

Mental Ability Test (MAT)



NEW10'S
A NEW TURN IN EDIFICATION

1. NUMBER SERIES

- In this type of series, the set of given numbers in a series are related to one another in a particular pattern or manner.
- The relationship between the numbers may be:
 - (i) consecutive odd/even numbers;
 - (ii) consecutive prime numbers;
 - (iii) squares/cubes of some numbers with/without variation of addition or subtraction of some number;
 - (iv) sum/ product/ difference of preceding numbers;
 - (v) addition/subtraction/multiplication/division by some number, and
 - (vi) many more combinations of the relationships given above.

SOLVED EXAMPLES

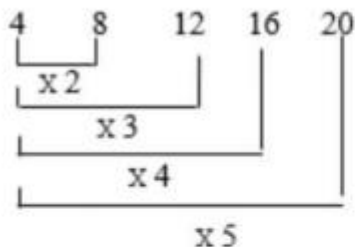
1. Which number will complete the given series?

4, 8, 12, 16, ?

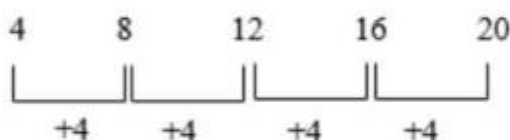
- (a) 18 (b) 20
(c) 22 (d) 24

Ans. (b):

The series is made of numbers which are multiples of 4. Other explanation can be that the difference between the two consecutive numbers is 4.



OR



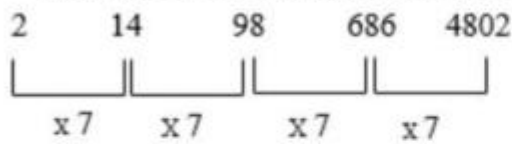
2. Complete the given series.

2, 14, 98, 686, ?

- (a) 1976 (b) 2548
(c) 980 (d) 4802

Ans. (d):

The numbers are multiplied by 7 to obtain the next numbers.



The given series may also comprise of two alternate series merged as one.

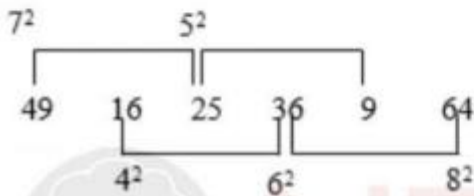
3. Find the missing number in the series.

49, 16, 25, 36, 9, ?

- (a) 64 (b) -52
(c) 45 (d) 43

Ans. (a):

In this series the first set comprises of squares of odd numbers in descending order and the second set comprises of squares of even numbers in ascending order.



Series I : / 49, 25, 9 (Squares of 7, 5, 3)

Series II : 16, 36, 64 (Squares of 4, 6, 8)

EXERCISE

Directions : In the following questions, select the number(s) from the given options for completing the given series.

1. 11, 13, 17, 23, 31, ?
a) 39 b) 37
c) 41 d) 43
2. 8, 48, 16, 96, 32, ?
a) 192 b) 15
c) 64 d) 288
3. 5, 7, 10, 19, 46, 127, ?
a) 370 b) 380
c) 360 d) 390
4. 138, 115, 92, 69, 46?
a) 9 b) 18
c) 21 d) 23
5. 8, 10, 18, 28, 46?
a) 64 b) 68
c) 70 d) 74
6. 2, 6, 12, 20, 30, 42?
a) 54 b) 5
c) 52 d) 58
7. 1, 2, 2, 4, 16, ? , 65536
a) 276 b) 64
c) 256 d) 198
8. 5, 9, 17, 33, 65, ?
a) 127 b) 129
c) 131 d) 125
9. 1, 4, 5, 11, 9, 18, ? , 25
a) 12 b) 13
c) 19 d) 23

