# Logical Reasoning Module

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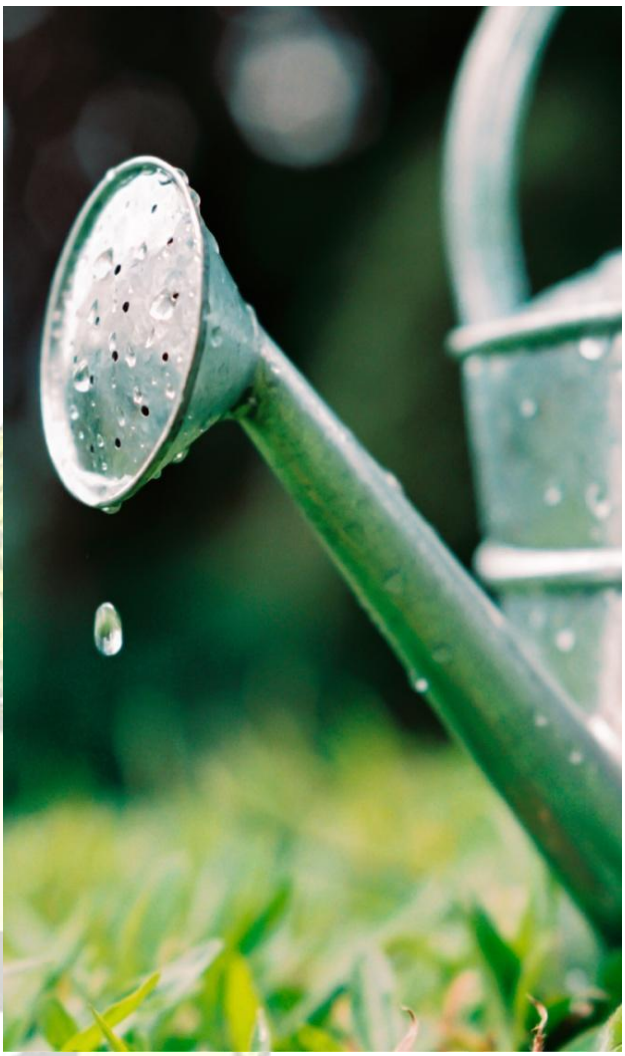
## Objective:

Aptitude tests are immensely popular and almost all recruiters/employers use them to choose the right candidate who fits their organization. Aptitude tests are designed to measure the intelligence and the potential of a candidate applying for a job. A high LR score confirms that the candidate can apply logics effectively. The objective of this Module is to improve the reasoning ability and problem-solving skills of the candidates by providing them with exposure to various topics and common questions, so that they can perform better in Aptitude Tests and apply the same in their job and career.



# Index

# 1. Sequence & Series

**Introduction:**

Sequence & Series consists of questions where the student is supposed to understand and the logic behind a given sequence or series of numbers or alphabets.

In this topic, generally three types of questions are asked –

1. A continuation to the series

2. The immediate next term of the series

3. A missing term/terms or a wrong term within the series.

**Concepts:**

Series based on Numbers

There may be series based on following patterns –

1. Squares 1, 4, 9, 16, 25 ……..
2. Squares+Something e.g. 11, 18, 27, 38, … will be 51 since the series is ($3^2$+2, $4^2$+2, $5^2$+2 etc.)
3. Squares–Something e.g. 8, 15, 24, 35 … will be 48 since the series is ($3^2$-1, $4^2$-1, $5^2$-1 etc.)
4. Cubes, 1, 8, 27, 64, 125, ……..
5. Cubes+Something
6. Cubes–Something
7. Arithmetic Series; a, a+d, a+2d,… where $\mathbf{t_n=a+(n-1)d}$
8. Geometric Series; a, ar, $ar^2$, … where $\mathbf{t_n=ar^{n-1}}$
9. Harmonic Series: (Where reciprocals of each term are in A.P.)
10. Series of constantly changing additions or multiplications e.g.
    I. 2, 6, 24, 120 ……. (The terms are got by successive multiplication by an increasing number e.g. here x3, x4, x5 and so on)
    II. 11, 16, 22, 29, 37 ……. (The series follows the logic of +5, +6, +7, +8 and so on)
11. Intermingled Series –

    e.g. 2, 5, 6, 10, 18, 15, 54

    In this series alternate terms starting with the first form a GP with common ratio 3, while the $2^{nd}$, $4^{th}$, $6^{th}$ terms form an AP 5, 10, 15 …

12. Series based on alphabets –

The table contains the position of each alphabet in the alphabet series A to Z both from start to end. These reference numbers for each alphabet become important.

| Going Forward | Alphabet | Going Backward |
|---|---|---|
| 1 | A | 26 |
| 2 | B | 25 |
| 3 | C | 24 |
| 4 | D | 23 |
| 5 | E | 22 |
| 6 | F | 21 |
| 7 | G | 20 |
| 8 | H | 19 |
| 9 | I | 18 |
| 10 | J | 17 |
| 11 | K | 16 |
| 12 | L | 15 |
| 13 | M | 14 |
| Going Forward | Alphabet | Going Backward |
| 14 | N | 13 |
| 15 | O | 12 |
| 16 | P | 11 |
| 17 | Q | 10 |
| 18 | R | 09 |
| 19 | S | 08 |
| 20 | T | 07 |
| 21 | U | 06 |
| 22 | V | 05 |
| 23 | W | 04 |
| 24 | X | 03 |
| 25 | Y | 02 |
| 26 | Z | 01 |



**Method to solve questions:**

- Look at the series carefully
- Analyze the terms in the series
- Identify a particular relationship between terms within the series.

- Based on the outcome of step (iii), identify the pattern of the series. (Different patterns are given in concepts)
- Identify the next member and match with the options given below.

**Examples:**

1. Which of the numbers given below would come next in the series of numbers 1, 9, 25, …

(a) 36 (b) 25 (c) 49 (d) none of these

Solution :

(i) The given series is 1, 9, 25, ……

(ii) The first term is 1, second is 9 and third is 25

(iii) Square of 1=1, 32=9, 52=25

(iv) Following the same pattern next term must be 72=49

(v) The series is square of consecutive odd numbers

Therefore, the correct answer should be (c) 49.

2. Which of the following letters would come next in the series of letters, Z, W, R, K, …

(a) A (b) C (c) B (d) D

Solution :

(i) The given series is Z, W, R, K, …

(ii) The series is a backward series.

(iii) In the backward series the position of Z is $1^{st}$. W is $4^{th}$, R is $9^{th}$ and K is $16^{th}$

(iv) 1, 4, 9, 16 … Form a series of squares of natural numbers $1^2$, $2^2$, $3^2$, $4^2$ …

(v) So, the next term should be $5^2$=25 i.e. $25^{th}$ letter from the backward is B.

Therefore, correct answer is option (c) B.

3. What would come next in the following series of numbers 1, 2, 10, 37 …….

(a) 62 (b) 91 (c) 101 (d) none of these

Solution : It is difficult to observe a pattern among the terms of the series. But observing carefully the difference between the terms

1, 2, 10, 37,… is 1 8 27

Here we see that the differences are in the sequence 1, 8, 27 which is $1^3$, $2^3$, $3^3$, So the next difference must be $4^3 = 64$ hence, 64 + 37 = 101

Diff + last term = next term

So, the correct option is (c) 101.

4. What would come next in the following series A10, D15, G20, J25, …….

(a) N18 (b) O22 (c) M26 (d) None

Solution :

(i) The series has letters A, D, G, J

(ii) Between two consecutive alphabets a gap of two letters is there.

(iii) The next member should be

J KL M

last gap next

(iv) Subscript of all terms are at a distance of 5 from one another.

(v) So, next subscript should be 25 +5= 30

(vi) Combining both the letter & corresponding subscript we get M3o, which is not given as the option.

(vii) Correct answer is (d) None of these.

5. What should come next in the series 1 2 2 3 4 3 4 5 6 …?

(a) 45678 (b) 6789 (c) 34567 (d) none of these

Solution: The given series is a group of joined series.

Breaking the series in different parts as below.

12, 234, 3456 …

(i) In second term first digit is the last digit of first term & two additional digit are there.

(ii) In third term, first two digits are the last two digits of the second term and two additional digits are there.

So following the same pattern

In the fourth term, first three digits should be the last 3 digits of 3456 i.e. 456 …. and two additional terms 78. So, combining these two gives 45678

as the correct option (a).

## 1.1 Sequence & Series (Class Work)

**Find the next number in the following**

1. 2, 5, 8, 11, …
   (a) 15 (b) 12
   (c) 14 (d) None of these
2. 36, 31, 27, 24, 22, …
   (a) 18 (b) 23
   (c) 20 (d) None of these
3. 1, 3, 7, 13, 21, 31, …
   (a) 41 (b) 43
   (c) 40 (d) None of these
4. 1, 2, 6, 15, 31, …
   (a) 56 (b) 57
   (c) 50 (d) None of these
5. 25, 225, 625, …
   (a) 1320 (b) 1225
   (c) 1435 (d) 1525
6. 2, 3, 5, 6, 7, 13, 14, 15, …
   (a) 27 (b) 23
   (c) 19 (d) None of these
7. 13, 25, 37, 49, 61, 73, 85, 97, 109, …
   (a) 120 (b) 122
   (c) 121 (d) 125
8. 2, 4, 8, 3, 9, 27, 4, 16, …
   (a) 64 (b) 60
   (c) 68 (d) None of these
9. 7, 8, 6, 7, 5, …
   (a) 3 (b) 6
   (c) 4 (d) 9
10. 2, 8, 12, 48, 52, …
    (a) 208 (b) 210
    (c) 310 (d) 104
11. 3, 9, 10, 30, 31, …
    (a) 93 (b) 96
    (c) 99 (d) None of these
12. 14, 916, 2536, …
    (a) 4964 (b) 6481
    (c) 6449 (d) None of these
13. 1, 2, 2, 4, 8, 32, …
    (a) 256 (b) 265
    (c) 276 (d) None of these
14. 10/100, 2/10, 30/100, 400/1000, …
    (a) 5/100 (b) 50/100

(c) 600/1000 (d) 40/100

15. 49, 121, 169, 289, 361, …
    (a) 529 (b) 441
    (c) 484 (d) 576
16. 1 : 4 :: 25 : ?
    (a) 27 (b) 29
    (c) 30 (d) 36
17. 80 : 99 :: 3 : ?
    (a) 8 (b) 7
    (c) 10 (d) None of these
18. 49 : 343 :: 81 : ?
    (a) 141 (b) 139
    (c) 216 (d) 729
19. 0.25 : 0.5 :: 2 : ?
    (a) 2.25 (b) 2.30
    (c) 2.50 (d) 2.80
20. 49 : 94 :: 25 : ?
    (a) 45 (b) 52
    (c) 75 (d) None of these
21. 9 : 5 :: 25 : ?
    (a) 14 (b) 15
    (c) 9 (d) 12
22. 5 : 7 :: 13 : ?
    (a) 17 (b) 20
    (c) 25 (d) 30
23. 2 : 16 :: 5 : ?
    (a) 125 (b) 100
    (c) 625 (d) None of these
24. 12 : 20 :: 30 : ?
    (a) 42 (b) 48
    (c) 44 (d) 46
25. 8 : 4 :: 1 : ?
    (a) 3 (b) 4
    (c) 1 (d) 2

## 1.2 Sequence & Series (Home Assignment)

**Find the next number in the following**

1. 2, 5, 10, 17, 26 …
   (a) 35 (b) 38
   (c) 39 (d) 37
2. 10, 19, 28, 37, 46, 55, 64, 73, 82, …
   (a) 94 (b) 93
   (c) 91 (d) 89
3. 135, 246, 357, 468, …
   (a) 578 (b) 579
   (c) 577 (d) None of these
4. 13, 24, 35, 46, 57, …
   (a) 69 (b) 67
   (c) 59 (d) 68
5. 23, 68, 113, 158, 203, …
   (a) 252 (b) 248
   (c) 242 (d) 256
6. 786, 663, 540, 417, 294, 171, …
   (a) 48 (b) 56
   (c) 87 (d) 92
7. 2, 2, 4, 12, 48, 240, …
   (a) 1680 (b) 1560
   (c) 1440 (d) 1320
8. 120/120, 60/120, 40/120, 30/120, 24/120, …
   (a) 15/120 (b) 8/120
   (c) 10/120 (d) 20/120
9. 10, 100, 50, 500, ___, 2500, …
   (a) 400 (b) 350
   (c) 25 (d) 250
10. 29, 31, 37, 41, 43, 47, …
    (a) 51 (b) 49
    (c) 57 (d) 53
11. 23, 27, 33, 41,___, 63, …
    (a) 43 (b) 47
    (c) 51 (d) 49
12. 96, 119, 144, 171, ___, 231, …
    (a) 203 (b) 200
    (c) 207 (d) 193
13. 2, 3, 5, 6, 7, 13, 8, 9, …
    (a) 23 (b) 21
    (c) 17 (d) 19
14. 7, 56, 8, 11, 143, 13, 17, __, 19 …
    (a) 356 (b) 347

(c) 331 (d) 323

15. 8, 27, 125, 343, ___, 2197, …
    (a) 512 (b) 729
    (c) 1000 (d) 1331
16. 6, 15, 35, 77, 143, 221, …
    (a) 438 (b) 323
    (c) 356 (d) 446
17. 3, 7, 16, 32, 57, …
    (a) 87 (b) 93
    (c) 91 (d) 97
18. 7, 14, 42, 168, 840, …
    (a) 5040 (b) 5060
    (c) 3040 (d) 4050
19. 3, 15, 35, 63, 99, …
    (a) 138 (b) 132
    (c) 143 (d) 156
20. 5, 6, 14, 41, 105, …
    (a) 225 (b) 230
    (c) 256 (d) 289
21. 25 : 5 :: 36 : ?
    (a) 30 (b) 26
    (c) 20 (d) 6
22. 4 : 125 :: 9 : ?
    (a) 121 (b) 84
    (c) 216 (d) None of these
23. 4 : 12 :: 10 : ?
    (a) 20 (b) 90
    (c) 60 (d) 45
24. 4 : 2 :: 15 : ?
    (a) 3 (b) 7.5
    (c) 8.5 (d) 9.5
25. 17 : 19 :: ? : 31
    (a) 30 (b) 25
    (c) 18 (d) 29
26. 1 : 11 :: ? : 1111
    (a) 11 (b) 101
    (c) 1010 (d) None of these
27. 3 : 6 :: ? : 18
    (a) 10 (b) 12
    (c) 9 (d) 16
28. 2 : 4 :: ? : 1
    (a) 1 (b) 2
    (c) 3 (d) None of these
29. 3 : 25 :: 2 : ?

