8 Counting of Geometrical Patterns

If rectangle is divided into n parts horizontally and m parts vertically, the total number of rectangles (including the squares).

Formed $= \dfrac{mn(m+1)(n+1)}{4}$

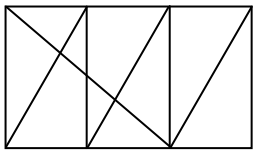
Intersection of diagonals in a square, rectangle, quadrilateral, parallelogram, rhombus, and trapezium gives eight triangles.

Note

Sacred geometry involves sacred universal patterns used in the design of everything in our reality, most often seen in sacred architecture and sacred art. The basic belief is that geometry and mathematical ratios, harmonics and proportion are also found in music, light, cosmology.

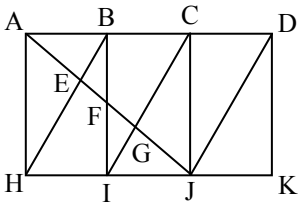
This value system is seen as widespread even in prehistory, a cultural universal of the human condition. In order to count the figures accurately, we should follow a systematic method.

Example 1. How many triangles are there in the following figure?



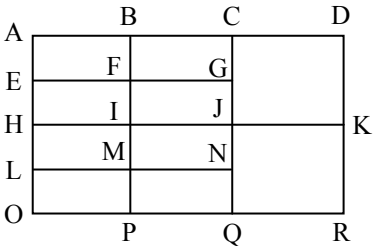
a. 15 **b.** 19 **c.** 17 **d.** 20

Solution: (b) First label the figure as shown below and then cont the triangles. There are totally 19 triangles.



AEH	AEB	EBF	ABH	BHI
FGI	GJC	GIJ	BIC	AJC
CIJ	CJD	JDK	AJH	AJD
EHJ	FIJ	AFB	AGC	

Example 2. How many rectangles (excluding squares) are there in the following figure?

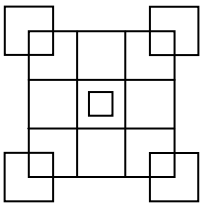


a. 25 **b.** 28 **c.** 29 **d.** 30

Solution: (c) There are totally 29 rectangles in the above figure. The rectangles are:

ABFE	BCGF	ACGE	EFIH	FGJI
EGJH	HIML	IJNM	HJNL	ACNL
LMPO	MNQP	LNQO	ACJH	EGNL
HJQO	BDKI	IKRP	ADKH	EGQO
HIKRO	ABML	EFPO	ABPO	BCNM
FGQP	BCQP	CDRQ	ADRO	

Example 3. How many squares are there in the following figure?



a. 13 **b.** 17 **c.** 23 **d.** 27

Solution: (c) Each side of the bigger square is divided into three equal parts. Apply the formula: If a square is divided into n parts on each side, then the total number of squares formed

$= \dfrac{mn(m+1)(n+1)}{4}$

Here the value of $n = 3$

$\therefore$ Total number of squares $= \dfrac{3(3+1)(2\times 3+1)}{6}$

$= \dfrac{3(4)(7)}{6} = \dfrac{12\times 7}{6} = 4$

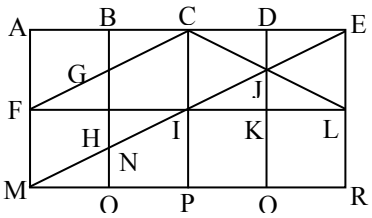
(Or, to be simple, add $1^2 + 2^2 + 3^2 = 1+4+9 = 14.$)

Squares at the four corners $= 4 \times 2 = 8$

Square formed at the center = 1

Total number of squares $= 14 + 8 + 1 = 23$

Example 4. Find the number of triangles in the figure,



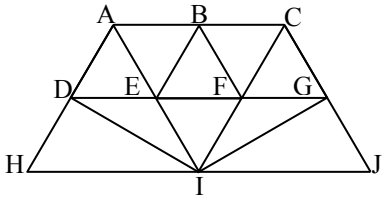
a. 23 **b.** 21 **c.** 25 **d.** 29

Solution:(c)

IJK	JKL	JIL	CIJ	CDJ	DEJ	CEJ
EJL	FGH	BCG	AFC	AEM	FMI	CEL
CEI	EIL	CFI	CFL	CIL	MNO	MIP
MJQ	MER	HIN	BEN			

Total number of triangles = 25

Example 5. Find the total number of triangles in the following figure.



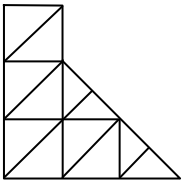
a. 25 **b.** 18 **c.** 21 **d.** 20

Solution: (b) There are 18 triangles, as given below.

