# 1 Coding-Decoding and Series

## Introduction

Coding-decoding is based on the candidate's intellectual ability to decode a complex question given in the form of codes or conditions and answer questions based on them.

These and series-based questions are pretty common in the logical reasoning section of SNAP, CMAT, NMAT, TISS-NET, MAT, ATMA, etc. Even in XAT and IIFT, you may find questions based on this topic.

Usually, these questions are easy to tackle. However, the level of difficulty and the variety of questions vary from exam to exam. This module will first discuss the concept and then help you understand the tricks needed to solve questions.

### Keynote

For a particular letter, the letter from the opposite end can be found using the 'Rule of 27'. Always remember that the sum of the positional value of opposite alphabets is always 27, i.e.,

A (1), Z (26)

B (2), Y (25)

## Coding-Decoding

Coding and decoding is an important topic in all entrance exams. In coding, a data value is encrypted and in decoding, it is decrypted.

To answer the coding question, you need to remember the alphabetic position of the letters.

The best way to write the English alphabet is:

| 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 |

## Important

- While solving questions based on letter coding, students should know the alphabetic position of each letter. Even if you remember the positions of the following six letters, it will help you in finding the positions of the other letters.
  **A**-1 **E**-5 **J**-10 **O**-15 **T**-20 **Y**-25.
- One should also try to remember the reverse coding, i.e., A-Z, B-Y, etc.

Now, let's look at the types of questions asked as part of coding-decoding.

## Types of Coding-Decoding

- **Type 1:** Letter coding
- **Type 2:** Letter to number coding
- **Type 3:** Substitution
- **Type 4:** Deciphering coding
- **Type 5:** Symbol coding
- **Type 6:** Coding based on condition
- **Type 7:** New pattern coding-decoding

### Type 1: Letter Coding

In this type of coding, the letters of a word are replaced by other letters which are at a gap of a few units in English alphabets. This gap forms the logic behind the encryption.

**Example 1:**

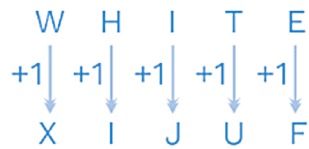Detect the coding pattern/rule and answer the question below:

If WHITE is written as XIJUF, then BLUE is written as:
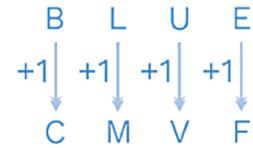
(A) CMFV
(B) CMVF
(C) DMVF
(D) DMFV

**Solution: (B)**

Each letter in the word WHITE is moved one step forward to obtain the corresponding letter of the code.
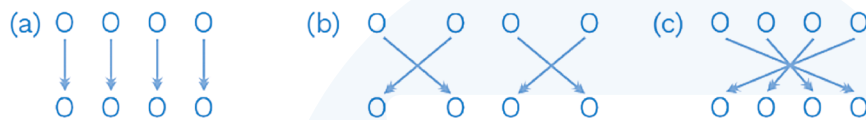
W  H  I  T  E
+1 +1 +1 +1 +1
X  I  J  U  F

So, BLUE can be written as,

B  L  U  E
+1 +1 +1 +1
C  M  V  F

Hence, option (B) is correct.

**Important coding patterns**

- For three-letter word
  (a) O O O    (b) O O O

- For four-letter word
  (a) O O O O    (b) O O O O    (c) O O O O

- For five-letter word
  (a) O O O O O    (b) O O O O O    (c) O O O O O

- For six-letter word
  (a) O O O O O O    (b) O O O O O O    (c) O O O O O O

- For seven-letter word
  (a) O O O O O O O    (b) O O O O O O O    (c) O O O O O O O
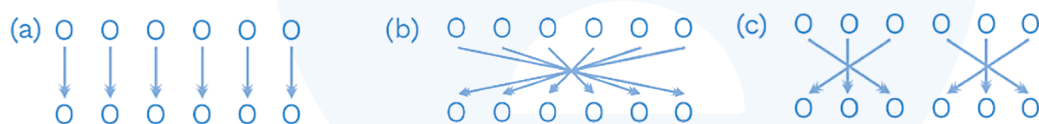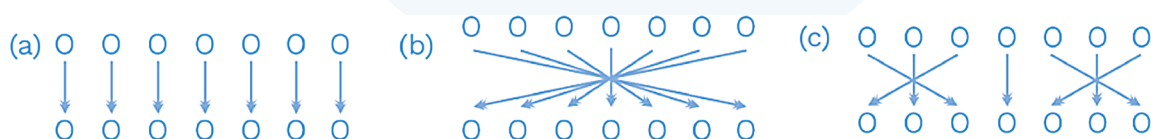
**Type 2: Letter to Number Coding**

In this type of coding, the letters of a word are replaced by numbers. The series of numbers so formed, follow a sequence. This sequence forms the logic behind the encryption.

## Example 2:

In a certain code, CHAMP is coded as 9641169256. How will DEAF be coded?

    (A) 42,516
    (B) 16,25,136
    (C) 1,62,516
    (D) 1,65,136

### Solution: (B)

The letters are coded as:
A   B   C   D   E
1   4   9   16   25
and so on, i.e., the square of the alphabetic position of letters.
So, the code for DEAF will be 1625136.
Hence, option (B) is correct.

### Rack Your Brain

1. If WEATHER is coded as 13,56,937 and CATCH as 25,629, how can 'TEAR' be coded?

### Type 3: Substitution

In these types of coding questions, object names are substituted with different object names. Candidates should carefully trace the substitution and answer the given questions.

### Example 3:

If Pink is called black, black is called blue, blue is called white, white is called yellow, and yellow is called red, then what would be the color of a sunflower?

    (A) Blue
    (B) Yellow
    (C) Red
    (D) White

### Solution: (C)

The color of a sunflower is 'yellow', and as is given that 'yellow' is called 'red'. So, the color of the sunflower is mentioned as 'red'.