(a) 23 (b) 18
(c) 16 (d) 22

30. 11 : 120 :: 13 : ?
(a) 148 (b) 156
(c) 220 (d) 168

31. 24 : 90 :: 56 : ?
(a) 120 (b) 122
(c) 118 (d) 124

32. 625 : 650 :: 900 : ?
(a) 1000 (b) 1200
(c) 950 (d) 930

33. 1600 : 1560 :: 225 : ?
(a) 200 (b) 150
(c) 210 (d) 215

34. 9 : 8 :: ? : 125
(a) 25 (b) 36
(c) 26 (d) 27

35. 3 : 25 :: 16 : ?
(a) 256 (b) 289
(c) 324 (d) 400

36. 122 : 170 :: 290 : ?
(a) 362 (b) 344
(c) 332 (d) 313

37. 10 : 990 :: 3 : ?
(a) 9 (b) 18
(c) 24 (d) 27

38. 8 : 68 :: 12 : ?
(a) 138 (b) 140
(c) 149 (d) 150

39. 35 : 711 :: 1317 : ?
(a) 1719 (b) 1921
(c) 1923 (d) 2123

40. 10 : 90 :: 13 : ?
(a) 156 (b) 182
(c) 169 (d) 130

## 1.3 Sequence & Series (Class Work)

**Find the next member in the following**

1. X, C, H, S, V, E, M…
   (a) L (b) N
   (c) P (d) S
2. D, N, O, S, A, J, J, M, ___, ___,
   (a) K,S (b) H,J
   (c) N, D (d) A, M
3. M, O, N, N, O, M, P, L, Q, K, R, J, …
   (a) Z (b) I
   (c) J (d) S
4. I, G, E, D, B, Z, Y, …
   (a) V (b) D
   (c) W (d) None of these
5. H, I, K, L, N, O, Q, R, …
   (a) T (b) S
   (c) K (d) None of these
6. E, V, G, T, I, R, K, P, …
   (a) G (b) T
   (c) R (d) M
7. Y, W, U, S, Q, O, M, …
   (a) X (b) S
   (c) U (d) None of these
8. A, B, F, X, P, …
   (a) Z (b) K
   (c) R (d) O
9. D, H, P, F, L, X, …
   (a) K (b) G
   (c) Y (d) V
10. A, B, E, C, I, D, O, ___, U, G
    (a) M (b) F
    (c) T (d) E
11. C, A, D, E, I, N, W, …
    (a) K (b) P
    (c) Z (d) I
12. G, H, J, M, Q, V, …
    (a) D (b) F
    (c) B (d) Z
13. H, J, N, T, B, L, …
    (a) S (b) X
    (c) P (d) M
14. B, D, G, L, S, D, Q, …
    (a) U (b) H

(c) P (d) R

15. S, H, Y, R, M, J, …
    (a) B (b) A
    (c) I (d) F
16. TGS, RIQ, ____, NMM
    (a) POK (b) KOP
    (c) PKO (d) OPK
17. AIU, CKW, _____, GOA
    (a) ENY (b) EMY
    (c) EKY (d) EGS
18. AXE, FSJ, KNO, ___
    (a) PRI (b) PRU
    (c) PSV (d) PIT
19. XCD, WDE, _____, UFG
    (a) VEF (b) VFG
    (c) VUF (d) VFE
20. QON, MKJ, IGF, ____
    (a) ECA (b) ECB
    (c) BCE (d) EBC
21. ABC, ZYX, DEF, WVU, ____
    (a) GHI (b) TSR
    (c) IHG (d) STR
22. ABY, CDW, EFU, GHS, ____
    (a) IJK (b) IJR
    (c) IKP (d) IJQ
23. BD, EG, HJ, KM, ____
    (a) NQ (b) NP
    (c) OP (d) NM
24. AD, EI, JO, PV, ____
    (a) WC (b) VC
    (c) WD (d) SX
25. KP, LO, MN, ____
    (a) NM (b) NP
    (c) OP (d) PQ
26. SAM : WEQ :: ZAR : ?
    (a) DZU (b) WGV
    (c) DGV (d) None of these
27. ROM : PMK :: SET : ?
    (a) QCR (b) UGV
    (c) RPS (d) TFU
28. CGH : FKM :: JLN : ?
    (a) NTS (b) NRS
    (c) MQT (d) MPS
29. AEH : ZVS :: DGL : ?

(a) WTO (b) VPN
(c) WHO (d) VPT

30. GFE : TSR :: JIH : ?
(a) OPQ (b) WXY
(c) WVU (d) None of these

31. SUE : QUSWCG :: RIM : ?
(a) PIJKGNO (b) PTGKKO
(c) PJIGKON (d) PTKGOK

32. BART : CABZSQUS :: DINE : ?
(a) ECJHOMED (b) FDKIPNGE
(c) EDIJONEF (d) None of these

33. DUST : CETVRTSU :: PALM : ?
(a) ORZCJNKN (b) OQBCJNMN
(c) OQZBKMLN (d) None of these

34. RASH : VFYO :: ROAR : ?
(a) VSGY (b) YTGX
(c) VUHY (d) None of these

35. ZODIAC : XQBKYE :: ARROW : ?
(a) XNSPR (b) YTPQU
(c) XRNPS (d) YPTUQ

36. MICRO : PLFUR :: CENTI : ?
(a) ZBFQK (b) EIPSK
(c) ZBKQF (d) FHQWL

37. DELHI : EDMGJ :: COCHIN : ?
(a) DODIKO (b) BPBIHM
(c) DNDGJM (d) BPBIJN

38. ZEBRA : ZDBOA :: LEROI : ?
(a) MFSRJ (b) LDSLJ
(c) MDSRJ (d) LDRLI

39. BARK : YZIP :: TENT : ?
(a) GVMG (b) HUMG
(c) GEMG (d) HEMG

40. GEORGE : HEQRJE :: RUSTIN : ?
(a) SULTAN (b) SUUTLN
(c) TUVTMN (d) None of these

## 1.4 Sequence & Series (Home Assignment)

**Complete the following series:**

1. A, E, I, M, Q, U, ___, ___
   (a) B, F (b) Y, C
   (c) G, I (d) K, O
2. AY, BZ, CW, DX, ___
   (a) GU (b) FV
   (c) EV (d) EU
3. Z, Y, X, W, V, T, ___, R, Q, P, N, M
   (a) W (b) S
   (c) P (d) U
4. C, D, E, G, I, L, ___, S, W, B, ___, M, S
   (a) M, Q (b) J, I
   (c) O, G (d) None of these
5. B, C, D, F, G, H, J, K, L, M, N, ___
   (a) P (b) Q
   (c) R (d) O
6. P, R, T, V, X ___, Y, W, U, S, Q
   (a) Z (b) A
   (c) V (d) T
7. Z, A, B, E, F, G, J, K, L, …
   (a) P (b) O
   (c) M (d) S
8. J, L, K, M, O, N, P, R, Q, S, …
   (a) U (b) V
   (c) T (d) R
9. B, G, P, C, H, Q, D, I, R, E, J, S, …
   (a) K (b) T
   (c) J (d) F
10. A, E, I, O, U, U, O, I, ___
    (a) E (b) A
    (c) U (d) O
11. LT : QY :: EF : ?
    (a) OP (b) MJ
    (c) LN (d) None of these
12. LN : OR :: JL : ?
    (a) OM (b) PM
    (c) OP (d) MP
13. VS : LI :: PR : ?
    (a) EF (b) FH
    (c) GH (d) DF
14. BF : YU :: MN : ?
    (a) JK (b) QR

(c) PO (d) None of these

15. DJ : WQ :: FK : ?
    (a) UR (b) RU
    (c) PU (d) UP
16. JK : HH :: QP : ?
    (a) LM (b) MO
    (c) OM (d) None of these
17. RI : NE :: PT : ?
    (a) LP (b) LN
    (c) NO (d) None of these
18. YDIN : VAFK :: ? : BGLQ
    (a) EKNS (b) DKMT
    (c) DLMS (d) EJOT
19. AFKP : UZEJ :: ? VAFK
    (a) CGLQ (b) BHLQ
    (c) GCQL (d) BGLQ
20. OLIR : UFCX :: ? : IROL
    (a) CYUF (b) CUXF
    (c) CLIF (d) CXUF
21. NLO : RPS :: ? : ZXA
    (a) VUW (b) VTR
    (c) VTW (d) TRP
22. CEG : EGC :: LNP : ?
    (a) LPN (b) UWY
    (c) NPL (d) MOP
23. EFG : HIJ :: MNO : ?
    (a) STV (b) PQR
    (c) XYZ (d) CDE
24. DEN : EFFGOP :: RUM : ?
    (a) STVWNO (b) QSTVLN
    (c) SQVTNZ (d) None of these
25. TOR : VRQMTP :: DWN : ?
    (a) BFUYLP (b) FBYUPL
    (c) FYBULP (d) BUFLYP

## 2 Coding-decoding

**Introduction:**

- A CODE is a *system of signals*. Therefore, Coding is a method of transmitting a message between the sender and the receiver without a third person knowing it.
- Before transmitting, the data is encoded and at receiver side the encoded data is decoded in order to obtain original data by determining common key in encoded data.
- The Coding and Decoding Test is set up to judge the candidate's ability to decipher the rule that codes a particular word or message and break the code to decipher the message.

**Method to solve:**

- Observe the word and the code carefully.
- Try to identify the correct coding type out of the most common 7 types of coding.
- Once the correct coding type is identified, apply it same on the given word.
- At times we don't have to find the complete word. Correct option can be found out of the given choices easily if the options are quite dissimilar.
- If the options are quite similar then convert the word completely and find out the correct option.

**Concepts:**

Type 1: Letter Coding:

In this type the real alphabets in a word are replaced by certain other alphabets according to a specific rule to form its code. The candidate is required to detect the common rule and answer the questions accordingly.

**Case 1 :** To form the code for another word

1. If in a certain language MYSTIFY is coded as NZTUJGZ. How is NEMESIS coded in that language?

**Sol.** Clearly, each letter in the word MYSTIFY is moved one step forward to obtain the corresponding letter of the code.

M Y S T I F Y

+1↓

N Z T U J G Z

So, in NEMESIS, N will be coded as O, E as F, M as N and so on. Thus, the code becomes OFNFTJT.

2. In a certain code, MENTION is written as LNEITNO. How is PATTERN written in that code?

**Sol**: Clearly, to obtain the code, the first letter of the word MENTION is moved one step backward and the remaining letters are reversed in order, taking two at a time.

So, in the word PATTERN, P will be coded as O, and the sequence of the remaining letters in the code would be TAETNR. Thus, the code becomes OTAETNR.

Hence, the answer is OTAETNR.

**Case 2:** To find the word by analyzing the given code(DECODING)

3. If in a certain language CARROM is coded as BZQQNL, which word will be coded as HOUSE?

**Sol**: Each letter of the word is one step ahead of the corresponding letter of the code

B Z Q Q N L H O U S E

| | | | | | | | | | |

C A R R O M I P V T F

So, H is coded as I, O as P, U as V, S as T and E as F. HOUSE is coded as IPVTF.

Type 2: Number Coding

In these questions, either numerical code values are assigned to a word or alphabetical code letters are assigned to the numbers. The candidate is required to analyze the code as per the directions.

Case 1: when a numerical code values are assigned to words

4. If in a certain language A is coded as 1, B is coded as 2, and so on, how is BIDDIC is coded in that code?

**Sol**: As the given letters are coded as,

A B C D E F G H I

1 2 3 4 5 6 7 8 9

So in BIDDIC, B is coded as 2, I as 9, D as 4 and C as 3. Thus, BIDDIC is coded as 294493.

5. If PAINT is coded as 74128 and EXCEL is coded as 93596, then how would you encode ACCEPT?

**Sol:** Clearly, in the given code, the alphabets are coded as follows

P A I N T E X C L

7 4 1 2 8 9 3 5 6

So, in ACCEPT, A is coded as 4, c as 5, E as 9, P as 7 and T as 8.

Hence, the correct code is 455978.

**Case 3: Number to letter coding.**

6. In a certain code, 2 is coded as P, 3 as N, 9 as Q, 5 as R, 4 as A and 6 as B. How is 599423 coded in that code?

**Sol:** Clearly as given 5 is coded as R, 9 as Q, 4 as A, 2 as P, 3 as N. So, 599423 is coded as RQQAPN.

Type 3: Matrix Coding

In this type of questions, a word is represented by only one set of numbers as given in any one of the alternatives. The set of alternatives are represented by two classes of alphabets as in the given matrices.

7. Find the correct code for COLD?

MATRIX 1

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | D | K | A | E | C |
| 1 | C | D | K | A | E |
| 2 | K | C | E | A | D |
| 3 | K | C | D | E | A |
| 4 | E | D | A | K | C |

MATRIX 2

| | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|
| 5 | P | L | O | T | N |
| 6 | T | P | N | L | O |
| 7 | P | N | T | O | L |
| 8 | O | N | T | P | L |
| 9 | L | O | P | N | T |

(a) 44,96,95,22 (b) 31,99,77,22

(c) 30,66,86,43 (d) 10,85,79,24

**Sol:** From matrix 1, C can be coded as 04,10,21,31 or 44.

From matrix 2, O can be coded as 57,69,78,85 or 96.

From matrix 2, L can be coded as 56,68,79,89 or 95.

From matrix 1, D can be coded as 00,11,24,32 or 41.

Clearly, only (d) contains all correct codes.

Type 4: Substitution

In this type of questions, some particular objects are assigned code names. Then a question is asked that is to be answered in the code language.

8. If COOK is called BUTLER, BUTLER is called MANAGER, MANAGER is called TEACHER, TEACHER is called CLERK, CLERK is called PRINCIPAL, who will teach in a class?

Sol: Clearly, a TEACHER teaches in a class and as given TEACHER is called CLERK. So a CLERK will teach in a class.

Type 5: Mixed Letter Coding

- In this type of questions, three or four complete messages are given in the coded language and the code for a particular word is asked.
- To analyze such codes, any two messages bearing a common word are picked up.
- The common code word will mean that word.
- Proceeding similarly, by picking up all possible combinations of two, the entire message can be analyzed.

9. If

    - ‘nso ptr kli chn’ stands for ‘sharma gets marriage gift’,
    - ‘ptr lnm wop chn’ stands for ‘wife gives marriage gift’,
    - ‘tti wop nhi’ stands for ‘he gives nothing’, what would mean ‘gives’?

(a)chn (b)nhi (c)ptr (d)wop

**Sol:** (d). In the second and third statements the common word is 'gives' and the common code word is 'wop'. So 'wop' means 'gives'.

Type 6: Mixed Number Coding

- In this type of questions, a few groups of numbers each coding a certain short message, are given.
- Through a comparison of the given coded messages, taking two at a time, the candidate is required to find the number code for each word and
- Then formulate the code for the message given.

10. In a certain code, '786' means 'study very hard', '958' means 'hard work pays' and '645' means 'study and work'. Which of the following is the code for 'very'?

**SOL:** In the first and second statements, the common word is 'hard' and the common code digit is '8'. So, '8' means 'hard'. In the first and third statements, the common word is 'study' and the common code digit is '6'. So, '6' means 'study'.

Thus, in the first statement '7' means 'very'.

Type 7: Deciphering Individual Letter Codes by Analysis

In this type of questions, certain simple words are given along with their codes. The candidate is required to decipher individual codes for different letters by comparing, taking two words at a time, and then answer the given questions accordingly.

Example:

| **COLUMN 1** | **COLUMN 2** |
|---|---|
| DELIBERATION | aemrqs |
| CONSIDERATE | ccehlmo |
| GHOSTLIKE | cfhmoqqrx |
| WORLDLY | cdgmqrsxz |
| KNOWLEDGE | adefmopqqsz |
| ROCKET | cefkmopqqszz |

11. SOLACE

(a) aedpqr (b) acemoq (c) acdmpq (d) demopq

SOL: We first find the exact codes for given word. DELIBERATION is a 12 letter word. Hence its code is cefkmopqqszz. CONSIDERATE is a 11 letter word. So its code is adefmopqqsz. Similarly find for another words. In all words the common letter is 'O' and common code letter is 'm'. Hence 'O' means 'm'.

In WORLDLY and ROCKET, the common letters are O & R. code letter for O is 'm', then other common code letter 'e' stands for R. Similarly find code letters for others. The information can be summarized as below:

| code | m | e | c | o | h | l | Q | r | s | a | x | f | z | d | g | p | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| letter | O | R | L | D | W | Y | E | K | T | C | G | N | I | S | H | A | B |

For SOLACE: The code for 'S' is 'd', for 'O' is 'm', for 'L' is 'c', for 'A' is 'p', for 'C' is 'a' and for 'E' is 'q'. So, the code for SOLACE is 'dmcpaq' or 'acdmpq'.

## 2.1 Coding-decoding (Class Work)

Q.1 If in a certain language, MADRAS is coded as NBESBT, how is BOMBAY coded in that code?

(a) CPNCBX (b) CPNCBZ (c) CPOCBZ (d) CQOCBZ (e) None

Q.2 In a certain code, TRIPPLE is written as SQHOOKD. How is DISPOSE written in that code?

(a) CHRONRD (b) DSOESPI (c) ESJTPTF (d) ESOPSID (e) None

Q.3 In certain code, TOGETHER is written as RQEGRJCT. In the same code PAROLE will be written as

(a) NCPQJG (b) NCQPJG (c)RCPQJK (d) RCTQNG (e) None

Q.4 In certain language, CHAMPION is coded as HCMAIPNO, how is NEGATIVE coded in that code ?

(a) ENAGITEV (b) NEAGVEIT (c) MGAETVIE (d) EGAITEVN (e) NEGATIEV

Q.5 If in a certain code ,TEACHER is written as VGCEJGT, how would DULLARD be written in the same code ?

(a) FWMNCTF (b) FWNNBTE (c) FWNNCSF (d) FWNNCTF (e) None of these

Q.6 In certain code, TOGETHER is written as RQEGRJCT .in the same code, PAROLE will be written as

(a) NCPQJG (b) NCQPJG (c) RCPQJK (d) RCTQNG (e) None

Q.7 In a code ,CORNER is written as GSVRI .how can CENTRAL be written in that code?

(a) DFOUSBM (b) GIRXVEP (c) GJRYVEP (d) GNFJKER (e) None

Q.8 If DELHI is coded as CCIDD ,how would you encode BOMBAY?

(a) AJMTVT (b) AMJXVS (c) MJXVSU (d) WXYZAX (e) None

Q.9 If in a certain language, POPULAR is coded as QPQVMBS, which word would be coded as GBNPVT ?