10. 144, 121, 100, 81, 64 ?
a) 36 b) 49
c) 25 d) 16
11. 5, 50, 45, 450, 445, ? 4445
a) 4450 b) 4600
c) 4550 d) 4500
12. 1, 4, 27, 256, ?
a) 625 b) 3025
c) 3125 d) 7776
13. 9, 81, 90, 810, 819, ?
a) 7371 b) 900
c) 8100 d) 1638
14. 11, 15, 20, 26, 33?
a) 41 b) 40
c) 42 d) 43
15. 2, 8, 18, 32, 50, 72?
a) 132 b) 102
c) 89 d) 98
16. 1.5, 3, 7.5, 22.5, ?
a) 90 b) 78.75
c) 67.5 d) 45
17. 2, 6, 12, 20, 30?
a) 42 b) 36
c) 41 d) 40
18. 3, 10, 29, 66, ?
a) 125 b) 127
c) 123 d) 129
19. 1, 2, 6, 24, 120, ?
a) 480 b) 600
c) 720 d) 840
20. 1, 2, 2, 5, 3, 10, ?
a) 8 b) 4
c) 7 d) 11
21. 81, 27, 9, 3, ?
a) 0 b) 1
c) 2 d) 4
22. 3, 6, 9, 36, 27, 216, 81 ?
a) 1296 b) 648
c) 243 d) 1944
23. 2, 3, 6, 15, 42, ?
a) 129 b) 126
c) 123 d) 132
24. 0.75, 1.5, 3, 6, 12, ?
a) 20 b) 22
c) 24 d) 26
25. 23, 6, 19, 9, 15, 12, 11?
a) 14 b) 15
c) 16 d) 17
26. 128, 64, 32, 16, 8?
a) 6 b) 4
c) 2 d) 0
27. 5, 12, 26, 54, 110?
a) 220 b) 226
c) 224 d) 222
28. 3, 5, 9, 17, 33, 65, ?
a) 127 b) 129
c) 131 d) 125
29. 1, 10, 25, 46, 73
a) 106 b) 108
c) 110 d) 112
30. 0, 6, 24, 60, 120?
a) 180 b) 210
c) 240 d) 200
31. 3, 6, 12, 24, 48, ?
a) 96 b) 84
c) 72 d) 108
32. 2, 5, 10, 17, 26, ?
a) 35 b) 37
c) 39 d) 41
33. 100, 90, 81, 73, 66, ?
a) 58 b) 60
c) 62 d) 64
34. 1, 8, 27, 64, 125, ?
a) 196 b) 216
c) 256 d) 225
35. 4, 9, 25, 49, 121, ?
a) 144 b) 169
c) 196 d) 225
36. 7, 14, 28, 56, 112, ?
a) 196 b) 210
c) 224 d) 168
37. 1, 3, 7, 15, 31, ?
a) 63 b) 55
c) 47 d) 71

38. 5, 11, 23, 47, 95, ?
a) 190 b) 191
c) 189 d) 193
39. 2, 6, 18, 54, 162, ?
a) 324 b) 486
c) 540 d) 648
40. 144, 121, 100, 81, 64, ?
a) 49 b) 36
c) 25 d) 16
41. 0, 1, 4, 9, 16, 25, ?
a) 30 b) 36
c) 49 d) 64
42. 3, 5, 11, 29, 83, ?
a) 245 b) 248
c) 251 d) 254
43. 6, 12, 21, 33, 48, ?
a) 60 b) 63
c) 66 d) 69
44. 1000, 500, 250, 125, ?
a) 60 b) 62.5
c) 65 d) 70
45. 2, 3, 5, 7, 11, 13, ?
a) 15 b) 17
c) 19 d) 21
46. 8, 24, 72, 216, 648, ?
a) 1944 b) 1624
c) 1844 d) 1524
47. 13, 17, 25, 37, 53, ?
a) 69 b) 71
c) 73 d) 75
48. 512, 256, 128, 64, 32, ?
a) 8 b) 12
c) 16 d) 24
49. 1, 2, 6, 24, 120, ?
a) 480 b) 600
c) 720 d) 840
50. 4, 7, 13, 25, 49, ?
a) 97 b) 95
c) 93 d) 99

