

EXERCISE 5(F)

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

- (i) $1 \times 9 + 1 = 10$
 $12 \times 9 + 2 = 110$
 $123 \times 9 + 3 = 1110$
- (ii) $9 \times 9 + 7 = 88$
 $98 \times 9 + 6 = 888$
 $987 \times 9 + 5 = 8888$
- (iii) $1 \times 8 + 1 = 9$
 $12 \times 8 + 2 = 98$
 $123 \times 8 + 3 = 987$
- (iv) $111 \div 3 = 37$
 $222 \div 6 = 37$
 $333 \div 9 = 37$

Solution:

- (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) $9 \times 9 + 7 = 88$
 $987 \times 9 + 6 = 888$
 $9876 \times 9 + 5 = 8888$
 $9876 \times 9 + 4 = 88888$
 $98765 \times 9 + 3 = 888888$
 $987654 \times 9 + 2 = 8888888$
- (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	.....
.....	5	9
8	.....	4

(ii)

4	.....	8
.....	7	.....
.....	.....	10

(iii)

16	2	.....
.....	10	.....
.....	.....	4

Solution:

(i) Sum for row-wise is as follows

$$6 + 7 + 2 = 15$$

$$1 + 5 + 9 = 15$$

$$8 + 3 + 4 = 15$$

Sum for column wise is as follows

$$6 + 1 + 8 = 15$$

$$7 + 5 + 3 = 15$$

$$2 + 9 + 4 = 15$$

Sum for diagonal wise is as follows

$$6 + 5 + 4 = 15$$

$$2 + 5 + 8 = 15$$

Hence, the magic square is

6	7	2
1	5	9
8	3	4

(ii) Row wise sum is as follows:

$$4 + 9 + 8 = 21$$

$$11 + 7 + 3 = 21$$

$$6 + 5 + 10 = 21$$

Column wise sum is as follows

$$4 + 11 + 6 = 21$$

$$9 + 7 + 5 = 21$$

$$8 + 3 + 10 = 21$$

Diagonal wise sum is as follows

$$4 + 7 + 10 = 21$$

$$8 + 7 + 6 = 21$$

Hence, the magic square is

4	9	8
11	7	3
6	5	10

(iii) Row wise sum is as follows

$$16 + 2 + 12 = 30$$

$$6 + 10 + 14 = 30$$

$$8 + 18 + 4 = 30$$

Column wise sum is as follows

$$16 + 6 + 8 = 30$$

$$2 + 10 + 18 = 30$$

$$12 + 14 + 4 = 30$$

Diagonal wise sum is as follows

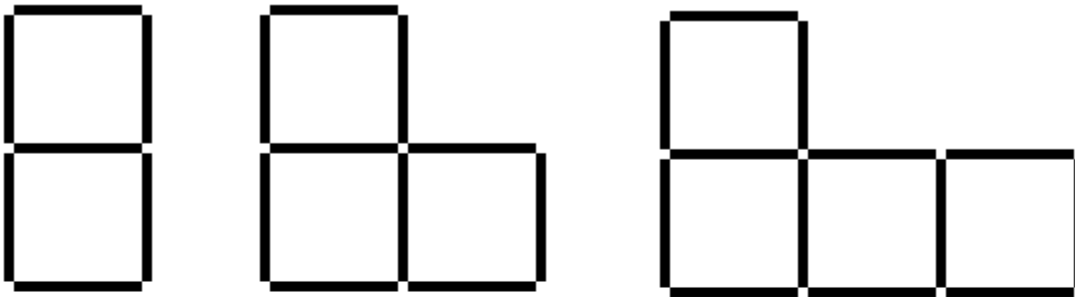
$$16 + 10 + 4 = 30$$

$$12 + 10 + 8 = 30$$

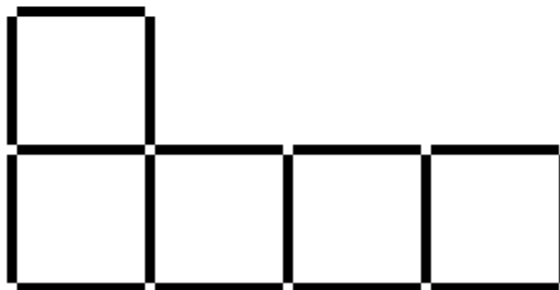
Hence, the magic square is

16	2	12
6	10	14
8	18	4

3. See the following pattern carefully:



and



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

(ii) Find how many matches are required to make the:

(1) 15th figure

(2) 40th figure

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

Solution:

The table is

n	1	2	3	4
S	7	10	13	16

$$S = 3n + 4$$

(ii) (1) 15th figure has $= 3 \times 15 + 4$
 $= 49$ matches

(2) 40th figure has = $3 \times 40 + 4$
= 124 matches

(iii) It is clear that each time the figure (n) is increased by 4, the number of matches (S) are increased by 3.

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.

