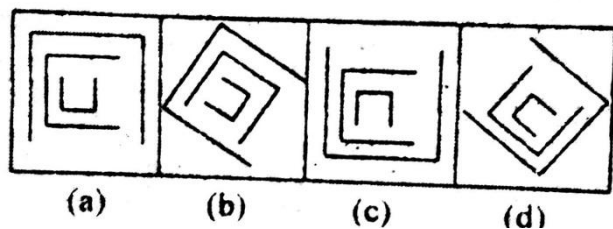


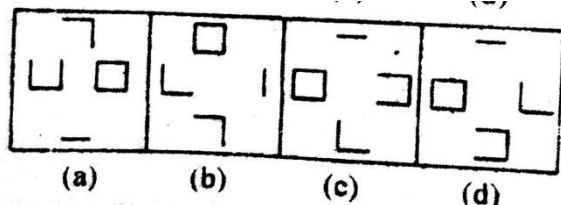
### EXERCISE

**DIRECTIONS (Qs. 1-3):** Choose the figure which is different from the others.

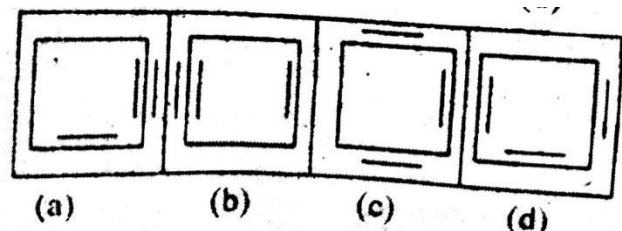
1.



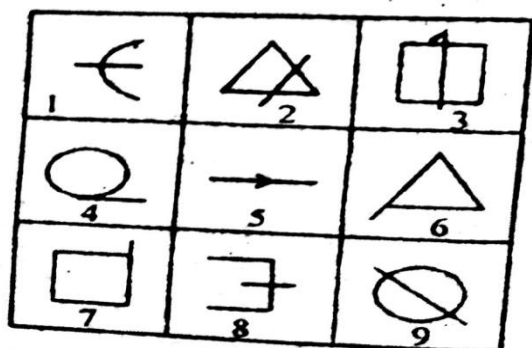
2.



3.



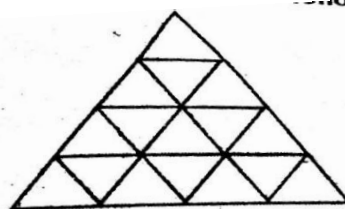
4. Group the following figures into three classes on the basis of identical properties.



- (a) 1, 3, 9; 2, 5, 8; 4, 6, 7  
(b) 4, 8, 9; 1, 2, 5; 3, 6, 7  
(c) 2, 5, 9; 1, 3, 8; 2, 6, 7

