குறள் பதிப்பகம்
KURAL PATHIPPAGAM

MENTAL ABILITY

Logic Is The Beginning Of Wisdom, Not The End..

TNPSC GROUP - I, II, II (A), IV





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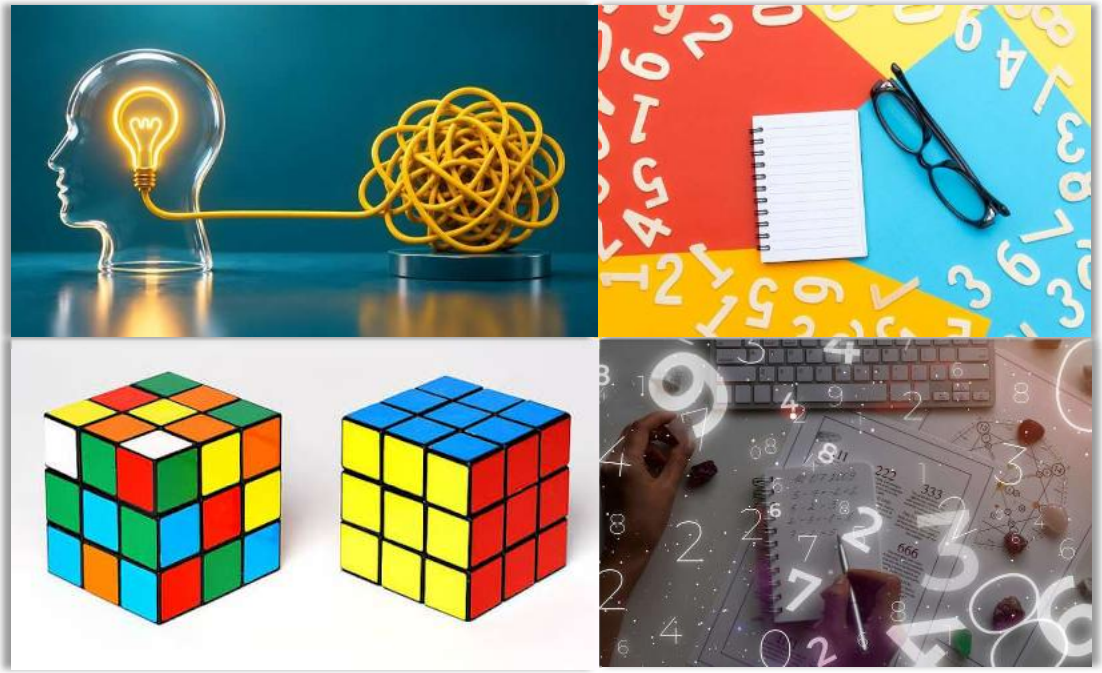
J.Aagasa Moorthy M.Com., LL.B.,
Founder, TAF IAS ACADEMY

TNPSC

GROUP-I, II, IIA, IV, SI, PC, SSC, RRB

REASONING (PART – II)

(New syllabus)



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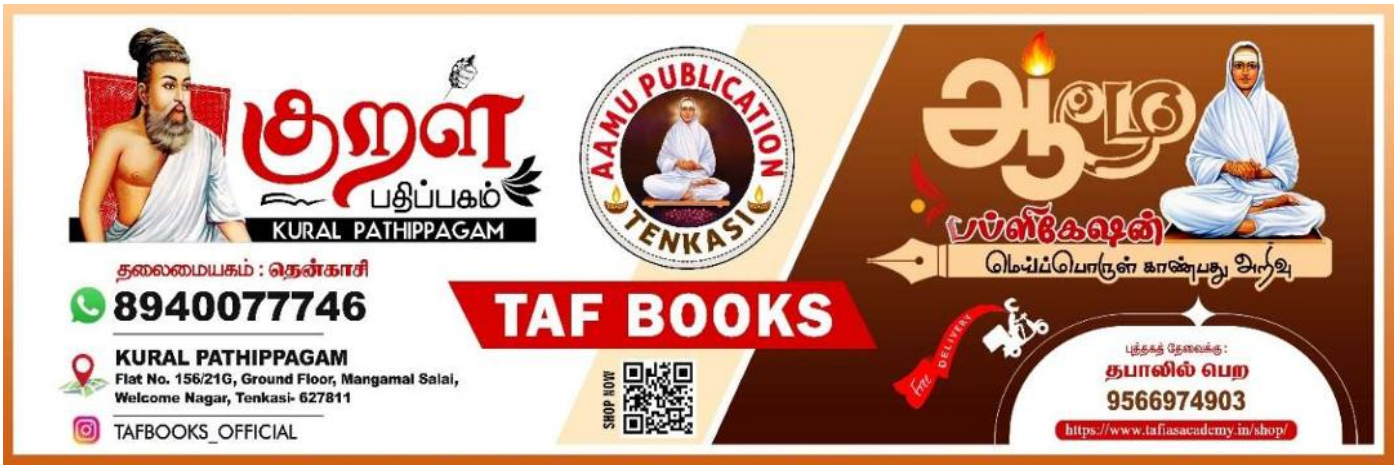
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Thanks To All The Contributors Of This Book..

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SYLLABUS - 2025

TNPSC GROUP – I, II, IIA, IV SYLLABUS

UNIT II : REASONING / (10 QUESTIONS)

Logical reasoning - Puzzles - Dice - Visual reasoning - Alpha numeric reasoning - Number series.

TNUSRB SUB – INSPECTOR, POLICE SYLLABUS

PART – B : PSYCHOLOGY EXAM

LOGICAL ANALYSIS :

- Analysis of any information logically to find out various dimensions of the information.

NUMERICAL ANALYSIS :

- Quick response with regard to numerical ability will be tested.

INFORMATION HANDLING SKILL :

- For any given information, various aspects of the information, inferences and connected facts will be tested.

MENTAL ABILITY TEST :

- To test the candidate's capability to draw conclusions through inductive or deductive reasoning.



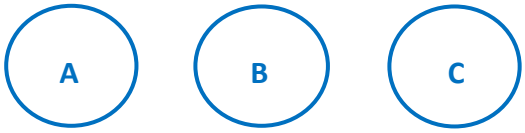
01 LOGICAL REASONING

1.1 VENN DIAGRAM

CONDITION:

The following diagrams represent **relationships between different groups**. From these, we can understand how different sets are related to each other. Based on these relationships, we can identify different types of sets.

DIAGRAM 1

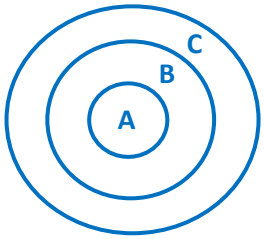


In the above diagram A, B, and C are completely separate groups with no relationship between them.

EXAMPLE:

Doctors, advocates, engineers

DIAGRAM 2

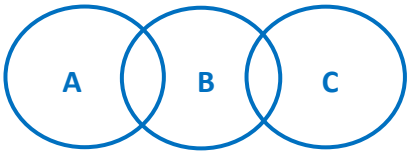


All A are B and All B are C

EXAMPLE:

Village, District, State

DIAGRAM 3

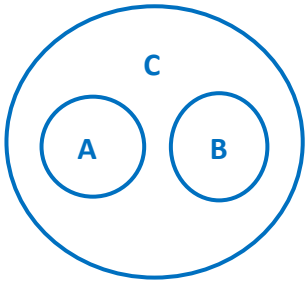


Some A are B and Some B are C

EXAMPLE:

Dogs, Cats, and Pets

DIAGRAM 4

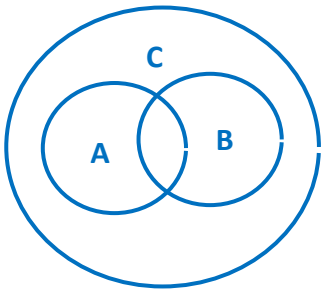


There is no common relationship between A and B, but All A and All B are C and that both A and B are entirely contained within C.