ADE	ABE	BEF	BFC	CGF	DHI
DEI	EFI	FGI	IGJ	ADI	AHI
CIG	CIJ	ACI	DGI	EIF	DFI

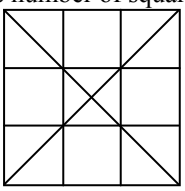
Multiple Choice Questions

1. Find the number of triangles in figure?



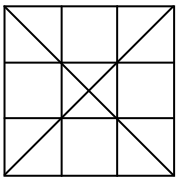
a. 19 **b.** 24 **c.** 18 **d.** 12

2. Find the number of square in given figure ?



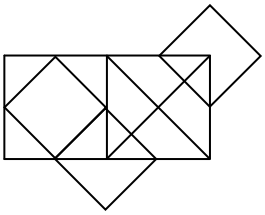
a. 10 **b.** 15 **c.** 14 **d.** 16

3. Find the number of triangles in the given right figure?



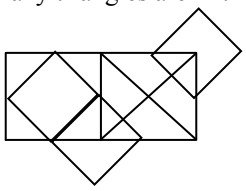
a. 28 **b.** 30 **c.** 36 **d.** 32

4. How many squares are there figure ?



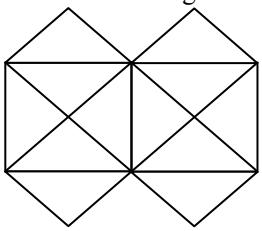
a. 2 **b.** 3 **c.** 4 **d.** 5

5. How many triangles are in the right figure?



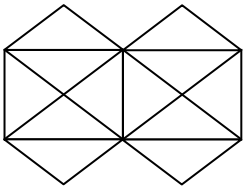
a. 22 **b.** 24 **c.** 21 **d.** 26

6. Find the number of triangles in figure?



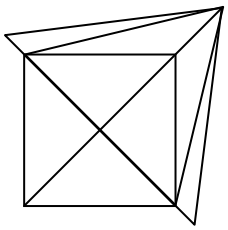
a. 24 **b.** 22 **c.** 20 **d.** 18

7. Find the number of straight line segments in given right figure.



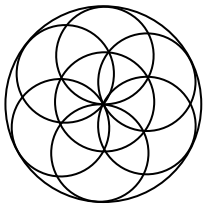
a. 13 **b.** 10 **c.** 12 **d.** 14

8. Find the number of triangles in given figure.



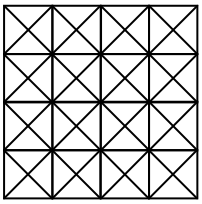
a. 16 **b.** 18 **c.** 20 **d.** 22

9. How many circles are there in given figure?



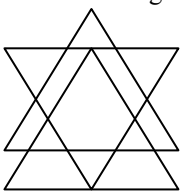
a. 12 **b.** 10 **c.** 8 **d.** 6

10. Find the number of squares in figure?



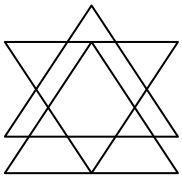
a. 35 **b.** 42
c. 43 **d.** 45

11. Find the number of triangles in the given figure?



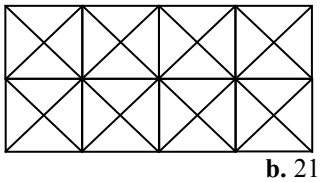
a. 14 **b.** 16
c. 18 **d.** 17

12. Find the number of straight line segments in the given figure.



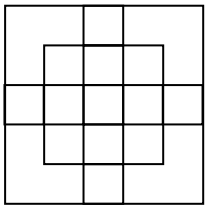
a. 9 **b.** 10
c. 8 **d.** 11

13. Find the number of squares in figure ?



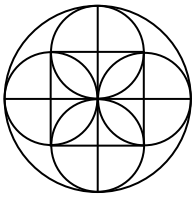
a. 11 **b.** 21
c. 24 **d.** 26

14. Find the number of squares in given figure ?



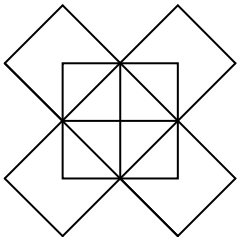
a. 24 **b.** 20 **c.** 27 **d.** 28

15. Find the number of semi circles in given figure?



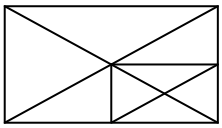
a. 24 **b.** 18
c. 20 **d.** 22

16. Find the number of rectangles in figure?



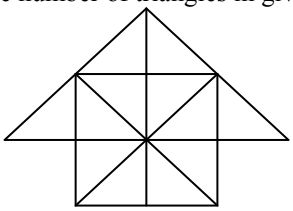
a. 15 **b.** 18
c. 13 **d.** 30

17. Find the number of triangles in given figure?



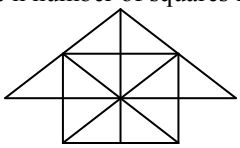
a. 16 **b.** 18 **c.** 20 **d.** 22

18. Find the number of triangles in given figure?



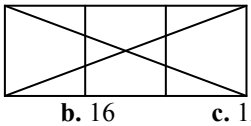
a. 24 **b.** 20 **c.** 16 **d.** 28

19. Find the n number of squares in the given right figure.



a. 9 **b.** 10 **c.** 8 **d.** 11

20. Find the number of triangles in given figure



a. 15 **b.** 16 **c.** 12 **d.** 14

ANSWERS

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

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