Hence, option (C) is correct.

### Rack Your Brain

2. If book is called pillow, pillow is called cloth, cloth is called table, table is called bottle, and bottle is called speaker, then what do we wear?

### Type 4: Deciphering Coding

In these questions, one is expected to determine the codes for a certain statement based on the directions mentioned in the problem statements.

### Example 4:

In a certain code language,

- 'Life in a jungle' is written as 'ae tp lo pi',
- 'Plant a jungle tree' is written as 'mn pi tp xy',
- 'Tall mango tree now' is written as 'mn do ln rs'
- 'Now the jungle rains' is written as 'ln pi aa cb'

    Which of the following does 'mn' stand for?
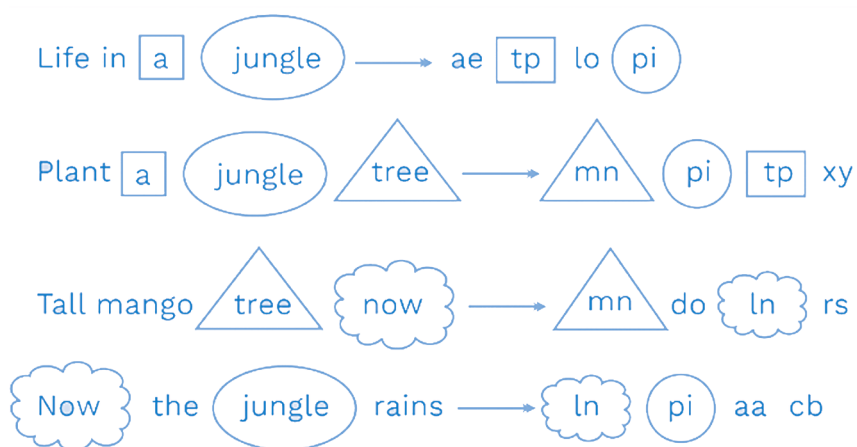    (A) Plant
    (B) Tree
    (C) Mango
    (D) Tall

### Solution: (B)

Let's compare the common words with the codes in the given phrases.

### Rack Your Brain

3. In a certain code, 'rim sim tim' means 'where are you', 'gim sim tim' means 'who are you', what is the code for 'who'?

Clearly, 'mn' stands for tree.

Hence, option (B) is correct.

### Type 5: Symbol Coding

In this type of coding, candidates are going to deal with the questions, in which a set of symbols is assigned to a group of letters. Candidates are required to identify the relationship between the letter and the symbol and decipher the pattern of coding and answer accordingly.

### Example 5:

In a certain code 'TIGER', is written as '4*3@1', and 'RABBIT' is written as '1922*4'. How is 'BEAR' written in that code?

    (A) 219@
    (B) 2@19
    (C) 921@
    (D) 2@91

### Solution: (D)

Here, just by comparison, we can figure out the codes for each letter, as shown below:

As,

| T | I | G | E | R | and | R | A | B | B | I | T |
|---|---|---|---|---|-----|---|---|---|---|---|---|
| ↓ | ↓ | ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 4 | * | 3 | @ | 1 | | 1 | 9 | 2 | 2 | * | 4 |

Similarly,

| B | E | A | R |
|---|---|---|---|
| ↓ | ↓ | ↓ | ↓ |
| 2 | @ | 9 | 1 |

Hence, option (D) is correct.

### Type 6: Coding Based on Condition

In these types of questions, the codes for the digits and symbols are given with some conditions. Candidates should identify the codes and answer the following questions according to the conditions given.

### Example 6:

Given below are the codes for the digit/symbol. Study the conditions given below and answer the questions that follow.

| Digital/Symbol | 8 | 3 | @ | * | π | 4 | 1 | # | 6 | 2 | ® | 5 | 9 | $ | 7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Letter code | M | C | L | P | A | F | Z | S | T | E | W | N | R | D | Q |

## Additional conditions

- If both the first and the last elements are even digits, both of them are coded as 'U'.
- If both first and last elements are odd digits, both of them are coded as 'Y'.
- If the first element is an even digit and the last element is a symbol, then the codes for the first and the last elements get interchanged.

1. What will be the codes for the following groups of elements 3@53*7?
   - (A) YLNCPY
   - (B) YNLPCY
   - (C) UNLCPU
   - (D) YLNCPQ

### Solution: (A)

As per the table, the code for 3@53*7 will be CLNCPQ.

But, the group of elements '3@53*7' also satisfies condition (ii). So, change both the first and last element to 'Y'. Therefore, the code will be YLNCPY.

Hence, option (A) is correct.

### Type 7: New Pattern-Based Coding-Decoding

In this type, alphabets, symbols, and numeric values together are given in the form of code representing a word. Candidates should identify the logic behind the codes and answer accordingly.

### Example 7:

In a certain code language,

- 'Raise your hand' is written as V@18, F@25, W#8.
- 'Sky is Blue' is written as B@19, H#9, V#2.
- 'Kill Corona Campaign' is written as O#11, Z#3, M#3.

1. Which among the following is the code for 'COVID Shield'?
   - (A) W@3 D#19
   - (B) W@3 W#19
   - (C) W#4 W@3
   - (D) D#3 W#4

### Solution: (B)

The given words are coded as per the following pattern:

i) The first letter in the code represents the letter from the opposite end of the last letter in the word.

ii) The symbol represents the number of letters in the word, i.e., # for even, and @ for odd.

iii) The number in the code represents the positional value of first letter of the word.

So, the code for 'COVID Shield' will be W@3 W#19.

Hence, option (B) is correct.

## Number Series

Number series questions are based on numerical sequences that follow a certain pattern which is based on the mathematical rule.

