2 Number Series

In the number series, some numbers are arranged in a particular sequence. One is required to observe the trend in which the numbers. After finding the relation between the numbers in the given series, we can easily find the missing number or odd number from the given series. Following are some of the important rules or order on which the number series are based on:

Note

Number series is a arrangement of numbers in a certain order, where some numbers are wrongly put into the series of numbers and some number is missing in that series, we need to observe and find the accurate number to the series of numbers. Paper setter is usually not asking AP, GP or HP questions. Just try to find a pattern in the series and solve it. Sequence:

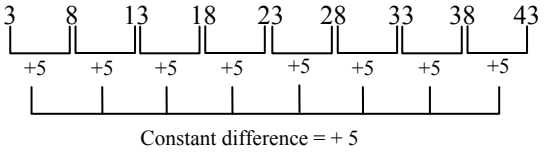
- Growing quickly: 2, 9, 28, 65, 126, $(n^3 + 1)$. In quick-growing sequences are cubes or fourth powers, or maybe factorials.
- Growing slowly: 2, 4, 6, 8, 10. If it is growing slowly just addition or subtraction with particular number
- or in between: 2, 5, 10, 17, 26, 37, 50, $(n^2 + 1)$. If it is growing in between, compare it to the sequence of squares

I. Difference Series: Under this category, the change in the order for the differences between each consecutive number of the series is found out. The difference series can be further classified as:

- **Number series with a constant difference:** In the number series with a constant difference, there is always a *constant difference* between two consecutive numbers.

Examples 1.

Solution:

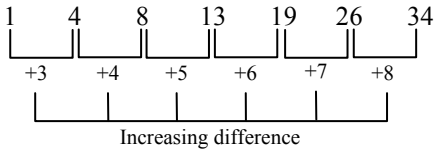


We can also have series of *odd numbers* or series of *even numbers* in the number series with constant difference.

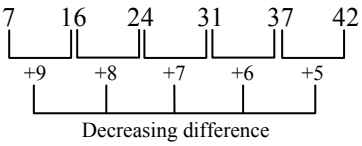
- **Number series with an increasing or decreasing difference:** In the number series with an increasing or decreasing difference, the difference between consecutive terms are increasing or decreasing, as the case may be.

Example 2.

Solution: Increasing difference:



Decreasing difference:



II. Squares/Cubes Series: In this type all the terms are related to the squares of numbers or cubes of numbers. The number itself obeys certain order so that the character of the series can be found out.

Squares Series:

Example 3. Squares of consecutive odd numbers,

Solution:

1	9	25	49	81	121
↓	↓	↓	↓	↓	↓
1^2	3^2	5^2	7^2	9^2	$(11)^2$

Squares of consecutive prime numbers – 1,

3	8	24	48	120
↓	↓	↓	↓	↓
$2^2 - 1$	$3^2 - 1$	$5^2 - 1$	$7^2 - 1$	$(11)^2 - 1$

Cubes Series:

Example 4. Cubes of consecutive even numbers,

Solution:

8	64	216	512
↓	↓	↓	↓
2^2	4^3	6^3	8^3

Cubes of consecutive prime numbers + 3,

11	30	128	346
↓	↓	↓	↓
$2^2 + 3$	$3^3 + 3$	$5^3 + 3$	$7^3 + 3$

Squares:

$1^2 = 1$	$2^2 = 4$	$3^2 = 9$	$4^2 = 16$	$5^2 = 25$
$6^2 = 36$	$7^2 = 49$	$8^2 = 64$	$9^2 = 81$	$10^2 = 100$
$11^2 = 121$	$12^2 = 144$	$13^2 = 169$	$14^2 = 196$	$15^2 = 225$
$16^2 = 256$	$17^2 = 289$	$18^2 = 324$	$19^2 = 361$	$20^2 = 400$
$21^2 = 441$	$22^2 = 484$	$23^2 = 529$	$24^2 = 576$	$25^2 = 625$

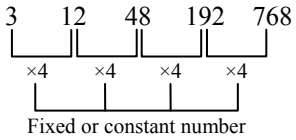
Cubes:

$1^3 = 1$	$2^3 = 8$	$3^3 = 27$	$4^3 = 64$
$5^3 = 125$	$6^3 = 216$	$7^3 = 343$	$8^3 = 512$
$9^3 = 729$	$10^3 = 1000$	$11^3 = 1331$	$12^3 = 1728$
$13^3 = 2197$	$14^3 = 2744$	$15^3 = 3375$	$16^3 = 4096$
$17^3 = 4913$	$18^3 = 5832$	$19^3 = 6859$	$20^3 = 8000$

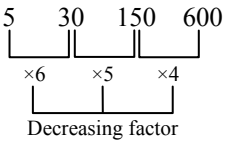
III. Product Series: In this type of series, each term is multiplied by a fixed number or certain pattern to get the next number.