EXAMPLE:

Tamil, English, and Languages

DIAGRAM 5

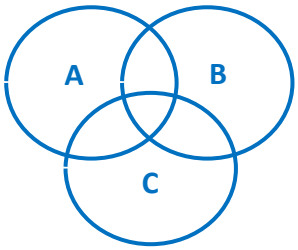


Some A are in B, and some B are in A. Both A and B are subsets of C and B are entirely contained.

EXAMPLE:

Women, Sister and Wife

DIAGRAM 6

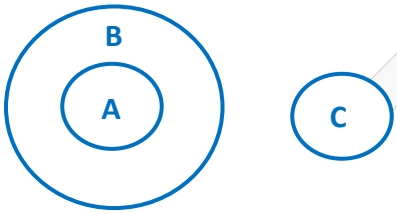


Three groups A, B, and C are related as follows:
Some A's are B ; Some B's are C
Some C's are A and Some A's are B and C
Some B's are C and A ; Some C's are A and B

EXAMPLE:

Indians, Tall people, Literate people

DIAGRAM 7

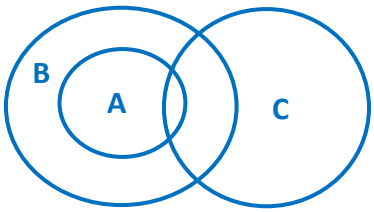


All A are B
No B is C

EXAMPLE:

Biology, Science, Maths

DIAGRAM 8

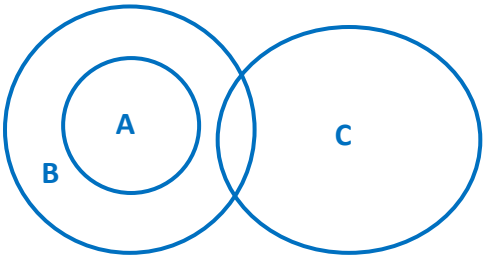


All A are B
Some A are C
Some B are C

EXAMPLE:

Males, Father's, Engineers

DIAGRAM 9

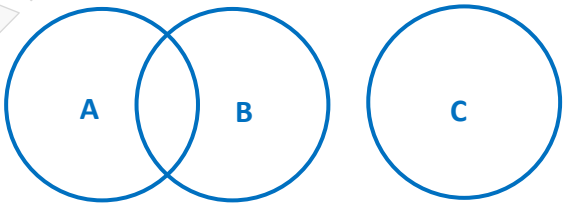


All A are B
Some B are C

EXAMPLE:

Males, Fathers, Children

DIAGRAM 10

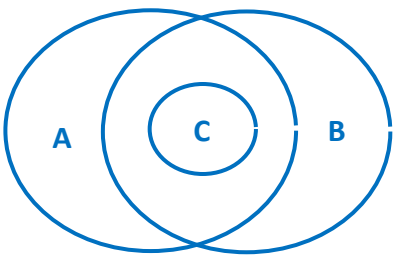


Some A are B
No B is C

EXAMPLE:

Professor, Writer, Children

DIAGRAM 11



All C are A
All C are B

EXAMPLE:

Carnivorous, Frog, Amphibian

1.2 SYLLOGISM

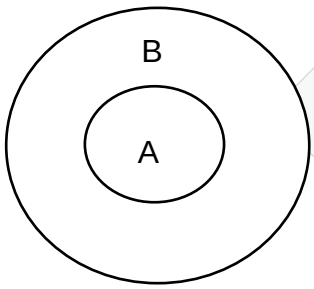
INTRODUCTION :

In this topic, statements and conclusions are provided. Based on the relationships given, you must draw a diagram, analyze it, and select whether the conclusions are correct or incorrect.

CONDITIONS :

By drawing a diagram for the given statements and verifying the conclusions, three types of diagrams are obtained. Their corresponding solutions are given below.

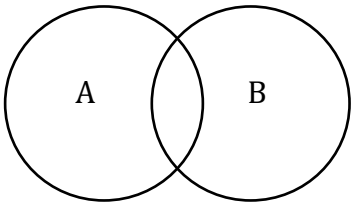
DIAGRAM 1



Solutions:

All A are B.
All B are not A.
Some B are A.

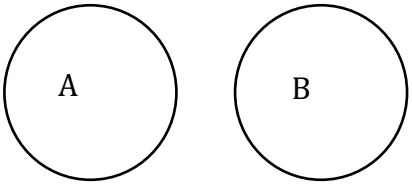
DIAGRAM 2



Solutions:

Some A are B.
Some B are A.
All A are not B.
All B are not A.

DIAGRAM 3



Solutions:

No A is B.
No B is A.

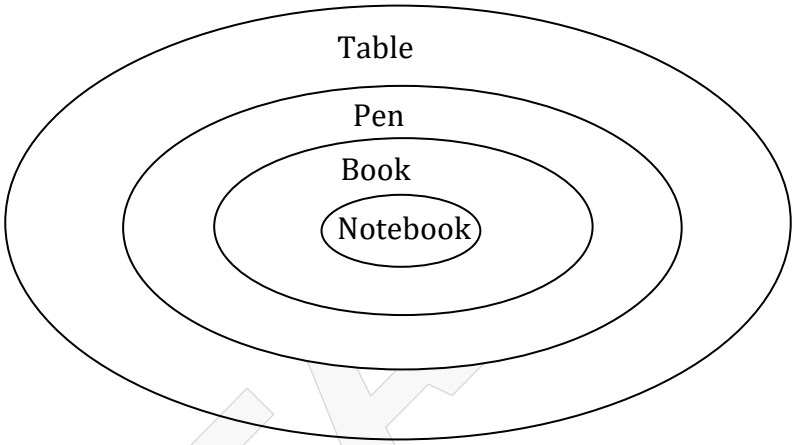
SOLUTION

When verifying the given conclusions, you must only consider the diagrams provided for the conclusions, when doing so only one of the three diagrams mentioned in the conditions above will first choose the solutions corresponding to that specific diagram and answer accordingly.

ALL TYPE QUESTIONS

1. Statement 1 : All notebooks are books.
   Statement 2 : All books are pens.
   Statement 3 : All pens are tables.

   Conclusion 1 : All books are tables.
   Conclusion 2 : Some notebooks are pens.
   Conclusion 3 : All pens are books.
   Conclusion 4 : Some pens are books

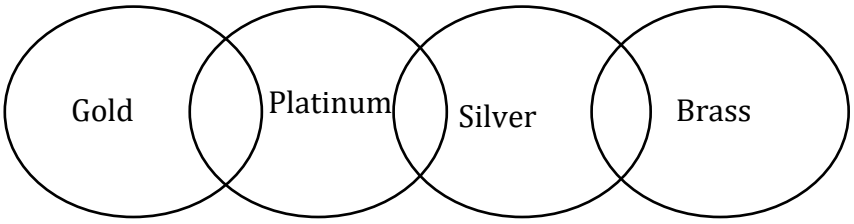


ANS: C

A) Only conclusion 1 is correct
B) All conclusions are correct
C) Conclusions 1, 4 are correct; 2, 3 is incorrect
D) Conclusions 1, 2 are correct; 3, 4 are incorrect

2. Statement 1 : Some gold are platinum.
   Statement 2 : Some platinum are silver.
   Statement 3 : Some silver are brass.

   Conclusion 1 : Some gold are silver.
   Conclusion 2 : Some brass are platinum.
   Conclusion 3 : Some platinum are gold.
   Conclusion 4 : Some platinum are not gold.