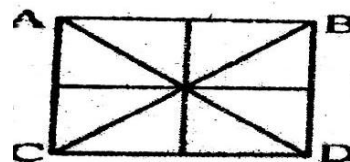
(d) 1, 8, 9; 4, 6, 7; 2, 3, 5

5. How many triangles are there in the following figure?



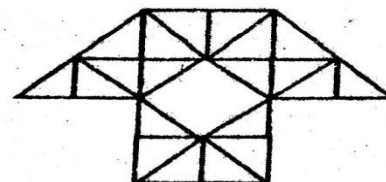
- (a) 29  
(b) 27  
(c) 23  
(d) 30

6. How many triangles are there in the given figure?



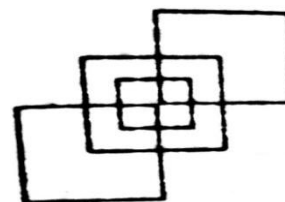
- (a) 16  
(b) 14  
(c) 8  
(d) 12

7. How many triangles are there in the given figure?



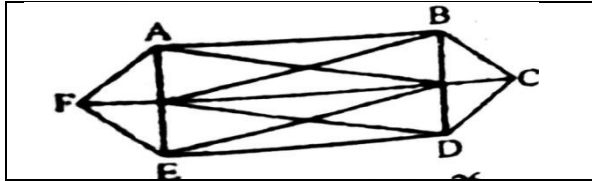
- (a) 29  
(b) 38  
(c) 40  
(d) 35

8. How many squares are there in the given figure?

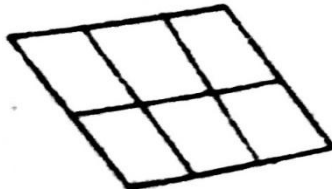


- (a) 12  
(b) 13  
(c) 10  
(d) 11

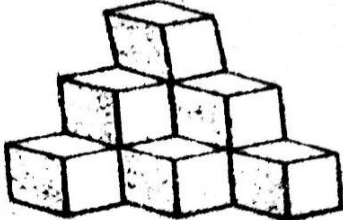
9. How many triangles are there in the given figure ABCDEF?



- (a) 24 (b) 26  
(c) 28 (d) 30  
10. How many Parallelograms are there in the given figure?

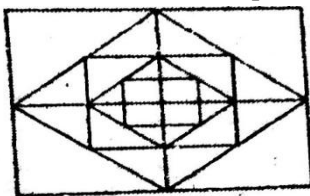


- (a) 14 (b) 15  
(c) 16 (d) 18  
11. How many cubes are there in the given figure?



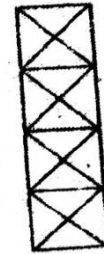
- (a) 6 (b) 10  
(c) 12 (d) 8

12. What is the number of squares in figure?

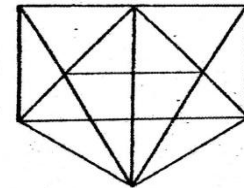


- (a) 12 (b) 13  
(c) 15 (d) 17

13. What is the number of triangles in figure?



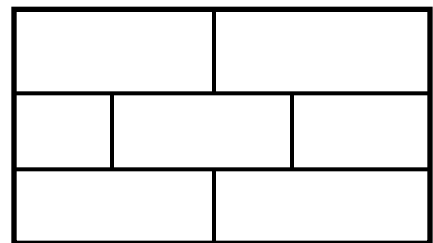
- (a) 16 (b) 28  
(c) 32 (d) 38  
14.



- How many triangles are there?

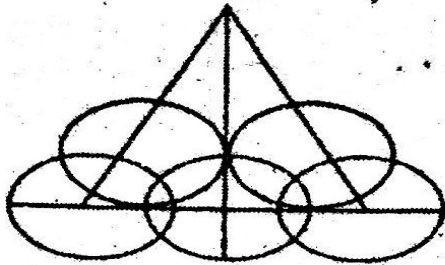
- (a) 20 (b) 21  
(c) 26 (d) 28

15. How many Rectangles are there in the given figure?



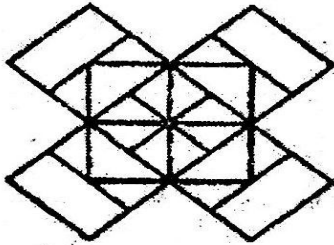
- (a) 13 (b) 14  
(c) 15 (d) 17

16. How many Semicircles are there in the given figure?



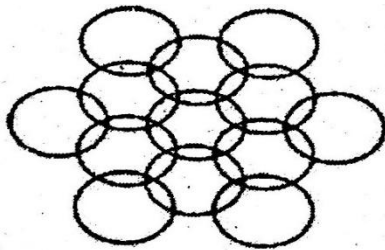
- (a) 16 (b) 14  
(c) 12 (d) 10

17. Count the number of squares in the given figure.



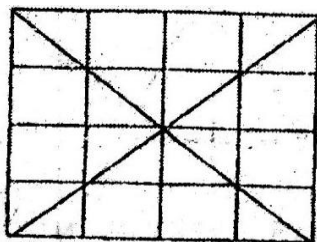
- (a) 22 (b) 20  
(c) 18 (d) 14

18. How many circles are there in the adjoining figure.



- (a) 11 (b) 12  
(c) 13 (d) 14

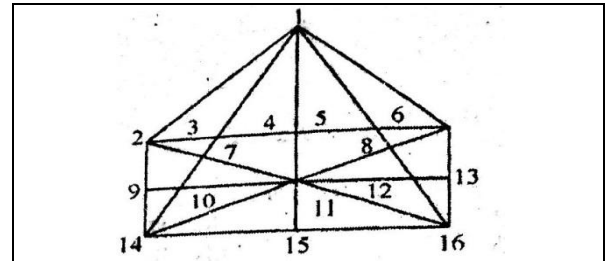
19. What is the number of triangles in figure?