Example 5.

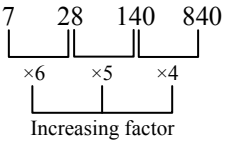
Solution: (i)



(ii)



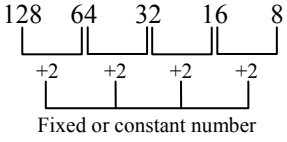
(iii)



IV. Division Series: In this type of series, each term is divided by a fixed number or certain pattern to get the next number. Under this category, the change in the order for the ratios between each consecutive number of these series is found out.

Example 6.

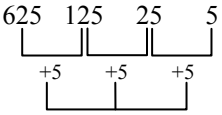
Solution:



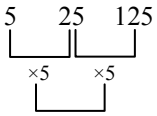
V. Combination or Mixed Series: In this type of series, more than one series is combined together with certain pattern.

Example 7. 625 5 125 25 25 125 5.

Solution:Series I:



Series II:



Note: It includes triangular pattern series.

VI. Geometric series: A geometric series is a series with a constant ratio between successive terms. Pattern $T_n = ar^{n-1}$ (a = first term, r = common ratio, n = number of term).

Example 8. 5, 35, 245, 1715, ?

Solution: Here, a = 5, r = 7 and n = 5

$T_5 = 5 \times 7^{5-1} = 5 \times 2401 = 12005$

VII. Two-tier Arithmetic series: Under this category, the differences of successive numbers form an arithmetic series.

Example 9. Find the sum of the first 10 terms of the following series: 3, 8, 13, 18, 23, 28, 33, 38, 43,…

Solution: If you observe the above series, you notice that there is a fixed difference of 5 between successive terms and so it is an Arithmetic Series.

Therefore, ***a*** =3, ***d*** = 5 and ***n*** = 10.

$[T_n = a + (n - 1)\, d]$

$T_{10} = 3 + (10 - 1)\, 5 = 48$

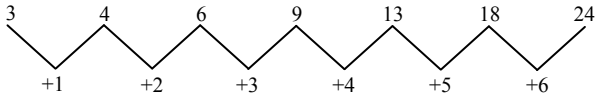
Basic Approach to Number Series

The best way/method of approaching the number series questions:

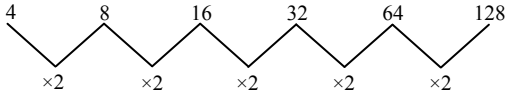
- Firstly, analyse the difference between terms.
- If the difference is constant, it is a constant difference.
- If the difference is increasing or decreasing by a constant number, then it is a series with a constant increasing or decreasing difference.
- If there is no constant increasing or decreasing difference, then try product series approach.
- For the product series approach, first divide the second term with the first term, third with the second and so on.
- If the numbers obtained are the same, then it is a product series.
- If the difference is increasing or decreasing fastly, then try the square series approach.

- If the increase is very much and it is not a square series, then try the cube series approach.
- If the difference is alternately decreasing and increasing or increasing for some time and alternately decreasing, then it should most probably be a mixed series. So, check out the series with alternate numbers.
- If still the series is not solved, try the general series.

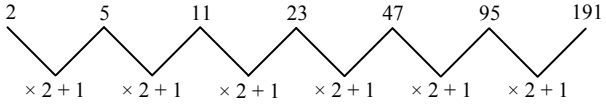
Example 10. 34 6 9 13 18 ____
Solution: (24)



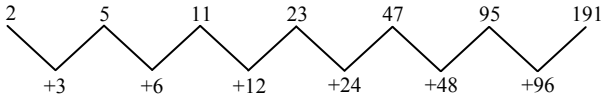
Example 11. 4 8 16 32 64 ____
Solution: (128)



Example 12. 2 5 11 23 47 95 ____
Solution: (191)



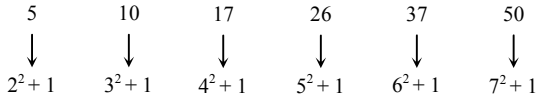
This problem can also be solved by an alternate method.



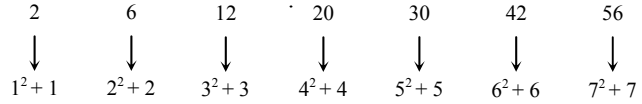
In this pattern, the difference between two consecutive terms is doubling in each step. From the above, it is clear that the same problem can be tackled by different methods. So, different patterns can be identified for the same problem is certain cases.

Example 13. 1 4 9 16 25 ____
Solution: (36) All the terms in the problem are prefect square of natural numbers.

