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Aptitude Made Simple

Number Series

Various competitive examinations ask questions regularly based on number series, therefore candidates must possess the required knowledge.

Number series can be quickly solved and is a biggest time saver!!!

Number series refers to a sequence of numbers following some pattern.

In our day to day life whenever we come across any problem we think whether we or any of our friend or family has already faced the problem. Depending on those previous experience (**pattern**) and what actions we did to solve it so we can use same thing to solve our current problems.

What is pattern and what is series?
Let us assume you live on 6th floor and you are going by stairs. So you will go from 0th floor to 1st floor.1st floor to 2nd floor and subsequently from 5th floor to 6th floor.
So each time we are going 1 floor up.
Each of these floor is pattern and our journey from Ground floor to 6th floor is Series.

Pre-requisites for solving series problems quickly and orally:
1. Tables 1 to 30
2. Squares 1 to 30
3. Cubes 1 to 10
4. Prime numbers 2 to 100

We will be looking at approaches to solve number series problems:

Addition (+)	Squares (n^2)
Subtraction (-)	Cubes(n^3)
Multiplication (*)	Odd/Even number
Division (/)	Prime Number
Miscellaneous [Combination of 2 or more any of these]	

Approach1: Addition

Problem 1 : 7, 11, 15, 19, 23, ?
Solution :
Look at the series and try to identify what is pattern?
Series is in increasing (ascending) order.
How much added in 7 to get 11? -> 4
How much added in 11 to get 15? -> 4
How much added in 15 to get 19? -> 4
How much added in 19 to get 23? -> 4

Pattern: 4 is getting added in number to get next number.

7	11	15	19	23	?
+4	+4	+4	+4		

To find number in place of ? we need to add 4 to 23.
23+4=27.
Answer is 27.

Problem 2 : 8, 12, 17, 23, 30, ?
Solution :
Look at the series and try to identify what is pattern?
All numbers are increasing order.
How much added in 8 to get 12-> 4
How much added in 12 to get 17-> 5
How much added in 17 to get 23 -> 6
How much added in 23 to get 30-> 7

Pattern: 4,5,6,7,…are getting added in number to get next number

8	12	17	23	30	?
+4	+5	+6	+7		

To find number in place of ? we need to add 8 in 30
30+8 = 38
Answer is 38

Approach2: Subtraction

Problem 1 : 45, 35, 25, 15, ?
Solution :
Look at the series and try to identify what is pattern?
It is in decreasing (descending) order.
How much to be subtracted from 45 to get 35 -> 10
How much to be subtracted from 35 to get 25 -> 10
How much to be subtracted from 25 to get 15 -> 10
Pattern: 10 is getting subtracted from number to get next number.

45	35	25	15	?
-10	-10	-10		

To find number in place of ? we need to subtract 10 from 15
15-10 = 5
Answer is 5.

Problem 2 : 72, 63, 54, 45, ?
Solution :
Look at the series and try to identify what is pattern?
It is in decreasing (descending) order.
If look at the numbers carefully and you know table of 9, you can easily figure it out that all numbers are from table of 9.
How much to be subtracted from 72 to get 63 -> 9
How much to be subtracted from 63 to get 54 -> 9
How much to be subtracted from 54 to get 45 -> 9

Pattern: 9 is getting subtracted from number to get next number.

72	63	54	45	?
-9	-9	-9		

To find number in place of ? we need to subtract 9 from 45
45-9 = 36
Answer is 36.

Approach3: Multiplication

In this approach there is common multiplication factor from 1st term to 2nd term and 2nd term to 3rd term in series till last term.

Problem 1: 4, 8, 16, 32, ?
Solution :
Look at the series and try to identify what is pattern?
With which number 4 is to be multiplied to get 8-> 2
With which number 8 is to be multiplied to get 16-> 2
With which number 16 is to be multiplied to get 32-> 2

Pattern: Number is multiplied by 2 to get next number.

4	8	16	32	?
*2	*2	*2		

To find number in place of ? we need to multiply 32 by 2.
32*2 = 64
Answer is 64.

Problem 2: 8, 12, 18, 27, ?
Solution :
Look at the series and try to identify what is pattern?
As it is increasing try to see if addition pattern exists.