An initial sequence is given from which the rule is to be deduced. You are then asked to predict the next number that obeys the rule or even to identify the wrong terms or the missing term in the given sequence.

The difficulty level of these questions can increase in two ways; first, the logic behind the sequence becomes less trivial and demands attention and creativity; second, the missing number can be positioned at an early stage, thus preventing you from deciphering the hidden rule by only looking at the previous numbers in the sequence.

### Different Types of Number Series

There are some formats of series which are asked in exams.

### Series with first-level difference same

This is the simplest of all the series questions. It is a series in the form of an arithmetic progression (i.e., the difference between two consecutive terms is the same). Look at the following example:

### Example 8:

Find the next term in the following series: 2, 5, 8, 11, _____.

### Solution: 14

It is very easy to figure out that the next term of the sequence is obtained by adding '3' to the previous term.

Hence, answer is (14).

**Note:** Series with second level difference constant being of the form: (an + b).

### Series with second-or third-level difference same

Questions based on this variety are slightly more challenging.

Series with second level difference constant being of the form: $(an^2 + bn + c)$.

Series with third level difference constant with being of the form: $(an^3 + bn^2 + cn + d)$.

Check the following example.

### Example 9:

Find the next term in the following series: 3, 6, 10, 15, 21, **28**, _____.

### Solution: 36

Here, the difference between the terms of the given series is 3, 4, 5, 6, 7, ...

So, the next term will be 28 + 8 = 36.

Hence, answer is 36.

**Note:** Here, the difference between the terms of the given series is 3, 4, 5, 6, 7, ...

So, the difference between the difference of the terms is 1, 1, 1, 1, 1, ...

So, it is a series with second level difference same.

If you observe carefully,

$3 = \frac{1}{2} (2^2 + 2)$

$6 = \frac{1}{2} (3^2 + 3)$

$10 = \frac{1}{2} (4^2 + 4)$

$15 = \frac{1}{2} (5^2 + 5)$       ... and so on

### Geometric series

This type of series is based on ascending or descending order of numbers and each successive number is obtained by multiplying or dividing the previous number with a fixed number.

### Example 10:

5, 45, 405, 3645, ?

### Solution: 32,805

$5 \times 9 = 45$, $45 \times 9 = 405$, $405 \times 9 = 3,645$, $3,645 \times 9 = 32,805$.

Hence, answer is 32,805.

### Multiplication series

In this series, the next term is obtained by multiplying/dividing the previous terms by a common number or numbers in a pattern.

### Example 11:

4, 4, 6, 12, 30, 90, _____.

### Solution: 315

The terms are multiplied by 1, 1.5, 2, 2.5, and so....

So, $90 \times 3.5 = 315$

Hence, answer is 315.

**Rack Your Brain**

4. Find the wrong term in the following series: 121, 81, 21, 6, 2.

### Perfect square series

This type of series is based on the square of a number that is in the same order There may be some additional pattern along with the squares of the numbers.

**Example 12:**

442, 483, 530, 575, ?

**Solution: 626**

$442 = 21^2 + 1$, $483 = 22^2 - 1$, $530 = 23^2 + 1$, $575 = 24^2 - 1$, $626 = 25^2 + 1$.

Hence, answer is 626.

**Perfect cube series**

This type of series is based on a cube of a number, along with some additional patterns as discussed earlier.

**Example 13:**

1331, 1728, 2197, ?

**Solution: $14^3$**

$11^3$, $12^3$, $13^3$, $14^3$

Hence, answer is ($14^3$).

**Mixed series**

In this type of series, more than one different order is given in a series which is arranged alternatively in a single series or created according to any non-conventional rule. The following example of a mixed series describes the above perfectly.

**Example 14:**

11, 24, 50, 102, 206, ?

**Solution: 414**

$11 \times 2 = 22 + 2 = 24$

$24 \times 2 = 48 + 2 = 50$

$50 \times 2 = 100 + 2 = 102$

$102 \times 2 = 204 + 2 = 206$

$206 \times 2 = 412 + 2 = 414$

So, the missing number is 414.

Hence, answer is 414.

**Letter series**

- The letter series questions require you to identify the pattern of the given sequence and choose the missing letter or the next letter in the sequence or even the wrong term in the sequence.

- This variety of series questions requires you to remember the alphabetic positions of the letters (as discussed earlier in coding-decoding), along with other mathematical operations (sum, product, square, etc.)

Let's take some examples to understand the approach to solving such questions.

**Example 15:**

A, C, F, J, ?, ?

**Solution: O, U**

A (B) C; C (D, E) F; F (G, H, I) J; J (K, L, M, N) O; O (P, Q, R, S, T) U

So, the next terms are O and U.

Hence, answer is O, U.

**Example 16:**

BMO, EOQ, HQS, ?

**Solution: KSU**

See all the first letters of the given series: B (C, D) E; E (F, G) H; H (I, J) K.

Now, see all the second letters of the given series: M (N) O; O (P) Q; Q (R) S.

Now, see all the third letters of the given series: O (P) Q; Q (R) S; S (T) U.

So, the next term will be KSU.

Hence, answer is KSU.

**Alphanumeric series**

It is a jumbled combination of alphabetic and numeric series.

**Example 17:**

Z1A, X2D, V6G, T21J, R88M, ?

**Solution: P445P**

The series formed by the numerals 1, 2, 6, 21, and 88, follow the pattern: $\times 1 + 1$, $\times 2 + 2$, $\times 3 + 3$, $\times 4 + 4$, ...

So, numeral in the desired term = $88 \times 5 + 5 = 445$.

Observe the first letters of all the terms: Z (Y) X; X (W) V; V (U) T; T (S) R; R (Q) P.

Observe the second letters of all the terms: A (B, C) D; D (E, F) G; G (H, I) J; J (K, L) M; M (N, O) P.

