

Q 4, 5, 6, 7, 9, 12, 14, 19, 20, 22

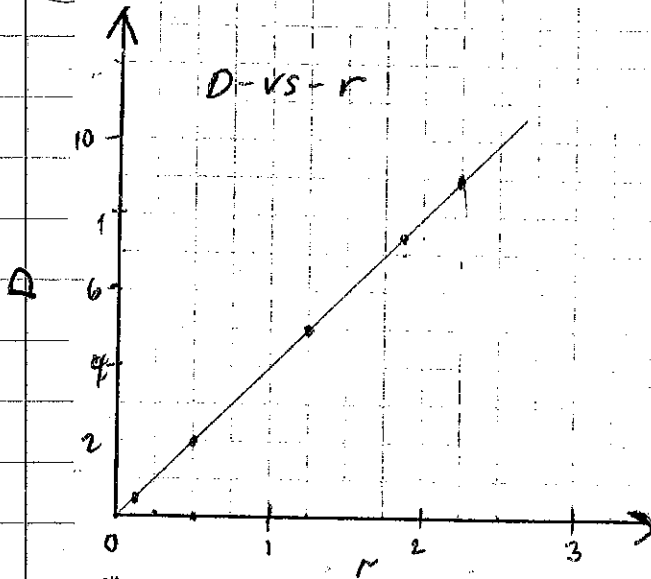
EX 5.1

Q4.	m	10	20	50	100	250
	n	1.5	3	7.5	15	3.75
	n/m	0.15	0.15	0.15	0.15	0.15

numerical rate method = n/m

Yes. Related by fixed rate of 0.15.

Q5 Plot graph.

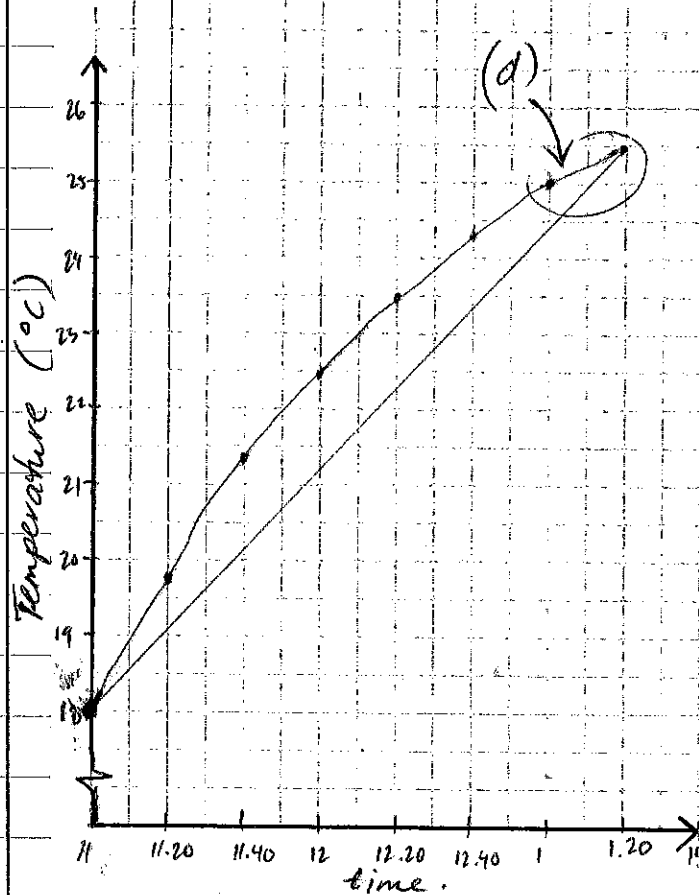


Straight line ∴ fixed rate.

$$\text{rate} = \frac{10}{2.5} = \underline{\underline{4}}$$

Q6 See back of text Answers.

Q7 Graph of Temp vs time.



b) the temp is not rising at a fixed rate as the line is not straight.
- the rate of change gradually decreases.

c) avg rate of change

$$= \frac{25.5 - 18}{2.33} \text{ } ^\circ\text{C/hr}$$

$$= 3.21 \text{ } ^\circ\text{C/hr}$$

d) in section (d) the rate is $0.5^\circ/20 \text{ min}$.
IF it remained const rate.
then

Temp	25	26.5	28
time	1	2	3

So at 3pm → NO USE
e) Next day USELESS!