ANSWER KEY

- (c) All these are prime numbers.
- (a) The sequence in the series is $\times 6$, then divided by 3 which is repeated.
 $8 \times 6 \div 3$
- (a) The pattern is $\times 3 - 11$. multiplied by 3 and then subtracted by 11.
- (d) The series is decreasing by 23.
- (d) The number in the series is the sum of two numbers preceding it.
($8+10=18$), ($10+18=28$), ($18+28=46$), ($28+46=74$)
- (b) The pattern is $+4, +6, +8, +10, +14, \dots$
- (c) The number in the series is product of all the numbers preceding it.
($1 \times 2 = 2$)
($1 \times 2 \times 2 = 4$)
($1 \times 2 \times 2 \times 4 = 16$)
($1 \times 2 \times 2 \times 4 \times 16 = 256$)
($1 \times 2 \times 2 \times 4 \times 16 \times 256 = 65536$)
- (b) The pattern is $\times 2$ then -1 . the pattern is multiplied by 2 and then subtracted by 1.
($65 \times 2 = 130$; $130 - 1 = 129$)
- (b) There are two alternate series.
series 1 : 1, 5, 9, 13 (addition of 4)
series 2 : 4, 11, 18, 25 (addition of 7)
- (b). The pattern is squares in descending order.
- (a). The sequence in the series is $\times 10, -5$, which is repeated.
- (c) The pattern is $1^1, 2^2, 3^3, 4^4, 5^5$.
 $5^5 = 3125$.

13. (a) The sequence in the series is $\times 9, +9$ which is repeated.

14. (a) The pattern is $+4, +5, +6, +7, +8 \dots$

15. (d) The sequence in the series is double the square of numbers in their natural order.

$$1^2 \times 2 = 2$$

$$2^2 \times 2 = 8$$

$$3^2 \times 2 = 18$$

$$4^2 \times 2 = 32$$

$$5^2 \times 2 = 50$$

$$6^2 \times 2 = 72$$

$$7^2 \times 2 = 98$$

16. (b) The pattern is $\times 2, \times 2.5, \times 3, \times 3.5$
so, $22.5 \times 3.5 = 78.75$

17. (a) The difference between the consecutive numbers in the series increases by 2 at each step.

$$2+4 = 6$$

$$6+6 = 12$$

$$12+8 = 20$$

$$20+10 = 30$$

$$30+12 = 42 \dots$$

18. (b) The pattern is $\times 3 + 1$. first multiply by three then add by one.

19. (c), The pattern is $\times 2, \times 3, \times 4, \times 5$

20. (b) There are two alternate series
series 1 : 1, 2, 3, 4
series 2 : 2, 5, 10

21. (b) Divide by 3 each time.

$$81 \div 3 = 27$$

$$27 \div 3 = 9$$

$$9 \div 3 = 3$$

$$3 \div 3 = 1$$

22. (a) pattern : two interleaved series.
odd positions; 3, 9, 27, 81 ($\times 3$ each time)
even positions; 6, 36, 216 ($\times 6$ each time)

23. (c) the pattern is $\times 3$ then -3

$$2 \times 3 - 3 = 3$$

$$3 \times 3 - 3 = 6$$

$$6 \times 3 - 3 = 15$$

$$15 \times 3 - 3 = 42$$

$$42 \times 3 - 3 = 123$$

24. (c) pattern is multiplying by 2 each time.

25. (b) two alternate series.

series 1 (odd positions): difference -4 each time.

series 2 (even positions): difference $+3$ each time.

26. (b) pattern : divide by 2 each time.

27. (d) pattern is multiply by 2 ($\times 2$) then $+2$.

28. (b) pattern is $2^n + 1$

$$2^1 + 1 = 3$$

$$2^2 + 1 = 5$$

.....