ANS: A

A) Only conclusion 3 is correct
B) All conclusions are incorrect
C) Conclusions 1, 2 are correct; 3, 4 are incorrect
D) Conclusions 3, 4 are correct; 1, 2 are incorrect

PRACTICE QUESTIONS

(QUESTIONS 1-16)
"Based on the statements provided in each question, Select the correct conclusions from the given options.

1. Statement 1 : Some books are pens.
   Statement 2 : All pens are papers.
   Conclusion 1 : Some papers are books.
   Conclusion 2 : All books are papers.
   A) If only conclusion 1 is correct
   B) If only conclusion 2 is correct
   C) If both conclusion 1 and 2 are correct
   D) If neither conclusion 1 nor 2 is correct

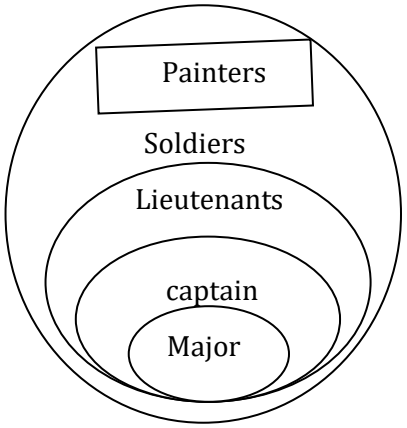
2. Statement 1 : All windows are doors.
   Statement 2 : All doors are houses.
   Conclusion 1 : Some houses are windows.
   Conclusion 2 : All windows are houses.
   A) If only conclusion 1 is correct
   B) If only conclusion 2 is correct
   C) If both conclusion 1 and 2 are correct
   D) If neither conclusion 1 nor 2 is correct

3. Statement 1 : All flowers are trees.
   Statement 2 : All trees are fruits.
   Conclusion 1 : Some fruits are flowers.
   Conclusion 2 : Some flowers are fruits.
   A) If only conclusion 1 is correct
   B) If only conclusion 2 is correct
   C) If both conclusion 1 and 2 are correct
   D) If neither conclusion 1 nor 2 is correct

4. Statement 1 : Some toys are books.
   Statement 2 : All books are pencils.
   Conclusion 1 : All toys are pencils.
   Conclusion 2 : Some pencils are books.
   A) If only conclusion 1 is correct
   B) If only conclusion 2 is correct
   C) If both conclusion 1 and 2 are correct
   D) If neither conclusion 1 nor 2 is correct

5. Statement 1 : Some kites are threads.
   Statement 2 : No thread is a needle.
   Conclusion 1 : Some kites are needles.
   Conclusion 2 : No needle is a thread.
   A) If only conclusion 1 is correct
   B) If only conclusion 2 is correct
   C) If both conclusion 1 and 2 are correct
   D) If neither conclusion 1 nor 2 is correct

17. Study the diagram and answer the question



Conclusion 1 : some captains are painters
Conclusion 2 : some lieutenants are painters
Conclusion 3 : all majors are soldiers
Conclusion 4 : all captains are soldiers
Conclusion 5 : all soldiers are painters

A) Only conclusions 1 and 5 follow
B) Only conclusions 2,3 and 4 follow
C) Only conclusions 3,4 and 5 follow
D) Only conclusions 3 and 4 follow

18. Examine the information suitable for the following conclusion

CONCLUSION : Many people were arrested for drug addiction.
INFORMATION : 1. Consumption of drugs is a crime
2. A person who commits a crime can be arrested
3. Many people use drugs continuously

A) All information is applicable
B) Only information 1 and 2 are applicable
C) Only information 2 and 3 are applicable
D) The given information are not sufficient to the answer.

19. INFORMATION : Do not sleep under a tree.
ASSUMPTIONS : 1. Our health will be affected by leaves falling from the tree.
2. The carbon di oxide emitted by trees is harmful to the body.

A) Only assumption 1 is applicable
B) Only assumption 2 is applicable
C) Both assumptions 1 and 2 are applicable
D) Both assumptions 1 and 2 are not applicable

20. Read the following information and select the appropriate conclusion accordingly.

Information: 1. Hybrid plants are resistant to fungal attacks
2. Fungal infection reduces the lifespan of flowering plants

A) Hybrid plants will live for a long time
B) Fungi attack hybrid plants
C) Yield is higher in hybrid plants
D) All plants are hybrid plants

ANSWERS																			
1	A	2	C	3	A	4	B	5	B	6	A	7	B	8	B	9	A	10	C
11	A	12	D	13	C	14	B	15	A	16	B	17	D	18	A	19	B	20	C

1.9 BLOOD RELATIONS

INTRODUCTION:

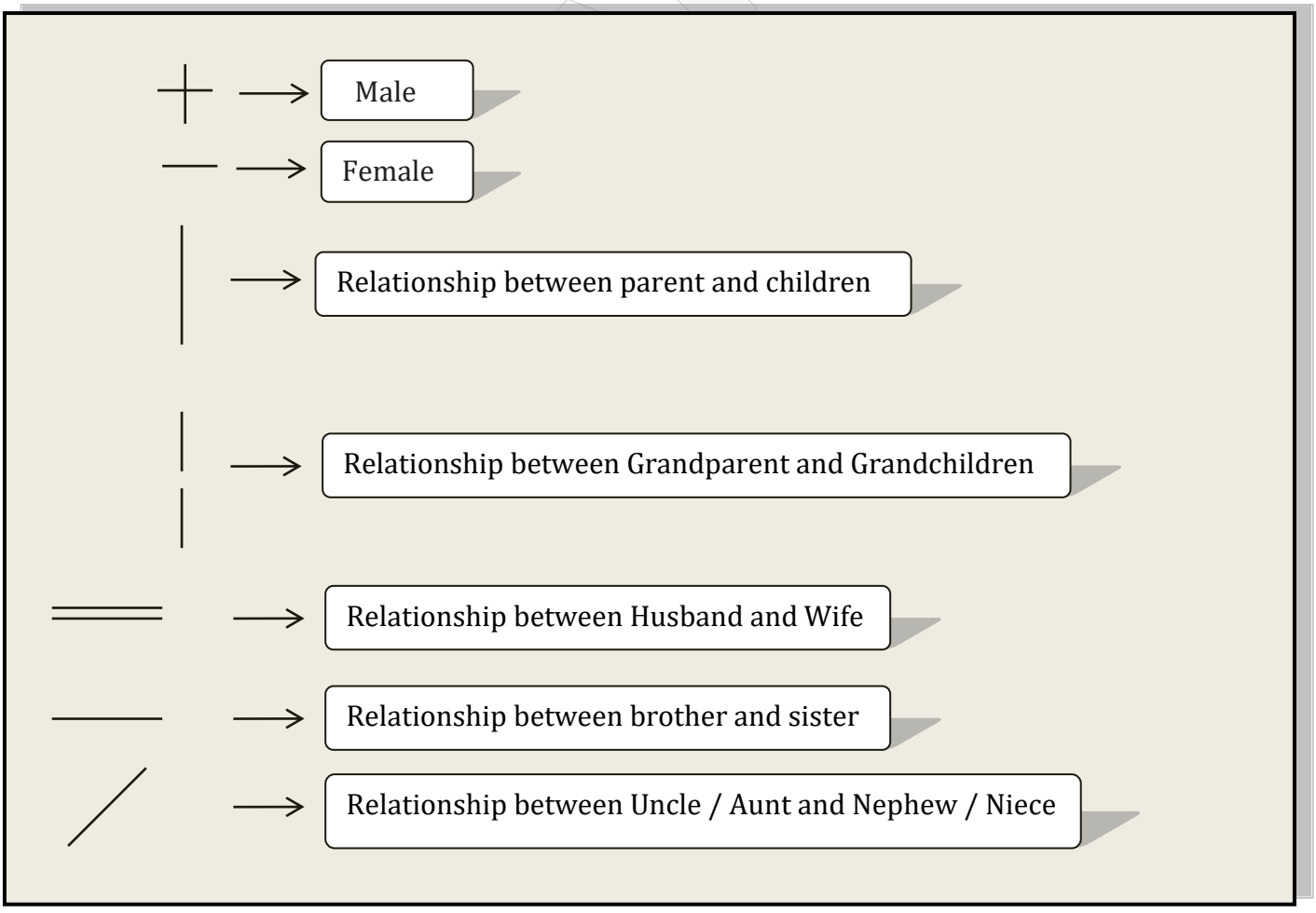
To accurately answer questions under this topic, a thorough understanding of kinship structures and relationship terms is essential. In this section, problems will present a specific group of individuals and outline the relationships connecting them. Based on this provided data, you will be required to deduce the precise relationship between two specific persons.