So, the next term in the series will be P445P.

Hence, answer is P445P.

**Example 18:**

The following sets of three characters form a pattern. Which of the following is the odd one out: G4T, J10R, M20P, P43N?

**Solution: J10R**

Observe the pattern followed by the first letter in all the terms: G (H, I) J; J (K, L) M; M (N, O) P.

Observe the pattern followed by the second letter in all the terms: T (S) R; R (Q) P; P (O) N.

Observe the pattern followed by the numerals in all the terms. It follows '× 2 + 1' pattern.

Hence, if × 2 + 1 rule is satisfied then the second term should be J9R.

This rule can be applied to the whole series except the second term.

So, J10R is the odd one out.

Hence, answer is J10R.

**Continuous pattern series**

- This type of question usually consists of a sequence of letters (which follow a certain pattern) with some letters that will be missing from the series.
- You are asked to choose the correct alternative with the missing letters in a proper sequence.

Let's look at one example.

**Example 19:**

ppq _ ppp _ qqp _

    (A) qqp
    (B) pqq
    (C) qpq
    (D) pqp
    (E) qqq

**Solution: (A)**

Step 1: Fill the first blank space with 'q' so that you can have two ps are followed by two qs.

Step 2: Fill the second blank space either with 'p' (so that you have four ps followed by two qs) or with 'q' (so that you have three ps followed by three qs).

Step 3: The last space must be filled by 'p' to have any of the above two possible patterns repeated.

Step 4: So, now you can have two possible answers: 'qpp' and 'qqp'. But only 'qpp' appears in the choices. Thus, option (A), i.e. qqp is the answer.

**Note:** In such questions, there are multiple ways possible. But, by the given answer options, the other possibilities can be eliminated.

For example,

p p q _ p p p _ q q p _

By filling the blanks with 'ppq', it becomes, p p q q p p p p q q p p.

Now observe by taking groups of three letters: ppq | qpp | ppq | qpp.

It forms a perfect pattern of 'ppq' and 'qpp', alternately.

## Level of Difficulty – 1

**1.** In a certain code language, if MATHS = 16, VERBAL = 06, then find the code of SCIENCE.
(A) 85
(B) 87
(C) 89
(D) 91

**2.** In a certain code language, if violet is called red, red is called green, green is called yellow, yellow is called blue, and blue is called brown, then what is the colour of grass in that language?
(A) Green
(B) Blue
(C) Yellow
(D) Cannot be determined

**3.** In a certain code language, if 'M O S Q U I T O' is coded as 'O N U P W H V N' then how will 'E L E P H A N T' be coded?
(A) K G O G Z J S P
(B) G K G O J Z P S
(C) G K O G Z J P S
(D) K G G O J Z P S

**4.** In a certain coding language 'YELLOW' is written as 'ZGOPTC'. In the same coding language 'ORANGE' will be written as:
(A) PTDRLK
(B) PTDLKR
(C) LPTRLD
(D) PKLRDQ

**5.** In a certain coding language 'LOAFER' is written as 'MMBDFP'. In the same coding language 'SHORTS' will be written as:
(A) TTEPHQ
(B) TPPUPF
(C) PTPUFQ
(D) TFPPUQ

**6.** Find the next term in the given series:
A9B, B25C, C49D, D81E, _____
(A) E144F
(B) E121G
(C) F121E
(D) E121F

**7.** Complete the following series: AYX, ZWU, YUR ___.
(A) XVS
(B) XSO
(C) XSS
(D) XVO

**8.** Study the following alphabet series and answer the question given below:
L and N 3 ? M U = 6 J Z L ↑ * T M 5 D 2 ↓ G 8 E > 4 P % J @ # 9 B 7
If all the symbols are deleted, then which is the 5th element to the left of the 17th element from the left end?
(A) 5
(B) B
(C) D
(D) Z

**9.** Complete the following series: 4, 8, 11, 55, 62, 682, _____.
(A) 693
(B) 695
(C) 697
(D) 699

**10.** Complete the following series: 6, 15, 35, 77, 143, 221, _____.
(A) 319
(B) 321
(C) 323
(D) 325

**Directions for Questions 11 to 15: Complete the following series.**

11. 12, 14, 18, 26, 38, 62, ____
    (A) 80
    (B) 76
    (C) 74
    (D) 72

12. 12, 36, 150, 392, 1452, ____
    (A) 2197
    (B) 2246
    (C) 2312
    (D) 2366

13. 7, 15, 32, 65, 132, ____, 532
    (A) 267
    (B) 265
    (C) 264
    (D) 263

14. 6, 8, 10, 12, 16, 20, 15, ____, 25
    (A) 16
    (B) 18
    (C) 20
    (D) 22

15. 0, 4, 48, 180, 448, ____
    (A) 900
    (B) 1010
    (C) 1331
    (D) 1480

**Directions for Questions 1 to 3: Study the following two tables and find the codes for the words given:**

|   | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | P | D | E | H | A |
| 1 | B | T | G | K | R |
| 2 | U | H | Y | B | O |
| 3 | C | A | N | E | D |
| 4 | S | R | F | L | T |

|   | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|
| 5 | N | H | S | A | B |
| 6 | A | D | L | U | V |
| 7 | E | W | O | C | T |
| 8 | G | U | H | D | L |
| 9 | S | P | C | H | E |

The table has to be interpreted as mentioned below:

Code for A can be: 04 or 31 or 65 or 58.

Code for R can be: 14 or 41.

Also, BAD can be coded as 59 31 34.