8	12	18	27	?
+4	+6	+9		

Not able to see any pattern of addition and So we will check for multiplication.
So there is multiplication factor 1.5
Note here multiplication factor can be decimal as well.
Pattern: Number is multiplied by 1.5 to get next number.

8	12	18	27	?
*1.5	*1.5	*1.5		

To find number in place of ? we need to multiply 27 by 1.5
Multiplication by 1.5 means adding half of number to it.
27+ (27/2) = 27+ 13.5 = 40.5
Answer is 40.5

Approach4: Divison

Problem 1: 200, 100, 50, 25, ?
Solution :
Look at the series and try to identify what is pattern?
With which number 200 is to be divided to get 100-> 2
With which number 100 is to be divided to get 50-> 2
With which number 50 is to be divided to get 25-> 2

Pattern: Number is divided by 2 to get next number.

200	100	50	25	?
/2	/2	/2		

To find number in place of ? we need to divide 25 by 2.
25/2 = 12.5
Answer is 12.5

Problem 2: 270, 90, 30, ?
Solution :
Look at the series and try to identify what is pattern?
With which number 270 is to be divided to get 90-> 3
With which number 90 is to be divided to get 30-> 3
Pattern: Number is divided by 3 to get next number.

270	90	30	?
/3	/3	/3	

To find number in place of ? we need to divide 30 by 3.
Answer is 10

Approach 5: Squares

If you have squares learned from 1 to 30 it would help you and speed up your calculation in each aptitude topic.

Problem 1: 9, 16, 25, 36, 49, ?
Solution :
Look at the series and try to identify what is pattern?
You can see 1 number is added and its square is calculated.

Pattern: 1 is added to current number and its square is calculated to get next number.

9	16	25	36	49	?
3^2	$(3+1)^2$	$(4+1)^2$	$(5+1)^2$	$(6+1)^2$	
3^2	4^2	5^2	6^2	7^2	

To find number in place of ? we need to add 1 in 7 and calculate square of it.
$(7+1)^2 = 8^2 = 64$
Answer is 64

Problem 2: 121, 100, 81, 64,?
Solution :

Look at the series and try to identify what is pattern?

Pattern: 1 is reduced to current number and its square is calculated to get next number.

121	100	81	64	?
11^2	$(11-1)^2$	$(10-1)^2$	$(9-1)^2$	
11^2	10^2	9^2	8^2	

To find number in place of ? we need to reduce 1 from 8 and calculate square of it.
$(8-1)^2 = 7^2 = 49$
Answer is 49

Approach 6: Cubes

If you have cubes learned from 1 to 10 it would help you and speed up your calculation in each aptitude topic.

Problem 1: 1, 8, 27, 64, ?
Solution :
Look at the series and try to identify what is pattern?

Pattern: 1 is added to current number and its cube is calculated to get next number.

1	8	27	64	?
1^3	$(1+1)^3$	$(2+1)^3$	$(3+1)^3$	
1^3	2^3	3^3	4^3	

To find number in place of ? we need to add 1 to 4 and calculate cube of it.

$(4+1)^3 = 5^3 = 125$

Answer is 125

Problem 2: 125, 64, 27, 8, ?
Solution :

Look at the series and try to identify what is pattern?

Pattern: 1 is reduced from current number and its cube is calculated to get next number.

125	64	27	8	?
5^3	$(5-1)^3$	$(4-1)^3$	$(3-1)^3$	
5^3	4^3	3^3	2^3	

To find number in place of ? we need to subtract 1 from 2 and calculate cube of it.
$(2-1)^3 = 1^3 = 1$
Answer is 1

Approach7: Prime number

Problem 1: 7, 13, 19, 29, ?
Solution :

Looking at all terms we can figure out that all are prime number.

Pattern: After current number consecutive 1st prime number is ignored and 2nd prime number is taken as next number in series

Prime number(n)	7	13	19	29	?
n+1 Prime no	11	17	23	31	
n+2 Prime no	13	19	29	**37**	

To find number in place of ? we need to find 2nd consecutive prime number after 29.
1st Prime number after 29 : 31
2nd Prime number after 29 : 37
Answer is 37

Problem 2: 61, 59, 53, 47, ?
Solution :

Looking at all terms we can figure out that all are prime number.