For these types of problems, drawing a family tree diagram is the most effective method to find the solution easily.

There are three main types of questions in this category:

1. **Chain Statements**
2. **Dialogue-Based / Conversation Problems**
3. **Coded Relations / Symbols**

CONDITIONS:



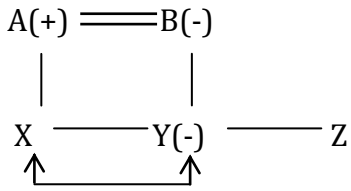
ALL TYPE QUESTIONS

1. A is the father of X. B is the mother of Y. Y is the sister of X and Z. Which of the following statements is definitely NOT correct?

   A) B is the mother of Z
   B) Y is the son of A
   C) B has a son
   D) B is the wife of A

SOLUTION:

ANS: B

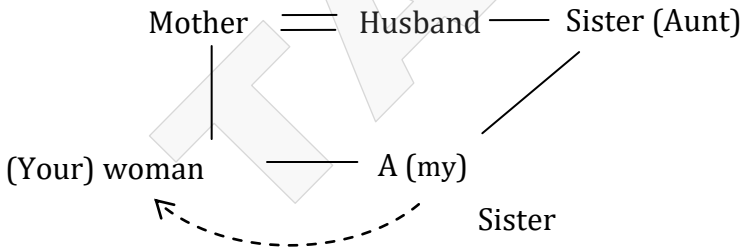


2. Pointing to a woman, A says, "Your mother's husband's sister is my aunt." How is that woman related to A?

   A) Daughter B) Sister C) Mother D) Aunt

SOLUTION:

ANS: B

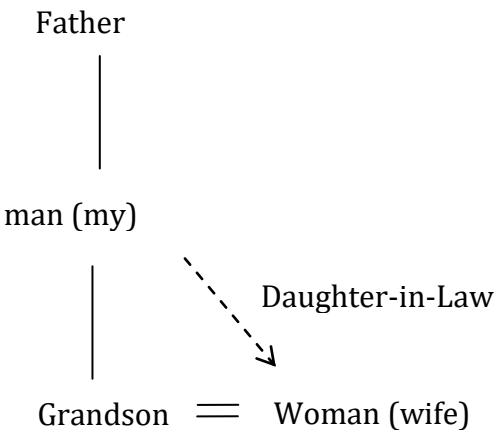


3. A man looking at a woman and he said, "She is the wife of my father's grandson." How is that woman related to the man?

   A) Sister's daughter B) Sister-in-law C) Daughter-in-law D) Daughter

SOLUTION:

ANS: C



PRACTICE QUESTIONS

1. Deepa pointing to a man in a photograph and she said, "He is the son of my grandfather's only son." How is Deepa related to that man?
   A) Aunt B) Sister C) Maternal Aunt D) Sister-in-law
2. Raja pointing to a man and said to Saran, "He is the son of the only son of my father's wife." What is the relationship between Raja and that man?
   A) Son B) Son-in-law C) Grandfather D) Brother-in-law
3. Pointing to a man, Selvi says, "He is the son of the brother of my husband's wife's daughter." How is that man related to Selvi?
   A) Son-in-law B) Maternal Uncle C) Grandson D) Son
4. Pointing at a man in a crowd, Kala said, "His brother's father is the only son of my grandfather." How is Kala related to the man in the crowd?
   A) Daughter B) Mother C) Grandmother D) Sister
5. Introducing a woman, Vinay said, "She is the sister of my father's only son's wife." How is that woman related to Vinay?
   A) Mother B) Daughter-in-law
   C) Sister-in-law D) Sister
6. If B is the husband of A, B is the father of C, and D is the son of A, then how is D related to C?
   A) Brother B) Uncle C) Wife D) Husband
7. A's husband is B. Further, D is the mother of C and A. Then, how is D related to B?
   A) Daughter-in-law B) Aunt C) Daughter D) Maternal Aunt
8. B is the brother of D. D is the sister of E. E is the brother of F. Then, how is F related to B?
   A) Maternal Uncle B) Brother or Sister
   C) Brother-in-law D) Nephew
9. Looking at a woman, Vinoth says, "She is the only daughter of my grandfather's only child. " How is that woman related to Vinoth?
   A) Daughter B) Sister C) Sister-in-law D) None of these
10. B is the only child of the only daughter of C's grandfather. Then, how is C's father related to B?
    A) Son B) Maternal Uncle C) Brother D) None of these
11. P is the father of J. S is the mother of N, and N is the brother of J. B is the son of S. If C is the sister of B, then how is J related to C?
    A) Son B) Maternal Uncle C) Brother D) Data Inadequate
12. M is the brother of N. S is the mother of D and also the Aunt of M. Then, how is M related to D?
    A) Aunt B) Sister C) Brother in law D) None of these
13. Pointing to a woman, Kumar said, "She is the daughter of my grandfather's only son." Then, how is Kumar related to that woman?
    A) Maternal Uncle B) Brother C) Father D) Daughter
14. Looking at Hari, Vijay says, "His sister's father is the husband of my wife's mother." Then, how is Hari's sister related to Vijay?
    A) Maternal Uncle B) Sister C) Wife D) Father

02 PUZZLES

2.1 ORDER & RANKING

INTRODUCTION:

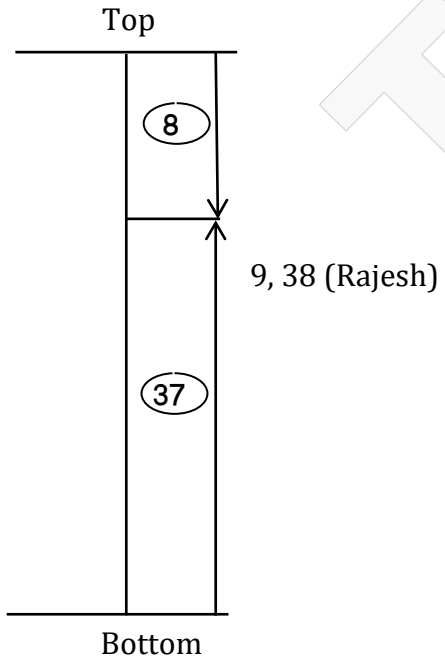
It is easy to map out the answers to these questions.

ALL TYPE QUESTIONS

1. In a class Rajesh is ranked 9th from the top and 38th from the bottom. How many students are there in the class ?
   A) 47 B) 45 C) 46 D) 48

SOLUTION:

ANS: C



Total = 8 + 1 + 37 = 46

Another method:

Total = Top + Bottom – 1
= 9 + 38 – 1
= 47 – 1
= 46

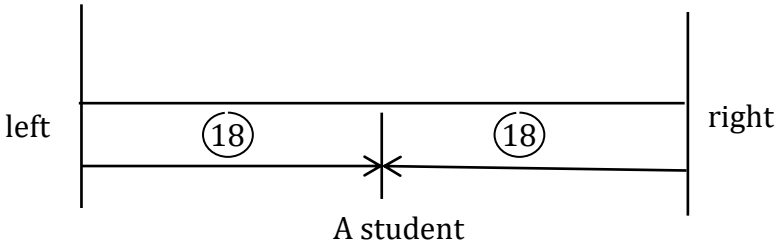
TAF

2. All students in a class are standing in a linear row. If a student are standing 19th from either end of the row. How many students are there in a class?