(a) FAMOSU (b)FAMOUS (c) FASOUM (d) FOSAUM (e) FAMSUO

Q.10 If ROBUST is coded as QNATRS in a certain language, which word would be coded as ZXCMP ?

(a) BKQEVE (b) BKQDWE (c) BKQDWF d)AYDNQ e) BZEOR

Q.11 If in a certain code, SWITCH is written as TVJSDG, which word would be written as CQFZE?

(a) BARED (b) BRAED (c) BREAD (d)BRADE (e) BRDAE

Q.12 If in a certain language, SHIFT is coded as RFFBO,which word would be coded as LKUMB?

(a) MMXQG (b) MLVNC (c) KJVLA (d) MJVLC (e) KJTLA

Q.13 If in a certain language, DIUGNAL is the code for LANGUID, which word would be coded as ELKCAHS?

(a) SHINGLE (b) SHERBET (c) SHACKLE (d) SHOCKLE (e) NONE

Q.14 If in a certain language, TRIANGLE is coded as SQHZMFKD, which word would be coded as DWZLOKD?

(a) EXAMPLE (b) FIGMENT (c) DISMISS (d) DISJOIN (e) NONE

Q.15 If DELHI is coded as 73541 and CALCUTTA as 82589662, how can CALICUT be coded?

(a) 5279431 (b) 5978213 (c) 8251896 (d) 8543691

Q.16 In a certain code, RIPPLE is written as 613382 and LIFE is written as 8192.How is PILLER written in that code?

(a) 318826 (b) 318286 (c) 618826 (d) 338816

Q.17 In a certain code language 24685 is written as 33776.how is 35791 written in that code?

(a)44826 (b) 44880 (c)46882 (d)44882

Q.18 In a certain code language 35796 is written as 44887.how is 46823 written in that code?

(a) 57914 (b) 55914 (c) 55934 (d)55714

Q.19 If PALAM could be given the code number 43, what code number can be given to SANTACRUZ ?

(a) 75 (b) 85 (c) 120 (d) 123

**Directions (Questions 20 to 22)**: The number in each question below is to be codified in the following code:

| Digit | 7 | 2 | 1 | 5 | 3 | 9 | 8 | 6 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| Letter | W | L | M | S | I | N | D | J | B |

Q.20 184632

(a)MDJBSI (b) MDJBIL (c) MDJBWL (d) MDBJIL (e) none of these

Q.21 879341

(a) DWNIBS (b) DWNBIM (c) DWNIBM (d) NDWBIM (e) none of these

Q.22 64928

(a) JBNLD (b) JBLND (c) BJNLD (d) DBNLS (e) None of these

Q.23 In a certain code, 15789 is written as XTZAL and 2346 is written as NPSU. How is 23549 written in that code ?

(a) NPTUL (b) PNTSL (c) NPTSL (d) NBTSL (e)None of these

**Questions 24 to 25:** In the following questions 2 matrices are given and on the basis of these matrices find the codes:

MATRIX 1

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | D | K | A | E | C |
| 1 | C | D | K | A | E |
| 2 | K | C | E | A | D |
| 3 | K | C | D | E | A |
| 4 | E | D | A | K | C |

MATRIX 2

| | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|
| 5 | P | L | O | T | N |
| 6 | T | P | N | L | O |
| 7 | P | N | T | O | L |
| 8 | O | N | T | P | L |
| 9 | L | O | P | N | T |

Q.24 Find the code for POND?

a) 88,99,76,22 (b) 57,78,59,32 (c) 66,96,76,11 (d) 57,68,89,42

Q.25 Find the code for DONE?

(a) 00,57,76,40 (b) 11,78,71,40 (c) 10,57,76,37 (d) 78,11,20,40

## 2.2 Coding-decoding (Home Assignment)

**Questions 1 to 3**: Below are given two matrices, find the code for the following:

MATRIX 1

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | F | A | N | O | I |
| 1 | I | O | F | A | N |
| 2 | A | N | O | I | F |
| 3 | O | F | I | N | A |
| 4 | N | I | A | F | O |

MATRIX 2

| | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|
| 5 | S | E | H | B | T |
| 6 | H | S | E | T | B |
| 7 | B | T | S | E | H |
| 8 | E | H | T | B | S |
| 9 | T | S | E | H | B |

Q.1 Find the code for NEST ?
(a) 33,85,88,86 (b) 21,76,77,76 (c) 14,67,66,67 (d) 02,56,55,59

Q.2 Find the code for FAITH ?
(a) 43,42,41,78,89 (b) 31,34,23,76,79 (c) 24,31,10,59,57 (d) 12,20,40,68,65

Q.3 Find the code for FINE ?
(a) 31,32,33,82 (b) 24,19,21,78 (c) 12,10,13,67 (d) 00,04,02,56

Q.4 If ROOM is called BED, BED is called WINDOW, WINDOW is called FLOWER and FLOWER is called COOLER, on what would a man sleep?
(a) WINDOW (b) BED (c) FLOWER (d) COOLER

Q.5 If SAND is called AIR, Air is called PLATEAU, PLATEAU is called WELL, WELL is called ISLAND and Island is called SKY, then from where will a woman draw water?
(a) WELL (b) ISLAND (c) SKY (d) AIR

Q.6 If CLOUD is called WHITE, WHITE is called RAIN, RAIN is called GREEN, GREEN is called AIR, AIR is called BLUE and BLUE is called WATER, where will the birds fly?
(a) AIR (b) CLOUD (c) WHITE (d)RAIN (e)BLUE

Q.7 If AIR is called GREEN, GREEN is called BLUE, BLUE is called SKY,SKY is called YELLOW, YELLOW is called WATER and WATER is called PINK, then what is the colour of clear sky ?
(a) BLUE (b) SKY (c) YELLOW (d) WATER (e) PINK

Q.8 If SKY is called SEA, SEA is called WATER, WATER is called AIR, AIR is called CLOUD and CLOUD is called RIVER, then what do we drink when thirsty?
(a) SKY (b) AIR (c) WATER (d)SEA (e)CLOUD

Q.9 In a certain code,' nee tim see' means 'how are you', 'ble nee see' means 'where are you', what is code for 'where'?
(a) nee (b) tim (c) see (d) ble

Q.10 If 'sti nro kti' stands for 'clouds pour down','nro bsi mit' stands for 'down he goes' and 'bsi nro zpi' stands for 'died down he',which would mean 'goes'?
(a) nro (b) mit (c) kti (d) bsi

Q.11 If 'gnr tag zog qmp' stands for 'Seoul Olympic Organising committee'; hyto gnr emf' stands for 'summer Olympic games' and 'esm sdr hyto' stands for 'modern games history', What would be the code for 'summer' ?
(a) hyto (b) gnr (c) emf (d) zog

Q.12 In a code language, 'mok dan sil' means 'nice big house'; 'fit kon dan' means 'house is good' and 'warm tir fit' means 'cost is high'. Which word stands for 'good' in that language ?
(a) mok (b) dan (c) fit (d) kon

Q.13 In certain code language, 'Tom Kun Sud' means "Dogs are barking'; 'Kun Jo Mop' means 'Dogs and Horses' and 'Mut Tom Ko' means 'Donkeys are mad'. Which word in that language means 'barking'?
(a) Sud (b) Kun (c) Jo (d)Tom (e) Ko

Q.14 If 'nitco sco tingo' stands for 'softer than flower'; 'tingo rho mst' stands for 'sweet flower fragrance' and 'mst sco tmp' stands for 'sweet than smile' , what would 'fragrance' stands for ?
(a) rho (b) mst (c) tmp (d) sco

Q.15 In a certain code, '37' means 'which class' and '583' means 'caste and class'. What is the code for caste?
(a) 3 (b) 7 (c) 8 (d) either 5 or 3 (e) either 5 or 8

Q.16 In a certain code '256' means 'you are good', '637' means 'we are bad' and '358' means 'good and bad'. Which of the following represents 'and' in that code?
(a) 2 (b) 5 (c) 8 (d) 3

Q.17 In certain code, '247' means 'spread red carpet'; '256' means 'dust one carpet' and '234' means 'one red carpet'. Which digit in that code means 'dust'?
(a) 2 (b) 3 (c) 5 (d) 6 (e) None of these

Q.18 In certain code, '123' means 'hot filtered coffee'; '356' means 'very hot day' and '589' means 'day and night'. Which digit in that code means 'very'?
(a) 9 (b) 5 (c) 8 (d) 2 (e) 6

Q.19 In certain code language, '851' means 'good sweet fruit'; '783' means 'good red rose' and '341' means 'rose and fruit'. Which of the following digit stands for 'sweet' in that language ?
(a) 8 (b) 5 (c) 1 (d) 3 (e) None of these

Q.20 In certain code language, '479' means 'fruit is sweet'; '248' means 'very sweet voice' and '637' means 'eat fruit daily'. Which of the following digit stands for 'is' in that language ?
(a) 7 (b) 9 (c) 4 (d) Can't be determined (e) None of these

Q.21 In certain code language, '253' means 'books are old'; '546' means 'man is old' and '378' means 'buy good books'. Which of the following digit stands for 'are' in that language ?
(a) 2 (b) 4 ( c) 5 (d)6 (e) 9

**Questions(22-23):** Words given in the column 1 have been coded and randomly put in column 2. First match the columns and accordingly find the codes for the following words:

| **COLUMN 1** | **COLUMN 2** |
|---|---|
| DELIBERATION | aemrqs |
| CONSIDERATE | ccehlmo |
| GHOSTLIKE | cfhmoqqrx |
| WORLDLY | cdgmqrsxz |
| KNOWLEDGE | adefmopqqsz |
| ROCKET | cefkmopqqszz |

Q22 KNIGHT
(a) fgrsxz (b) gprsxz (c) fhmpqr (d) ghrxyz

Q.23 NOTICE
(a) acdeqs (b) afmqsz (c) efhpqs (d) fghpqr

Q.24 WORDY
(a) fhlmq (b) ehlmo (c) efhlm (d) adeop

Q.25 BLOAT
(a) lkpqz (b) hmpqz (c) cmpqs (d) ckmps

# 3. Directions

**Introduction:**

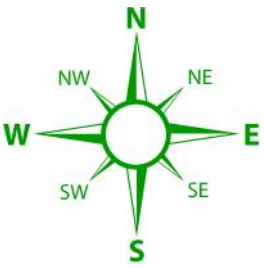
As the name itself suggests, questions about directions would involve reasoning based on the eight directions on a map – viz. north, northeast, east, southeast, south, southwest, west and northwest. In order to solved the questions based on directions, a candidate is required to visualize these directions and the movement of an individual or relative positioning of places on a map.

**Concepts:**

Generally, following two concepts are useful to solve problems based on directions.

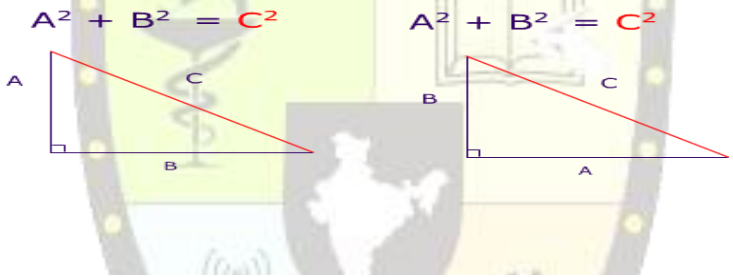
1. Directions on a map:

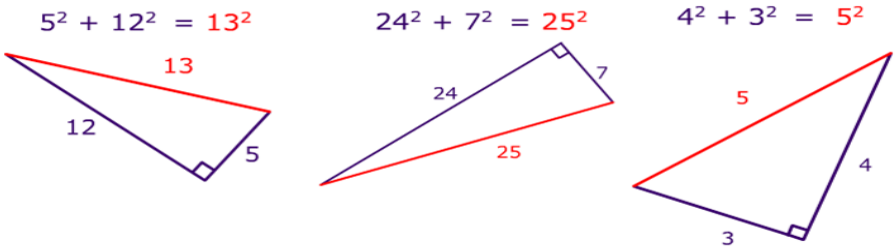
A candidate must have the ability to understand basic mapping concepts like what are the basic directions, what direction one would start facing if one turns right while going north or south. For that matter even, what direction one would be facing if one turns $45^{O}$ right while moving southwards, etc.




2. Pythagoras Theorem:

The picture below shows the formula for the Pythagorean theorem. In the pictures below, side C is always the hypotenuse. Remember that this formula only applies to right triangles.




**Method to solve:**

1. Understand and interpret the clues written in plain language in terms of what it means direction wise.
2. Arrange the clues in the correct order of usage.
3. Apply the mapping concepts to the problem.
4. Create a picture to represent the flow as mentioned in the problem.
5. Find out the required information.

**Example 1:**

Ram starts from his house and goes 2 km towards east, then turns towards right and goes 14 km and again goes towards east travelling 5 km and then turns left and travels for 8 km. He then goes towards east and travels 1 km. How far is he from his house?

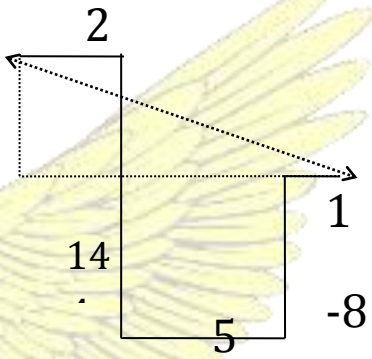
**Solution :**

If we represent the path, covered by him in a diagram. It will appear like the fig.

Total horizontal distance: 2 + 5 + 1 = 8 km.

Total Vertical distance: 14 – 8 = 6 km.

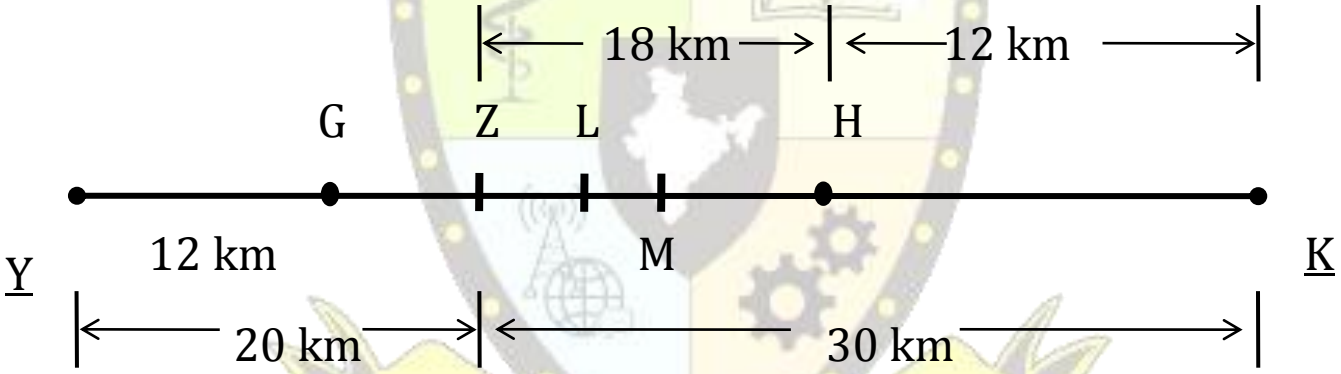
His distance from his house = $(8^2 + 6^2)^{1/2}$ = 10 km.




**Example 2:**

**Answer the following questions based on the following information.**

The city K is 30 km to the southeast of Z while Y is 50 km to the northwest of K. Also, H is 38 km to the southeast of Y. L lies in the direct route between Y & K and its distance from H is 14 km. G also lies on this route and is exactly midway between L & Y.




I. A car starting from K at 9 am and running at the constant speed towards Y reaches H at 9.24 am and then reaches G at
(a) 9.18 am (b) 10.16 am (c) 10.36 am (d) 10.42 am

II. If M is 1 km to the southeast of L, then it is exactly midway between
(a) H & L (b) Y & K (c) H & Z (d) none of these

III. The distance from G to H is
(a) 26 km (b) 24 km (c) 12 km (d) 16 km

**Sol:** Since the southeast & northwest directions are exactly opposite to each other, we can represent all of them on a straight line as per the information given in the question.

The figure above shows the respective position of the cities K, H, L, Z, G & Y.

I. The car starting from K at 9 am reaches H
(b) 9.24 am -> car covers 12 km in 24 minutes

∴ Speed of the car => 2 km/min

To reach G the car has to cover a distance of

50-12 = 38 km from K.