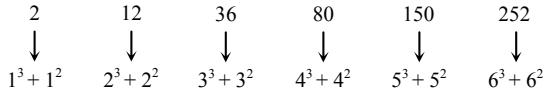
Example 14. 5 10 17 26 ___ 50
Solution: (37)



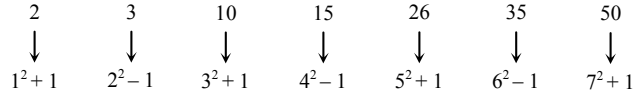
Example 15. 2 6 12 20 30 42 ___
Solution: (56)



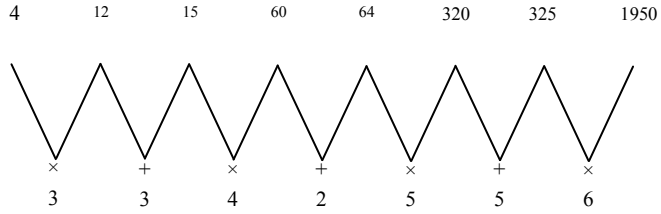
Example 16. 2 12 36 80 150 ___
Solution: (252)



Example 17. 2 3 10 15 26 35 ___
Solution: (50)



Example 18. 4 12 15 60 64 320 325 ___
Solution: (1950)



Example 19. 1, 1, 3, 9, 6, 36, 10, 100, ____, 225
Solution: The given series a mixture of two series.
I. 1, 3, 6, 10, …
II. 1, 9, 36, 100, 125
The logic of I is $+2, +3, +4, +5,$ and the logic of II is the squares of the corresponding numbers of I. So, the missing number is 10 + 5 i.e., 15.

Multiple Choice Questions

Directions: In each of the following questions, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and replace the question mark in the given series:

Type–I: Difference Series

1. 6, 12, 21, ?, 48
a. 38 **b.** 40
c. 45 **d.** 33

2. 10, 18, 28, , 40, 54, 70, ?
a. 85 **b.** 86 **c.** 87 **d.** 88

3. 1, 6, 15, ?, 45, 66, 91
a. 25 **b.** 26 **c.** 27 **d.** 28

4. 6, 11, 21, 36, 56, ?
a. 42 **b.** 81 **c.** 51 **d.** 91

5. 0, 2, 8, 14, ? 34
a. 25 **b.** 23 **c.** 20 **d.** 24

6. 0.5, 0.55, 0.65, 0.8, ?
a. 0.82 **b.** 0.95 **c.** 0.9 **d.** 1

7. 28, 33, 31, 36, ?, 39
a. 32 **b.** 34 **c.** 38 **d.** 40

8. 60.5 72 84.5 98 112.5 ?
a. 127 **b.** 125 **c.** 126 **d.** 128

9. 289 303 324 352 387 429 ?
a. 473 **b.** 487 **c.** 558 **d.** 478

10. 55 60 67 78 91 108 ?
a. 89 **b.** 127 **c.** 125 **d.** 121

Type – II: Squares/Cubes Series

11. 4, 8, 28, 80, 244, ?
a. 628 **b.** 728 **c.** 278 **d.** 428

12. 112, 111, 119, 92, 156, 31, ?
a. 387 **b.** 247 **c.** 375 **d.** 287

13. 1, 4, 27, 256, 3125, 46656, ?
a. 705894 **b.** 823543 **c.** 279936 **d.** 16807

14. 104, 153, 189, 214, ?
a. 235 **b.** 239
c. 225 **d.** None of these

15. 2, 6, 33, 49, 174, 210, ?
a. 426 **b.** 259
c. 274 **d.** None of these

Type – III: Product/Division Series

16. 6 13 28 59 ?
a. 111 **b.** 122 **c.** 113 **d.** 114

17. 12 12 18 45 180 1170 ?
a. 12870 **b.** 12285 **c.** 10530 **d.** 11700

18. 2916, 972, 354, 108, 36, 12
a. 2916 **b.** 972 **c.** 354 **d.** 36

19. 23, 25, 53, 163, 657, 3291, ?
a. 23045 **b.** 19753 **c.** 16461 **d.** 13169

20. 1250, 500, 200, 80, 32, 12.8, ?
a. 5.16 **b.** 6.02 **c.** 6.4 **d.** 5.12

21. 89250, 17850, 7140, 1408, 571.2, ?
a. 126.12 **b.** 114.24 **c.** 228.48 **d.** 246.48

22. 3, 10, 32, 100, ?
a. 460 **b.** 308
c. 345 **d.** None of these

23. 17, 19, 10, ?, 35, 90
a. 27.5 **b.** 16.5
c. 21 **d.** None of these

24. 13, 25, 51, 101, 203, ?
a. 411 **b.** 405 **c.** 406 **d.** 407

25. 705, 728, 774, 843, 935, 1050, ?
a. 1180 **b.** 1187
c. 1185 **d.** None of these