.....

$$2^7 + 1 = 129$$

29. (a) the differences are 9, 15, 21, 27 (each difference increase by 6 each time)

30. (b) pattern is $n^3 - n$.

$$6^3 - 6 = 216 - 6 = 210.$$

31. a) 96

$$\times 2 \text{ each time, } 48 \times 2 = 96$$

32. b) 37

$$+3, +5, +7, +9, +11, 26 + 11 = 37$$

33. b) 60

$$-10, -9, -8, -7, -6, 66 - 6 = 60$$

34. b) 216

$$1^3, 2^3, 3^3, 4^3, 5^3, 6^3, 6^3 = 216$$

35. b) 169

Squares of prime numbers

$$2^2, 3^2, 5^2, 7^2, 11^2, 13^2, 13^2 = 169$$

36. c) 224

$$\times 2 \text{ each time, } 112 \times 2 = 224$$

37. a) 63

$$\times 2 + 1 \text{ each time, } 31 \times 2 + 1 = 63$$

38. b) 191

$$\times 2 + 1 \text{ each time, } 95 \times 2 + 1 = 191$$

39. b) 486

$$\times 3 \text{ each time, } 162 \times 3 = 486$$

40. a) 49

Descending squares $12^2, 11^2, 10^2, 9^2, 8^2, 7^2,$
 $7^2=49$

41. b) 36

Ascending squares $0^2, 1^2, 2^2, 3^2, 4^2, 5^2, 6^2,$
 $6^2=36$

42. a) 245

$\times 3 - 4$ each time, $83 \times 3 - 4 = 245$

43. c) 66

$+6, +9, +12, +15, +18,$ $48 + 18 = 66$

44. b) 62.5

$\div 2$ each time, $125 \div 2 = 62.5$

45. b) 17

Prime numbers series, next prime after
 $13=17$

46. a) 1944

$\times 3$ each time, $648 \times 3 = 1944$

47. c) 73

$+4, +8, +12, +16, +20,$ $53 + 20 = 73$

48. c) 16

$\div 2$ each time, $32 \div 2 = 16$

49. c) 720

Factorial series $1!, 2!, 3!, 4!, 5!, 6!,$ $6! = 720$

50. a) 97

$\times 2 - 1$ each time, $49 \times 2 - 1 = 97$



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2. REPEAT SERIES

- In this type of series small letters of the alphabet are used to make a set of letters which are repeated
- The candidate has to find the set of letters which will fit the blanks left in the given series in such a manner that one section of the series is further repeated in the same manner.

SOLVED EXAMPLES

1. Which of the following groups of letters will complete the given series?

ba-b-aab-a-b

- (a) baab (b) abba
(c) abaa (d) babb

Ans. (b): The series is baab, baab, baab. Here the section 'baab' is repeated in the series.

Solving steps:

- The candidate has to look for clues to solve such series pattern.
- 'aab' in the Series indicates that 'b' in this series is preceded by two 'a'
- so, the first blank and the last blank will be filled by 'a'
- Now the first set is formed, i.e., 'baab' in the beginning.
- This set is repeated, so the second and third blanks will have 'b' filling them.

Now, solve the exercise given below to know the different ways in which these series are formed.

EXERCISE

Directions: Which of the following groups of letters will complete the given series?

1. c- bbb - - abbbb - abbb -
 a) abccb b) bacbb
 c) aabcb d) abacb
2. ba - cb - b - bab -

- a) acbb b) bcaa
 c) cabb d) bacc
3. a - ba - caacb - bc -
 a) acbb b) cbab
 c) cbaa d) cbba
4. a - bab - - b - abb
 a) abab b) bbab
 c) aabb d) babb