So it will take 38 x 2 = 76 min after 9:00 am

∴ It will reach G at 10:16 am

II. 24 = 20 + 4

∴ YM = YL + LM

25 = 24 + 1

YK = YM + MK

YZ + ZK = YM + MK

20 + 30 = 25 + MK

50 – 25 = MK = 25 => MK = YK/2

So correct option is (b) Y & K

III. GH = GZ + ZH

= (YZ – YG) + (YH – YZ)

= (20 – 12) + (38 – 20)

= (8 + 18)

= 26

Correct Option is (a) 26 km

**Example 3:**

There are six cities e.g. A, B, C, D, E, F. Their positions with respect to one another on a map are described through the five clues given below.

- C is to the south of F, but to the west of D

- F is the south of E which is east of D
- A is south of B which is west of F
- E is south of A which is west of C
- D is south of F which is west of A

IV. Which of the following are situated to the north east of at least one other city?
(a) B, A, E. (b) A and E
(c) B, A (c) A, F and D

V. Which of the following are to the northeast if F?
(a) A only (b) E only (c) C (d) both A & E

VI. Which of the following statements cannot be derived from the given information?
(a) B is to the west of A (b) D is to the south of A
(c) D is to the south of C (d) A is to the west of E

**Solution:**

We can solve the problem easily if divide the distribution on two axes separately and then combine them.
Vertical north-south arrangement.

| Vertical Arrangement-1 | Vertical Arrangement-2 |
|---|---|
| B | B |
| A | A |
| E | E |
| F | F |
| D | C |
| C | D |

The hortizontal (east-west) arrangement

| B | F | A | C | D | E |
|---|---|---|---|---|---|

So the combined overall arrangement can be given by one of the two arrangements.

Combined Arrangement-1

| B | | | | | |
|---|---|---|---|---|---|
| | | A | | | |
| | | | | | E |
| | F | | | | |
| | | | | D | |
| | | | C | | |

Combined Arrangement-2

| B | | | | | |
|---|---|---|---|---|---|
| | | A | | | |
| | | | | | E |
| | F | | | | |
| | | | C | | |
| | | | | D | |

Based on these we can answer the questions.

IV. (b) Looking at the above tabular picture of the arrangement of the cities as north-south or east-west, we can see that E and A are the only cities that satisfy this condition. D & C could be northeast to each other depending on which possibility we consider in arrangement-1 C is not northeast of any city and hence we can eliminate the possibility of C being northeast of at least one other city.

Similarly, on the basis of B being west most cannot be to the northeast of any city. Hence option (b) is correct.

V. (d) Both A & E

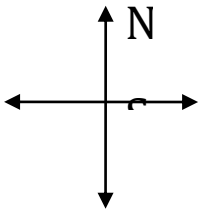
VI. (c) Option C cannot be concluded from the information as we cannot decide on the northeast placement between C & D.

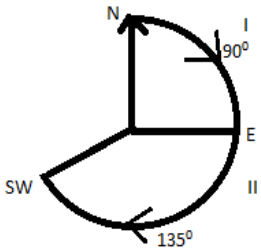
**Example 4:**

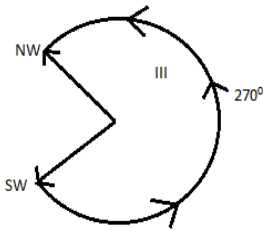
Radha is facing north. She turns $90^0$ in the clockwise direction and then $135^0$ in the same direction and then $270^0$ anti-clockwise. Which direction is she facing now?

(a) southwest (b) south (c) west (d) northwest

Solution :




Clockwise rotations => I & II

=> $90^0 + 135^0 = 225^0$ to North

i.e. in southwest

Anticlockwise rotation: III

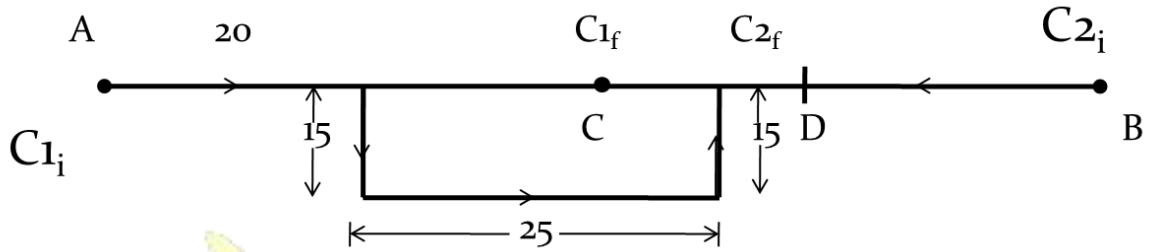
So, Radha is facing northwest now.

Correct option is (d) northwest

**Example 5:**

Two cars start from the opposite points of straight part of a highway, which are 100 km apart. The first car runs for 20 km. It then takes a diversion – takes a right turn, goes straight for 15 km. It then turns left, runs for another 25 km and then takes the straight connecting road to reach back on the main road. In the meantime, due to a minor breakdown, the other car has run only 35 km along the main road. What would be the distance between the two cars at the point?

(a) 20 km (b) 30 km (c) 45 km (d) 10 km




$C1_i$ = Initial position of Car 1

$C1_f$ = Final position of Car 1

$C2_i$ = Initial position of Car 2

$C2_f$ = Final position of Car 2

From the above figure it is clear that Car 1 would move 20 + 25 km => 45 km along the highway while Car 2 would run 35 km along the same highway. Hence the distance between the two cars => 100 – (Distance travelled by Car 1+Distance travelled by Car 2)

= 100 – (45 + 35)

= 100 – 80

= 20

So, the correct option is (a) 20 km.

## 3.1 Directions (Class Work)

Q.1 P started from his house towards west. After walking a distance of 25 m. He turned to the right and walked 10 m. He then again turned to the right and walked 15 m. After this he is to turn right at 135 degree and to cover 30 m. In which direction should he go?

(a) West (b) South (c) South-West (d) South-East

Q.2 X started to walk straight towards south. After walking 5 m he turned to the left and walked 3 m. After this he turned to the right and walked 5 m Now to which direction X is facing?

(a) North-East (b) South (c) North (d) South-West

Q.3 Hemant in order to go to university started from his house in the east and came to a crossing. The road to the left ends in a theatre, straight ahead is the hospital. In which direction is the university?

(a) North (b) South (c) East(d) West

Q.4 After walking 6 km, I turned to the right and then walked 2 km. After then I turned to the left and walked 10 km. In the end, I was moving towards the North. From which direction did I start my journey?

(a) North (b) South (c) East(d) West

Q.5 Ravi left home and cycled 10 km towards South, then turned right and cycled 5 km and then again turned right and cycled 10 km. After this he turned left and cycled 10 km. How many kilometers will he have to cycle to reach his home straight?

(a) 10 km (b) 15 km (c) 20 km (d) 25 km

Q.6 Reena walked from A to B in the East 10 feet. Then she turned to the right and walked 3 feet. Again she turned to the right and walked 14 feet. How far is she from A?

(a) 4 feet (b) 5 feet (c) 24 feet (d) 27 feet

Q.7 One morning after sunrise Nivedita and Niharika were talking to each other face to face at Dalphin crossing. If Niharika's shadow was exactly to the right of Nivedita, Which direction Niharika was facing?

(a) North (b) South (c) East(d) Data is inadequate

Q.8 If A x B means A is to the south of B; A + B means A is to the north of B; A % B means A is to the east of B; A - B means A is to the west of B; then in P % Q + R - S, S is in which direction with respect to Q?

(a) South-West (b) South-East (c) North-East (d) North-West

**(Q. 9-10) Solve these questions based on the following information:**

- Dev, Kumar, Nilesh, Ankur and Pintu are standing facing to the North in a playground such as given below:
- Kumar is at 40 m to the right of Ankur.
- Dev is are 60 m in the south of Kumar.
- Nilesh is at a distance of 25 m in the west of Ankur.
- Pintu is at a distance of 90 m in the North of Dev.

Q.9 Which one is in the North-East of the person who is to the left of Kumar?

(a) Dev (b) Nilesh (c) Ankur (d) Pintu

Q.10 If a boy starting from Nilesh, met to Ankur and then to Kumar and after this he to Dev and then to Pintu and whole the time he walked in a straight line, then how much total distance did he cover?

(a) 215 m (b) 155 m (c) 245 m (d) 185 m

**(Q. 11-14) Each of the following questions is based on the following information:**

Six flats on a floor in two rows facing North and South are allotted to P, Q, R, S, T and U. Q gets a North facing flat and is not next to S. S and U get diagonally opposite flats. R next to U, gets a south facing flat and T gets North facing flat.

Q.11 If the flats of P and T are interchanged then whose flat will be next to that of U?

(a) P (b) Q (c) R (d) T

Q.12 Which of the following combination get south facing flats?

(a) QTS (b) UPT (c) URP (d) Data is inadequate

Q.13 The flats of which of the other pair than SU, is diagonally opposite to each other?

(a) QP (b) QR (c) PT (d) TS

Q.14 Whose flat is between Q and S?

(a) T (b) U (c) R (d) P

**(Q. 15-17) Each of the following questions is based on the following information:**

- 8-trees → mango, guava, papaya, pomegranate, lemon, banana, raspberry and apple are in two rows 4 in each facing North and South.
- Lemon is between mango and apple but just opposite to guava.
- Banana is at one end of a line and is just next in the right of guava or either banana tree is just after guava tree.
- Rasberry tree which at one end of a line, is just diagonally opposite to mango tree.

Q.15 Which of the following statements is definitely true?

(a) Papaya tree is just near to apple tree.

(b) Apple tree is just next to lemon tree.

(c) Raspberry tree is either left to Pomegranate or after.

(d) Pomegranate tree is diagonally opposite to banana tree.

Q.16 Which tree is just opposite to raspberry tree?

(a) Papaya (b) Pomegranate (c) Papaya or Pomegranate (d) Data is inadequate

Q.17 Which tree is just opposite to banana tree?

(a) Mango (b) Pomegranate (c) Papaya (d) Data is inadequate

**(Q. 18-20) Each of the following questions is based on the following information:**

A # B means B is at 1 metre to the right of A. A $ B means B is at 1 metre to the North of A.

A * B means B is at 1 metre to the left of A. A @ B means B is at 1 metre to the south of A.

In each question first person from the left is facing North.

Q.18 According to X @ B * P, P is in which direction with respect to X?

(a) North (b) South (c) North-East (d) South-West

Q.19 According to M # N $ T, T is in which direction with respect to M?

(a) North-West (b) North-East (c) South-West (d) South-East

Q.20 According to P # R $ A * U, in which direction is U with respect to P?

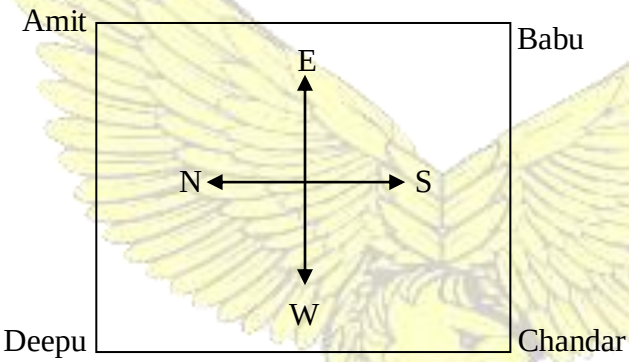
(a) East (b) West (c) North (d) South

# 3.2 Directions (Home Assignment)

Q.1 A watch in my house reads 4:30. If the minute hand points towards the West, in which direction does the hour hand point ?

(a) northwest (b) Southwest (c) northeast (d) north

Following questions are based on the diagram given below showing four persons Amit, Babu, Chandar and Deepu stationed at the four corners of a square piece of plots as shown.




Q.2 Amit starts crossing the plot diagonally. After walking half the distance, he turns right ($90^0$), walks some distance and turns left. Which direction is A facing now ?

(a) northeast (b) north (c) northwest (d) southwest

Q.3 From the original position given in the above figure, Amit and Chandar move one side lengh clockwise and then cross over to the corner diagonally opposite; Babu and Deepu move one side length anticlockwise and cross over to the corner diagonally opposite. The original configurations Amit-Babu-Chandar-Deepu (ABCD) has new changed to
(a) CBDA (b) DCBA (c) BDAC (d) ACBD

Q.4 From the original position, Babu and Deepu move one and a half length of sides clockwise and anticlockwise respectively. Which one of the following statements is now true ?

a) Babu and Deepu are both at the midpoints between Amit and Chander.
b) Babu is at the midpoint between Amit and Chander, and Deepu is at the corner originally occupied by Amit.
c) Deepu is closer to Amar than he is to Chandar and Babu is closer to Chandar than he is to Amit.
d) Deepu is closer to Chandar than he is to Amit and Babu is closer to Chandar than he is to Amit

Q.5 From the positions in the original figure, Babu and Amit move diagonally to opposite corners and then one side each clockwise and anticlockwise respectively. Chandar and Deepu move three sides each anticlockwise and clockwise respectively. Where is Amit now?

(a) At the northwest corner (b) At the southeast corner
(c) At the northeast corner (d) At the southwest corner

Q.6 After the movements given in the above questions who is at the northwest corner ?

(a) Amit (b) Chandar (c) Babu (d) Deepu

Q.7 A road network has parallel and perpendicular roads running northsouth or eastwest only. Junctions/ Intersections on this road are marked as A, B, C, D, … All roads are at exactly half a kilometer distance from each other. The following is known about junctions A, B, C, H & X

'A' is east of B and west of C, H is southwest of C and southeast of B. B is southeast of X. Which junctions are he farthest south and the farthest east?

(a) H, B (b) H, C (c) C, H (d) B, H

Q.8 A river flows from west to east and on the way turns left and goes in a quarter circle around a temple, and then turns left in right-angles. In which direction is the river finally flowing?

(a) North (b) South (c) East (d) West

**Answer the following questions based on the following information:**

A, B, C, D, E, F, G, H & I are nine poles. C is 2m south of A. G is 1m west of H while D is 3m east of G and F is 2m north of G. I is situated just in middle of B and C, while E is just in middle of H and D.

Q.9 Distance between B and C is :

(a) 2m (b) 1m (c) 5m (d) 1.5m

Q.10 Distance between B and I is :

(a) 1.41m (b) 3m (c) 2m (d) 1m

Q.11 Distance between G and H is :

(a) 4m (b) 2m (c) 1m (d) 3m

**Study the following information carefully to answer these questions :**

All the streets of a city are either perpendicular or parallel to one another. The streets are all straight. Street N, O, P, Q & R are parallel to one another. Streets S, T, U, V, W, X & Y are parallel to one another.

i) Street N is 1 km east of street O.
ii) Street O is ½ km west of street P.
iii) Street Q is 1 km west of Street R.
iv) Street S is ½ km south of street T.
v) Street U is 1 km north of street V.
vi) Street W is ½ km north of street X.
vii) Street W is 1 km south of street Y.

Q.12 If W is parallel to U & W is ½ km south of V and 1 km north to T then which two streets would be 1 & ½ km apart?

(a) U & W (b) V & S (c) V & T (d) W & V

Q.13 Which of the following possibilities would make two streets coincide?

(a) X is ½ km north to U (b) P is 1 km west of Q
(c) Q is ½ km east of N (d) R is ½ km of O

Q.14 If street R is between O & P, then distance between N & Q is:

(a) ½ km (b) 1 km (c) 1.5 km (d) 1.5 – 2 km

Q.15 If R is between O & P, then which of the following is false?

(a) Q is 1.75 km west of N (b) P is less than 1 km from Q
(c) R is less than 1 km from N (d) Q is less than 1 km from O

Q.16 Which of the following is necessarily true (given the basic clues)?

(a) R & O intersect (b) Q is 2 km west of O
(c) Q is at least 2 km west of N (d) Y is 1.5 km north of X

Q.17 The front door of Kamini's house is towards the south. From the backside of her house she walks 50 meters straight. Then turns towards the left and walks 100 metres and after that turns right and stops after walking 100 meters. Now Kamini is facing directions?

(a) East (b) South (c) West (d) North

Q.18 A boy starts waling straight towards the north and walks 10 feet, then he turns to his left and left and walks 5 feet, then he turns to his left walks another 5 feet, then again he turns to his left and walks 10 feet and then he turns his right and walks 2 feet. How for is he from his starting point?

(a) 5 feet (b) 2 feet (c) $\sqrt{34}$ (d) 7 feet

Q.19 If southeast becomes east and Northwest becomes west and all other directions are changed in the same directions. Then what will be the direction for north?

(a) Northwest (b) Southeast (c) Southeast (d) Northeast

Q.20 At a crossing there was a direction pole, which was showing all the four directions in correct manner. But due to wind it turns in such a manner that now west pointer is showing south. A man went to the wrong direction thinking that he was travelling east. In what direction he was actually travelling?

