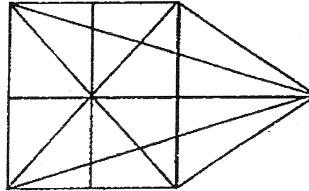


## 10. Analytical Reasoning

The chapter on Analytical Reasoning involves the problems relating to the counting of geometrical figures in a given complex figure. The systematic method for determining the number of any particular type of figure by the analysis of the complex figure would be clear from the examples that follow.

### Solved examples

**Ex.1** What is the number of straight lines in the following figure?



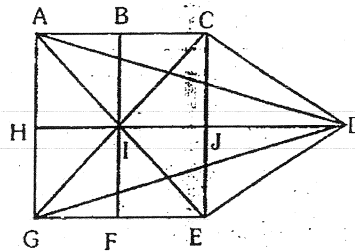
(1) 10

(2) 12

(3) 13

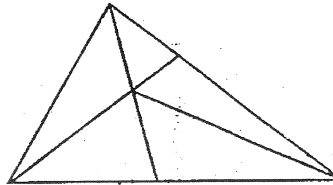
(4) 17

**Sol.** We shall label the figure as shown below:



Clearly, in this figure : There are 3 horizontal lines namely AG, BF and CE. There are 3 vertical lines namely AC, HD and GE. There are 6 slanting lines namely AD, AE, GC, GD, CD and CE. Thus, there are  $3 + 3 + 6 = 12$  straight lines in all. Hence, the answer is (2).

**Ex.2** How many triangles are there in the following figure?



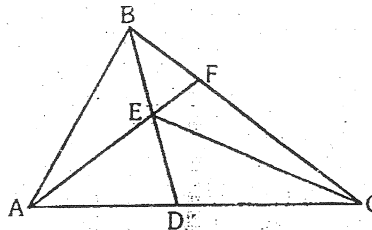
(1) 6

(2) 10

(3) 11

(4) 12

**Sol.** The figure may be labelled as shown below:



The simplest triangles are ABE, BEF, EFC, CDE and AED i.e. 5 in number.

The triangles composed of two components each are ABF, BCE, ACE and ABD i.e. 4 in number.

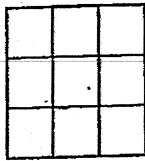
The triangles composed of three components each are AFC and BCD i.e. 2 in number. There is only one triangle ABC composed of five components.

Thus, there are  $5 + 4 + 2 + 1 = 12$  triangles in the figure.

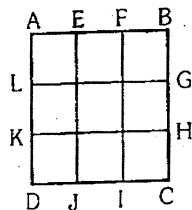
Hence, the answer is (4).

**Ex.3** Count the number of squares in the following figure:

- (1) 18  
(2) 14  
(3) 10  
(4) 9



**Sol.** We shall label the figure as shown below:



The simplest squares are AEML, EFNM, FBGN, NGHO, MNOP, LMPK, KPJD, POIJ and OHCI i.e. 9 in number.

The squares composed of four components each are AFOK, EBHP, LNID and MGCJ i.e. 4 in number.

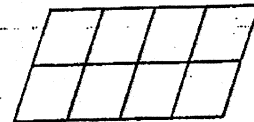
There is only one square i.e. ABCD composed of nine components.

Thus, there are  $9 + 4 + 1 = 14$  squares in the figure.

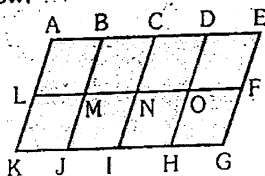
Hence, the answer is (2).

**Ex.4** How many parallelograms are there in the following figure?

- (1) 20  
(2) 24  
(3) 28  
(4) 30



**Sol.** We shall label the figure as shown below:



The simplest || gms are ABML, BCNM, CDON, DEFO, OFGH, NOHI, MNIJ and LMJK i.e. 8 in number.

The || gms composed of two components each are ACLN, BDOM, CEFN, LNIK, MOHJ, NFGI, ABJK, BCIJ, CDHI and DEGH i.e. 10 in number.

The || gms composed of three components each are ADOL, BEFM, LOHK and MFGJ i.e. 4 in number.

The || gms composed of four components each are AEFL, LFGK, ACIK, BDHJ and CEGI i.e. 5 in number.

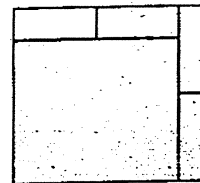
The || gms composed of six components each are ADHK and BEGJ i.e. 2 in number. AEGK is the only || gm composed of eight components.

$\therefore$  Total number of parallelograms in the figure =  $8 + 10 + 4 + 5 + 2 + 1 = 30$ .

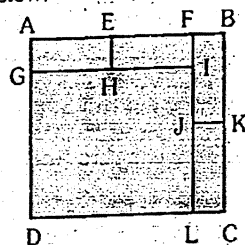
Hence, the answer is (4).

**Ex.5** What is the number of rectangles in the following figure?

- (1) 6  
(2) 7  
(3) 9  
(4) 11



**Sol.** The figure may be labelled as shown below:

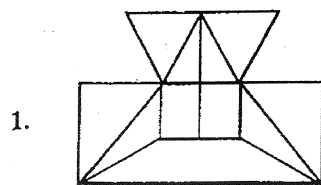


The simplest rectangles are AEHG, EFJH, FBKJ, JKCL and GILD i.e. 5 in number. The rectangles composed of two components each are AFJG and FBCL i.e. 2 in number.