26. 15, 17, 21, 29, 45, 77, ?
a. 125 **b.** 141
c. 173 **d.** None of these

Type – IV: Combination of Series

27. 10, 22, 8, 24, 6, ?
a. 18 **b.** 26 **c.** 16 **d.** 12

28. 20, 20, 19, 16, 17, 13, 14, 11 ?, ?
a. 13, 14 **b.** 10, 11 **c.** 13, 16 **d.** 10, 10

29. 19, 2, 38, 3, 114, 4, ?
a. 352 **b.** 256 **c.** 228 **d.** 456

30. 23, 26, 24, 27, 25, 28, ?
a. 29 **b.** 26 **c.** 27 **d.** 24

Type – V: Triangular Pattern Series

31. 2, 12, 36, 80, 150, ?
a. 210 **b.** 258 **c.** 194 **d.** 252

32. 2, 9, 28, ? 126, 217, 344
a. 82 **b.** 65 **c.** 50 **d.** 70

33. 3, 20, 63, 144, 275, ?
a. 548 **b.** 554 **c.** 354 **d.** 468

Type – VI: Miscellaneous

34. 3, 4, 12, ?, 576, 27648
a. 96 **b.** 48
c. 64 **d.** 52

35. 13 (168) 13, 14 (181) 13, 15 (?) 13
a. 195 **b.** 194 **c.** 190 **d.** 196

36. 5 6 ? 57 244
a. 15 **b.** 36
c. 17 **d.** None of these

37. 15 17 32 49 81 130 ?
a. 226 **b.** 194 **c.** 179 **d.** 211

38. 1, 1000, 11011, 1000000, 1111101, ?
a. 1100101 **b.** 11011000
c. 10000000 **d.** None of these

39. 7, 12, 19, 28, 39, ___
a. 49 **b.** 57 **c.** 50 **d.** 52

40. 1, 2, 6, 15, 31, ___.
a. 47 **b.** 52
c. 55 **d.** 56

41. 5, 11, 23, 47, 95, ___.
a. 191 **b.** 161
c. 169 **d.** 190

42. 13, 24, 46, 90, 178, ….
a. 354 **b.** 266 **c.** 364 **d.** 344

43. 11, 12, 20, 47, … .
a. 91 **b.** 101 **c.** 111 **d.** 121

44. 7, 15, 31, 63, 127, … .
a. 254 **b.** 265 **c.** 253 **d.** 255

45. 23, 48, 99, 203, 413, …
a. 927 **b.** 837 **c.** 937 **d.** 437

46. 5, 7, 10, 15, 22, …
a. 31 **b.** 32 **c.** 38 **d.** 35

47. 7, 15, 29, 59, 117, … .
a. 230 **b.** 231 **c.** 233 **d.** 235

48. 98, 72, 14, …
a. 9 **b.** 8
c. 6 **d.** 4

49. 1, 3, 3, 6, 7, 9, …, 12, 21.
a. 10 **b.** 11
c. 12 **d.** 13

50. 2, 3, 5, 8, 13, 21, ….
a. 29 **b.** 30
c. 32 **d.** 34

51. 840, 168, 42, 14, 7, ….
a. 1 **b.** 7 **c.** 9 **d.** 3

Type – VI: Missing Term

Directions: Find the missing term in the following questions.