(a) South (b) West (c) North (d) Can't say

# 4. Blood Relations

Introduction:

As the name suggests, questions based on blood relations involve working out the familial relationships among people in a family. Questions on blood relations are most common under the logical reasoning section of aptitude exams.

Concepts:

1. Statements based relationship questions:

In this type of questions, we typically have to determine the relationship between two individuals whose relationship is mentioned in a roundabout manner.

In such questions if you place yourself as the central figure in the relationship matrix, the solving of the question becomes much easier as the solution anchors itself to pre-existing relationships in your own mind.

There are two types of questions

**A. Routed Relationship**

In these questions relation between two people is given through a route of relating them through other people. The student has to go through the series of relationships and finally determine the relationships between the two people in the question. The relationship is given as a simple statement or a statement made by a person.

Following table can be useful:

| | | | |
|---|---|---|---|
| Father's or mother's son | Brother | Father's or mother's daughter | Sister |
| Father's or mother's brother | Uncle | Father's or mother's sister | Aunt |
| Father's or mother's father | Grandfather | Father's or mother's mother | Grandmother |
| Grandfather's or grandmother's brother | Granduncle | Grandfather's or grandmother's sister | Grandaunt |
| Daughter's husband | Son-in-law | Son's wife | Daughter-in-law |
| Husband's or wife's brother | Brother-in-law | Husband's or wife's sister | Sister-in-law |
| Brother's or sister's son | Nephew | Brother's or sister's daughter | Niece |
| Sister's husband | Brother-in-law | Brother's wife | Sister-in-law |
| Uncle's or aunt's son or daughter | Cousin | Children of same parents | Siblings |
| Woman's spouse | Husband | Man's spouse | Wife |

**B. Coded Relationship:**

In these types of questions, certain codes are used to describe different relationships and then using these codes a statement is given to relate people. On interpreting the codes, students can find the relationship between the people.

2. Puzzle type Questions:

This type of questions normally involves situations where there is some family relationship that part is of the puzzle.

**Method to solve:**

**While solving the questions keep in mind the following points:**

- Firstly, use the direct clues.
- In the case of family tree, the diagram should essentially be a multilevel diagram to ensure clarity of being able to see multiple generations on the same diagram.
- Males and females should be marked separately with some symbols like + - or underline or overline or triangle or circle O, depending upon your convenience.
- Relationships should be marked using horizontal links or vertical links.

**Example 1:** Ram's father says to him, "My father has a daughter whose son is Shyam." What is Shyam to Ram?

(a) Father (b) Cousin (c) Brother (d) Grandfather

**Solution:** Ram's father's father is his grandfather. And, grandfather's daughter is his aunt and aunt's son is his cousin. So, Shyam is his cousin. Answer is (b) Cousin.

**Example 2:** A's father has a mother B whose husband is C and who has a brother D whose granddaughter is E. What is E to A?

(a) Grandmother (b) Mother (c) Niece (d) Cousin

**Solution:** C is A's grandfather; D will be his granduncle; so, E will be A's cousin.

**Example 3:**

X + Y means X is the father of Y; P – Q means Q is the daughter of P; R * S means S is the brother of R. Given that A + B – C * D. How is A related to D?

(a) Grandfather (b) Uncle (c) Father (d) Can't be made

**Solution:**

Given Statement is A + B – C * D. Build the relationship between A and D step by step.

Since A + B is given, it means A is the father of B (B is either a daughter or a son).

Now B – C means, C is the daughter of B ( B is either father or mother of C). So, C is the granddaughter of A.

Now, C * D means, D is the brother of C, so D will be grandson of A. So, A is related to D as grandfather.

**Example 4 :**

In a family of six persons – Abhay, Banta, Cathy, Deepak, Emily and Fatima, there are three males and three females. There are two married couples and two persons are unmarried. Each one of them likes different cold drinks.

Emily who likes Coke, is the mother-in-law of Abhay, who is wife of Cathy. Deepak is the father of Fatima and he does not like Thumps Up or Pepsi; Banta likes Limca and is the sister of Fatima who likes Sprite. Cathy does not like Pepsi. Fanta is another cold drink.

i. Who among the following like Thumps Up?

(a) Cathy (b) Deepak (c) Abhay (d) Data inadequate

ii. How is Fatima related to Emily ?

(a) Brother (b) Son (c) Father (d) Daughter

iii. One of the married couple's is :

(a) Deepak – Banta (b) Deepak- Emily (c) Banta – Fatima (d) Emily – Fatima

iv. Which of the following cold drinks is liked by Abhay?

(a) Thumps Up (b) Fanta (c) Pepsi (d) Data inadequate

v. How many sons does Emily have?

(a) Four (b) Three (c) Two (d) One

**Solution :**

While solving logical reasoning questions, always try to place the direct information first and keep any indirect clues aside for later use.

In this question you will find that:

Emily likes Coke …… - ---> Direct clue

Deepak is the father of Fatima ---> Direct clue

Deepak does not like Thumbs-up or Pepsi ---> Indirect clue and so on

The following diagram will emerge from the clues

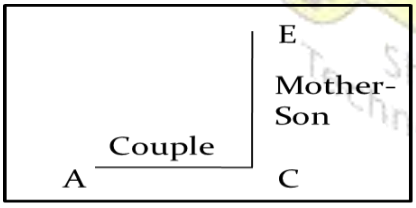



Fig 1

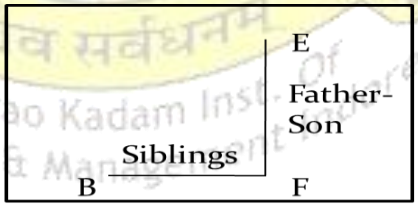
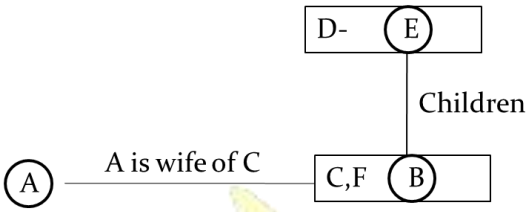



Fig 2

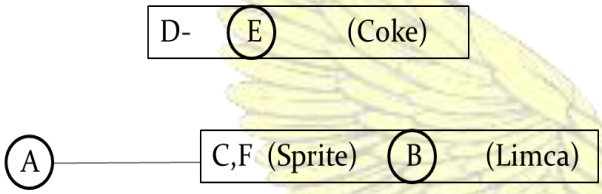
At this stage, you know that A, B and E are the three females and C, D and F are the three males; you also know that A and C are one of the two couples.

Hence, the other couple must be D and E. (They must be married to each other since they have children.)

This leads to a combined diagram which looks as below:




To this information, add the likes and dislikes of individual as follows:




Further, D does not like Thumbs Up, hence he must like Fanta; Cathy does not like Pepsi (hence Thumbs Up) and Abhay likes Thumbs Up.

The answers are :

i. Cathy

ii. Fatima is Emily Son

iii. Deepak-Emily is a married couple

iv. Thumbs Up

v. Two sons (C & F)

## 4.1 Blood Relations (Class Work)

Q.1 Arun Told Meesum, "Yesterday I met the son of my wife's father-in-law". How is Arun related to that man ?

(a) Brother (b) Father (c) Son-in-law (d) None of these

Q.2 Pointing to a man, Manisha said, "He is the youngest son of my father-in-law's only son". How is Manisha related to this youngest son's father ?

(a) Daughter (b) Sister (c) Wife (d) Can't be determined

Q.3 A family consists of a husband and wife, their three sons and two daughters, three wives of three sons. How many females are in this family?

(a) 5 (b) 6 (c) 7 (d) none of these

Q.4 A man has two wives A and B. A is Sunny's step mother. How is Sunny related to B?

(a) Step-daughter (b) Sister-in-law (c) Son (d) Can't be determined

**Direction for Questions 5 to 7:**

- If a+b means a is sister of b,
- a – b means a is brother of b,
- a x b means a is daughter of b,
- a ÷ b means a is mother of b.

Q.5 Which of the following relationship shows that *l* and *n* are wife and husband?

(a) *l* ÷ *m* x *n* (b) *l* – *m* x *n* (c) *l* + *m* x *n* (d) None of these

Q.6 How many females does this relationship shows? l + m – n + o – p x q

(a) 2 (b) 3 (c) 4 (d) Can't be determined

Q.7 The relationship p + q – r x s ÷ t shows that

(a) p, q, r and s are children of t (b) p, q, r and t are children of s
(c) p, q and r are children of t and s (d) p, q, r, s and t are all siblings.

**Directions for Questions 8 to 12:**

- If a + b means a daughter of b,
- a – b means a is husband of b,
- a x b means a is brother of b.

Q.8 What does the relation p x q – r shows?

(a) p is son-in-law of r (b) p is brother of r
(c) r is wife of p (d) None of these

Q.9 If h + i x j + k x l + m x n, then what is the present generations of h. Assume that the oldest generation in this group is the first generations?

(a) 2nd (b) 3rd (c) 4th (d) None of these

Q.10 Which of the following statements does not hold?

(a) a + b x c (b) a – b x c (c) a + b + c (d) a + b – c

Q.11 From the statement a x b x c x d, which of the following statement is not necessarily true?

(a) b is the brother of a (b) c is the brother of a
(c) d is brother of c (d) a, b, c are male

Q.12 From the statement p – q + r x s, how is q related to s?
(a) Niece (b) Sister (c) Mother (d) None of these

Q.13 Anwar's father is the only son of Mahesh's father. How is Mahesh related to Anwar ?
(a) Father (b) Brother (c) Can't be determined (d) None of these

Q.14 Rahul has two mothers. Shalini is the step-daughter of Seema and step-sister of Rahul. How is Seema related to Rahul?

(a) Step-mother (b) Mother (c) Can't be determined (d) None of these

Q.15 If

I. A is the brother of B
II. B is the brother of C
III. C is the brother of D
IV. D is the sister of E

Then which of the following statements is not necessarily true ?

(a) D is the sister of C
(b) B and C are brothers
(c) A, B, C are male and D is a female
(d) D and E are sisters

Q.16 Pointing to a photograph, Vandana says, "She is the elder daughter of my mother's husband "? How is person in photograph related to Vandana?

(a) Sister (b) Mother (c) Sister-in-law (d) None of these

Q.17 Pointing to the man in the platform, Siddhartha said. "He is the brother of the father of my mother's son". How is this man on the platform related to Siddhartha?

(a) Nephew (b) Father (c) Brother (d) None of these

**Directions for Questions 18 to 20:**

- a * b means a is the brother of b.
- a @ b means a is the daughter of b.
- a $ b means a is the sister of b.

Q.18 Which of the following shows the relationship p is the paternal uncle of n?

(a) n$o@p (b) n@o$p (c) n@o*p (d) None of these

Q.19 From the following statement, what is the relationship between n and s? n$o@p*q$r*s

(a) Grandmother (b) Grandfather (c) Aunt (d) Can't be determined

Q.20 If a $b$c@d@e*f*g, then how many males and females are there respectively?

(a) 4, 3 (b) 3, 4 (c) 5, 2 (d) Can't be determined

## 4.2 Blood Relations (Home Assignment)

**Direction (1 – 10):** Read the paragraph given and answer the following questions:
Ajay goes to the house of his sister Sasha who is the neighbor of Gilly. Gilly has a daughter Maina. Maina studies in the first year of college. Ansh is the father of Ajay and is married to Ana and has a sister who is Gilly.

1. Gilly related to Ajay as
   (a) aunt (b) sister (c) cousin (d) mother
2. Ansh related to Sasha as
   (a) brother (b) uncle (c) cousin (d) father
3. Maina is related to Ajay as
   (a) niece (b) cousin (c) uncle (d) brother
4. Gilly is related to Ana as
   (a) sister (b) sister-in-law (c)aunt (d) mother

**Direction (05 – 09):** Read the paragraph given below and answer the following questions:
In a family of 7 members, P is the oldest person and has one son and one daughter. V's father is S, who is a businessman. S's wife, T is a social worker. R is a spinster. Q who is P's son, and U are a newly married couple. Both the children of P are married and all stay together. V and R are siblings.

5. U is related to P as
   (a) daughter-in-law (b) daughter (c) son-in-law (d) son
6. Who among the following is P's child?
   (a) T (b) S (c) R (d) can't be made
7. V is related to T as
   (a) son (b) daughter (c) brother (d) can't be made
8. U is related to R as
   (a) niece (b) nephew (c) uncle (d) None of these
9. R is related to P as
   (a) grandson (b) granddaughter (c) son (d) None of these
10. Sam's sweet little sister's father's wife's brother's wife's son is related to him as
    (a) brother (b) maternal uncle (c) cousin (d) father
11. If X says that his mother is the only daughter of Y's mother, how is Y related to X?
    (a) Aunt (b) Father (c) Brother (d) Uncle
12. Jack said, "This girl is the wife of the only grandson of my mother". How is Jack related to the girl?
    (a) Father (b) Father-in-law (c) Grandfather (d) Husband
13. A woman Manpreet asks a man Harpreet, "How are the brother of my uncle's daughter. How are you related to me?". What was the man's answer?
    (a) Cousin (b) Son (c) Brother-in-law (d) Nephew
14. Allen told Beatrix, "Yesterday, I met the only brother of the daughter of my grandmother." Whom did Allen meet?
15. Cousin (b) Brother (c) Nephew (d) Father A woman presents a man as the son of the brother of her mother. How is the man related to the woman?
    (a) Nephew (b) Son (c) Cousin (d) Uncle

**Directions for Questions 16 to 17:** Study the following information carefully and answer the questions given below.

Raina, Murli, Haiden, Patel, Gony, Balaji and Morkel are seven members in a family, out of which there are three females and four males. There are two managers, two layers, one teacher, one engineer. Haiden is a lawyer and is married to Raina, who is a teacher. Balaji, the engineer, is married to Patel, who is neither a lawyer nor a doctor. No two ladies have the same profession. Murli is the sister of Morkel, who is manager.

16. What is Gony's professional ?
    (a) Manager (b) Lawyer (c) Manger of Layer (d) Data inadequate
17. Which of the following is the group of males ?
    (a) Raina, Murli, Balaji and Morkel (b) Gony, Balaji, Patel and Morkel
    (c) Raina, Haiden, Gony and Balaji (d) Raina, Gony, Balaji and Morkel

**Directions for Questions 18 to 19:** Study the following information carefully and answer the questions given below.

P, Q, R, S, T, U and V are seven members of a family belonging to three generations. There are two married couples – one each of first and second generations respectively. They travel in three different cars – Bentley, Lamborghini and Ferrari so that no car has more than three members and there is at least one female in each car. R, who is a granddaughter, does not travel with her grandfather and grandmother. Q travels with his father T in Lamborghini. U travels with her granddaughter S in Bently. P travels with her daughter in Ferrari.

18. How many female members are there in the family ?
    (a) Three (b) Four (c) Five (d) None of these
19. Which of the following is one of the married couples ?
    (a) DB (b) BC (c) EF (d) None of these

**Direction for Question 20:** Read the information given carefully and answer the question.

In a family of six persons- Pranay, Qayamat, Ravi, Shashi, Tanveer, Umed, there are three males and three females. There are two married couples and two persons are married. Each one of them reads different magazines, which are Cosmomplitan, Vogue, India Today, Economist, Stardust and Femina.

The following facts about the family members are also known:

Tanveer, who reads Cosmopolitan, is mother-in-law of Pranay, who is wife of Ravi. Shashi is the father of Umed and he does not read Vogue or Femina. Qayamat reads Stardust and is the sister of Umed, who reads India Today. Ravi does not read Femina.

20. Who among the following reads Vogue and what is the relation between the person who reads Vogue and Qayamat?
    (a) Ravi, Sister (b) Ravi, Father (c) Umed, Sister (d) Shashi, Father

# 5. Analogies

**Introduction:**

Analogy means similarity. In this type of questions, generally four terms are given. These terms are separated by colons (:) like,

(first term) : (second term) :: (third term) : (fourth term).

One has to determine the relation between the first two terms and by using the same logic, one has to figure out the term in the place of the question mark. Generally, these questions formed using numbers and alphabets.

**Method:**

1. Observe the questions carefully.
2. Try to identify the logic which is applied in the first pair i.e. try to know in how many different ways the first term is related to the second term.
3. Try to apply the same logic on the second pair i.e. figure out the fourth possible term using the same logic.
4. Match the possible fourth terms with the options given in the question.
5. Most suitable match that is available in the options, is the right question.

**Example:**

5 : 25 :: 6 : ?