EX 5.1

Q9 a) fastest in 1st leg.

$$\begin{aligned} \text{speed} &= \frac{\text{dist}}{\text{time}} \\ &= \frac{20 \text{ km}}{1.5} \\ &= 13.3 \text{ km/h} \end{aligned}$$

b) Use spinnaker on 1st leg.

c) 2nd leg is slowest.
(line is less steep)

$$\begin{aligned} \text{d) Avg speed} &= \frac{\text{total dist}}{\text{total time}} \\ &= \frac{40 \text{ km}}{5} \\ &= \underline{\underline{8 \text{ km/h}}} \end{aligned}$$

Q12 Get out your pencil
+ draw in lines.

$$\begin{aligned} \text{a) avg sp} &= \frac{d_2 - d_1}{t_2 - t_1} \\ &= \frac{1 - 0}{2 - 0} \\ &= \underline{\underline{0.5 \text{ m/s}}} \end{aligned}$$

$$\begin{aligned} \text{b) avg sp} &= \frac{4 - 2}{4 - 2} \\ &= \frac{3}{2} \\ &= \underline{\underline{1.5 \text{ m/s}}} \end{aligned}$$

$$\begin{aligned} \text{c) avg sp} &= \frac{9 - 4}{6 - 4} \\ &= \frac{5}{2} \\ &= \underline{\underline{2.5 \text{ m/s}}} \end{aligned}$$

$$\begin{aligned} \text{d) avg sp} &= \frac{9 - 0}{6 - 0} \\ &= \underline{\underline{1.5 \text{ m/s}}} \quad \checkmark \end{aligned}$$

$$\begin{aligned} \text{Q14 a) } f(x) &= x^2 + x - 8 \\ f(1) &= 1^2 + 1 - 8 \\ &= -6 \quad (1, -6) \\ f(6) &= 6^2 + 6 - 8 \\ &= 34 \quad (6, 34) \end{aligned}$$

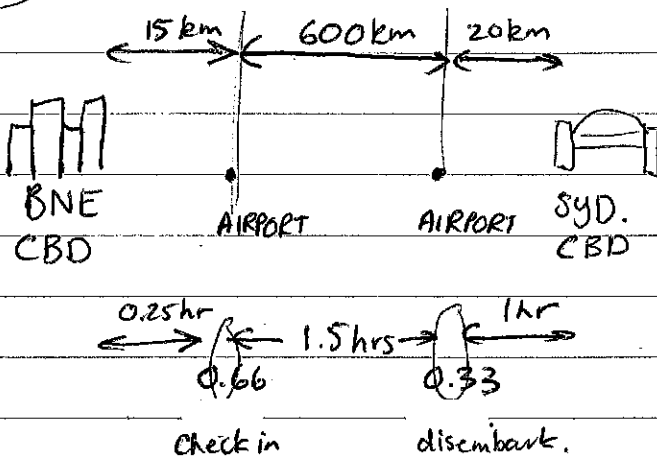
$$\begin{aligned} \text{avg rate of change} &= \frac{f(x_2) - f(x_1)}{x_2 - x_1} \\ &= \frac{34 - (-6)}{6 - 1} \\ &= \frac{40}{5} \\ &= \underline{\underline{8}} \end{aligned}$$

$$\begin{aligned} \text{c) } f(m) &= (m+5)(m-4) \\ f(-2) &= (-2+5)(-2-4) \\ &= 3 \times -6 \\ &= -18 \quad (-2, -18) \\ f(2) &= (2+5)(2-4) \\ &= 7 \times -2 \\ &= -14 \quad (2, -14) \end{aligned}$$

EX 5.1

avg rate of change
 $= \frac{f(x_2) - f(x_1)}{x_2 - x_1}$
 $= \frac{-18 - -14}{-2 - -2}$
 $= \frac{-4}{-4}$
 $= \underline{\underline{1}}$ ✓

Q 19



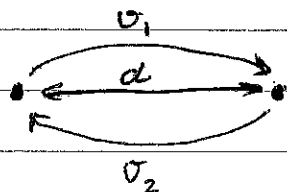
a) avg sp = $\frac{\text{dist}}{\text{time}}$
 $= \frac{600}{1.5}$
 $= \underline{\underline{400 \text{ km/h}}}$ ✓

b) avg sp = $\frac{\text{dist}}{\text{time}}$
 $= \frac{635 \text{ km}}{3.75}$
 $= \underline{\underline{169.3 \text{ km/h}}}$ ✓

c) time = 1.5 + 1.5 + 1
 $= \underline{\underline{4 \text{ hrs}}}$ ✓

d) sp = $\frac{1200}{4}$ vel = $\frac{0}{4}$
 $= \underline{\underline{300 \text{ km/h}}}$ $= \underline{\underline{0 \text{ km/h}}}$ ✓

Q 20



Even if speeds are different, the distance remains the same.

$\therefore v_1 = \frac{d}{t_1} \Rightarrow t_1 = \frac{d}{v_1}$

and $v_2 = \frac{d}{t_2} \Rightarrow t_2 = \frac{d}{v_2}$

$\therefore \text{avg speed} = \frac{\text{total dist}}{\text{total time}}$
 $= \frac{2d}{t_1 + t_2}$

$= \frac{2d}{\frac{d}{v_1} + \frac{d}{v_2}}$
 $= \frac{2d}{\frac{v_2 d + v_1 d}{v_1 v_2}}$

$= \frac{2d \times v_1 v_2}{v_2 d + v_1 d}$

$= \frac{2d v_1 v_2}{d(v_2 + v_1)}$

$\therefore \text{avg speed} = \frac{2 v_1 v_2}{v_1 + v_2}$