- (a) 32  
(c) 40  
20.

- (b) 36  
(d) 56

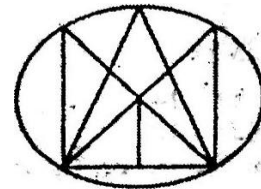
What is the number of triangles in figure?



- (a) 32  
(c) 46

- (b) 39  
(d) 60

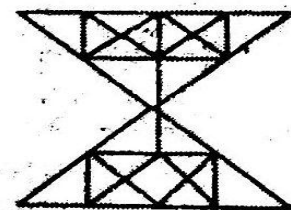
21. How many triangles are there in the given figure?



- (a) 10  
(c) 14

- (b) 12  
(d) 11

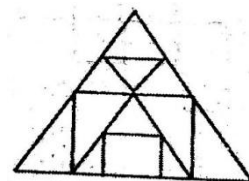
22. How many triangles are there in the given figure?



- (a) 48  
(c) 56

- (b) 60  
(d) 52

23. Find out the number of triangles in the given figure.



- (a) 13  
(c) 16

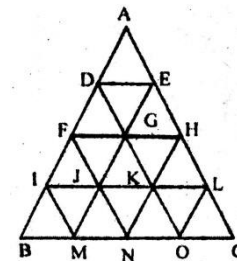
- (b) 15  
(d) 17

### ANSWER KEY

1	(a)	5	(b)	9	(c)	13	(d)	17	(c)	21	(c)
2	(b)	6	(a)	10	(c)	14	(d)	18	(c)	22	(c)
3	(c)	7	(c)	11	(b)	15	(a)	19	(d)	22	(c)
4	(d)	8	(c)	12	(d)	16	(c)	20	(d)		

### HINTS & EXPLANATIONS

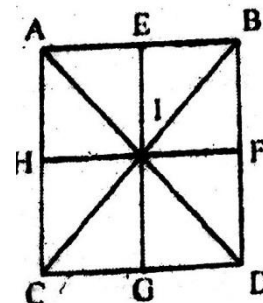
- (a) All other figures can be rotated into each other. (In each figure except fig. (a) the middle element is obtained by rotating the outer element through  $90^\circ$  CW and the inner element is obtained by rotating the middle element through  $90^\circ$  CW).
- (b) Each one of the figure except fig. (b), contains- one complete square, one cup-shaped element having side, one 'L'-shaped element having two sides and one straight line.
- (c) In all other figures, the square has two line segments insides and one inside and one line segment outside.
- (d) 1, 8, 9 are figure bisected by a straight line.  
4, 6, 7 are figures having an extended arm.  
2, 3, 5 are figures intersected by a line.  
Thus the given figure containing nine figures may be divided into three pairs: (1, 8, 9), (4, 6, 7) and (2, 3, 5). Hence the answer is (d).
- (b)



The triangles are:

$\triangle ABC$ ;  $\triangle ADE$ ;  $\triangle AFH$ ;  $\triangle AIL$ ;  
 $\triangle DFG$ ;  $\triangle DIK$ ;  $\triangle DBO$ ;  $\triangle GDE$ ;  
 $\triangle EGH$ ;  $\triangle EIL$ ;  $\triangle EMC$ ;  $\triangle FIJ$ ;  
 $\triangle FBN$ ;  $\triangle JFG$ ;  $\triangle GJK$ ;  $\triangle KGH$ ;  
 $\triangle HKL$ ;  $\triangle HNC$ ;  $\triangle NFH$ ;  $\triangle GMO$ ;  
 $\triangle IBM$ ;  $\triangle MIJ$ ;  $\triangle JMN$ ;  $\triangle NJK$ ;  
 $\triangle KNO$ ;  $\triangle OKL$ ;  $\triangle LOC$ ;