**1.** Which of the following can be the code for DOUBLE?
(A) 01 24 20 95 89 02
(B) 66 24 86 59 43 75
(C) 88 77 68 10 67 88
(D) 34 77 68 23 76 33

**2.** Which of the following can be the code for BRANCH?
(A) 23 14 58 55 97 12
(B) 59 41 58 55 97 65
(C) 10 41 04 55 03 56
(D) 23 14 31 32 30 87

**3.** Which of the following can be the code for HOSTAGE?
(A) 21 24 57 79 04 42 33
(B) 03 77 40 79 65 58 02
(C) 56 24 95 11 31 12 75
(D) 98 77 04 44 58 85 99

**4.** If $3 + 4 + 5 + 6 + 7 = 49$ and $6 + 7 + 8 + 9 + 10 = 16$. Then what is the value of $9 + 10 + 11 + 12 + 13$?
(A) 81
(B) 121
(C) 64
(D) 100

**5.** Which number will replace the ?? in the table below?

| 5 | 2 | 17 |
|---|---|----|
| 7 | 4 | 39 |
| 8 | 5 | 53 |
| 9 | 3 | ?? |

(A) 39
(B) 75
(C) 49
(D) 40

**6.** In a certain code language, if ENERGY is coded as CLCPEW, then what is the code of FORTUNE?
(A) DMPQSLC
(B) DMPRTLC
(C) DMQRSLC
(D) DMPRSLC

**7.** In a certain code language, A is represented by 1, B by 2, and C by 3. Also, all the letters whose positions are multiples of 2 are given a code of 2, similarly, all the letters whose positions are multiples of 3 are given a code of 3, and in case of

a clash code of 2 prevails. The rest of the letters are given a code of 4. What is the code for VOWEL in this code language?

(A) 23432
(B) 24342
(C) 23442
(D) 23424

**8.** In a certain code language, if all the positional values of the letters that are prime numbers are represented by 2 and the remaining letters are coded as 1, find the code of the word TOGETHER.

(A) 11211121
(B) 11221122
(C) 11211221
(D) 11221121

**9.** In a certain code language, if the value of INVADER is 42 and SECURE is 30, then what is the value of SITUATION?

(A) 81
(B) 72
(C) 63
(D) 90

**10.** In a certain code language, if the value of CUSTOM is 22 and LABOUR is 20, then what is the value of HISTORY?

(A) 49
(B) 48
(C) 46
(D) 42

**11.** Select the correct option from the given choices to fill in the blanks. ADZ, BFV, _____, HJN, PLJ.

(A) DHR
(B) EGS
(C) DGT
(D) EHT

**12.** Fill in the blanks: EL-60, BK-44, DP-192, CT-240, FO-___.

(A) 450
(B) 475
(C) 500
(D) 550

**13.** Find the next term: 600 J 32, 150 Q 128, 50 M 384, 25 T 768, _____.

(A) 12.5 P 768
(B) 25 Q 768
(C) 25 P 384
(D) 25 P 768

**14.** Complete the following series: 150, 392, 810, 1452, 2366, _____.

(A) 3500
(B) 3520
(C) 3560
(D) 3600

**15.** Complete the following series: 34, 55, 89, 144, 233, 377, _____.

(A) 600
(B) 604
(C) 608
(D) 610

1. In a certain code language, if 'BLACK' is coded as 123 73 128 118 78, then how will 'WHITE' be coded in that language?
   (A) 16 95 89 35 109
   (B) 15 93 88 33 110
   (C) 14 94 86 37 112
   (D) 18 93 88 33 108

2. In a certain code language, if 'MATHS' is coded as 640 and 'ENGLISH' is coded as 3,78,000, then how will the word 'SCIENCE' be coded?
   (A) 98,500
   (B) 1,01,250
   (C) 1,08,350
   (D) 1,15,600

3. In a certain code language, 'MANAGE' is coded as 27, and 'OSCAR' is coded as 24, then how will the word 'NICE' be coded?
   (A) 31
   (B) 3
   (C) 30
   (D) 6

4. In a certain code language, the value of 'HISTORY' = 49 and 'MATHS' = 21, then what is the value of the word 'SCIENCE'?
   (A) 40
   (B) 38
   (C) 45
   (D) 50

5. In a certain code language, 'M A S T E R' is coded as 'N Z H G V I' then how will the word 'R I F L E' be coded?
   (A) I R V O U
   (B) R I U O V
   (C) I R U O V
   (D) R I O U V

**Direction for Questions 6 to 10: In a certain code language, some statements are coded as follows:**

'Keys region mouse paper' is coded as 'Y11 O13 O13 A13',

'Look skyline nose normal' is coded as 'O11 K15 S11 A13',

'Twice pen white honour' is coded as 'W13 E11 H13 U13', and

'Rubber farm clothes quest' is coded as 'E13 R11 L15 U13'.

6. What is the code for the word 'Education'?
   (A) D18
   (B) O18
   (C) O17
   (D) D17

7. Which of the following word is coded as 'L13'?
   (A) Ocean
   (B) People
   (C) Matrix
   (D) Bear

8. Which of the following is definitely true?
   (A) Park – N12
   (B) Green – R13
   (C) Earning – N14
   (D) Slope – P13

9. What is the code for 'annual function'?
   (A) A13 O15
   (B) N13 U18
   (C) N13 O15
   (D) A12 O17

10. Which of the following word is coded as 'R13 E13'?
    (A) List Down
    (B) Matrix Out
    (C) Great Movies
    (D) Bad System

11. Complete the following series: 30, 36, 42, 52, 60, 68, _____
    (A) 76
    (B) 78
    (C) 80
    (D) 82

**12.** Complete the following series: 16, 22, 26, 38, 62, 74, _____
   (A) 102
   (B) 105
   (C) 110
   (D) 116

**13.** Complete the following series: 17, 52, 174, 464, 1500, _____
   (A) 2342
   (B) 2424
   (C) 2486
   (D) 2534

**14.** Complete the following series: 5, 6, 13, 40, 161, _____
   (A) 694
   (B) 724
   (C) 758
   (D) 796

**15.** Find out the wrong term in the following series: 10, 8, 13, 35, 135, 670, 4007.
   (A) 8
   (B) 670
   (C) 135
   (D) 35

**1. (A)**

In this question, the reverse of the sum of the place values of the letters in the word is the code.