A) 38 B) 37 C) 36 D) 35

SOLUTION:

ANS: B



Total = 18 + 1 + 18 = 37

Another method:

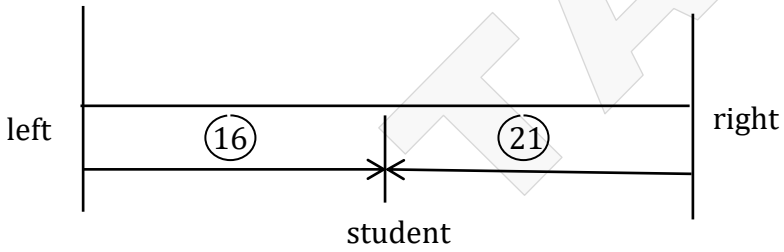
Total = Right + Left - 1
= 19 + 19 − 1
= 38 − 1
= 37

3. Sandhiya is 17th from the left and 22nd from the right in a row. How many students are there in a row?

A) 38 B) 37 C) 36 D) 35

SOLUTION:

ANS: A



Total = 16 + 1 + 21 = 38

Another method:

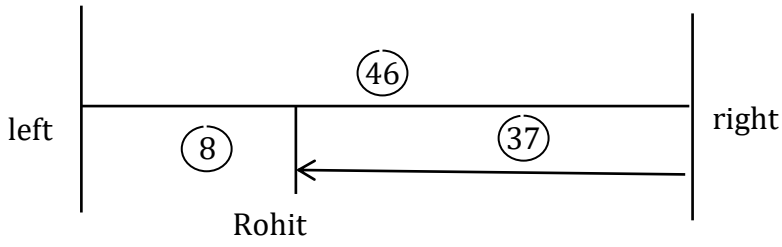
Total = Right + Left - 1
= 17 + 22 − 1
= 39 − 1
= 38

4. There are 46 boys standing in a row. If Rohit stands at the 38th Position from the right end, what is Rohit's position from the left end?

A) 10th B) 9th C) 8th D) 11th

SOLUTION:

ANS: B



Rohit's position from the left = 46 – 37 = 9

Another method:

Total = Right + Left - 1
$46 = x + 38 - 1$
$46 = x + 37$
$x = 46 - 37$
$= 9$

03 DICE

3.1 DICE AND CUBES

A Dice is a cube or cuboid-shaped object with **6 faces**. The faces of a dice can be represented in the following ways:

1. **Numbers** (1, 2, 3, 4, 5, 6)
2. **Dots** (•, ••, •••, ••••, •••••, ••••••)
3. **Letters** (A, ..., Z) / (a, ..., z)
4. **Symbols** (+, −, ÷, ..., #)
5. **Shapes** (□, △, ○, ...)
6. **Colors** (Black, Red, Green, ...)

DICE ARE CLASSIFIED INTO TWO TYPES:

1. **Standard Dice:** The numbers on opposite faces always add up to 7.
   Examples: 1 and 6, 2 and 5, 3 and 4
2. **Ordinary Dice:** A die in which the numbers on opposite faces are not necessarily fixed to add up to 7. In an ordinary die, the numbers on opposite faces may vary depending on the arrangement.

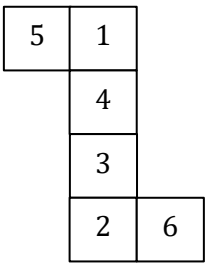
A face adjacent to another side can never be its opposite side.

ALL TYPE QUESTIONS

OPEN DICE:

TYPE I - FINDING THE OPPOSITE SIDE

1. Find the opposite side of 4 in the following open dice:



5 1 4
| | |
6 3 2

A) 5 B) 3 C) 2 D) 6

SOLUTION:

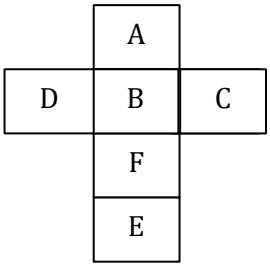
ANS: C

STEP 1 : The isolated faces are opposite to each other.

STEP 2 : Take the first number in the vertical column, skip the next adjacent face, and take the following face as the opposite side.

∴ **Therefore, the opposite side of 4 is 2.**

2. Find the opposite side of C in the given open dice:



D	A	B
|	|	|
C	F	E

A) D B) E C) A D) B

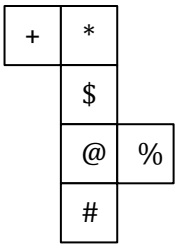
SOLUTION:

ANS: A

STEP 1 : The isolated faces are opposite to each other.

Therefore, the opposite side of C is D.

3. Find the opposite side of "$" in the given open dice:



+	*	$
|	|	|
%	@	#

A) @ B) % C) # D) +

SOLUTION:

ANS: C

STEP 1 : The isolated faces are opposite to each other.

STEP 2 : Take the first symbol in the vertical column, skip the next adjacent face, and take the following face as the opposite side.

Therefore, the opposite side of $ is #.

4. Find the opposite side of the White color in the given open dice:



Black	Yellow	White
|	|	|
Green	Blue	Purple

A) Yellow B) Purple C) Blue D) Black

SOLUTION:

ANS: B

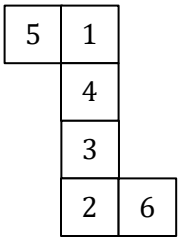
STEP 1: If there are no isolated faces, find the opposite sides for the two vertical columns.

STEP 2: The remaining two faces are opposite to each other.

Therefore, the opposite side of the White color is Purple.

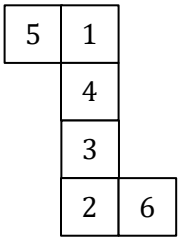
PRACTICE QUESTIONS

1. Find the opposite side of 4 in the given open dice:



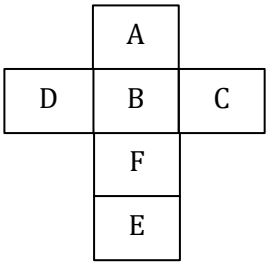
A) 5 B) 1 C) 2 D) 6

2. Find the opposite side of 5 in the given open dice:



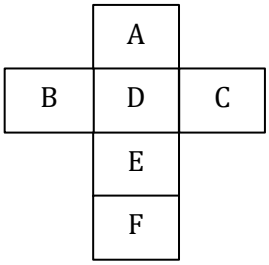
A) 1 B) 2 C) 4 D) 6

3. Find the opposite side of C in the given open dice:



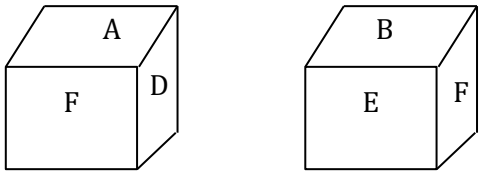
A) D B) A C) F D) E

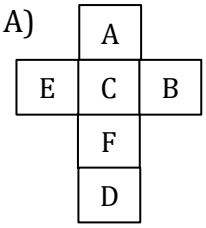
4. Find the opposite side of F in the given open dice:

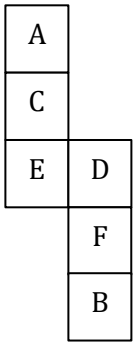


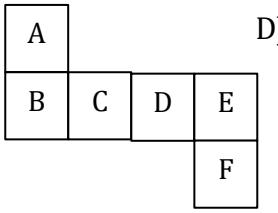
A) E B) D C) A D) C

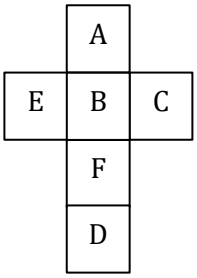
43. Two different positions of a closed dice are given below. Select the correct open dice corresponding to them