- (a)

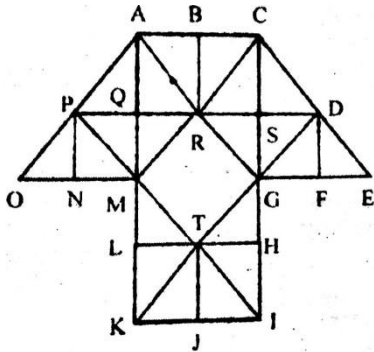


The triangles are;

$\triangle AEH$ ;  $\triangle AIE$ ;  $\triangle EIB$ ;  $\triangle BFI$ ;  
 $\triangle IHC$ ;  $\triangle IGC$ ;  $\triangle IGD$ ;  $\triangle DFI$ ;

$\triangle IAB$ ;  $\triangle IBD$ ;  $\triangle ICD$ ;  $\triangle IAC$ ;  
 $\triangle BAC$ ;  $\triangle ACD$ ;  $\triangle BDC$ ;  $\triangle BDA$ ;

7. (c)



The simplest triangles are:

$\triangle PNO$ ;  $\triangle PNM$ ;  $\triangle MPQ$ ;  
 $\triangle MQR$ ;  $\triangle AQP$ ;  $\triangle AQR$ ;  
 $\triangle BRA$ ;  $\triangle BRC$ ;  $\triangle SRC$ ;  
 $\triangle SCD$ ;  $\triangle SGR$ ;  $\triangle SGD$ ;  
 $\triangle DFG$ ;  $\triangle DFE$ ;  $\triangle TLM$ ;  
 $\triangle TJK$ ;  $\triangle TLK$ ;  $\triangle TIH$ ;

The triangles composed of two components are:

$\triangle PON$ ;  $\triangle PMA$ ;  $\triangle APR$ ;  
 $\triangle RAM$ ;  $\triangle RAC$ ;  $\triangle RGC$ ;  
 $\triangle DGC$ ;  $\triangle DGE$ ;  $\triangle MPR$ ;  
 $\triangle GRD$ ;  $\triangle DGE$ ;  $\triangle TMK$ ;  
 $\triangle TKI$ ;  $\triangle TIG$

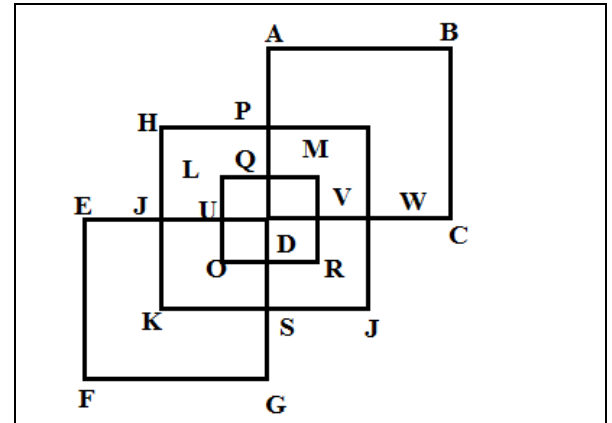
The triangles Composed of four components are:

$\triangle AMO$ ;  $\triangle AMC$ ;  $\triangle CAG$ ;  
 $\triangle CGE$ ;  $\triangle MKI$ ;  $\triangle GIK$ ;

Other triangles are:  $\triangle SPI$ ;  $\triangle DQK$

Total number of triangles  $18 + 14 + 6 + 2 = 40$

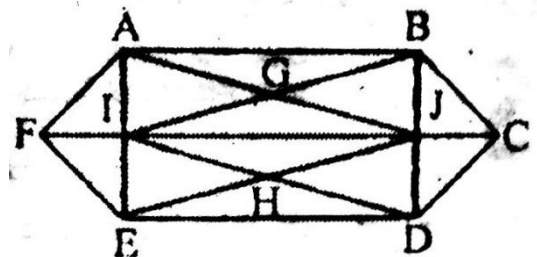
8. (a)



Squares are:

ABCP, DEFG, HIJK, LMNO,  
HPDT, TDSK, PIWD, DWJS,  
LQDU, UDRO, QMVD, DVNR.