52. 11, 23, 48, 99, __, 409.
a. 200 **b.** 202 **c.** 201 **d.** 205

53. 17, 21, 37, 73, 137, 237, … .
a. 363 **b.** 369 **c.** 375 **d.** 381

54. 5, 11, 25, 55, 117, 243, ….
a. 511 **b.** 499 **c.** 498 **d.** 497

55. 9, 19, 37, 75, 149, 299, ….
a. 598 **b.** 597 **c.** 599 **d.** 697

56. 13, 17, 33, 97, 353, ….
a. 1377 **b.** 653 **c.** 712 **d.** 1273

57. 3, 7, 13, 21, 31, ….
a. 40 **b.** 41 **c.** 42 **d.** 43

58. 10, 12, 16, 24, 40, ….
a. 60 **b.** 56 **c.** 70 **d.** 72

59. 2, 7, 28, 63, 126, ….
a. 210 **b.** 213 **c.** 215 **d.** 219

60. 999, 730, 511, 344, 215, ….
a. 123 **b.** 126 **c.** 125 **d.** 130

61. 8, 24, 48, 80, 120, ….
a. 158 **b.** 162 **c.** 164 **d.** 168

62. 23, 27, 43, 79, 143, ….
a. 244 **b.** 243 **c.** 242 **d.** 241

63. 1, 2, 4, 8, 16, 32, 64, 96
a. 4 **b.** 32 **c.** 64 **d.** 96

64. 5, 10, 17, 24, 37, 50, 65.
a. 10 **b.** 17 **c.** 24 **d.** 37

65. 2, 5, 10, 17, 26, 37, 50, 64
a. 17 **b.** 26 **c.** 37 **d.** 64

66. 13, 17, 19, 23, 27, 31
a. 13 **b.** 19 **c.** 27 **d.** 31

67. 17, 18, 22, 31, 46, 72
a. 17 **b.** 18 **c.** 31 **d.** 46

68. 7, 15, 69, 149, 307
a. 15 **b.** 33 **c.** 69 **d.** 307

69. 126, 135, 144, 216, 154, 801
a. 115 **b.** 216 **c.** 154 **d.** 801

70. 76, 89, 115, 167, 271, 489
a. 115 **b.** 167 **c.** 271 **d.** 489

ANSWERS

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
d	d	d	b	d	d	b	d	d	b
11.	**12.**	**13.**	**14.**	**15.**	**16.**	**17.**	**18.**	**19.**	**20.**
b	b	b	d	d	d	d	c	c	d
21.	**22.**	**23.**	**24.**	**25.**	**26.**	**27.**	**28.**	**29.**	**30.**
d	b	b	b	d	b	b	d	d	b

31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
d	b	d	b	b	b	d	b	d	d
41.	**42.**	**43.**	**44.**	**45.**	**46.**	**47.**	**48.**	**49.**	**50.**
a	a	c	d	b	d	d	d	d	d
51.	**52.**	**53.**	**54.**	**55.**	**56.**	**57.**	**58.**	**59.**	**60.**
b	b	d	d	b	a	d	d	c	b
61.	**62.**	**63.**	**64.**	**65.**	**66.**	**67.**	**68.**	**69.**	**70.**
d	b	d	c	d	c	d	c	c	d

SOLUTIONS

1. **(d)** The given sequence follows the pattern:
+6, +12, +15, . . .

i.e. 6 12 21 [33] 48
+6 +9 +12 +15

Therefore, Missing term = 21 + 12 = 33.

2. **(d)** The given sequence follows the pattern:
+8, +10, +12, +14, . . .

i.e. 10 18 28 40 54 70 [88]
+8 +10 +122 +145 +16 +185

Therefore, Missing term = 70 + 18 = 88.

3. **(d)** The given sequence follows the pattern:
+5, +9, +13, +17, +21, +25, . . .

i.e. 1 6 15 [28] 45 66 91
+5 +9 +13 +17 +21 +25

Therefore, Missing term = 15 + 13 = 28.

4. **(b)** The sequence follows the pattern:
+5, +10, +15, +20, . . .

i.e. 6 11 21 36 56 [81]
+5 +10 +15 +20 +25

Therefore, Missing term = 56 + 25 = 81.

5. **(d)** The given sequence follows the pattern:
+2, +6, +6, +10, +10, . . .

i.e. 0 2 8 14 [24] 34
+2 +6 +6 +10 +10

Therefore, Missing term = 14 + 10 = 24.

6. **(d)** The given sequence follows the pattern:
+0.05, +0.10, +0.15, +0.20.

i.e. 0.5 0.5 0.65 0.8 [1]
+0.05 +0.10 +0.15 +0.20

Therefore, Missing term
= 0.8 + 0.20 = 1

7. **(b)** The given sequence follows the pattern:

i.e. 28 33 31 36 [34] 39
+5 –2 +5 –2 +5

Therefore, Missing term = 36 – 2 = 34.

8. **(d)** The given sequence of number follows the pattern:
+ 11.5; + 11.5 + 1.0
= + 12.5; + 12.5 + 1.0 = + 13.5; + 13.5 + 1.0
= + 14.5; + 14.5 + 1.0 = + 15.5.

i.e. 60.5 72 84.5 98 [112.5] 128
+11.5 +12.5 +13.5 +14.5 +15.5

Therefore, Missing number = 112.5 + 15.5 = 128.

9. **(d)** The given sequence of number follows the pattern:
+ 14; + 14 + 7
= + 21; + 21 + 7 = + 28; + 28 + 7
= + 35; + 35 + 7 = + 42; + 42 + 7 = + 49

289 303 324 352 387 429 [478]
+14 +21 +28 +35 +42 +49
+7 +7 +7 +7 +7

Therefore, Missing number = 429 + 49 = 478.

10. **(b)** The given sequence of number follows the pattern:
+ 5; + 7; + 11; + 13; + 17; + 19.

i.e. consecutive prime numbers

55 60 67 78 91 108 [127]
+5 +7 +11 +13 +17 +19

Therefore, Missing number = 108 + 19 = 127.