MATHS = 13 + 1 + 20 + 8 + 19 = 61 and the code is 16.

VERBAL = 22 + 5+ 18 + 2 + 1 + 12 = 60 and the code is 06.

Similarly,

SCIENCE = 19 + 3 + 9 + 5 + 14 + 3 + 5 = 58 and the code is 85.

Hence, option (A) is correct.

**2. (C)**

The colour of the grass is green and green is called yellow in this language.

Hence, option (C) is correct.

**3. (B)**

| M | O | S | Q | U | I | T | O |
|---|---|---|---|---|---|---|---|
| +2 | -1 | +2 | -1 | +2 | -1 | +2 | -1 |
| O | N | U | P | W | H | V | N |

Similarly:

| E | L | E | P | H | A | N | T |
|---|---|---|---|---|---|---|---|
| +2 | -1 | +2 | -1 | +2 | -1 | +2 | -1 |
| G | K | G | O | I | Z | P | S |

Hence, option (B) is correct.

**Note:** In the exam, it would not be necessary to do the last five steps (i.e., P to T), because once GKG is obtained as the first 3 letters of the code, we can pick the correct option.

**4. (A)**

The word YELLOW is coded as

| Y | E | L | L | O | W |
|---|---|---|---|---|---|
| +1 | +2 | +3 | +4 | +5 | +6 |
| Z | G | O | P | T | C |

Similarly, ORANGE will be coded as

| O | R | A | N | G | E |
|---|---|---|---|---|---|
| +1 | +2 | +3 | +4 | +5 | +6 |
| P | T | D | R | L | K |

Hence, option (A) is correct.

**5. (D)**

The word LOAFER will be coded as

| L | O | A | F | E | R |
|---|---|---|---|---|---|
| +1 | −2 | +1 | −2 | +1 | −2 |
| M | M | B | D | F | P |

Similarly, SHORTS will be coded as

| S | H | O | R | T | S |
|---|---|---|---|---|---|
| +1 | −2 | +1 | −2 | +1 | −2 |
| T | F | P | P | U | Q |

Hence, option (D) is correct.

**6. (D)**

The first letter in the given terms of the series includes consecutive letters starting with A, so the required first letter is E.

The second letter in the given terms of the series are consecutive letters starting with B, so the required second letter is F.

The number in the middle is the square of the sum of the place values of the letters on either side of it, so the required number is 121.

Hence, option (D) is correct.

**7. (B)**

By close observation, it is clear that each letter has been subtracted by the number of its position. For example, A was subtracted by 1, Z was obtained, Y was subtracted by 2, and W was obtained. Therefore, each letter is subtracted by (1, 2, 3).

Hence, option (B) is correct.

**8. (A)**

Given series: L & N 3 ? M U = 6 J Z L ↑ * T M 5 D 2 ↓ G 8 E > 4 P % J @ # 9 B 7.

After eliminating all symbols, the new series is: L N 3 M U 6 J Z L T M 5 D 2 G 8 E 4 P J 9 B 7.

Fifth element to the left of 17th element from the left end b = 12th element from the left end = 5

Hence, option (A) is correct.

**9. (B)**

The given series can be written as: $4 \times 2$, $8 + 3$, $11 \times 5$, $55 + 7$, $62 \times 11$, 682, _____.

The numbers are alternatively multiplied by and added to consecutive prime numbers in increasing order. So, the next number in the series is $682 + 13 = 695$.

Hence, option (B) is correct.

**10. (C)**

Given series: 6, 15, 35, 77, 143, 221, _____

is $2 \times 3$, $3 \times 5$, $5 \times 7$, $7 \times 11$, $11 \times 13$, $13 \times 17$, _____

The given series can be written as product of two consecutive primes. So, the next term should be $17 \times 19 = 323$.

Hence, option (C) is correct.

**11. (C)**

The product of the digits in each number is added to the number itself to get the next number. Like $12 + (1 \times 2) = 14$, $14 + (1 \times 4) = 18$ and so on. $62 + (6 \times 2) = 74$.

Hence, option (C) is correct.

**12. (D)**

First prime no $2^2 + 2^3 = 12$, next prime no $3^2 + 3^3 = 36$, the next prime number $5^2 + 5^3 = 150$, and so on.

$13^2 + 13^3 = 2,366$.

Hence, option (D) is correct.

**13. (B)**

Multiply the previous number to 2 and add 1 or 2 in alternate cases. Like $(7 \times 2) + 1 = 15$, $(15 \times 2) + 2 = 32$, $(32 \times 2) + 1 = 65$, and so on.

$(132 \times 2) + 1 = 265$.

Hence, option (B) is correct.

**14. (C)**

Each group of consecutive three numbers is a Pythagorean Triplet. Like $6^2 + 8^2 = 10^2$, $12^2 + 16^2 = 20^2$, and so on.

$15^2 + 20^2 = 25^2$.

Hence, option (C) is correct.

**15. (A)**

Each number is the difference between cubes and squares of consecutive even numbers starting from 0. Like $0^3 - 0^2 = 0$, $2^3 - 2^2 = 4$, and so on.

$10^3 - 10^2 = 900$.

Hence, option (A) is correct.

**Common explanation for Questions 1 to 3**

There are multiple codes for each letter, as per the given two tables. We need to identify which option gives us the correct possible code for each letter in the given word, in that order.

Keeping that in mind, we can get the following answers:

1. **(B)**
   66 24 86 59 43 75.
   Hence, option (B) is correct.

2. **(D)**
   D: 23 14 31 32 30 87.
   Hence, option (D) is correct.