9. (c)

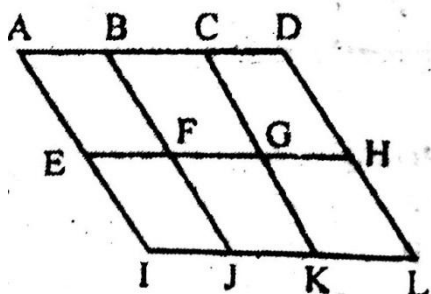


The triangles are:

$\triangle FAE$ ;  $\triangle FAI$ ;  $\triangle FIE$ ;  $\triangle CBD$ ;  
 $\triangle CBJ$ ;  $\triangle CJD$ ;  $\triangle AIJ$ ;  $\triangle BJI$ ;  
 $\triangle BJA$ ;  $\triangle AIB$ ;  $\triangle IED$ ;  $\triangle IDE$ ;  
 $\triangle JDI$ ;  $\triangle IEJ$ ;  $\triangle GAB$ ;  $\triangle GAI$ ;  
 $\triangle GJI$ ;  $\triangle GJB$ ;  $\triangle HJI$ ;  $\triangle HDE$ ;  
 $\triangle HEI$ ;  $\triangle HJD$ ;  $\triangle AJF$ ;  $\triangle DEFJ$ ;  
 $\triangle BCI$ ;  $\triangle CDI$ ;  $\triangle IBD$ ;  $\triangle JEA$ ;

10. (c) We can label the figure as shown.





The simplest parallelogram are ABFE, BCGF, CDHG, EFJI, FGKJ and GHLK. These are 6 in number.

The parallelograms composed of two components each, are ACGE, BDHF, EGKI, FHLJ, ABJI, BCKJ and CDLK. Thus, there are 7 such parallelograms. The parallelogram composed of four components each are ACKI and BDLJ i.e. 2 in number. There is only one parallelogram composed of six components, namely, ADLI. Thus, there are  $6 + 7 + 2 + 1 = 16$  parallelograms in the figure.

11. (b) There are 10 cubes.

12. (d) We have three squares with vertical and horizontal sides. Each such square has  $1^2 + 2^2 = 5$  squares in it.

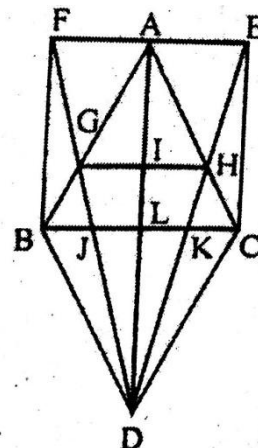
Thus there are 15 such squares.

In addition, we have two obliquely placed squares. Hence total no. of squares = 17

13. (d) Each small square is bisected by its diagonals to give 4 triangles of half the size of the square and 4 triangles of  $1/4$ th the size of the square.

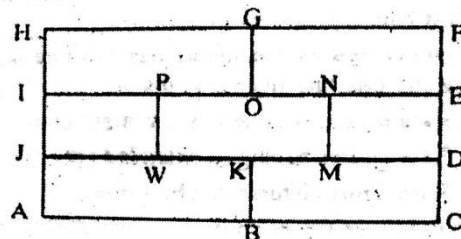
Thus there are  $8 \times 4 = 32$  triangles in the four squares. Then there are six triangles as shown in the adjoining figure. Total no. of triangles =  $32 + 6 = 38$

14. (d)

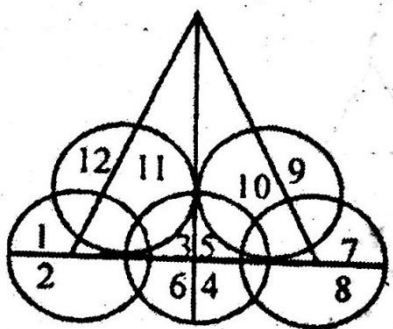


$\Delta FDE, \Delta ACD, \Delta ABD,$   
 $\Delta FBD, \Delta ABC, \Delta BCD,$   
 $\Delta BKD, \Delta BLD, \Delta BJD,$   
 $\Delta JCD, \Delta JKD, \Delta LDJ, \Delta LCD,$   
 $\Delta LKD, \Delta HDC, \Delta KDC, \Delta EDC,$   
 $\Delta HKC, \Delta EKC, \Delta AEC, \Delta EHC,$   
 $\Delta AEH, \Delta AGH, \Delta AIH, \Delta AGI,$   
 $\Delta AFB, \Delta AGF, \Delta FBG.$

