Ex A·2

Q1 (i) $a = 8 \quad d = 5$

$$T_n = 8 + (n-1)(5)$$
$$= 8 + 5n - 5$$
$$= 3 + 5n$$

(ii) $a = 16 \quad d = 20$

$$T_n = 16 + (n-1)(20)$$
$$T_n = 16 + 20n - 20$$
$$T_n = 20n - 4$$

(iii) $a = 10 \quad d = -3$

$$T_n = 10 + (n-1)(-3)$$
$$= 10 - 3n + 3$$
$$= 13 - 3n$$

Q2 $T_n = 5n - 2$

$$T_1 = 5(1) - 2 = 3$$
$$T_2 = 5(2) - 2 = 8$$
$$T_3 = 5(3) - 2 = 13$$
$$T_4 = 5(4) - 2 = 18$$

$3, 8, 13, 18, \ldots$

Q3 (i) $a = -5 \quad d = 4$

$$T_n = -5 + (n-1)(4)$$
$$= -5 + 4n - 4$$
$$= 4n - 9$$

$$4n - 9 = 75$$
$$4n = 84$$
$$n = 21$$

Q3 (ii) $a = 2 \quad d = 3$

$T_n = 2 + (n-1)(3)$
$= 2 + 3n - 3$
$= 3n - 1$

$3n - 1 = 59$
$3n = 60$
$n = 20$

(iii) $a = -3/2 \quad d = 1/2$

$T_n = -3/2 + (n-1)(\frac{1}{2})$
$= -3/2 + 1/2 n - \frac{1}{2}$
$= \frac{1}{2}n - 2$

$1/2 n - 2 = 14$
$\frac{1}{2} n = 16$
$n = 32$

Q4 (i) $T_1 = 4$
$T_n = a + (n-1)d$
$a = 4$

$T_7 = 22$
$T_7 = 4 + (6)(d) = 22$
$6d = 18$
$d = 3$

(ii) $T_n = 4 + (n-1)(3)$
$T_n = 4 + 3n - 3$
$T_n = 3n + 1$

first 5 Terms are: 4, 7, 10, 13, 16, 19, ...

(iii) $T_{20} = 3(20) + 1$
$= 61$

Q5 Red: 1, 2, 3, - - -
Orange: 8, 10, 12, - - -

Total: 9, 12, 15,

(i) design 8: Red = 8
Orange = 22.

(ii) N°. all totals are divisible by 3 but 38 is not.

Totals: $T_n = 9 + (n-1)(3)$
$T_n = 9 + 3n - 3$
$T_n = 6 + 3n$

$6 + 3n = 38$
$3n = 32$
$n = 32/3$ not a natural N°.

Q6 $T_{13} = 27$ $T_7 = 3T_2$.

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

T_{13}: $a + 12d = 27$

T_7: $a + 6d$ T_2: $a + d$.
$a + 6d = 3a + 3d$
$0 = 2a - 3d$.

$a + 12d = 27$
$2a - 3d = 0$ $(\times 4)$

$a + 12d = 27$
$8a - 12d = 0$
$9a = 27$
$a = 3$

$3 + 12d = 27$
$12d = 24$
$d = 2$

$T_n = 3 + (n-1)(2)$
$= 3 + 2n - 2$
$= 2n + 1$

first 6 Terms: 3, 5, 7, 9, 11, 13 ....

Q7 (i) $2k+2, \quad 5k-3, \quad 6k.$

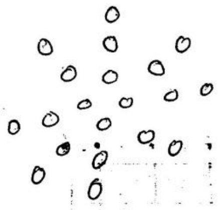
Consecutive terms $\Rightarrow$ differences between them are equal.

$$(5k-3)-(2k+2) = (6k)-(5k-3)$$
$$5k-3-2k-2 = 6k-5k+3$$
$$3k-5 = k+3$$
$$2k = 8$$
$$k = 4$$

(ii) $4p, \quad -3-p, \quad 5p+16.$

$$(-3-p)-(4p) = (5p+16)-(-3-p)$$
$$-3-p-4p = 5p+16+3+p$$
$$-3-5p = 6p+19$$
$$-22 = 11p$$
$$-2 = p$$

Q8



(i) $12, \quad 20, \quad 28, \ldots$

$$T_n = 12+(n-1)8$$
$$= 12+8n-8$$
$$= 8n+4.$$

(ii) $T_{15} = 8(15)+4 = 124$

(iii)
$$8n+4 = 164$$
$$8n = 160$$
$$n = 20$$

Q9 $T_n = 4n - 2$

Arithmetic $\Rightarrow T_{n+1} - T_n =$ a constant.

$[4(n+1) - 2] - [4n - 2]$

$4n + 4 - 2 - 4n + 2$

$= 4$ a constant.

Q10 $T_n = n(n+2)$

Arith $\Rightarrow T_{n+1} - T_n =$ a constant.

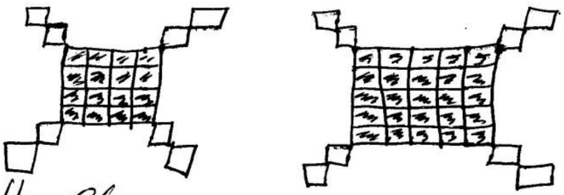
$(n+1)(n+1+2) - n(n+2)$

$(n+1)(n+3) - n^2 + 2n$

$n^2 + 4n + 3 - n^2 - 2n$

$= 2n + 3$ Not a constant $\Rightarrow$ Not Arith

Q11



(i) 8 light tiles.

(ii) Coloured Tiles: $1, 4, 9, 16, 25 \ldots n^2$

7^{th} shape $= 49$ tiles.

(iii) $T_n = 8 + n^2$

(iv) $T_{n+1} - T_n$

$(8 + (n+1)^2) - (8 + n^2)$

$\cancel{8} + \cancel{n^2} + 2n + 1 - \cancel{8} - \cancel{n^2}$

$2n + 1$ not a constant.

Q12

Nº of hex	1	2	3	4	..	...	10	..	...	(20)	...	..	..	30
Perimeter	6	10	(14)	(18)			(42)			82				(122)

~~4n~~

$$T_n = 6 + (n-1)4$$
$$= 6 + 4n - 4$$
$$= 4n + 2$$

(i) $4n + 2 = 87$

$4n = 85$

$n = \frac{85}{4}$ is not a whole Nº

$\therefore$ will have some left over.

(ii) $T_{n+1} - T_n$

$\left(4(n+1) + 2\right) - (4n + 2)$

$4n + 4 + 2 - 4n - 2$

$= 4 \Rightarrow$ a constant $\Rightarrow$ Arith

(iii) New Sequence

6, 12, 18, ... (arith $\Rightarrow d = 6$)

$$T_n = 6 + (n-1)6$$
$$= 6 + 6n - 6$$
$$= 6n.$$

~~6n~~

6, 12, 18, 24, 30, 36 ...

Total Used 6, 18, 36, 60, 90, 126.

$\Rightarrow$ 5 complete levels, using 90, $\Rightarrow$ 32 left over.

Q13 12, 18, 24, ...

$$T_n = 12 + (n-1)6$$
$$= 12 + 6n - 6$$
$$= 6n + 6.$$

$6n + 6 = 60$

$6n = 54$

$n = 9$

Ans: 9^{th} Week