11. **(b)** The given sequence of number follows the pattern:
$3^1 + 1, 3^2 - 1, 3^3 + 1, 3^4 - 1, 3^5 + 1, 3^6 - 1$

1 8 28 80 244 [728]
↓ ↓ ↓ ↓ ↓ ↓
3^1+1 3^2+1 3^3+1 3^4+1 3^5+1 3^6+1

Therefore, Missing term = $3^6 - 1 = 728$.

12. **(b)** The given sequence of number follows the pattern:
$-1^3; +2^3; -3^3; +4^3; -5^3; +6^3$

112 111 119 92 156 31 [247]
-1^3 $+2^3$ -3^3 $+4^3$ -5^3 $+6^3$

Therefore, Missing number = $31 + 6^3 = 247$.

13. **(b)** The given sequence of number follows the pattern:

1 [4] 27 256 3125 46656 823543
↓ ↓ ↓ ↓ ↓ ↓ ↓
3^1 2^2 3^3 4^4 5^5 6^6 7^7

Therefore, Missing term = $7^7 = 823543$.

14. **(d)** The given sequence of number follows the pattern:
$+ 7^2, + + 6^2, + 5^2, + 4^2$

104 153 189 214 [230]

$+7^2$ $+6^2$ $+5^2$ $+4^2$

Therefore, Missing number = $214 + 4^2 = 230$.

15. (d) The given sequence of number follows the pattern:

2 6 33 49 174 210 [553]

$+2^3$ $+3^3$ $+4^3$ $+5^3$ $+6^2$ $+7^3$

Therefore, Missing number = $210 + 7^3 = 553$.

16. (d) The given sequence of number follows the pattern:

6 13 28 59 [122]

$\times 2+1$ $\times 2+2$ $\times 2+3$ $\times 2+4$

Therefore, Missing number
= $(59 \times 2) + 4 = 122$.

17. (d) The given sequence of number follows the pattern:
$\times 1$; $\times 1.5$; $\times 2.5$; $\times 4$; $\times 6.5$; $\times 10.5$.

12 12 18 45 180 1170 [12285]

$\times 1$ $\times 1.5$ $\times 2.5$ $\times 4$ $\times 6.5$ $\times 10.5$

1+1.5 1.5+2.5 2.5+4 4+6.5

Therefore, Missing number = 1170×10.5
= 12285.

18. (c) Each number is one-third of the next. In place of 354, it should have been 324.
Hence 354 is odd man out.

19. (d) The given sequence of number follows the pattern:
$\times 1+2$; $\times 2+3$; $\times 3+4$; $\times 4+5$; $\times 5+5$; $\times 6+7$

23 25 53 163 657 3291 [19753]

$\times 1+2$ $\times 2+3$ $\times 3+4$ $\times 4+5$ $\times 5+5$ $\times 6+7$

Therefore, Missing number = $3291 \times 6 + 7 = 19753$.

20. (d) The given sequence of number follows the pattern:

$X \times \frac{2}{5}$

1250 500 200 80 32 12.8 [5.12]

$\times\frac{2}{5}$ $\times\frac{2}{5}$ $\times\frac{2}{5}$ $\times\frac{2}{5}$ $\times\frac{2}{5}$ $\times\frac{2}{5}$

Therefore, Missing number = $12.5 \times \frac{2}{5} = 5.12$.

21. (d) The given sequence of number follows the pattern:
+ 5; + 2.5; + 5; + 2.5; + 5.

89250 17850 7140 1428 571.2 [114.24]

+ 5 + 2.5 + 5 + 2.5 + 5

Therefore, Missing number = 571.2 + 5 = 114.24.

22. (b) The given sequence of number follows the pattern:

3 10 32 100 [308]

$\times 3+1$ $\times 3+2$ $\times 3+4$ $\times 3+8$

$\times 2$ $\times 2$ $\times 2$

Therefore, Missing number = $100 \times 3 + 8 = 308$.

23. (b) The given sequence of number follows the pattern:

17 9 10 [16.5] 35 90

$\times 0.5+0.5$ $\times 1+1$ $\times 1.5+1.5$ $\times 2+2$ $\times 2.5+2.5$

Therefore, Missing number = $10 \times 1.5 = 1.5$

24. (b) The given sequence of number follows the pattern:

13 25 51 101 203 [405]

$\times 2-1$ $\times 2+1$ $\times 2-1$ $\times 2+1$ $\times 2-1$

Therefore, Missing number = $203 \times 2 - 1 = 405$.

25. (d) The given sequence of number follows the pattern:
+ 23 × 1; + 23 × 2; + 23 × 3; + 23 × 4; + 23 × 5; + 23×6.