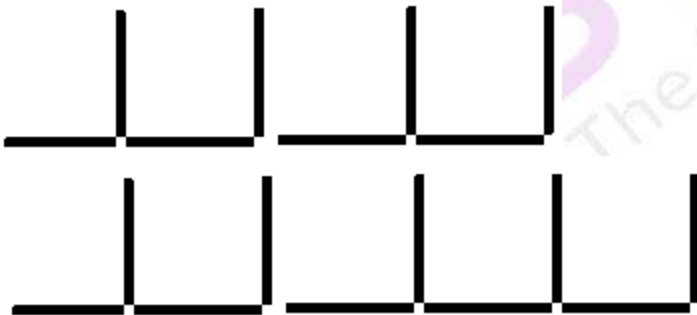
(iv) Find how many matchsticks are required to make the:

(1) 12th figure

(2) 20th figure

Solution:

(i)



(ii) The table is

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

(iii) Hence, the value of L is

$$L = 2n$$

(iii) (1) Number of matchsticks in 12th figure = 2×12

$$= 24$$

(2) Number of matchsticks in 20th figure = 2×20

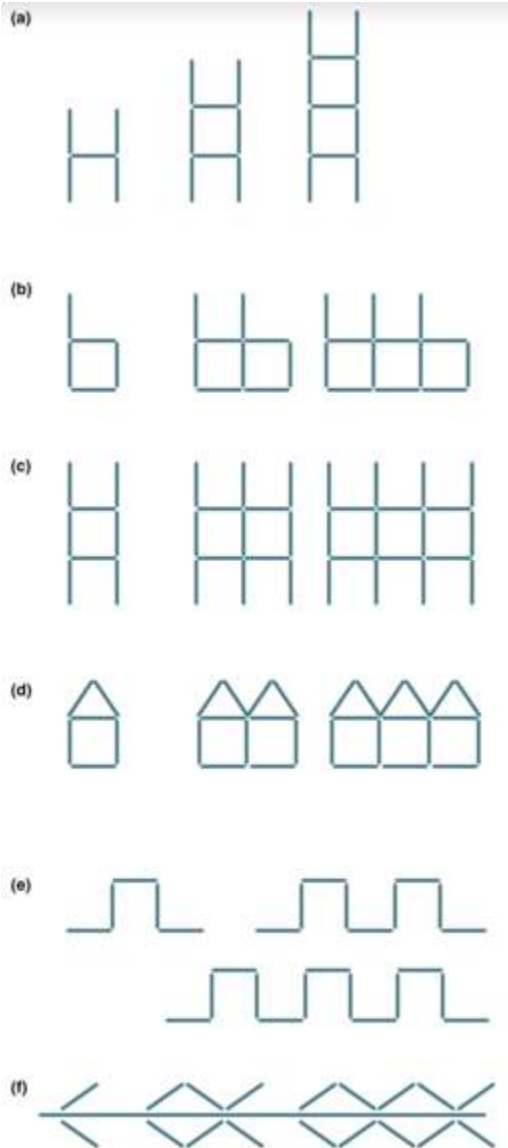
$$= 40$$

5. In each of the following patterns, construct 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:
16th figure and 30th figure.



Solution:

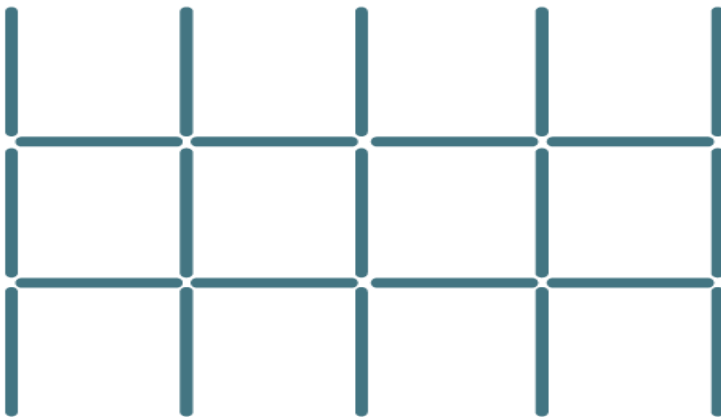
(a)



(b)



(c)



(d)



(e)



(f)



(i) (a) $F = 3n + 2$

(b) $F = 4n + 1$

(c) $F = 5n + 3$

(d) $F = 5n + 1$

(e) $F = 4n + 1$

(f) $F = 4n - 2$

16th figure

(a) $3 \times 16 + 2$

$= 48 + 2$

$= 50$

(b) $F = 4 \times 16 + 1$

$= 64 + 1$

$= 65$

(c) $F = 5 \times 16 + 3$

$= 80 + 3$

$= 83$

(d) $F = 5 \times 16 + 1$

$= 80 + 1$

$= 81$

$$\begin{aligned} \text{(e) } F &= 4 \times 16 + 1 \\ &= 64 + 1 \\ &= 65 \end{aligned}$$

$$\begin{aligned} \text{(f) } F &= 4 \times 16 - 2 \\ &= 64 - 2 \\ &= 62 \end{aligned}$$

30th figure

$$\begin{aligned} \text{(a) } F &= 3 \times 30 + 2 \\ &= 90 + 2 \\ &= 92 \end{aligned}$$

$$\begin{aligned} \text{(b) } F &= 4 \times 30 + 1 \\ &= 120 + 1 \\ &= 121 \end{aligned}$$

$$\begin{aligned} \text{(c) } F &= 5 \times 30 + 3 \\ &= 150 + 3 \\ &= 153 \end{aligned}$$

$$\begin{aligned} \text{(d) } F &= 5 \times 30 + 1 \\ &= 150 + 1 \\ &= 151 \end{aligned}$$

$$\begin{aligned} \text{(e) } F &= 4 \times 30 + 1 \\ &= 120 + 1 \\ &= 121 \end{aligned}$$

$$\begin{aligned} \text{(f) } F &= 4 \times 30 - 2 \\ &= 120 - 2 \\ &= 118 \end{aligned}$$