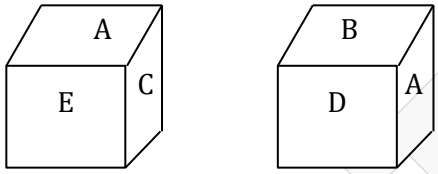
A) 

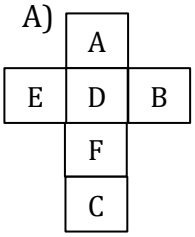
B) 

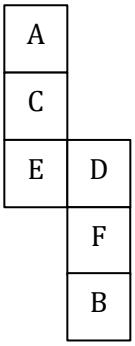
C) 

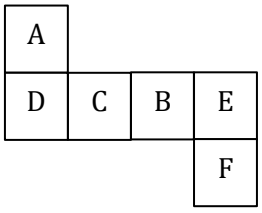
D) 

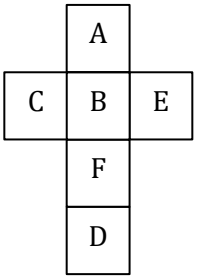
44. Two different positions of a closed dice are given below. Select the correct open dice corresponding to them



A) 

B) 

C) 

D) 

ANSWERS																			
1	C	2	D	3	A	4	B	5	C	6	B	7	D	8	B	9	B	10	A
11	D	12	B	13	A	14	C	15	B	16	B	17	D	18	D	19	B	20	C
21	A	22	B	23	C	24	D	25	D	26	D	27	B	28	B	29	A	30	C
31	B	32	A	33	C	34	A	35	C	36	B	37	B	38	A	39	B	40	C
41	A	42	B	43	B	44	A												

4.4 FIGURE COUNTING

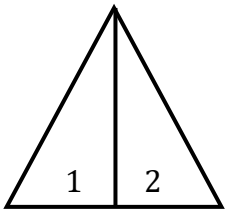
INTRODUCTION:

In this section, observe the given figures carefully and find the number of specific straight lines, triangles, squares (or) rectangles as asked in question.

ALL TYPE QUESTIONS

FIND THE NUMBER OF TRIANGLES IN THE GIVEN FIGURE

1.



A) 4 B) 3 C) 5 D) 2

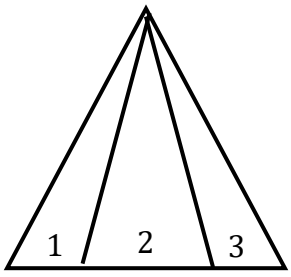
SOLUTION:

ANS: B

For these types of diagrams, you should number the base segments in order and then add them.

1 + 2 = 3

2.



A) 5 B) 8 C) 6 D) 7

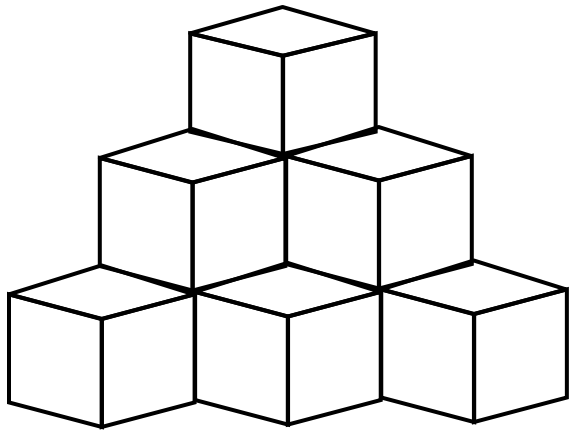
SOLUTION:

ANS: C

For these types of diagrams, you should number the base segments in order and then add them.

1 + 2 + 3 = 6

38.



A) 10 B) 8 C) 9 D) 6

SOLUTION:

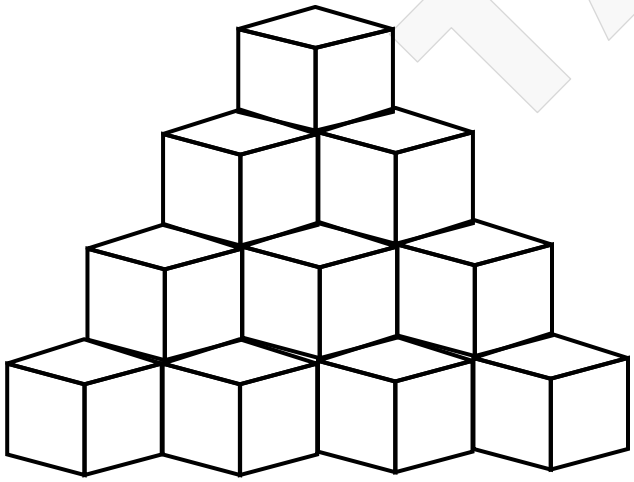
ANS: A

The numbers in the sequence 1, 3, 6, 10, 15, 21, …… should be used to represent the number of cubes in the rows, starting from the bottom row of the diagram.
For example, In the diagram above, the number of cubes in the bottom row is 3.
Therefore, we should only add the first 3 numbers of the sequence.

1 + 3 + 6 = 10

There are 10 cubes in total.

39.



A) 20 B) 21 C) 22 D) 23

SOLUTION:

ANS: A

The numbers in the sequence 1, 3, 6, 10, 15, 21, …… should be used to represent the number of cubes in the rows, starting from the bottom row of the diagram.

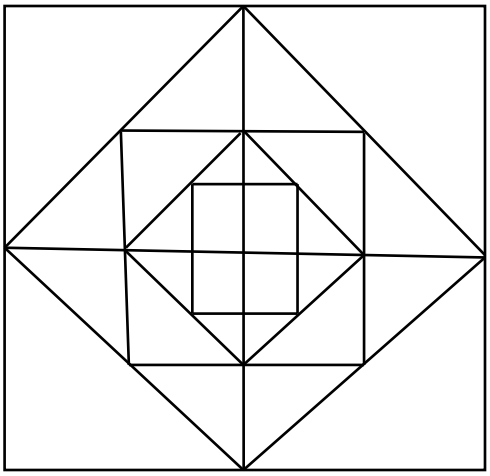
For example, In the diagram above, the number of cubes in the bottom row is 4.
Therefore, we should only add the first 4 numbers of the sequence.

1 + 3 + 6 + 10 = 20

There are 20 cubes in total.

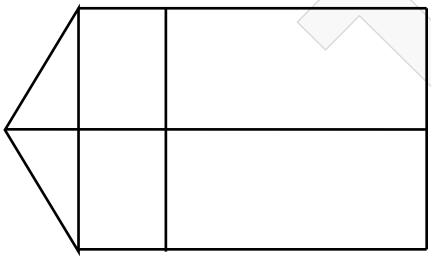
PRACTICE QUESTIONS

1. Choose how many Triangles are there in the given figure?



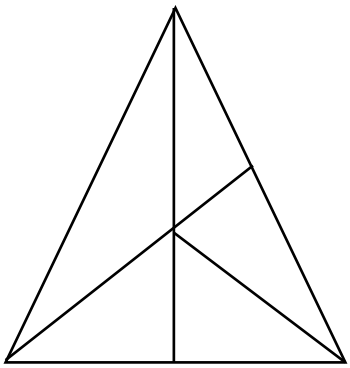
A) 36 B) 44 C) 40 D) 48

2. Choose how many Rectangles are there in the given figure?



A) 9 B) 8 C) 7 D) 6

3. Choose how many triangle are there in the given figure?



A) 9 B) 11 C) 10 D) 12

05 ALPHANUMERIC REASONING

5.1 LETTER SERIES

LETTER ORDER:

In this section, letters will be placed in a specific order. Some letters will be missing. The given letters will be arranged in a particular pattern. You should find the solution by checking if the given letters are divided equally or arranged in a specific sequence.