705 728 774 843 935 1050 [1188]

$\times 23\times 1$ $\times 23\times 2$ $\times 23\times 3$ $\times 23\times 4$ $\times 23\times 5$ $\times 23\times 6$

Therefore, Missing number = 1050 + 23 × 6
= 1188.

26. (b) The given sequence of number follows the pattern:
+ 2; + 4 (+2×2); + 8 (+2×4); + 16 (+2×8); + 32 (+2×16); + 64 (×2×32);

15 17 21 29 45 77 [141]

+ 2 + 4 + 8 + 16 + 32 + 64

Therefore, Missing number = 77 + 64 = 141.

27. (b) The given sequence of number is a combination of series that follows the pattern:

Series I: 10 8 6

-2 -2

Series II: 22 24 26

$+2$ $+2$

Therefore, Missing number = 24 + 2 = 26.

28. (d) The given sequence of number is combination of series that follows the pattern:

Series I: 20 19 17 14 [10]

-1 -2 -3 -4

Series II: 20 16 13 11 [10]

-4 -3 -2 -2

Therefore, Missing number = 10 and 10.

29. **(d)** The given sequence of number follows the pattern:

Series I: 19 38 114 [456]

× 2 × 3 × 4

Series II: 2 3 4

+ 1 + 1

Therefore, Missing number = 114 × 4 = 456.

30. **(b)** The given sequence of number follows the pattern:

Series I: = 1; series II; = 1

Series I: 23 24 25 [26]

+ 1 + 1 + 1

Series II: 26 27 28

+ 1 + 1

Therefore, Missing number = 25 × 1 = 26.

31. **(d)** The given sequence of number follows the pattern:

Series I: 2 12 36 80 150 ?

+10 +24 +44 +70 ?

Series II: 10 24 44 70 ?

+14 +20 +26

Series III: 14 20 26 ?

+6 +6 +6

[Uniform pattern = + 6]

So, Missing term in series III = 26 + 6 = 32.

Missing term in Series II = 70 = 32 = 102.

Therefore, Missing term in Series I = 150 + 102 = 252.

32. **(b)** The given sequence of number follows the pattern:

Series I: 2 9 28 ? 126 217 344

+7 +19 ? ? +91 +127

Series II: 7 19 ? ? 91 127

+12 ? ? ? +36

Series III: 12 ? ? ? 36

+6 +6 +6 +6

[∴ Uniform pattern must be +6 to form a series]

So, Missing term in series III = 18 24 30

+ 6 + 6

Missing term in Series II = 37 and 61.

i.e. 19 + 19 + <u>18</u> and 37 + <u>24</u>

Therefore, Missing term in Series I = 28 + <u>37</u> = 65.

33. **(d)** The given sequence of number follows the pattern:

Series I: 3 20 63 144 275 ?

+17 +43 +81 +131 ?

Series II: 17 43 81 131 ?

+26 +38 +50 ?

Series III: 26 38 50 ?

+12 +12 +12

[∴ Uniform pattern = + 12]

So, Missing term in Series III = 50 + 12 = 62.

Missing term in Series II = 131 + 62 = 193.

Therefore, Missing term in Series I = 275 + 193 = 468.

34. **(b)** The given sequence of number follows the pattern:

4 12 [48] 576 27648

i.e. 3 × 4 = 12; 4 × 12 = [48];

12 × 48 = 576; 48 × 576 = 27648

Therefore, Missing number = 48.

35. **(b)** The given sequence of number follows the pattern,

Number within the bracket = Multiply of numbers on its adjacent sides – 1

i.e. (13×13) – 1 = 168; (14×13) – 1 = 181

Therefore, Missing number = (15×13) – 1 = 194.

36. **(b)** The given sequence of number follows the pattern:

5 6 **3**6 57 [244]

×1 +1^2 ×2 +2^2 ×3 +3^2 ×4 +4^2

Therefore, Missing number = 6 × 2 + 2^2 = 36.

37. **(d)** The given sequence of number follows the pattern:

15 17 32 49 81 130 [211]

i.e. 15 + 27 = 32; 17 + 32 = 49; 49 + 81 = 130; 81 + 130 = <u>211</u>

Therefore, Missing number = 211.

38. **(b)** The given sequence of number is in Binary system and follows the pattern

Cubes of natural numbers i.e. 1^3; 2^3; 3^3; 4^3; 5^3; and <u>6^3</u>

Converting this binary system into decimal system,

We get 1 $\Rightarrow$ $1 \times 2^{\circ} \Rightarrow 1 = 1^3$

1000 $\Rightarrow$ $1 \times 2^3 + 0 + 2^2 + 0 \times 2^1 + 0 \times 2^{\circ}$

$\Rightarrow$ $8 + 0 + 0 + 0 = 8 = 2^3$.