Pattern: After current number previous consecutive 1st prime number is taken as next number in series

Prime number(n)	61	59	53	47	?
n-1 Prime no	59	53	47	43	

To find number in place of ? we need to find 1st previous consecutive prime number before 47.
Previous prime number of 47 : 43
Answer is 43

Approach8: Odd/Even number

Problem 1 : 23, 25, 27, 29, 31,?
Solution :
Looking at all terms we can figure out that all are odd numbers.
This can be solve with approach of addition as well as odd number.
Consecutive odd number of 23 ->25
Consecutive odd number of 25 ->27
Consecutive odd number of 27 ->29
Consecutive odd number of 29 ->31
To find number in place of ? we need to find consecutive odd number after 31.

Answer is 33

Problem 2: 60, 45, 58, 43, 56, 41, ?
Solution:

Sometimes it may happen that pattern is not in continuous numbers but in alternate numbers.

Pattern: Even numbers are decreasing on 1st , 3rd and 5th term and odd numbers are decreasing in 2nd,4th and 6th position

Even n		Even n-1		Even n-2		
60	45	58	43	56	41	?
	Odd n		Odd n-1		Odd n-2	

To find number in place of ? we need to find previous consecutive even number before 56.

Answer is 54

Miscellaneous:

This approach contains combination of 2 or more approaches that we discussed earlier.

Problem 1: 4 ,-8, 16, -32 ,64,?
Solution:

Pattern: Number is multiplied by -2 to get next number.

4	-8	16	-32	64	**-128**
*-2	*-2	*-2	*-2	*-2	

Answer is -128

Problem 2: 16, 33, 65, 131, 261, ?
Pattern: 1st number multiplied by 2 and 1 added. 2nd number multiplied by 2 and 1 is subtracted.

Solution

16	33	65	131	261	**523**
(16*2)+1	(33*2)-1	(65*2)+1	(131*2)-1	(261*2)+1	

Answer is 523

Problem 3: 165, 195, 255, 285, 345, ?

Pattern: 30 added in 1st number to get 2nd number and 60 gets added to get 3rd number. Subsequently 30 and 60 are added to get next numbers in series.

Solution :

165	195	255	285	345	**375**
+30	+60	+30	+60	+30	

Answer is 375

Problem 4:
7,26,63,124,215,342,?

Pattern: 1 number is added to current number and cube of it is calculated and then 1 is reduced from it.

Solution :

7	26	63	124	215	342	**511**
2^3-1	$(2+1)^3$-1	$(3+1)^3$-1	$(4+1)^3$-1	$(5+1)^3$-1	$(6+1)^3$-1	$(7+1)^3$-1
2^3-1	3^3-1	4^3-1	5^3-1	6^3-1	7^3-1	8^3-1

Answer is 511

Problem 5: 8,7,11,12,14,17,17,22,?
Solution :

Pattern: Alternate number series with add 3 and 5 in both sub-series.

8,11,14,17,**20**

7,12,17,22.

8	+3		=11	+3		=14	+3		=17	+3		
8	7	11	12	14	17	17	22	**20**				
	7	+5		=12	+5		=17	+5		=22		

Answer is 20

Problem 6: 11, 13, 17, 19, 23, 29, 31, 37, 41, ?
Solution :

Pattern: If you look at all numbers, all are prime numbers and consecutive prime numbers.

After 41 next prime number -> 43

Answer is 43

Problem 7: 2, 6, 12, 20, 30, 42, 56,?
Solution :

Pattern: Number is getting added in each number is in sequence 4,6,8,10,12,14,16

2	6	12	20	30	42	56	**72**
+4	+6	+8	+10	+12	+14	+16	

Answer is 72

Problem 8: 80, 99, 120, 143, ?
Solution:

Pattern: Number is increased by 1 and its square is calculated and 1 is reduced from it.

80	99	120	143	**168**
9^2-1	$(9+1)^2-1$	$(10+1)^2-1$	$(11+1)^2-1$	$(12+1)^2-1$
9^2-1	10^2-1	11^2-1	12^2-1	13^2-1

Answer is 168