3. **(C)**
   56 24 95 11 31 12 75.
   Hence, option (C) is correct.

4. **(D)**
   $3 + 4 + 5 + 6 + 7 = 25$, $2 + 5 = 7$, $7^2 = 49$.
   $6 + 7 + 8 + 9 + 10 = 40$, $4 + 0 = 4$, $4^2 = 16$.
   $9 + 10 + 11 + 12 + 13 = 55$, $5 + 5 = 10$, $10^2 = 100$.
   Hence, option (D) is correct.

5. **(A)**
   (First column number $\times$ second column number) + (first column number + second column number) = third column number
   i.e.,
   $(5 \times 2) + (5 + 2) = 10 + 7 = 17$.
   $(7 \times 4) + (7 + 4) = 28 + 11 = 39$.
   $(8 \times 5) + (8 + 5) = 40 + 13 = 53$.
   $(9 \times 3) + (9 + 3) = 27 + 12 = 39$.
   Hence, option (A) is correct.

6. **(D)**
   E − 2 = C, N − 2 = L, E − 2 = C, R − 2 = P,
   G − 2 = E, Y − 2 = W
   Similarly, FORTUNE is coded as DMPRSLC.
   Hence, option (D) is correct.

7. **(C)**
   The position of V is 22. As per conditions of coding, V = 2.
   Position of O is 15. As per conditions of coding, O = 3.
   The position of W is 23. As per conditions of coding, W = 4.
   The position of E is 5. As per conditions of coding, E = 4.
   The position of L is 12. As per conditions of coding, L = 2.
   Hence, option (C) is correct.

8. **(D)**
   Only G and E in 'TOGETHER' represent prime number positional values and hence they are represented by 2. Rest are 1s.
   Hence, option (D) is correct.

9. **(B)**
   Number of letters in INVADER = 7, so $(7 \times 6) = 42$.
   Number of letters in SECURE = 6, so $(6 \times 5) = 30$.
   Similarly, number of letters in SITUATION = 9, so $9 \times 8 = 72$.
   Hence, option (B) is correct.

10. **(A)**
    In CUSTOM,
    C = 3rd letter
    U = 21st letter = $2 \times 1 = 2$.
    S = 19th letter = $1 \times 9 = 9$.
    T = 20th letter = $2 \times 0 = 0$.
    O = 15th letter = $1 \times 5 = 5$.
    M = 13th letter = $1 \times 3 = 3$.
    $(3 + 2 + 9 + 0 + 5 + 3) = 22$.
    Similarly, LABOUR = 20.
    In the same way, HISTORY = 49
    Hence, option (A) is correct.

**11. (A)**

Consider the corresponding letters in each of the given sets of letters.

First letter: A × 2, B × 2, D × 2, H × 2, P.

Second letter: D + 2, F + 2, H + 2, J + 2, L.

Third letter: Z − 4, V − 4, R − 4, N − 4, J.

Hence, option (A) is correct.

**12. (A)**

The number is (the product of two alphabets) × (1, 2, 3, 4, ...)

E-5, L-12 ⇒ 5 × 12 × 1 = 60

B-2, K-11 ⇒ 2 × 11 × 2 = 44

....

F-6, O-15 ⇒ 6 × 15 × 5 = 450

Hence, option (A) is correct.

**13. (D)**

For first term:

600 / 4 = 150

150 / 3 = 50

50 / 2 = 25

25 / 1 = 25

For second term:

J + 7 = Q

Q − 4 = M

M + 7 = T

T − 4 = P

For third term:

32 × 4 = 128

128 × 3 = 384

384 × 2 = 768

768 × 1 = 768

Hence, option (D) is correct.

**14. (D)**

Given series: 150, 392, 810, 1452, 2366, ......................

is $5^3 + 5^2$, $7^3 + 7^2$, $9^3 + 9^2$, $11^3 + 11^2$, $13^3 + 13^2$, _____.

The next number in the series is $15^3 + 15^2$ = 3,600.

Hence, option (D) is correct.

**15. (D)**

In this series, the next term is obtained by adding the previous two terms, starting from the third term.

34 + 55 = 89

55 + 89 = 144

89 + 144 = 233

144 + 233 = 377

233 + 377 = 610

Hence, option (D) is correct.

**1. (D)**

Each letter is replaced by (5 × Place value in the reverse order) − 2.

In this coding pattern, 'WHITE' will be coded as '18 93 88 33 108'.

Hence, option (D) is correct.

**2. (B)**

In this, the sum of the digits in the place value of the letters as per the alphabet is obtained first and then multiplied.

For 'MATHS'

M = 13, 1 + 3 = 4

A = 1

T = 20, 2 + 0 = 2

H = 8

S = 19, 1 + 9 = 10

Now, (4 × 1 × 2 × 8 × 10) = 640

Similarly, 'ENGLISH' = 3,78,000 and 'SCIENCE' = 1,01,250.

Hence, option (B) is correct.

**3. (B)**

Let us analyse the logic behind the codes assigned to the above-mentioned words. MANAGE is coded as 27, here the logic is that the difference between the sum of the numerical value of consonants and the sum of the numerical value of vowels is taken.

The numeric values of the letters are calculated by considering A as 1 and Z as 26.

(M + N + G) − (A + A + E)

(13 + 14 + 7) − (1 + 1 + 5)

34 − 7 = 27.

Likewise, the code for OSCAR is (S + C + R) − (O + A)

(19 + 3 + 18) − (15 + 1)

= 40 − 16 = 24

Similarly, the code for NICE will be (N + C) − (I + E)

(14 + 3) − (9 + 5)

17 − 14 = 3

Hence, option (B) is correct.