11011 $\Rightarrow$ $1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^{\circ}$

$\Rightarrow$ $16 + 8 + 2 + 1 = 3^3$.

39. **(d)** Here the given series follows the rule: +5, + 7, + 9, + 11, + 13, ...

The term next to 39 is 39 + 13 i.e., 52.

Hence the answer is (d)

40. **(d)** Here the logic is $+1, +4, +9, +16, +25, ...$ i.e., $1^2, 2^2, 3^2, 4^2, 5^2, ...$

So, the term next to 31 is 31 + 25 i.e., 56.

41. **(a)** The rule in this series is double the term and then add one to the result i.e., 2 +1.

OR Another logic is $+6, +12, +24, +48, +96, ...$ So the next term is $95+96=191.$ Hence, the answer is (a).

42. **(a)** The rule is $+11, +22, +44, +88, +176.$ The next number is $178+176=354.$

43. **(c)** The rule is $1^3, 2^3, 3^2, 4^2, 5^2, ...$ The next number is 47 64 111.

44. **(d)** Rule is × 2 + 1 or +8, +16, +32, +64 etc. The next number is 127 2 1 255.

Or $127+128=255$

45. **(b)** The rule is × 2, + the numbers 2, 3, 5, 7, 11, etc. Thus the next number is 2 × 413 + 11 = 837.

46. **(d)** The rule is: $+2, +3, +5, +7, +11$ etc. (prime numbers)

47. **(d)** The rule is: Double the number and operate ±1 alternately.

The next term is $2\times117+1=235.$

48. **(d)** $98 \Rightarrow 9\times8=72,\ 72 \Rightarrow 7\times2=14, 1\times4=4$

49. **(d)** The given series is a combination of two series I. 1, 3, 7, …, 21 and II. 3, 6, 9, 12. The pattern in the first series is $+2, +4, +6, +8.$ The missing number is –6.

50. **(d)** Sum of the previous two terms is the next term.

∴ the missing term is $13+21=34.$

51. **(b)** The sequence is: divide first term by 5, then by 4, 3, 2 and 1.

So, the missing term is $7\div1=7.$

52. **(b)** Here the logic is $\times2+1, +2, +3, +4, +5, ...$

So, the series is 11, $11\times2+1, 23\times2+2, 48\times2+3,\ 99\times2+4$ i.e., 202. Hence, the answer is **(b).**

53. **(d)** Add to each term $2^2, 4^2, 6^2, 8^2, 10^2, 12^2,$ etc. The next term is $237+144=381.$

54. **(d)** Double each number and add 1, 3, 5, 7, 9, 11 etc. Next number is 2 × 243 + 11 = 497.

55. **(b)** Double the number and add one, subtract one alternately.

The next number is $299\times2-1=597.$

56. **(a)** Add to each number $4, 4^2, 4^3, 4^4, 4^5$ i.e., 4, 16, 64, 256, 1024, etc.

Next number = 353 + 1024 = 1377.

57. **(d)** Add the numbers 4, 6, 8, 10, 12 etc.

Next number is 31 + 12 = 43.

58. **(d)** Add to each number 2, 4, 8, 16, 32 etc.

Next number is 72.

59. **(c)** The rule is $1^3+1, 2^3-1, 3^3+1, 4^3-1, 5^3+1,\ 6^3-1$ etc.

Hence the next number is $216-1=215.$

60. **(b)** The rule is $10^3-1, 9^3+1, 8^3-1, 7^3+1, 6^3-1, 5^3+1.$

Next number is 126.

61. **(d)** Difference of two successive numbers are 16, 24, 32, 40, etc.

Hence the next number is $120+48=168.$

62. **(b)** The differences are 4, 16, 36, 64, 100 etc. Hence the next number is $143+100=243.$

63. **(d)** Each term is double the preceding term, so 96 is the wrong term. It should be 128.

64. **(c)** The sequence is +5, +7, +9 etc. 24 is wrong and it should be 26.

65. **(d)** The numbers are $1^2+1, 2^2+1, 3^2+1$ and so on.

66. **(c)** This is a prime number series, 27 is not a prime number.

67. **(d)** The difference of two successive terms is 1, 4, 9, 16, 25, etc. But difference between 31 and 46 is 15 (not sixteen). The right number should have 47.

68. **(c)** Double the number and then add 1, 3, 5 7, 9 etc. In place of 69, it should be $33\times2+5=71.$ Hence 69 is the odd man out.

69. **(c)** Sum of the digits in each number is 9 except in 154. Hence 154 is the odd man out.

70. **(d)** The difference of two successive terms is 13, 26, 52, 104, 208. In place of 489, it should have 497.

Hence 489 is the odd man out.

□ □ □