1	2	3	4	5	6	7	8	9	10	11	12	13
A	B	C	D	E	F	G	H	I	J	K	L	M
Z	Y	X	W	V	U	T	S	R	Q	P	O	N
26	25	24	23	22	21	20	19	18	17	16	15	14

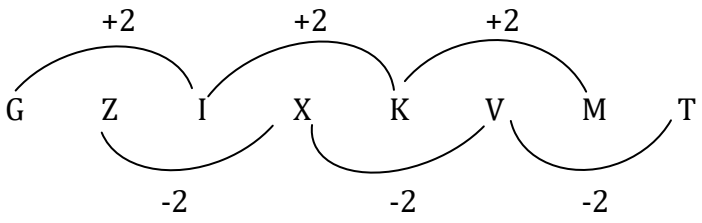
ALL TYPE QUESTIONS

TYPE I – LETTER SERIES :

1. Find the letter that should come in the blank space.
   G, ____, I, X, K, V, M, T
   A) H B) Y C) Z D) J

SOLUTION:

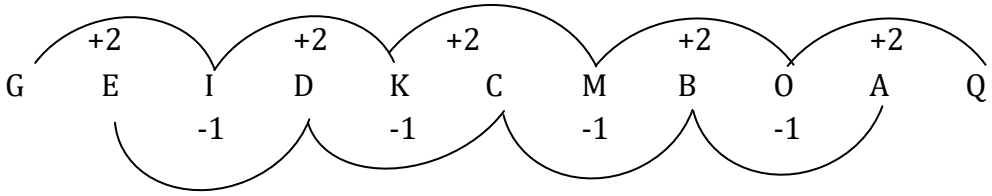
ANS: C



2. Find the correct option from the given choices to fill the blank in the following letter series.
   G, ____, I, D, K, C, M, B, O, A, Q
   A) H B) E C) F D) J

SOLUTION:

ANS: B



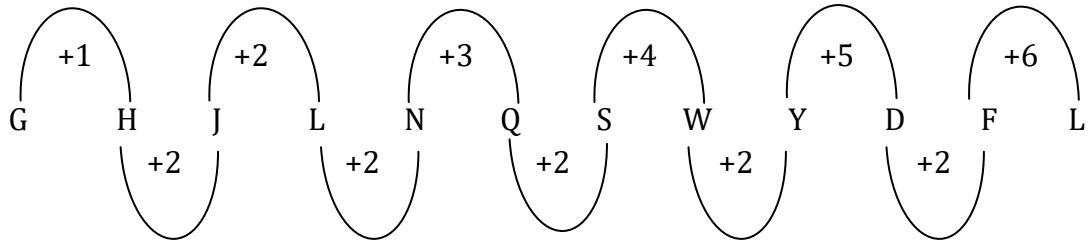
TYPE 2 – TWO LETTER SERIES

8. What is the next letter in the given series : GH, JL, NQ, SW., YD, ?

A) EJ B) FJ C) EL D) FL

SOLUTION:

ANS: D



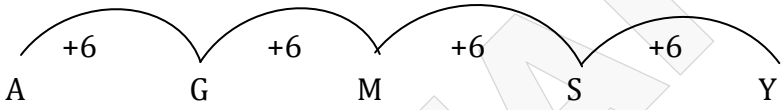
9. Find the missing letter **:** AZ, GT, MN, ?, YB

A) JH B) SH C) SK D) TS

SOLUTION:

ANS: B

A	B	C	D	E	F	G	H	I	J	K	L	M
Z	Y	X	W	V	U	T	S	R	Q	P	O	N



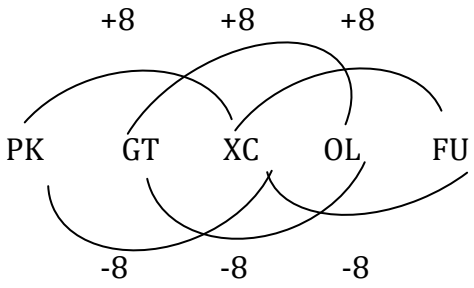
The opposite letter of A is Z, the opposite letter of G is T, and the opposite letter of M is N; therefore, the opposite of S is H.

10. Find the missing letter **:** PK, GT, XC, OL , ?

A) GT B) HS C) EV D) FU

SOLUTION:

ANS: D

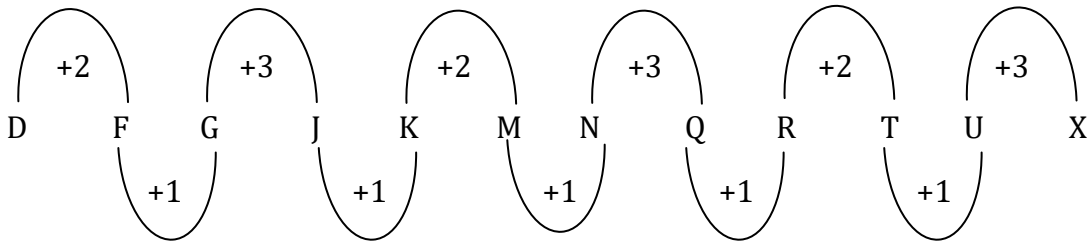


11. Find the missing letter **:** DF, GJ, KM, NQ, RT, ?

A) UW B) YZ C) XZ D) UX

SOLUTION:

ANS: D



6.2 MATHEMATICAL OPERATIONS

MATHEMATICAL OPERATIONS:

Numerical operations is an important measuring topic that develops logical thinking and decision making skill. An important part of improving data-driven decision-making ability (Reasoning) is Numerical Operations. In this, basic mathematical operations like addition, subtraction, multiplication, and division are directly used, or they are interchanged with other symbols to test your logical thinking skills.

Questions: (e.g., '+' symbol can mean '-', '-' can mean '+'). Finding the correct equation, number puzzles, and comparing equations obtained under new rules are some of the types. Read the given rules carefully, understand what the actual operations are, and solve them by following the step-by-step procedure. If you avoid conventional mathematical assumptions and focus on logic and changing patterns, these will become easy. With proper practice, these will change from being just about mathematics to training your logical knowledge and different ways of thinking.

ALL TYPE QUESTIONS

TYPE - 1: QUESTIONS REGARDING INTERCHANGING NUMBERS:

1. If the numbers 18 and 30 are interchanged with each other, which of the following options from the given equations will be correct?

   A) $35 \div 5 \times 5 + 30 - 18 = 23$ B) $14 \times 5 - 18 \div 6 + 30 = 73$

   C) $64 + 18 \times 5 \div 3 - 30 = 98$ D) $12 - 30 \times 18 \div 3 + 16 = 174$

   SOLUTION:

   ANS: A

   From option (a), according to the question, when interchanging the numbers 18 and 30:

   $$35 \div 5 \times 5 + 30 - 18 = 23$$
   $$7 \times 5 + 18 - 30 = 23$$
   $$53 - 30 = 23$$

2. Which two numbers should be interchanged to make the following equation correct?

   $384 \div 16 - 72 + 9 \times 10 = 2$

   A) 3 and 7 B) 7 and 9 C) 4 and 8 D) 6 and 9

   SOLUTION:

   ANS: B

   From option (b), when interchanging the numbers 7 and 9:

   $$384 \div 16 - 92 + 7 \times 10 = 2$$
   $$24 - 92 + 70 = 2$$
   $$94 - 92 = 2$$

3. Which two numbers should be interchanged to make the following equation correct?
$7 + 56 \div 8 \times 2 - 13 = 11$
A) 7 and 13 B) 7 and 2 C) 8 and 2 D) 7 and 8

SOLUTION:

ANS: D

From the given equation: $7 + 56 \div 8 \times 2 - 13 = 11$
After interchanging the numbers 7 and 8 from option (d):

$$7 + 56 \div 8 \times 2 - 13 = 11$$
$$8 + 56 \div 7 \times 2 - 13 = 11$$
$$8 + 8 \times 2 - 13 = 11$$
$$8 + 16 - 13 = 11$$
$$24 - 13 = 11$$
$$11 = 11$$

4. If two numbers are interchanged either on one side or on both sides of the equal sign (=), the values on both sides of the equation will become equal. Select the correct numbers to be interchanged from the given options.
$4 + 6 \times 2 - 27 \div 3 = 8 \times 2 - 4 + 9 \div 3$
A) 2, 8 B) 6, 2 C) 4, 3 D) 6, 8

SOLUTION:

ANS: D

After interchanging the numbers 6 and 8 from option (d):

$$4 + 6 \times 2 - 27 \div 3 = 8 \times 2 - 4 + 9 \div 3$$
$$4 + 8 \times 2 - 27 \div 3 = 6 \times 2 - 4 + 9 \div 3$$
$$4 + 16 - 9 = 12 - 4 + 3$$
$$20 - 9 = 15 - 4$$
$$11 = 11$$

5. Which pair of two digits should be interchanged to make the following equation correct?
$186 \div 17 + 104 - 12 \times 3 = 16$
A) 2 and 7 B) 8 and 3 C) 6 and 4 D) 4 and 7

SOLUTION:

ANS: B

From the given equation: $186 \div 17 + 104 - 12 \times 3 = 16$
After interchanging the digits 8 and 3 from option (b):

$$136 \div 17 + 104 - 12 \times 8 = 16$$
$$8 + 104 - 96 = 16$$
$$112 - 96 = 16$$
$$16 = 16$$

6. Which two digits should be interchanged to make the following equation correct?
$87 \times 2 - 65 + 182 \div 38 = 155$
A) 2 and 8 B) 5 and 7 C) 6 and 2 D) 8 and 6

SOLUTION:

ANS: A

After interchanging the digits 2 and 8 from option (a):

$$87 \times 2 - 65 + 182 \div 38 = 155$$
$$27 \times 8 - 65 + 128 \div 32 = 155$$
$$216 - 65 + 4 = 155$$
$$220 - 65 = 155$$
$$155 = 155$$

7. Which two numbers should be interchanged to make the following equation correct?
$42 \div 7 \times 5 + 35 - 49 = 18$
A) 42 and 49 B) 35 and 49 C) 5 and 35 D) 42 and 35

SOLUTION:

ANS: D

After interchanging the numbers 42 and 35 from option (d):

$$35 \div 7 \times 5 + 42 - 49 = 18$$
$$25 + 42 - 49 = 18$$
$$67 - 49 = 18$$
$$18 = 18$$

8. Which two numbers should be interchanged to make the following equation correct?
$15 + 90 \div 9 \times 5 - 11 = 28$
A) 11 and 9 B) 15 and 9 C) 15 and 5 D) 9 and 5

SOLUTION:

ANS: B

After interchanging the numbers 15 and 9 from option (b):

$$9 + 90 \div 15 \times 5 - 11 = 28$$
$$9 + 6 \times 5 - 11 = 28$$
$$9 + 30 - 11 = 28$$
$$39 - 11 = 28$$
$$28 = 28$$

9. Which two numbers should be interchanged to make the following equation correct?
$(40 \times 6) \div 8 + 14 - (7 \times 16) + (13 \times 12) = 26$
A) 40 and 16 B) 8 and 12 C) 6 and 12 D) 14 and 16

SOLUTION:

ANS: B

After interchanging the numbers 8 and 12 from option (b):

$$(40 \times 6) \div 12 + 14 - (7 \times 16) + (13 \times 8) = 26$$
$$240 \div 12 + 14 - 112 + 104 = 26$$
$$20 + 14 - 112 + 104 = 26$$
$$34 - 112 + 104 = 26$$
$$138 - 112 = 26$$
$$26 = 26$$

10. Which two numbers should be interchanged to make the following equation correct?
$78 \div 48 \times 8 + (26 \times 7) - 39 + (45 + 15) = 210$
A) 78 and 45 B) 45 and 48 C) 48 and 39 D) 26 and 15

SOLUTION:

ANS: C

After interchanging the numbers 48 and 39 from option (c):

$$78 \div 39 \times 8 + (26 \times 7) - 48 + (45 + 15) = 210$$
$$2 \times 8 + 182 - 48 + 60 = 210$$
$$16 + 182 + 12 = 210$$
$$210 = 210$$

11. Which two numbers should be interchanged to make the following equation correct?
$36 \times 81 \div 9 - (88 \div 4) + 14 + (22 + 7) = 169$
A) 36 and 14 B) 81 and 36 C) 9 and 36 D) 14 and 22

SOLUTION:

ANS: A

After interchanging the numbers 36 and 14 from option (a)

$$36 \times 81 \div 9 - (88 \div 4) + 14 + (22 + 7) = 169$$
$$14 \times 81 \div 9 - (88 \div 4) + 36 + (22 + 7)$$
$$= 14 \times 9 - (22) + 36 + 29$$
$$= 126 - 22 + 65$$
$$= 191 - 22 = 169$$

12. Which two numbers should be interchanged to make the following equation correct?
$64 + 36 \div 3 \times 9 - 32 = 44$
A) 32 and 36 B) 9 and 64 C) 64 and 36 D) 3 and 9

SOLUTION:

ANS: D

After interchanging the numbers 3 and 9 from option (d):

$$64 + 36 \div 3 \times 9 - 32 = 44$$
$$64 + 36 \div 9 \times 3 - 32 = 44$$
$$64 + 4 \times 3 - 32 = 44$$
$$64 + 12 - 32 = 44$$
$$64 - 20 = 44$$

13. Which two numbers should be interchanged to make the following equation correct?
$27 + 11 \times 9 - 36 \div 4 = 67$
A) 11 and 27 B) 11 and 36 C) 4 and 9 D) 27 and 36

SOLUTION:

ANS: B

From the given equation: $27 + 11 \times 9 - 36 \div 4 = 67$

After interchanging the numbers 4 and 9 from option (c):

$$27 + 11 \times 4 - 36 \div 9 = 67$$
$$27 + 44 - 4 = 67$$
$$67 = 67$$

84. Which two digits and mathematical signs should be interchanged with each other to make the given equation correct?
16 × 18 + 2 – 14 ÷ 3 = 38
A) 14 and 18, + and –
B) 16 and 14, – and ×
C) 16 and 3, – and ×
D) 14 and 18, + and ×

SOLUTION:

ANS: D

According to the given question: 16 × 18 + 2 - 14 ÷ 3 = 38
(When interchanging the signs +, × and numbers 14, 18):

$16 \times 18 + 2 - 14 \div 3 = 38$
$16 + 14 \times 2 - (18 \div 3) = 38$
$16 + 28 - 6 = 38$
$44 - 6 = 38$
$38 = 38$

85. Which two mathematical signs and two numbers should be interchanged with each other to make the given equation correct?
54 – 45 ÷ 9 + 7 × 11 = 14
A) 7 and 54, + and –
B) 9 & 11, – & ÷
C) 54 and 45, + and ×
D) 45 & 11, ÷ & ×

SOLUTION:

ANS: C

According to the given question: 54 - 45 ÷ 9 + 7 × 11 = 14
(When interchanging the signs +, × and numbers 54, 45):

$54 - 45 \div 9 + 7 \times 11 = 14$
$45 - 54 \div 9 \times 7 + 11 = 14$
$45 - 6 \times 7 + 11 = 14$
$45 - 42 + 11 = 14$
$3 + 11 = 14$
$14 = 14$

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