(a) 30 (b) 20 (c) 26 (d) 3

**Solution:** If we observe the first pair carefully, we get that the second term in the first pair is the square of the first term. So, following the same logic, the fourth term should be the square of the third term, i. e. the fourth term should be 36 which is not given in the option. Therefore, we have to ignore 36. If we observe the options carefully, then 5 + 20 = 25, and similarly, 6 + 20 = 26. Which is the matching option. Hence the answer to this question should be (c) 26.

## 5.1 Analogies (Class Work)

Q1. 1 : 11 :: 2 : ?

(a) 20 (b) 22 (c) 24 (d) 44

Q2. 18 : 27 :: 22 : ?

(a) 42 (b) 39 (c) 33 (d) 54

Q3. 8 : 32 :: 10 : ?

(a) 50 (b) 10 (c) 48 (d) 32

Q4. 8 : 27 :: 64 : ?

(a) 277 (b) 125 (c) 250 (d) 99

Q5. 1/7 : 1/14 :: 1/9 : ?

(a) 1/88 (b) 1/80 (c) 1/81 (d) 1/18

Q6. 0.16 : 0.0016 :: 1.02 : ?

(a) 10.20 (b) 0.102 (c) 0.0102 (d) 1.020

Q7. 5 : 24 :: 8 : ?

(a) 65 (b) 63 (c) 62 (d) 64

Q8. 7 : 98 :: 8 : ?

(a) 138 (b) 128 (c) 140 (d) 142

Q9. 2 : 10 :: 3 : ?

(a) 4 (b) 14 (c) 30 (d) 28

Q10. 7 : 28 :: 2 : ?

(a) 8 (b) 16 (c) 24 (d) 12

Q11. 65 : 30 :: 44 : ?

(a) 79 (b) 62 (c) 28 (d) 16

Q12. 99 : 76 :: 24 : ?

(a) 1 (b) 13 (c) 9 (d) 7

Q13. 11 : 35 :: 17 : ?

(a) 3 (b) 22 (c) 53 (d) 10

Q14. 4 : 12 :: 5 : ?

(a) 22 (b) 21 (c) 16 (d) 20

Q15. 16 : 0.16 :: ?

(a) 2 : 0.02 (b) 7 : 0.007 (c) 1.3 : 0.13 (d) 0.01 : 0.001

Q16. 3 : 1/3 :: ?

(a) 6:12 (b) 5 : 2/15 (c) 8 : 1/8 (d) 9 : 27

Q17. 43 : 34 :: 52 : ?

(a) 49 (b) 25 (c) 36 (d) 64

Q18. 65 : 13 :: 180 : ?

(a) 93 (b) 36 (c) 133 (d) 102

Q19. 100 : 45 :: 200 : ?

(a) 110 (b) 100 (c) 95 (d) 105

Q20. 125 : 27 :: 343 : ?

(a) 729 (b) 125 (c) 216 (d) 512

Q21. BYDW : FUHS :: AZCX : ?

(a) EVGT (b) FVGT (c) EGVT (d) FGVT

Q22. AF : IK :: LQ : ?

(a) MO (b) RS (c) TV (d) TU

Q23. FED : MKI :: PON : ?

(a) WUS (b) UVT (c) TVU (d) TVM

Q24. AYBZ : CWDX :: EUFV : ?

(a) GSHT (b) GHST (c) SHGT (d) MVGT

Q25. ACEG : IKMO :: JLNP : ?

(a) SWVY (b) RTVX (c) STVW (d) RVTY

(a) (b) (c) (d)

## 5.2 Analogies (Home Assignment)

Q1. 30 : 42 :: 56 : ?

(a) 92 (b) 21 (c) 38 (d) 72

Q2. 190 : 10 :: 102 : ?

(a) 4 (b) 7 (c) 3 (d) 5

Q3. 23 : 5 :: 28 : ?

(a) 10 (b) 12 (c) 13 (d) 14

Q4. 4 : 36 :: 6 : ?

(a) 63 (b) 54 (c) 35 (d) 30

Q5. 6 : 12 :: 20 : ?

(a) 50 (b) 30 (c) 42 (d) 38

Q6. 6 : 18 :: 4 : ?

(a) 2 (b) 6 (c) 12 (d) 16

Q7. 10 : 20 :: 30 : ?

(a) 45 (b) 60 (c) 50 (d) 70

Q8. 23 : 13 :: 35 : ?

(a) 57 (b) 34 (c) 31 (d) 19

Q9. 63 : 9 :: 49 : ?

(a) 12 (b) 3 (c) 36 (d) 7

Q10. 2 : 11 :: 3 : ?

(a) 27 (b) 30 (c) 33 (d) 36

Q11. 357 : 73 :: ?

(a) 429 : 94 (b) 201: 21 (c) 138 : 38 (d) 93: 39

Q12. 36 : 18 :: 72 : ?

(a) 164 (b) 134 (c) 94 (d) 36

Q13. 731 : 902 :: 655 : ?

(a) 646 (b) 800 (c) 793 (d) 556

Q14. 23 : 8 :: 43 : ?

(a) 64 (b) 11 (c) 16 (d) 36

Q15. 162 : 9 :: 310 : ?

(a) 33 (b) 27 (c) 16 (d) 4

Q16. 411 : 441 :: 755 : ?

(a) 705 (b) 775 (c) 635 (d) 665

Q17. 13 : 17 :: 15 : ?

(a) 19 (b) 11 (c) 21 (d) 16

Q18. 225 : 15 :: 256 : ?

(a) 26 (b) 16 (c) 20 (d) 28

Q19. 6 : 48 :: 8 : ?

(a) 59 (b) 64 (c) 67 (d) 62

Q20. 33 : 36 :: 21 : ?

(a) 9 (b) 18 (c) 24 (d) 32

Q21. 19 : 39 :: 42 : ?

(a) 60 (b) 83 (c) 85 (d) 91

Q22. 5 : 45 :: 2 : ?

(a) 40 (b) 36 (c) 20 (d) 18

Q23. 123 : 149 :: 201 : ?

(a) 202 (b) 404 (c) 401 (d) 227

Q24. 7 : 105 :: 5 : ?

(a) 97 (b) 83 (c) 75 (d) 61

Q25. 11 : 101 :: 73 : ?

(a) 153 (b) 330 (c) 543 (d) 703

Q26. 4 : 32 :: 8 : ?

(a) 34 (b) 68 (c) 92 (d) 128

Q27. 94 : 32 :: 169 : ?

(a) 43 (b) 22 (c) 39 (d) 48

Q28. 27 : 47 :: 32 : ?

(a) 70 (b) 75 (c) 60 (d) 41

Q29. 6 : 21 :: 14 : ?

(a) 82 (b) 75 (c) 60 (d) 41

Q30. 31 : 124 :: 103 : ?

(a) 98 (b) 215 (c) 412 (d) 517

Q31. ZWT : ROL :: IFC : ?

(a) ZWT (b) ZTW (c) ZUT (d) AXU

Q32. ABD : EFH :: IJL : ?

(a) MNP (b) MPN (c) NMP (d) NMT

Q33. FHJ : LNP :: RTV : ?

(a) ZXB (b) XZT (c) XZB (d) VTM

Q34. DE : 45 :: BC : ?

(a) 23 (b) 24 (c) 5 (d) 26

Q35. ABC : 8 :: FBD : ?

(a) 14 (b) 13 (c) 15 (d) 12

Q36. LJH : KKI :: WUS : ?

(a) VVT (b) VVW (c) XVV (d) WVT

Q37. NUMBER : UNBMRE :: GHOST : ?

(a) HOGST (b) HOGTS (c) HGOST (d) HGSOT

Q38. DRIVEN : EIDRVN :: TONSIL : ?

(a) NISLOT (b) INTOSL (c) TNOSIL (d) SLONIT

Q39. ? : YVBLKA :: WOULD : TLRIA

(a) MATTER (b) BEFORE (c) BYGONE (d) BEYOND

Q40. ? : DURXQG :: POLITY : SROLWB

(a) AROUND (b) SHOULD (c) ARMOUR (d) GROUND

# 6. Numerical Puzzles

Introduction:

Numerical puzzles ae interesting puzzles combined by numbers with logic. One has to study the pattern of the arrangement of numbers and find out one could get the number in the middle using the four numbers around it. In this type of questions, one has to find what number would come in the place of question mark (?).

Method:

- Observe each figure very carefully.
- Try to find out the common logic which brings the middle number is each figure.
- Apply the same logic in the question figure and find out the number that replaces the question mark (?).

Example 1:


Solution:

The middle number is the sum of the numbers outside it. So, the number which comes in the question mark is 6 + 5 + 1 + 3 = 15.

Example 2:

| | | |
|---|---|---|
| 5 | 8 | 8 |
| 3 | 6 | 4 |
| 4 | 7 | ? |

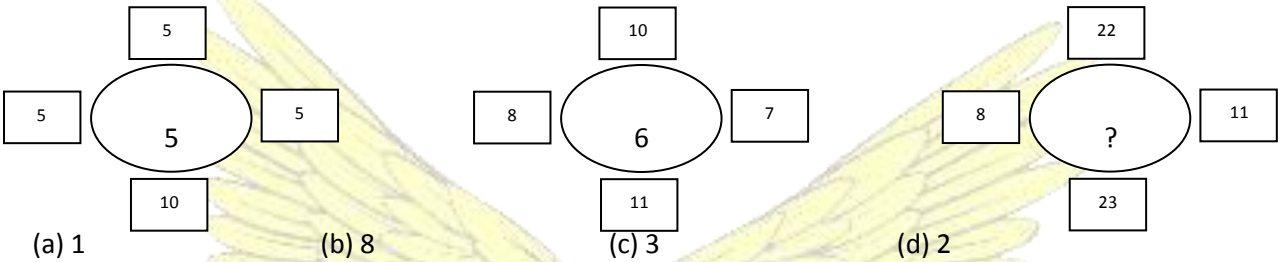
Solution:

Here if we observe carefully, we find that the average of first two numbers in the column is given in the third row. (5 + 3)/2 = 4 and (8 + 6)/2 = 7. Similarly, (8 + 4)/2 = 6. So, the number in place of question mark should be 6.

## 6.1 Numerical Puzzles (Class Work)

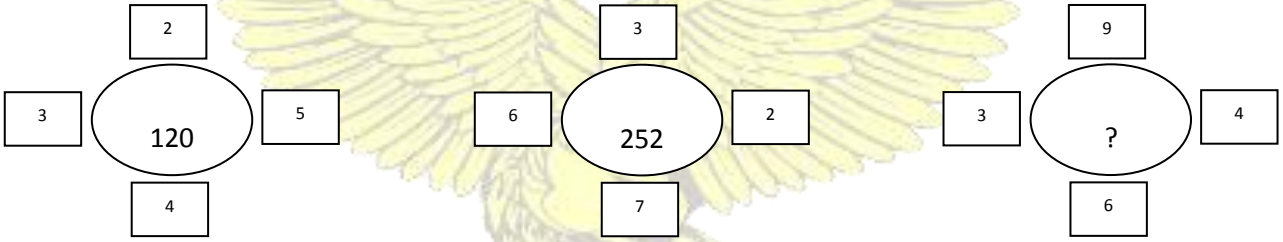
**Directions:** In each of the following questions, three figures are given. Out of these figures, first two are complete and follow a certain logic; while the third figure is incomplete. Using the same logic, find out the number that should replace the question mark.

Q1.



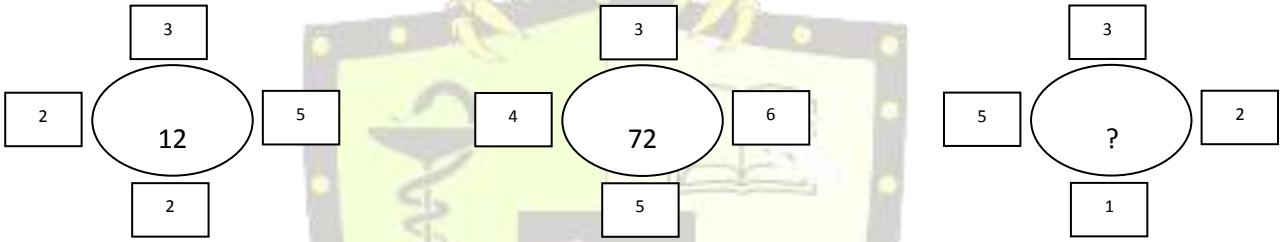

(a) 1 (b) 8 (c) 3 (d) 2

Q2.



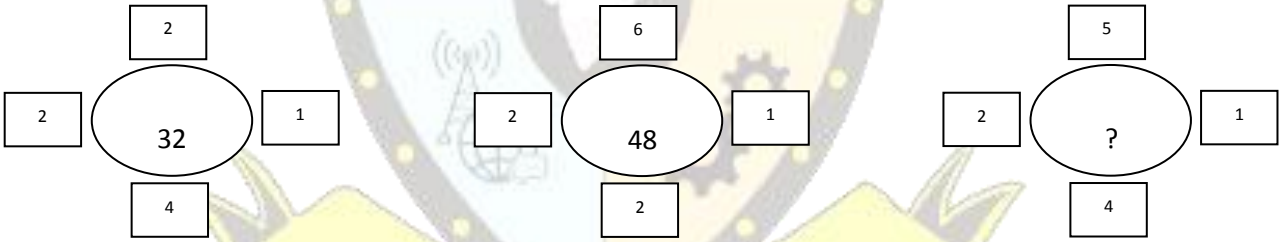

(a) 728 (b) 621 (c) 684 (d) 648

Q3.



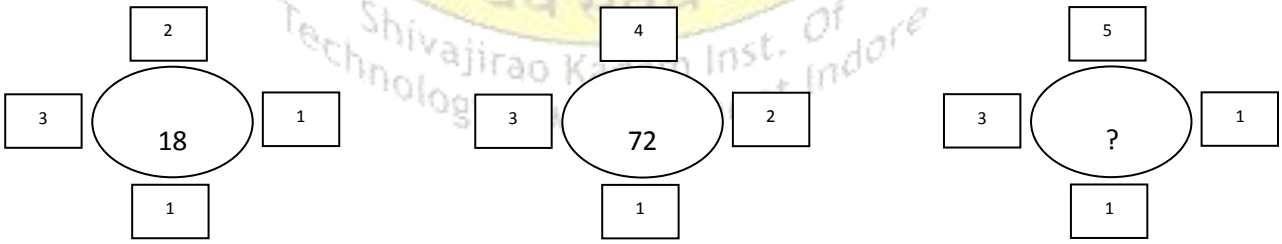

(a) 3 (b) 5 (c) 6 (d) 4

Q4.



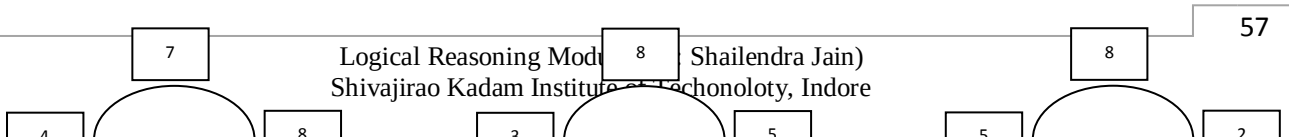

(a) 16 (b) 70 (c) 80 (d) 18

Q5.



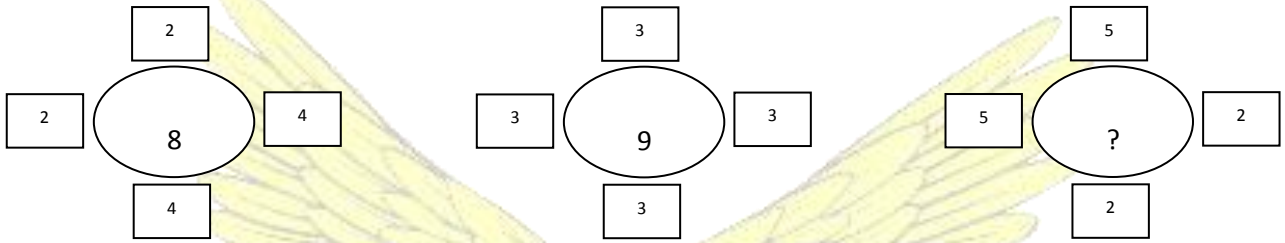

(a) 49 (b) 80 (c) 70 (d) 90

Q6.