**4. (B)**

In the question, the product of digits in the place-values of the letters as obtained from the alphabet first and then added, i.e., HISTORY

H = 8

I = 9

S = 19, 1 × 9 = 9

T = 20, 2 × 0 = 0

O = 15, 1 × 5 = 5

R = 18, 1 × 8 = 8

Y = 25, 2 × 5 = 10

Now, (8 + 9 + 9 + 0 + 5 + 8 + 10) = 49

Similarly, MATHS = 21

For, SCIENCE

S = 19, 1 × 9 = 9

C = 3

I = 9

E = 5

N = 14, 1 × 4 = 4

C = 3

E = 5
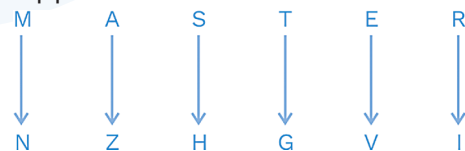
Now, (9 + 3 + 9 + 5 + 4 + 3 + 5) = 38
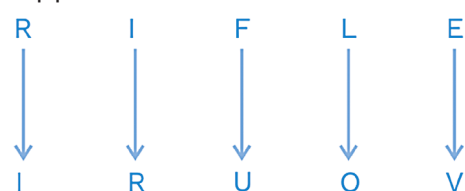
Hence, option (B) is correct.

**5. (C)**

Two alphabets are called opposite letters when they are equidistant from the extreme alphabets, so the sum of their positional values is 27.

Opposite letter

| M | A | S | T | E | R |
|---|---|---|---|---|---|
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| N | Z | H | G | V | I |

Similarly,

Opposite letter

| R | I | F | L | E |
|---|---|---|---|---|
| ↓ | ↓ | ↓ | ↓ | ↓ |
| I | R | U | O | V |

Hence, option (C) is correct.

**6. (D)**
- The logic for the first letter in the code is as explained below:
  - Take the second letter from the right end of the word if the number of letters in the word is even, else take the second letter from the left end of the word (i.e., if the number of letters in the word is odd).

- The logic for the number in the code is as explained below:
  - Consider the number of letters in the word and add 7 if the number of letters in the word is even, else the number of letters in the word + 8 (i.e., if the number of letters in the word is odd).

- For example: 'keys' is coded as 'Y11', because the number of letters is even so the second letter from the right end is 'Y' and the number of letters in the word is 4 and the code is 4 + 7 = 11.
- Also, 'mouse' is coded as 'O13' because the number of letters is odd so the second letter from the left end is 'O' and the number of letters in the word is 5 and the code is 5 + 8 = 13.
  Similarly, the code for the word 'Education' is 'D17'.

Hence, option (D) is correct.

**7. (B)**
As we discussed the logic before, the code for the word 'People' is 'L13'.
Hence, option (B) is correct.

**8. (B)**
As we discussed the logic before, Green being R13 is definitely true.
Hence, option (B) is correct.

**9. (A)**
As we discussed the logic before, the code for the word 'annual function' is 'A13 O15'.
Hence, option (A) is correct.

**10. (C)**
As we discussed the logic before, the code for the word 'Great Movies' is 'R13 E13'.
Hence, option (C) is correct.

**11. (B)**
Given series: 30, 36, 42, 52, 60, 68, _____.
The sum of the consecutive prime numbers is given.
13 + 17 = 30, 17 + 19 = 36, 19 + 23 = 42, 23 + 29 = 52, 29 + 31 = 60, 31 + 37 = 68. So, next term is 37 + 41 = 78.
Hence, option (B) is correct.

**12. (A)**
Given series: 16, 22, 26, 38, 62, 74, _____.
The product of the digits in each number is added to the number to get the next number in the series.
16 is $1 \times 6 = 6$ and 16 + 6 = 22, 22 is $2 \times 2 = 4$ and 22 + 4 = 26, and so on.
Similarly, 74 is $7 \times 4 = 28$ and 74 + 28 = 102.
Hence, option (A) is correct.

**13. (C)**
Given series: 17, 52, 174, 464, 1500, _____.
The given series can be written as $23 + 3^2$, $33 + 5^2$, $53 + 7^2$, $73 + 11^2$, $113 + 13^2$, _____.
The next term should be $133 + 17^2 = 2{,}486$.
Hence, option (C) is correct.

**14. (D)**
The actual series can be written as follows: $5 \times 1 + 1$, $6 \times 2 + 1$, $13 \times 3 + 1$, $40 \times 4 + 1$, 161, _____.
So, next term of the series is $161 \times 5 + 1 = 806$.
Hence, option (D) is correct.

**15. (B)**
The actual series can be written as follows: $10 \times 1 - 2$, $8 \times 2 - 3$, $13 \times 3 - 4$, $35 \times 4 - 5$, $135 \times 5 - 6$, $669 \times 6 - 7$, 4,007.
So, 670 is the wrong term in the series.
Hence, option (B) is correct.

## Rack Your Brain

**1. 6357**

W E A T H E R     C A T C H
1 3 5 6 9 3 7    2 5 6 2 9

So, T = 6, E = 3, A = 5, and R = 7
So, the code for 'TEAR' will be: 6,357.
Hence, the answer is 6,357.

## Rack Your Brain

**2. Table**

We wear clothes. Since the cloth is called Table, the answer will be 'Table'.

## Rack Your Brain

**3. gim**

By comparing the two phrases, we can figure out that the codes for 'are' and 'you' should be 'sim' and 'tim', not necessarily in the same order. But still, we can say that 'gim' must be the code for the word 'who'. Hence, 'gim' is the answer.

## Rack Your Brain

**4. 81**

121, 81, 21, 6, 2.
The series follows the pattern as explained below:
$[(121 - 1) \div 2] + 1 = 61$
$[(61 - 1) \div 3] + 1 = 21$
$[(21 - 1) \div 4] + 1 = 6$
$[(6 - 1) \div 5] + 1 = 2$

So, there should be 61 in place of '81'.
Hence, the answer is 81.