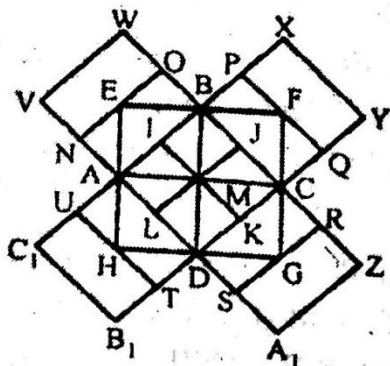
15. (a) The rectangles are—  
ABKJ, BCDK, JLPI, LMNP,  
MDEN, IOGH, OEFG, ACDJ,  
JMNI, LDEP, JDEI, IERH, ACFH



16. (c) According to the figure there are 12 semicircles.



17. (c) The figure may be labelled as shown.



The squares composed of two components each are BJM1, CK.MJ, DLMK and AIML i.e. 4 in number.

The squares composed of three components each are EBMA, BFCM, MCGD and AMDH i.e. 4 in number.

The squares composed of four components each are VWBA, XYCB, ZAIDC and BICIAD i.e. 4 in number.

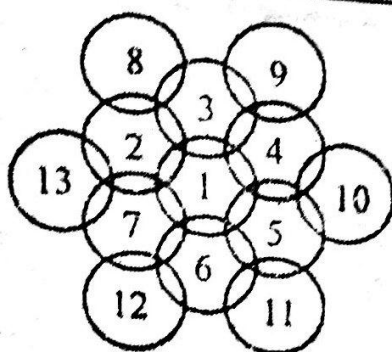
The squares composed of seven components each are NOJL, PQKI, RSLJ and TUIK i.e. 4 in number. There is only one square i.e. ABCD composed of eight components.

There is only one square i.e. EFGH composed of twelve components.

Total number of squares in the figure

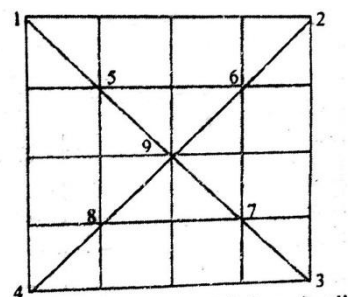
$$= 4 + 4 + 4 + 4 + 1 + 1 = 18.$$

18. (c) The figure may be labelled as shown.



There are 13 circles in the given figure. This is clear from the adjoining figure in which the centres of all the circles in the given figure have been numbered from 1 to 13.

19. (d) With vertex no. 1 we have four triangles on one side of the diagonal and four triangles on the other side.



Thus front four vertices. We have in all  $4 \times 8 = 32$  triangles.

Next consider square (5 - 6 - 7 - 8).

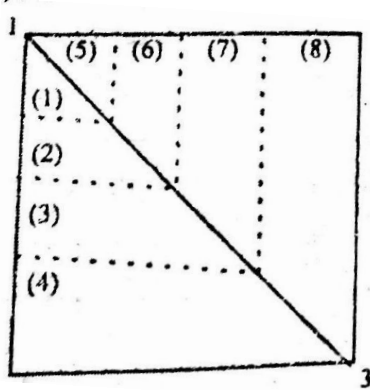
There are four triangles from each vertex.

Thus we have another  $4 \times 4 = 16$  triangles.

Lastly, we have oblique triangles with vertex 9 such as (9-6-7), (9-2-3) and so on.

