Sample Paper 2014 (Set F): Paper 1

Question 8 (50 marks)

Question 8 (a)

Plant 1

Height (day 1) = 16 cm
Height (day 2) = 20 cm (it grows 4 cm each day)

Plant 2

Height (day 1) = 24 cm
Height (day 2) = 27·5 cm (it grows 3·5 cm each day)

Day	Height of Plant 1 (cm)	Height of Plant 2 (cm)
1	16	24
2	20	27·5
3	24	31
4	28	34·5
5	32	38
6	36	41·5
7	40	45

Question 8 (b)

The heights of each plant form an arithmetic sequence.
n is the number of the term in the sequence which is also the day number.
T_n is the value of the nth term which is also the height h of the plant.

Plant 1: $a = 16$, $d = 4$

$T_n = 16 + (n - 1)(4)$
$\quad = 16 + 4n - 4$
$\quad = 4n + 12$
$\therefore h = 4n + 12$

Plant 2: $a = 24$, $d = 3·5$

$T_n = 24 + (n - 1)(3·5)$
$\quad = 24 + 3·5n - 3·5$
$\quad = 3·5n + 20·5$
$\therefore h = 3·5n + 20·5$

Formulae and Tables Book
Sequences and series:
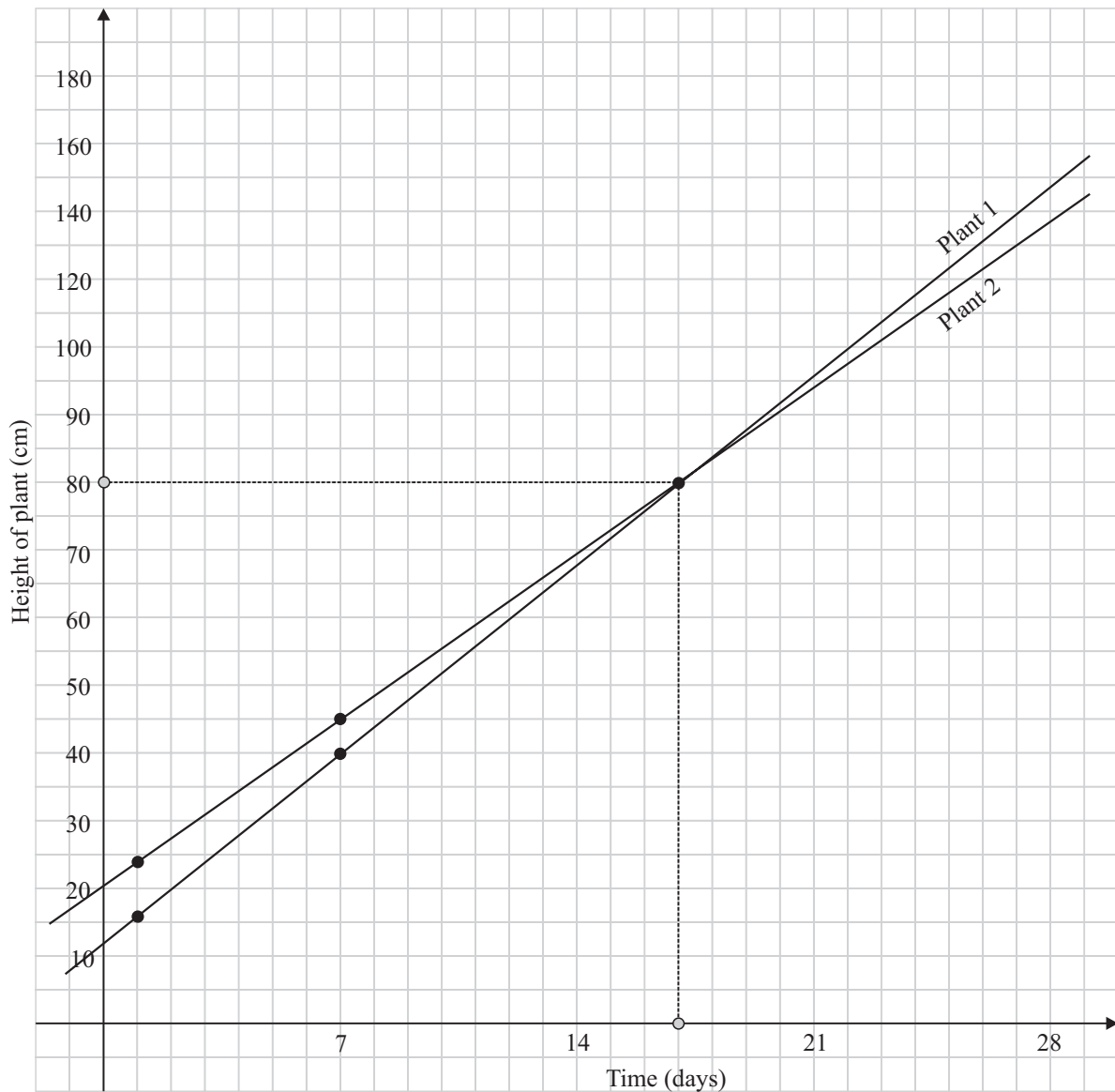**Arithmetic series or**
sequence [page 22]

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

a is the first term
d is the common difference

QUESTION 8 (c)

QUESTION 8 (d)

(i) Point of intersection = (17, 80)

(ii) The point of intersection means that after 17 days both plants have the same height of 80 cm.

QUESTION 8 (e)

Replace n by 17 in each formula and show you get an answer of $h = 80$.

PLANT 1:

$h = 4n + 12$

$h = 4(17) + 12 = 68 + 12 = 80$

PLANT 2:

$h = 3 \cdot 5n + 20.5$

$h = 3 \cdot 5(17) + 20 \cdot 5 = 59 \cdot 5 + 20 \cdot 5 = 80$

QUESTION 8 (f)

Using algebra will always give you the exact answer.

QUESTION 8 (g)

John's model has assumed that each plant grows by the same amount each day which means the graphs will be straight lines. Weather conditions (sun and rain) may alter the rates of growth which means that the graph may not be perfectly straight which will affect the point of intersection.