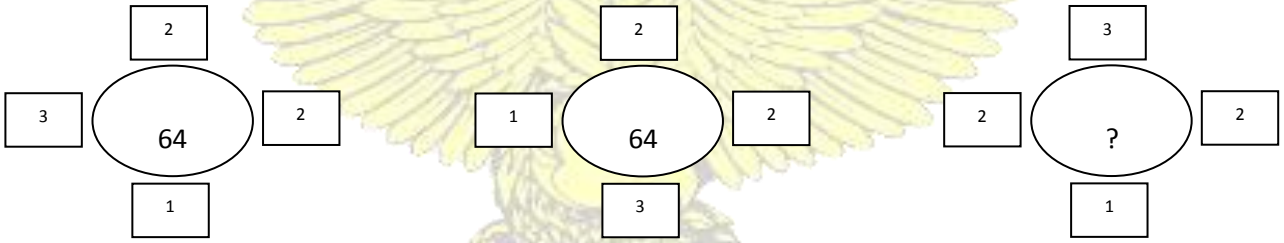
(a) 3 (b) 12 (c) 24 (d) 4

Q7.



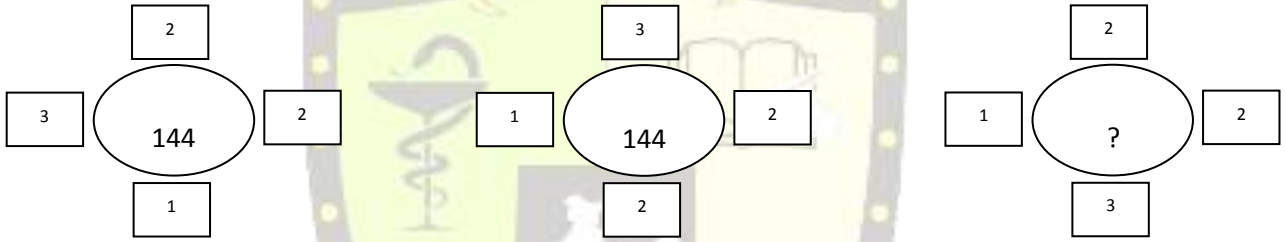

(a) 10 (b) 8 (c) 7 (d) 6

Q8.



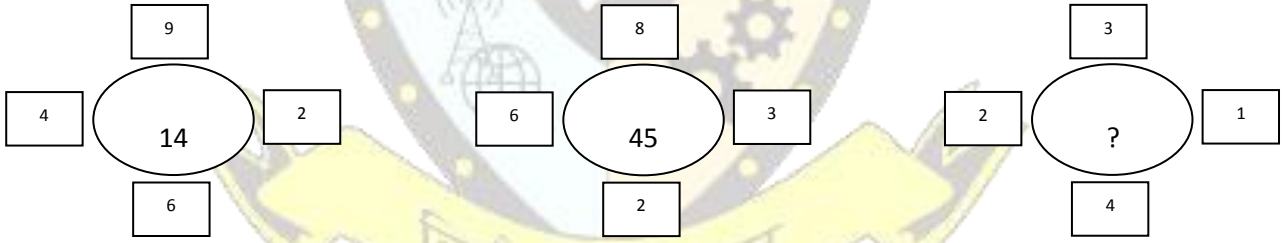

(a) 81 (b) 80 (c) 79 (d) 64

Q9.




(a) 181 (b) 12 (c) 144 (d) 64

Q10.




(a) 5 (b) 6 (c) 7 (d) 8

(a) (b) (c) (d)

Q11.

| | | |
|---|---|---|
| 14 | 26 | 27 |

| | | |
|---|---|---|
| 13 | 12 | 16 |
| 14 | 10 | 15 |
| 13 | 28 | ? |

(a) 90 (b) 28 (c) 17 (d) 20

Q12.

| | | |
|---|---|---|
| 6 | 5 | 5 |
| 8 | 9 | 7 |
| 10 | 7 | ? |
| 480 | 315 | 315 |

(a) 9 (b) 5 (c) 8 (d) 3

Q13.

| | | |
|---|---|---|
| 18 | 25 | 32 |
| 12 | 14 | 16 |
| 12 | ? | 4 |
| 72 | 100 | 128 |

(a) 2 (b) 3 (c) 8 (d) 5

Q14.

| | | |
|---|---|---|
| 4 | 4 | 2 |
| 1 | 2 | 4 |
| 3 | 1 | 3 |
| 64 | ? | 81 |

(a) 25 (b) 59 (c) 100 (d) 49

Q15.

| | | |
|---|---|---|
| 5 | 8 | 8 |
| 3 | 6 | 4 |
| 4 | 7 | ? |

(a) 25 (b) 59 (c) 100 (d) 49

**Directions (Q16-20):** Carefully observe the first two solutions; find out the rule and find the answer for the third set of figures.

Q16. 8 x 4 = 34, 16 x 6 = 98, When 32 x 9 = ?

(a) 286 (b) 288 (c) 290 (d) None of these

Q17. When 1 + 2 = 7, 4 + 5 = 187, then 1 + 10 = ?

(a) 888 (b) 299 (c) 998 (d) None of these

Q18. When 10 + 12 = 1205, 9 +11 = 995, 13 + 7 = 915, then 14 + 15 = ?

(a) 210 (b) 2105 (c) 2100 (d) None of these

Q19. When 10 + 8 = 40, 36 + 2 = 36, 12 + 9 = 54, then 14 + 15 = ?

(a) 100 (b) 110 (c) 105 (d) None of these

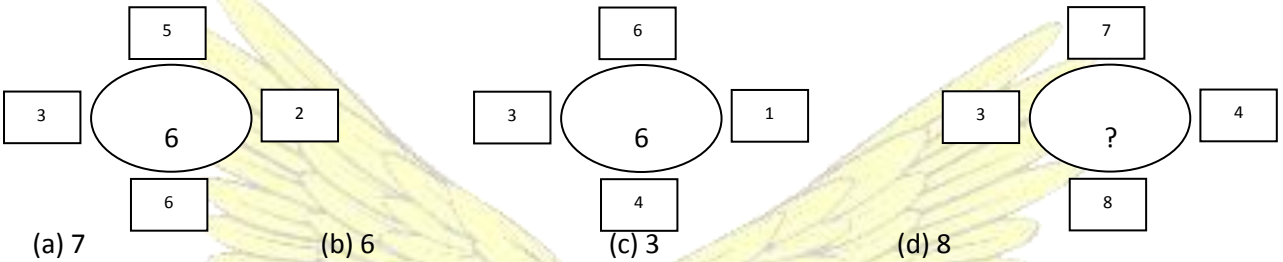
Q20. If 2 + 3 = 16, 6 + 8 = 108, then 10 + 12 = ?

(a) 254 (b) 255 (c) 256 (d) 257

## 6.2 Numerical Puzzles (Home Assignment)

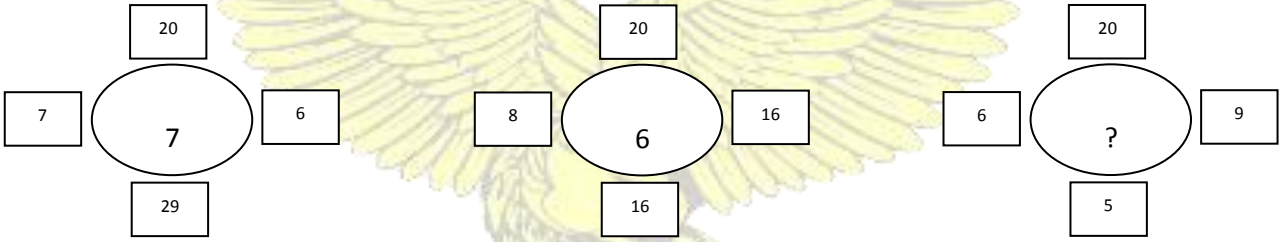
**Directions (1-10):** In each of the following questions, three figures are given. Out of these figures, first two are complete and follow a certain logic; while the third figure is incomplete. Using the same logic, find out the number that should replace the question mark.

Q1.



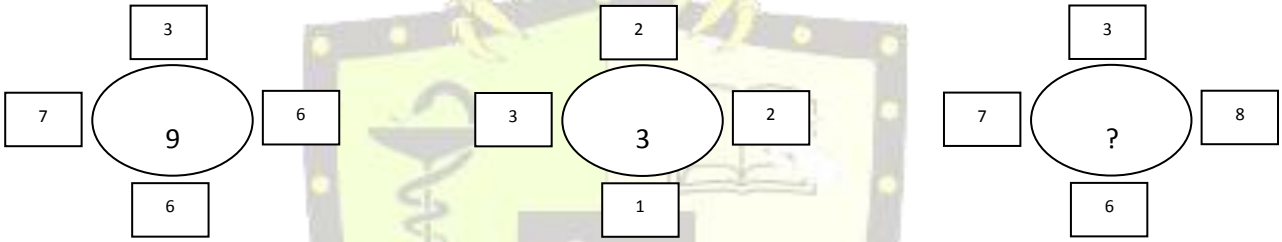

(a) 7 (b) 6 (c) 3 (d) 8

Q2.



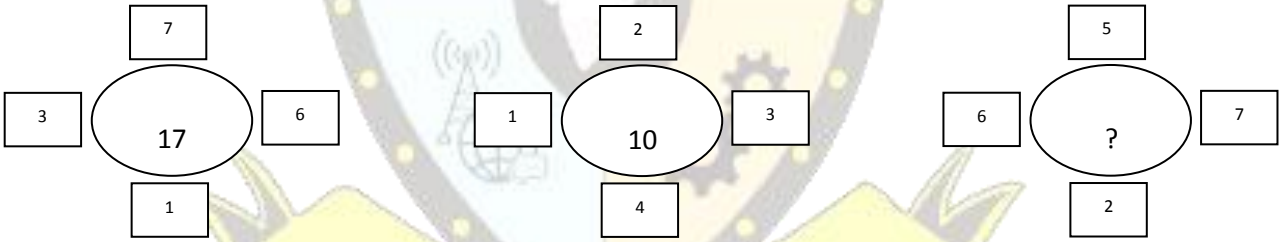

(a) 7 (b) 6 (c) 5 (d) 8

Q3.



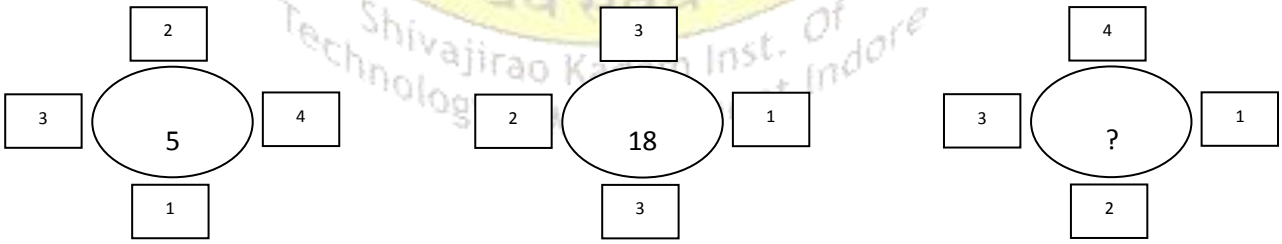

(a) 9 (b) 8 (c) 7 (d) 11

Q4.



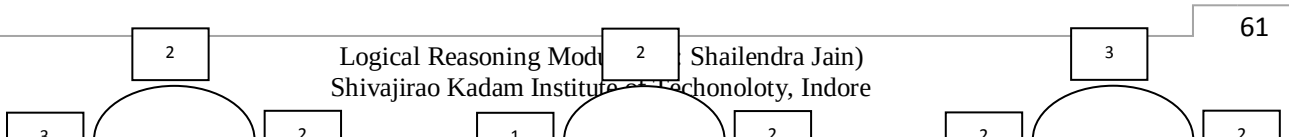

(a) 18 (b) 15 (c) 17 (d) 20

Q5.



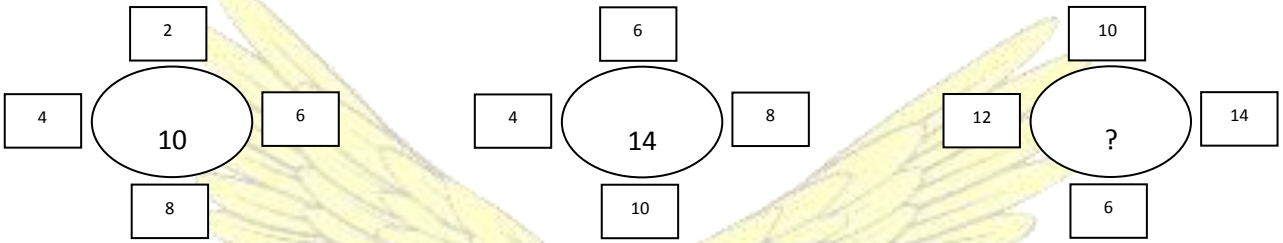

(a) 20 (b) 22 (c) 16 (d) 28

Q6.



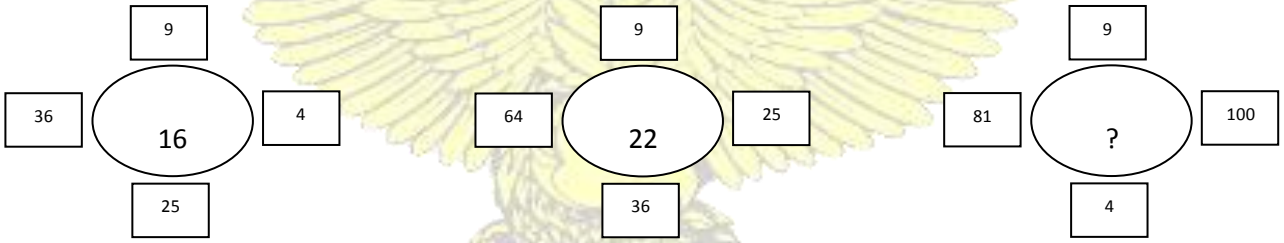
(a) 18 (b) 12 (c) 19 (d) 20

Q7.



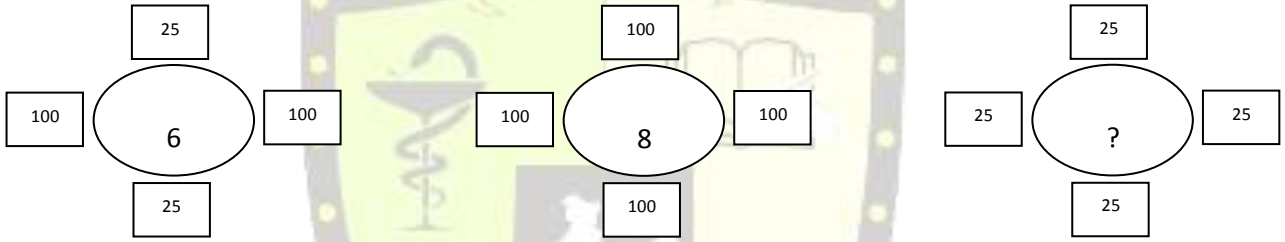

(a) 20 (b) 22 (c) 25 (d) 21

Q8.



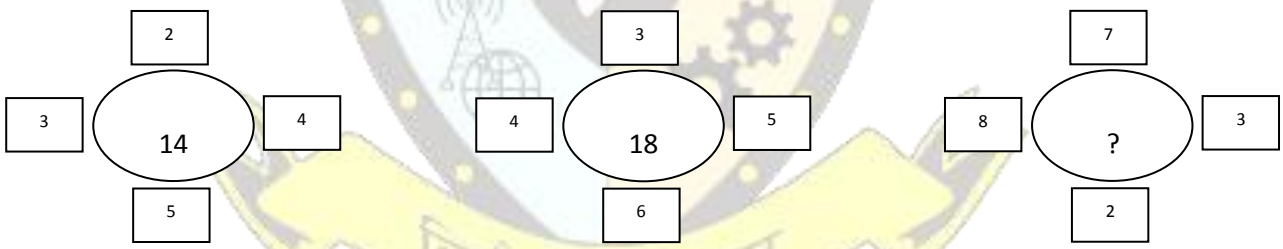

(a) 21 (b) 24 (c) 22 (d) 23

Q9.




(a) 3 (b) 2 (c) 4 (d) 6

Q10.




(a) 24 (b) 22 (c) 26 (d) 20

(a) (b) (c) (d)

Q11.

| | | |
|---|---|---|
| 6 | 0 | 6 |
| 2 | 6 | 7 |
| 1 | 8 | 3 |
| 41 | 100 | ? |

(a) 94 (b) 76 (c) 16 (d) 73

Q12.

| | | |
|---|---|---|
| 3 | 15 | 4 |
| 7 | 38 | 5 |
| 3 | ? | 5 |

(a) 15 (b) 19 (c) 20 (d) 18

**Directions (Q13-15):** Carefully observe the first two solutions; find out the rule and find the answer for the third set of figures.