5. – bcbc – caba –

- a) aabc b) abac
c) caab d) baba

6.ab – aabc – abc

- a) aab b) caa
c) bca d) cba

7.1 – nnlm – nlmn – lmn

- a) lmn b) nml
c) mlnm d) mnnm

8. -cabcc – bc – abcca –

- a) babc b) acac
c) cacb d) bacc

9. ac – cab – baca – aba – acac

- a) bccb b) aacb
c) babb d) acbc

10. – ba – baa – ab -a

- a) babb b) baab
c) abbb d) aaba

11. a – ba – bb – ab – a

- a) abab b) baab
c) baba d) abbb

12. k – mk – lmkk – kk – mk

- a) lkml b) lkmk
c) lkmm d) lkml

13. c – baa – aca – cacab – acac – bca

- a) acbaa b) cbaac
c) bccab d) bbcaa

14. – bcc – ac -aabb - ab – cc

- a) bacab b) abaca
c) aabca d) bcaca

15. – yyx – xxyx – yxyx – y

- a) yxxy b) xyxy

c) yxyx d) xyyx

16. a – ba – ab – aba – ab

- a) aabb b) baba
c) abba d) baab

17. – pqr – pq – r – pqr – pq

- a) rpqpr b) rppqr
c) rpqrp d) rprqp

18. bb – cc – bb – cc – bb

- a) bccb b) cbcb
c) bbcb d) cbcc

19. – xy – xxy - xyy -xyy – xyz – xy

- a) zyxz b) xyzx
c) zxyz d) yzxx

20. aa – bb – aaa – bbb – aaaa

- a) abab b) baba
c) aabb d) bbba

21. – mn – mmn – mnn – mno – mn

- a) omon b) mnom
c) nomo d) onmo

22. c – d – ccdd – cc – dd – ccdd

- a) dcdd b) cddc
c) dccc d) cddc

23. – abc – aabc – aaabc – aaaabc

- a) abca b) aabc
c) cabc d) bcab

24.pp – qqr – ppq – rr – ppqqr

- a) rpqr b) qpr
c) qpr d)rpqr

25. ab – abc – abcd – abcde – abc

- a) abc b) bcd
c) cde d) dea

26. – xyz – xxyz – xxxyz – xxxxyz

- a) xyzx b) xzyx
c) yxzx d) zxyx

27. aaa – bbb – aaaa – bbbb – aaaaa

- a) abab b) baba
c) aabb d) bbaa

28. – pqr – ppqr – pppqr – ppppqr – pppppqr

- a) pqrs b) prqs
c) pqr d) prs

29. – mno – mmno – mmmno – mmmmmo

- a) mnmo b) omnm
c) monm d) nmon

30. bb – cc – bbb – ccc – bbbb – cccc

- a) bcbe b) cbeb
c) bbcc d) ccbb

31. ab – abb – abbb – abbbb – ?

- a) abbbbb b) abbbb
c) aabbbb d) ababbb

32. cc – bcb – bbc – bbb – ?

- a) bccb b) abbb
c) cbbe d) bccc

33. aab – abb – bbb – bbc – ?

- a) bcc b) ccb
c) cbc d) bcc

34. abc – bca – cab – abc – ?

- a) bca b) cab
c) abc d) acb

35. aa – bba – aab – bba – ?

- a) aab b) abb
c) bab d) bba

36. ab – aab – aaab – aaaab – ?

- a) aaaaab b) aaaab

- c) aaabb d) aabbb

37. cba – cab – bca – abc – ?

- a) bac b) acb
c) cab d) cba

38. abb – bba – bab – abb – ?

- a) bba b) aba
c) bab d) aab

39. ac – bbc – abbc – bbac – ?

- a) abac b) acbb
c) abbc d) bbca

40. aabb – bbcc – ccaa – aabb – ?

- a) bbcc b) ccbb
c) aabb d) ccaa

41. mn – mnn – mnn – mnnn – ?

- a) mnnn b) mnnnn
c) mnnnn d) mnnnn

42. abc – cba – bac – cab – ?

- a) acb b) bca
c) abc d) cba

43. xxy – xyy – xxx – xyy – ?