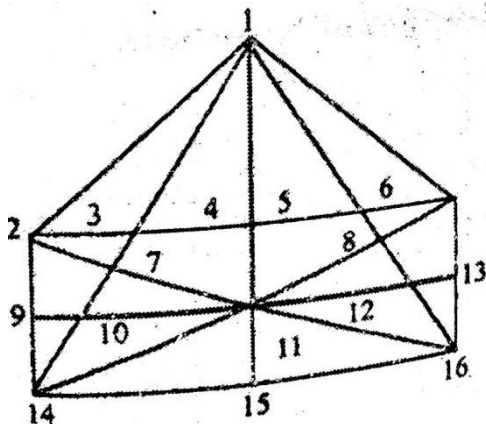
There are 8 such triangles.

Hence, total no. of triangles =  $32 + 16 + 8 = 56$



20. (d) Within the triangle with vertices 1, 2, 6, there are  $4 + 3 + 2 + 1 = 10$  triangles. In the triangle with vertices 1, 2, 14 there are 6 triangles.

In the triangle with vertices 1, 14, 15 there are 8 triangles.



This pattern is repeated for triangle 1, 6, 16 and for triangle 1, 15, 16.

In the triangle with vertices 1, 6, 14 there are 3 triangles and the pattern is repeated for the triangle with vertices 1, 2, 16.

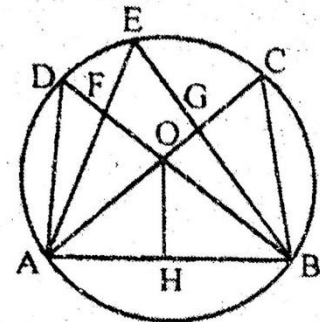
In the parallelogram, there are 4 triangles each half the size, 4 triangles of quarter size and 6 triangles each made up of two small triangles.

Finally, there two triangles with vertices 1, 10, 12 and 1, 14, 16 respectively

Hence total no. of triangles.

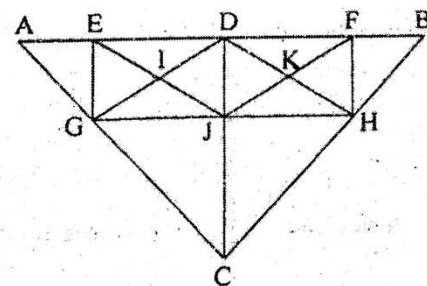
$$= 10 + 2(6 + 8) + 2 \times 3 + (4 + 4 + 6) + 2 = 60$$

21. (c)



There 14 triangles in the given figure. These are AHO, ACB, BHO, BAD, ABE, ABD, BAF, ABG, AOF, AFD, BOG, BGC, ADO and BOC.

22. (c)



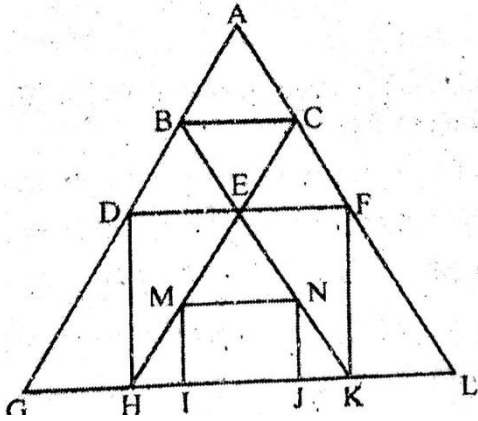
$\triangle ABC, \triangle ADC, \triangle DBC, \triangle AEG, \triangle BFH$

$\triangle EIG, \triangle EID, \triangle IGJ, \triangle IDJ$

$\triangle DKJ, \triangle DFK, \triangle KJH, \triangle KFH, \triangle EDG, \triangle DJG, \triangle EGJ, \triangle DJG, \triangle DFJ, \triangle FJH, \triangle DHJ, \triangle DFH, \triangle ADG, \triangle DGH, \triangle DBH, \triangle JEF, \triangle GJC, \triangle HJC, \triangle GHC = 28$  Triangles  $28 \times 2 = 56$  Triangles.

23. (c)





$\triangle ABC, \triangle BDE, \triangle BCE, \triangle CEF, \triangle ADF,$   
 $\triangle DGH, \triangle DEH, \triangle MHI, \triangle EMN, \triangle NKJ,$   
 $\triangle FKE, \triangle EHK, \triangle AGL, \triangle FKL, \triangle CHL, \triangle BGK$   
Number of Triangles = 16

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