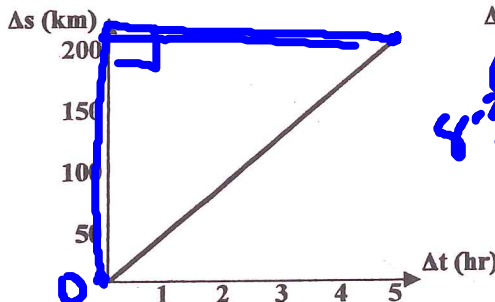
Distance
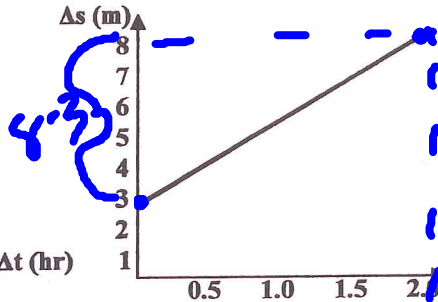
Time

NO
Cannot go back in Time.

Time →

5. A car drives on a road at a speed of 35 mph. Convert this into m/s and compare the distance the car travels in one second to the size of our classroom.

$$\frac{35 \, miles}{hr.} \cdot \frac{1 m/s}{2.237 \frac{miles}{hr}} = 15.65 \, m/s$$

6. Calculate the slope of the following graphs. Be sure to state units.

Δs (km): 200, 150, 100, 50 — Δt (hr): 1 2 3 4 5

Δs (m): 8 7 6 5 4 3 2 1 — Δt (s): 0.5 1.0 1.5 2.0

m (kg): 100, 90, 80, 70, 60 — Δt (wks): 1 2 3 4 5
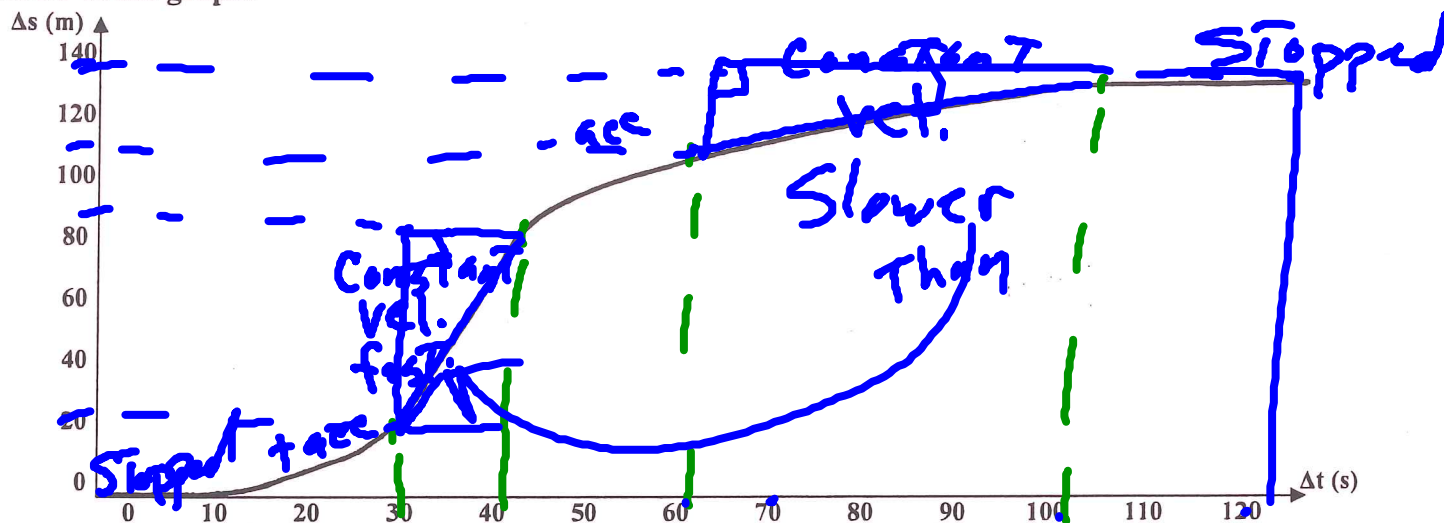
$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{200 \, km}{5 \, hr} = \boxed{40 \, km/hr}$$

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{5m}{2s} = \boxed{2.5 \, m/s}$$
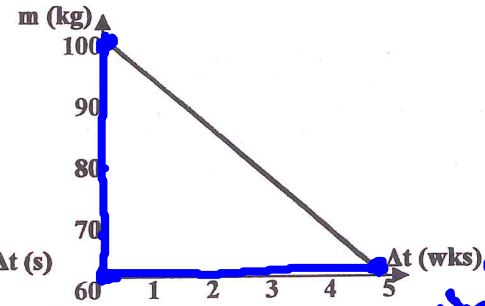
$$= \frac{-40}{5} = \boxed{-8 \, kg/wk}$$

7. Refer to the graph.

Graph annotations: Δs (m) vertical axis (0 to 140), Δt (s) horizontal axis (0 to 120). Handwritten notes: "Stopped", "Constant vel.", "Slower Then", "acc", "Constant vel. fast", "Start + acc"

a. Describe the "trip".

Note graph

b. At what time is the person going the fastest? Calculate this speed.

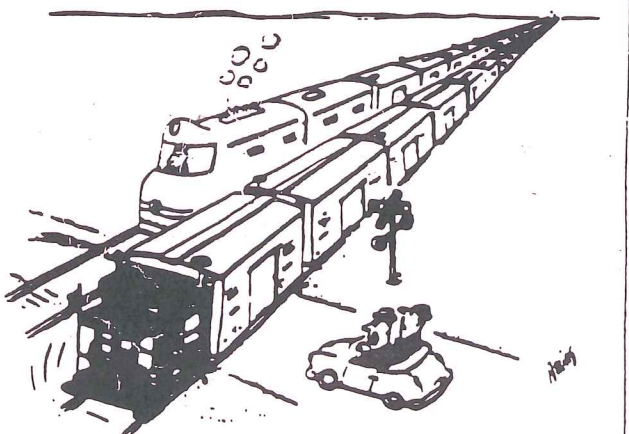$30-40 s$ Slope = Speed = $\frac{85-20}{40-30} = \frac{65}{10}$

$\boxed{6.5 \text{ m/s}}$

c. How fast is the person going at time 70 seconds?

Slope = $\frac{138-110}{100-60} = \frac{28}{40} = \frac{14}{20} = \boxed{.7 \frac{m}{s}}$

d. What is the average speed for the entire trip?

$\frac{S}{t} = V_{av} = \frac{140^m}{120 s} = \frac{7}{6} \frac{m}{s} = \boxed{1.16 \text{ m/s}}$

8. A train travels 100 km/hr for 0.52 hr, then 50 km/hr for the next 0.24 hr and finally 125 km/hr for the last 0.65 hr. What is the average speed of the train for this trip?

$V_{av} = \frac{S}{t} =$

$\begin{array}{r} .52 \\ .24 \\ + .65 \\ \hline 1.41 \text{ hrs} \end{array}$

$\frac{145.25 \text{ Km}}{1.41 \text{ hrs}}$

$\boxed{103 \text{ km/hrs}}$

$\begin{array}{r} 52 \\ 13 \\ + 81.25 \end{array}$

"Well, finally! I thought this thing would never end."