- a) xxy b) yyx
c) xyx d) yyy

44. pq – ppq – pq – pppq – ?

- a) pqqq b) ppqq
c) pqpq d) pppq

45. abc – bcd – cde – def – ?

- a) efg b) fgh
c) egh d) efh

46. aab – bba – aba – bab – ?

- a) bba b) aab
c) abb d) baa

47. rst – tsr – str – rts – ?

- a) trs b) srt
c) rts d) tsr

48. aabb – bbaa – abba – baab – ?

- a) aabb b) abab
c) baba d) bbaa

49. xy – yyx – xyy – yxy – ?

ANSWER KEY

1. **a)** abccb . the repeating pattern is cabbbb.

2. **d)** bacc . the repeating pattern is babc.

3. **c)** cbaa. the repeating pattern is acbabca.

4. **b)** bbab. the repeating pattern is abb.

5. **a)** aabc . the repeating pattern is abc bca cab abc.

6. **c)** caa. the repeating pattern is abca.

7.**d)** mnnn. the repeating pattern is lmnn.

8.**c)** cacb. the repeating pattern is ccab.

9. **b)** aacb . the repeating pattern is acac , abab acac , abab , acac.

10.**c)** abbb. the repeating pattern is ababba.

11.**b)** baab. the repeating pattern is abba .

12.**d)** lkml . the repeating pattern is klmk.

13.**a)** acbaa. the repeating pattern is cabaac , acabca , cabaac , acabca.

14.**a)** bacab. the repeating pattern is bbccaa, ccaabb, aabbcc.

15.**d)** xyyx. the repeating pattern is xyyx , yxxy , xyyx , yxxy .

16.**b)** baba . the repeating pattern is abab.

17. **c)** rpqr . the repeating pattern is rqrp.

a) yyx b) xyy

c) xxy d) yxx

50. lmn – mnl – nlm – lmn – ?

- a) lnm b) mnl
c) nlm d) mln

18. **b)** cbbc. the repeating pattern is bbcc .

19.**c)** xyz. the repeating pattern is xyz.

20. **a)** abab . the repeating pattern is aabb.

21. **a)** omon. the repeating pattern is mnop

22. **c)** dccd . the repeating pattern is ccdd.

23.**a)** abca. the repeating pattern is abc , aabc , aaabc, aaaabc

24. **a)** rpqr. the repeating pattern is ppqqr .

25. **c)** cde. the repeating pattern is abc , abcd , abcde.

26.**a)** xyzx the repeating pattern is xyz, xxyz, xxxyz, xxxxyz

27.**a)** abab . the repeating pattern is aaabbb , aaaabbbb , aaaaabbbbb

28. **c)** pqr . the repeating pattern is pqr, ppqr, pppqr, ppppqr

29.**b)** omnm . the repeating pattern is mno , mmno , mmmno.

30.**c)** bbcc . the repeating pattern is bbcc, bbbccc , bbbbcccc

31.**a)** abbbbbb (one more b added each time)

32.**b)** abbb (pattern shifts b forward, c reduces)

33.**a)** bcc (each letter increases by one step)

34.**a)** bca (rotating abc left each time)

35.**a)** aab (alternating pattern aab/bba)

- 36.a)** aaaaab (one more 'a' added each time)
37.b) acb (rotating cba pattern)
38.a) bba (repeating abb–bba pattern)
39.a) abac (alternating ab/bb positions)
40.a) bbcc (repeating shift of doubles)
41.c) mmnn (alternating single/double pattern)
42.b) bca (rotating abc positions)
43.a) xxy (repeating xxy–xyy pattern)
44.a) pqqq (one more q added each time)
45.a) efg (shift +1 each group)
46.a) bba (alternating aab/bba pattern)
47.a) trs (rotating rst pattern)
48.b) abab (alternating swap pattern)
49.a) yyx (rotating xy pattern)
50.b) mnl (rotating lmn left each time)



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