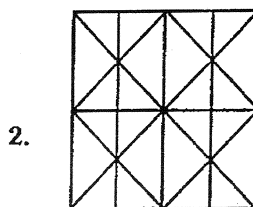
Only one rectangle namely AFLD is composed of three components and only one rectangle namely ABCD is composed of five components. Thus, there are  $5 + 2 + 1 + 1 = 9$  rectangles in the given figure. Hence, the answer is (3).

## EXERCISE

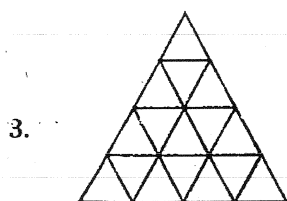
**Directions (Q.1 to Q.4) :** In each of the following questions, find the minimum number of straight lines required to make the given figure.



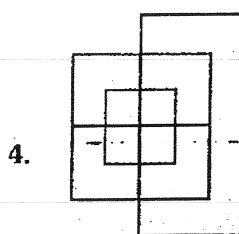
- (1) 16                      (2) 17  
(3) 18                      (4) 19



- (1) 11                      (2) 14  
(3) 16                      (4) 17

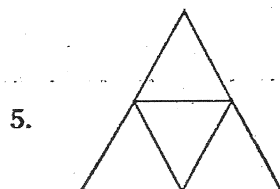


- (1) 9                      (2) 12  
(3) 15                      (4) 16

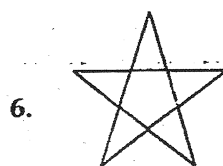


- (1) 13                      (2) 15  
(3) 17                      (4) 19

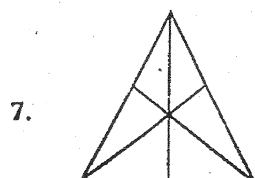
**Directions (Q.5 to Q.8) :** In each of the following questions, find the number of triangles in the the given figure.



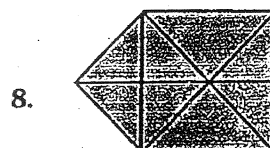
- (1) 4                      (2) 5  
(3) 6                      (4) 7



- (1) 5                      (2) 6  
(3) 8                      (4) 10

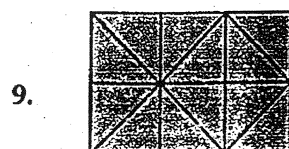


- (1) 16                      (2) 13  
(3) 9                      (4) 7

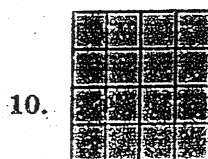


- (1) 15                      (2) 16  
(3) 17                      (4) 18

**Directions (Q.9 to Q.12) :** In each of the following questions, count the number of squares in the given figure.

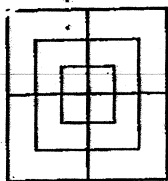


- (1) 6                      (2) 7  
(3) 9                      (4) 10



- (1) 32                      (2) 30  
(3) 29                      (4) 28

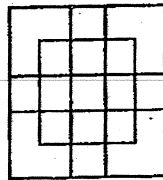
11.



- (1) 8  
(3) 15

- (2) 12  
(4) 18

12.

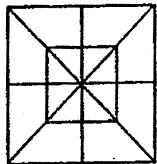


- (1) 18  
(3) 25

- (2) 19  
(4) 27

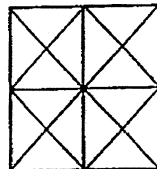
**Directions (Q.13 to Q.16) :** In each of the following questions, count the number of triangles and squares in the given figure.

13.



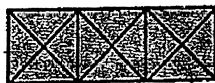
- (1) 28 triangles, 10 squares  
(2) 28 triangles, 8 squares  
(3) 32 triangles, 10 squares  
(4) 32 triangles, 8 squares

14.



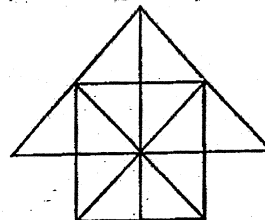
- (1) 44 triangles, 10 squares  
(2) 14 triangles, 16 squares  
(3) 27 triangles, 6 squares  
(4) 36 triangles, 9 squares

15.



- (1) 28 triangles, 3 squares  
(2) 24 triangles, 5 squares  
(3) 28 triangles, 5 squares  
(4) 24 triangles, 3 squares

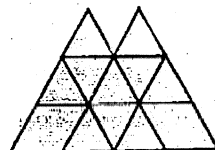
16.



- (1) 26 triangles, 5 squares  
(2) 28 triangles, 5 squares  
(3) 28 triangles, 6 squares  
(4) 26 triangles, 6 squares

**Directions (Q.17 to Q.20) :** In each of the following questions, count the number of parallelograms in the given figure.

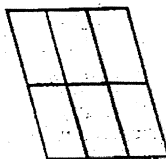
17.



- (1) 23  
(3) 21

- (2) 22  
(4) 18

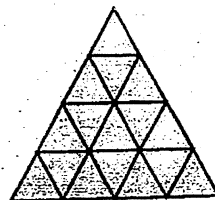
18.



- (1) 20  
(3) 18

- (2) 18  
(4) 12

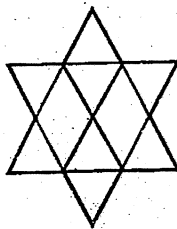
19.



- (1) 47  
(3) 41

- (2) 45  
(4) 39

20.



- (1) 8  
(3) 12

- (2) 11  
(4) 15

## EXERCISE

## ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	2	2	2	1	2	4	1	3	3	2	3	4	3	1	3	3	1	2	2	4