1. For each pattern, given below, write the next three steps :

(i)
$1 \times 9 + 1 = 10$
$12 \times 9 + 2 = 110$
$123 \times 9 + 3 = 1110$
$1234 \times 9 + 4 = 11110$
$12345 \times 9 + 5 = 111110$
$123456 \times 9 + 6 = 1111110$

(ii)
$9 \times 9 + 7 = 88$
$98 \times 9 + 6 = 888$
$987 \times 9 + 5 = 8888$
$9876 \times 9 + 4 = 88888$
$98765 \times 9 + 3 = 888888$
$987654 \times 9 + 2 = 8888888$

(iii)
$1 \times 8 + 1 = 9$
$12 \times 8 + 2 = 98$
$123 \times 8 + 3 = 987$
$1234 \times 8 + 4 = 9876$
$12345 \times 8 + 5 = 98765$
$123456 \times 8 + 6 = 987654$

(iv)
$111 \div 3 = 37$
$222 \div 6 = 37$
$333 \div 9 = 37$
$444 \div 12 = 37$
$555 \div 15 = 37$
$666 \div 18 = 37$

2. Complete each of the following magic squares :

(i)

6	7	2
1	5	9
8	3	4

(ii)

4	10	8
11	7	3
7	4	10

(iii)

16	2	12
7	10	13
7	19	4

3. See the following pattern carefully :

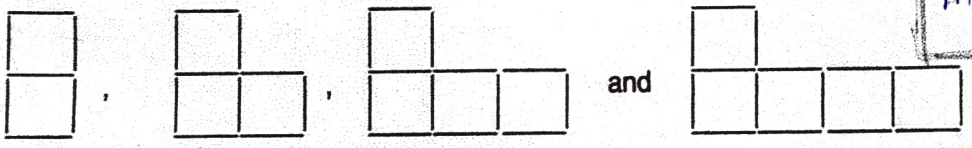


Figure-n	1	2	3	4
matchstick-S	7	10	13	16
		+3	+3	+3

3n	3	6	9	12
S	7	10	13	16

(i) If *n* denotes the number of figures and S denotes the number of matchsticks; find S in terms of *n*.

$S = 3n + 4$

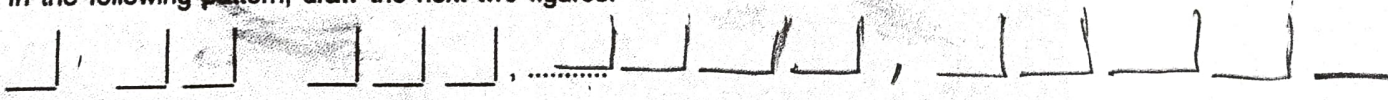
(ii) Find how many matchsticks are required to make the :
(1) 15th figure (2) 40th figure

① 49 ② 124

(iii) Write a discription of the pattern in words,

1st, 2nd, 3rd, 4th

4. (i) In the following pattern, draw the next two figures.



(ii) Construct a table to describe the figures in the above pattern.

(iii) If *n* denotes the number of figures and L denotes the number of matchsticks, find L in terms of *n*.

(iv) Find how many matchsticks are required to make the :
(1) 12th figure (2) 20th figure

4) ii

Figure-n	1	2	3	4	5
Matchstick-L	2	4	6	8	10
		+2	+2	+2	+2

iii

2n	1	2	3	4	5
L	2	4	6	8	10

$L = 2n$

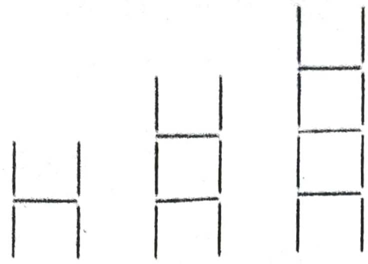
iv 1) 24 2) 40

5. In each of the following patterns, construct the next figure.

(i) In each case, if n denotes the number of figures and F denotes the number of matchsticks used, find F in terms of n.

(ii) Also find, in each case, how many matchsticks are required to make the : 16[th] figure and 30[th] figure.

(a)



Next fg :

a)

(a)

Fig n	1	2	3
Match F	5	8	11

+3 +3

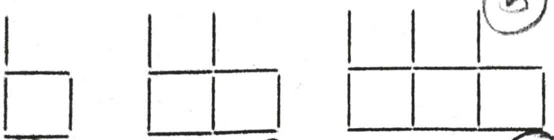
(i)

3n	3	6	9
F	5	8	11

(i) F = 3n + 2

(ii) 16th fg. F = 50 30th fg. F = 92

(b)



b)

(ii) 16th fg. F = 65 30th fg. F = 121

(b)

fig n	1	2	3
Match F	5	9	13

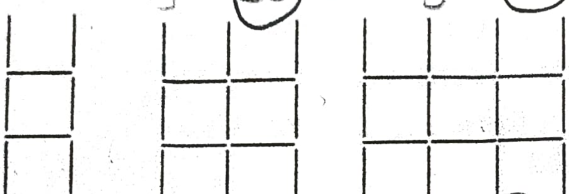
+4 +4

(i)

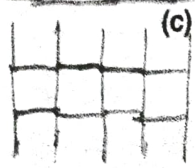
4n	4	8	12
F	5	9	13

F = 4n + 1

(c)



c)



(ii) 16th fg. F = 83 30th fg. F = 153

(c)

fig N	1	2	3
Mat F	8	13	18

+5 +5

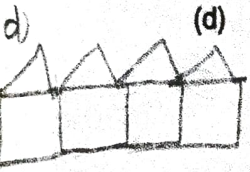
(i)

5n	5	10	15
F	8	13	18

F = 5n + 3

(d)

d)



(ii) 16th fg. F = 81 30th fg. F = 151

(d)

Fg N	1	2	3
MS F	6	11	16

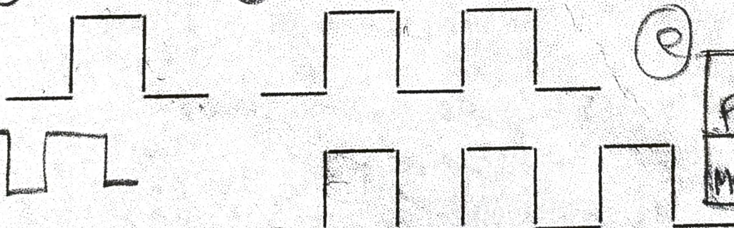
+5 +5

(i)

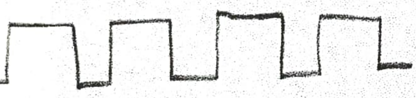
5n	5	10	1[illegible]
F	6	11	16

F = 5n + 1

(e)



e)



(ii) 16th fg. F = 65 30th fg. F = 121

(e)

Fg N	1	2	3
MS F	5	9	13

+4 +4

(i)

4n	4	8	1[illegible]
F	5	9	1[illegible]

F = 4n + 1

(f)

f)

(ii) 16th fg. F = 62 30th fg. F = 118

(f)

Fg N	1	2	3
MS F	2	6	10

+4 +4

(i)

4n	4	8	[illegible]
F	2	6	[illegible]

F = 4n − 2