Q13. If 12 x 6 x 5 = 18, 10 x 7 x 8 = 46, then 13 x 9 x 9 = ?

(a) 67 (b) 68 (c) 69 (d) 70

Q14. If 5 x 5 x 15 = 40, 14 x 6 x 16 = 100, then 17 x 18 x 11 = ?

(a) 317 (b) 318 (c) 319 (d) 320

Q15. If 20 + 19 + 25 = 14, 25 + 33 +18 = 40, then 33 + 12 +24 = ?

(a) 21 (b) 22 (c) 23 (d) 24

# 7. Calendars

"The Solar Year consists of 365 days 5 hrs. 48 minute 48 seconds. In the Calendar known as the Julian calendar arranged in B.C. 47 by Julius Caesar, the year was taken as being of 365¼ days, and in order to get rid of the odd quarter of a day, an extra or intercalary day was added once in every fourth year and this was called Bissextile or Leap year. The Calendar so arranged is known as the Old Style, and is now used only in Russia." But as the Solar Year is 11 minutes 12 seconds less than a quarter of a day it followed in course of year that the Julian calendar became inaccurate by several days, and in 1582 this difference amounted to 10 days.

Pope Gregory XIII determined to rectify this, and devised the Calendar now known as the Gregorian calendar. He dropped or cancelled these 10 days October 5th being called October 15th and made centurial years leap years only once in 4 centuries; so that whilst *1700, 1800 and 1900 were to be ordinary years, 2000 would be a leap year*. This modification brought the Gregorian system into such close exactitude with the solar year that there is only a difference of 26 seconds, which amounts to a day in 3323 years. This is the New Style. It was ordered by Act of Parliament to be adopted in England in 1752-170 years after its formation - and is now used throughout the civilised world with the single exception already named. The difference between the two styles will remain 13 days until A.D. 2100. In India, Vikrami and a number of other calendars were being used till recently. In 1952, committee was appointed to examine the different calendars and suggest an accurate and uniform calendar for the whole of India. On the basis of its report, the Government adopted the National Calendar based on Saka era with Chaitra as its first month. The days of this Calendar have permanent correspondence with the day of the Gregorian calendar, Chaitra 1 falling on March 22 in an ordinary year and March 21 in a leap year. Now both Saka and Gregorian Calendars are used for official purposes.

## 12.3 Calendars

### 12.3.1 Finding the Day of a Date in the Calendar

If the day on 1st May and 1 March was Tuesday, then what will be the day on 1 April?

How are you going to solve this problem?

If we approach in the simplest manner, 1 March being Tuesday, 2 March will be Wednesday, and so on; then 1 April will be Friday.

If we take an alternative approach, we know that there is a gap of 31 days between 1 March and 1 April.

Extra days or odd days, $E = 31 \bmod 7 = 3$ [On dividing 31 by 7, remainder is 3]

Third day from Tuesday will be Friday. Hence, 1 April will be Friday. The following facts should be kept in mind while solving problems of calendars:

1. In an ordinary year there are 365 days, that is, 52 weeks + 1 day.
   Therefore, an ordinary year contains 1 odd day.
2. A leap year contains two odd days.
3. 100 years = 76 ordinary years + 24 leap years
   = a number of week + $(76 + 2 \times 24)$ days
   = a number of weeks + 7 weeks + 5 days
   So, 100 years contain 5 odd days.
4. 200 years contain 3 odd days.
5. 300 years contain 1 odd day.
6. 400 years contain no odd day.
7. 1 January, A.D. 1, was Monday. Therefore, the days can be described as following:
   Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3, and so on.
8. February consists of 29 days in a leap year.
9. Months having 31 days are as follows:
   January, March, May, July, August, October and December have 3 extra days. ($E = 3$)
10. Months having 30 days are as follows:
    April, June, September and November have 2 extra days ($E = 2$)

11. February having 29 days in a leap year consists of 1 extra day; i.e., ($E = 1$). February in a non-leap year consists of no extra day; i.e., ($E = 0$).

If we write the problem-solving approach in a stepwise manner,

**Step-1**: Two cases arise when day on a certain date is asked.

**Case-I:** When a reference date is given.

**Example 7:** If 26 January, 2014 was a Sunday. Then what day of the week was 15 August, 2014?

In such cases, we need to count the extra days.

Extra days in January (27th – 31th) = 5; February = 0; March = 31 mod 7 = 3; April = 30 mod 7 = 2; May = 31 mod 7 = 3; June = 30 mod 7 = 2; July = 31 mod 7 = 3; August (till 15th) = 15 mod 7 = 1

So, total extra days = 5 + 0 + 3 + 2 + 3 + 2 + 3 + 1 = 19;

Overall extra days = 19 mod 7 = 5

Hence, 15th August, 2014 will be Friday (5 days after Sunday).

**Case-II:** When a reference date is not given.

**Example 8:** What was the day on 2 January 2001?

In such a case, 1 January A.D. 1 is considered to be the reference date, which was a Monday.

**Step-2**: The two dates can be written as:

$d_1\ m_1\ y_1$ $\quad$ $d_2\ m_2\ y_2$ $\quad$ ($\text{date}_1$ occurs before $\text{date}_2$)

$\text{date}_1$ $\quad$ $\text{date}_2$

Reach from $\text{date}_1$ to $\text{date}_2$ and count value of variable $E$.

**Step-3**: i) Cover years

ii) Cover months

iii) Cover days

**Table 4**

| | | i | ii | iii |
|---|---|---|---|---|
| Case-i: | $m_1 < m_2\ d_1 < d_2$ | Reach $d_1\ m_1\ y_2$ | Reach $d_1\ m_2\ y_2$ | Reach $d_2\ m_2\ y_2$ |
| Case-ii: | $m_1 < m_2\ d_1 > d_2$ | $m_1 < m_2\ d_1 > d_2$ | Reach $d_1\ (m_{2-1})\ y_2$ | Reach $d_2\ m_2\ y_2$ |
| Case-iii: | $m_1 > m_2\ d_1 < d_2$ | Reach $d_1\ m_1 (y_{2-1})$ | Reach $d_1\ m_2\ y_2$ | Reach $d_2\ m_2\ y_2$ |
| Case-iv: | $m_1 > m_2\ d_1 > d_2$ | $m_1 > m_2\ d_1 > d_2$ | Reach $d_1\ (m_{2-1})\ y_2$ | Reach $d_2\ m_2\ y_2$ |

**Solution:** 1 January A.D. 1 = Monday, so 1 January 401 = Monday (400 years have no extra days)

1 January 801 = Monday, 1 January 1201 = Monday

1 January 1601 = Monday, 1 January 2001 = Monday

1 January 2001 = Monday,

Hence, 2 January 2001 = Tuesday.

## *Important Points to Remember*

Conditions for a year to be a leap year divisible by 4 → Yes

Conditions for a year to be a leap year divisible by 4 and 100 → No

Conditions for a year to be a leap year divisible by 4, 100 and 400 → Yes
Maximum time between birthdays = 8 Years
Minimum time between birthdays = 365 days

**Example 9:** Today is Sunday. The day after 71 days will be:

1. Sunday 2. Monday 3. Tuesday 4. Friday

**Solution:** Extra days, $E = 71$; $E \bmod 7 = 71 \bmod 7 = 1$ So, after 71 days it will be Monday.

**Example 10:** What was the day of the week on 28 May 2007?

**Solution:** Here, no reference date is given, if we take 1 January A.D. 1 as reference date.

| | $date_1$ | $date_2$ |
|---|---|---|
| | 01/01/0001 | 28/05/2007 |
| | Monday | ? |
| Till | 01/01/2001, | no extra day, $E = 0$ |
| Till | 01/01/2007, | 5 ordinary years + 1 leap year |
| | | $E = 5 + 2 = 7$ |
| Till | 01/05/2007, | $E = 7 + 3 + 0 + 3 + 2 = 15$ |
| Till | 28/05/2007, | $E = 15 + 27 = 42$ |
| | | $E \bmod 7 = 42 \bmod 7 = 0$ |

So, 28 May 2007 will be six days after Monday, i.e., Monday.

**Example 11:** If 23 June 2006 was Friday, what will be the day of the week on 22 December, 2012?

**Solution:** Here, a reference date is given as following:

| | $date_1$ | | $date_2$ |
|---|---|---|---|
| | 23/06/2006 | | 22/12/2012 |
| Till | 23/06/2006 | → | Friday |
| Till | 23/06/2012 | → | 4 ordinary years + 2 leap years |
| | | | $E = 4 + 4 = 8$ |
| Till | 23/11/2012 | → | $E = 8 + 2 + 3 + 3 + 2 + 3$ |
| | | | $E = 21$ |
| Till | 22/12/2012 | → | $E = 21 + 29$ |

From 23 November to 21 December
$E = 50$
$E \bmod 7 = 50 \bmod 7 = 1$
So, 22 December 2012 will be Saturday.

**Example 12:** If 30 December 2012 is Sunday, what was the day on 12 March 1997?

**Solution:**

| | $date_1$ | | $date_2$ |
|---|---|---|---|
| | 12/03/1997 | | 30/12/2012 |
| Till | 12/03/2012 | → | 11 ordinary years + 4 leap years |
| | | | $E = 11 + 8 = 19$ |

Till 12/12/2012 → 19 + 3 + 2 + 3 + 2 + 3 + 3 + 2 + 3 + 2 = 42
Till 30/12/2012 → $E$ = 42 + 18
= 60

$E$ mod 7 = 60 mod 7 = 4

So, 30 December 2012 is four days ahead of 12 March 1997 or 12 March 1997 is 4 days behind 30 December 2012.

So, 12 March 1997 will be Wednesday.

**Example 13:** Which calendar year is exactly the same as year 1998.

**1.** 2000 **2.** 2002 **3.** 2004 **4.** none of these

**Solution:** From 1998 to 2000 → 2 ordinary years $E$ = 2

From 1998 to 2002 → 3 ordinary years + 1 leap year

$E$ = 3 + 2 = 5

From 1998 to 2004 → 5 ordinary years + 1 leap year

$E$ = 5 + 2 = 7

From 1998 to 2003 → 4 ordinary years + 1 leap year

$E$ = 4 + 2 = 6

For option 3, $E$ mod 7 is equal to 0. So, it seems that calendar of 2004 will be identical to calendar of 1998, but it is not true. Because 2004 is a leap year and 1998 is a non-leap year. Their calendars will be identical only for first two months, but not after that. As a practice, you can check the same in actual calendars. **Ans** 4

**Example 14:** The first Thursday of October 1994 falls on:

**1.** 3 October 1994 **2.** 4 October 1994 **3.** 5 October 1994 **4.** 6 October 1994

**Solution:** If we first find day of week on 1 October 1994:

| | $date_1$ | | $date_2$ |
|---|---|---|---|
| | 01/01/0001 | | 01/10/1994 |
| | Monday | | ? |
| Till | 01/01/1901 | → | 1600 years + 300 years |
| | | | $E$ = 0 + 1 = 1 |
| Till | 01/01/1994 | → | 70 ordinary years + 23 leap years |
| | | | $E$ = 1 + 70 + 46 = 117 |
| Till | 01/10/1994 | → | $E$ = 117 + 3 + 0 + 3 + 2 + 3 + 2 + 3 + 3 + 2 |
| | | | $E$ = 138 |

$E$ mod 7 = 138 mod 7 = 5

So, 1 October 1994 will be Saturday. First Thursday will come five days after Saturday, i.e., on 6 October 1994. **Ans** 4

**Example 15:** The maximum difference between a person's two consecutive birthdays is?

**1.** 1 year **2.** 4 years **3.** 8 years **4.** 16 years

**Solution:** If a person's birthday falls on 29 February his birthday will come after every 4 years. So, initially it might seem that the answer is 4 years. But, sometimes the difference between two leap years could be 8 years. A year divisible by 4 is leap year, but if it is divisible by both 4 and 100, it is non-leap; e.g., 1900, 1800, etc. So, if a person had a birthday on 29 February 1796, then his next birthday will fall on 29 February 1804. So, the maximum difference between two consecutive birthdays can be 8 years. **Ans** 3

**Examples:**

1. Curious Elva asked her father what he would gift for her nineteenth birthday. Father replied that it would depend on the day of the week and be one of SUNglasses, MONeybag, ..., FRIedcake, and SATchel. Please help Elva find the day of the week on 08-Jan-2029.
   a. Monday b. Tuesday c. Thursday d. Saturday

Solution:

Number of odd days upto 2000 = 0
From 2001 to 2028 = 28 + 7 = 35 = 0 (∵ 35/7 remainder zero)
From 2019 January 1 to 7 = 7 = 0
So, 08 - Jan - 2029 falls on the same week day as 1-1-1 which is Monday.
**Answer:** a. Monday

2. In 2003, there are 28 days in February and there are 365 days in the year. In 2004, there are 29 days in February and there are 366 days in the year. If the date March 11, 2003 is Tuesday, then which one of the following would the date March 11, 2004 be?
   a. Monday b. Thursday c. Wednesday d. Tuesday

Solution:

March 11, 2003 is Tuesday. So March 11, 2004 weekday will be 2 days after Tuesday. i.e. Thursday.

**Answer:** b. Thursday

3. In a particular year, the month of January had exactly 4 Thursdays, and 4 Sundays. On which day of the week did January 1st occur in the year
   a. Monday b. Tuesday c. Wednesday d. Thursday

Solution:

If a month has 31 days, and it starts with Sunday, Then Sundays, Mondays, Tuesdays are 5 for that month. If this month starts with Monday, then Mondays, Tuesdays, and Wednesdays are 5 and remaining days are 4 each. So, this month starts with Monday.

**Answer:** a. Monday

**Solving Calendar-problems using Shortcut Codes:**

In this type of problem, a particular date is given, and one is required to find the day of the given date. One can use the following shortcut codes to years, months and day:

Year Codes:

| **Year** | 1500-1599 | 1600-1699 | 1700-1799 | 1800-1899 | 1900-1999 | 2000-2099 | 2100-2199 | 2200-2299 |
|---|---|---|---|---|---|---|---|---|
| **Code** | 0 | 6 | 4 | 2 | 0 | 6 | 4 | 2 |

Extending the same pattern (**0-6-4-2**) forward or backward, one can find the year code.

Month Codes:

| Month | Code | Trick to Remember | |
|---|---|---|---|
| January | 1 | $144 = (12)^2$ | Part-1 |
| February | 4 | | |
| March | 4 | | |
| April | 0 | $025 = (5)^2$ | Part-2 |
| May | 2 | | |
| June | 5 | | |
| July | 0 | $036 = (6)^2$ | Part-3 |
| August | 3 | | |
| September | 6 | | |
| October | 1 | $146 = (12)^2 + 2$ | Part-4 |
| November | 4 | | |
| December | 6 | | |

Day Codes:

| Remainder | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Day | Sun | Mon | Tue | Wed | Thu | Fri | Sat |

$$\text{Required Day} = \frac{\text{Date + Month Code + (Last 2 digits} - 1\text{) + Leap years + Year code}}{7}$$

Example: Using Shortcut Codes, Find the day on 01-Jan-2016.

Step-1: Take the day number of the given date. Here in this example it is 01.

Step-2: Take the month code of the given month from the above table, i.e. January code is 1.

Step-3: Subtract 1 from the given year, i.e. 16 – 1 = 15.

Step-4: Count how many leap years are there in 15, i.e. divide 15 by 4 and consider the quotient 15/4 =3 (quotient)

Step-5: Take the year code of the given year, i.e. code for 2016 = 6 (Since 2000-2099 has the code as 6)

Step-6: Ad the values from step-1 to step-5 and divide the result by 7 and find the remainder.

Required Day = (01+1+15+3+6)/7 = 26/7 = 5 (quotient).

Based on the remainder obtained, the day of the given date can be determined from the day code. Here it is Friday

## 7.1 Calendars (Class Work)

1. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?
   (a) Sun (b) Sat (c) Fri (d) Wed
2. What was the day of the week on 28th May, 2006?
   (a) Thu (b) Fri (c) Sat (d) Sun
3. What was the day of the week on 17th June, 1998?
   (a) Mon (b) Tue (c) Wed (d) Thu
4. What will be the day of the week 15th August, 2010?
   (a) Sun (b) Mon (c) Tue (d) Fri
5. Today is Monday. After 61 days, it will be:
   (a) Wed (b) Sat (c) Tue (d) Thu
6. If 6th March, 2005 is Monday, what was the day of the week on 6th March, 2004?
   (a) Sun (b) Sat (c) Tue (d) Wed
7. On what dates of April, 2001 did Wednesday fall?
   (a) 1-8-15-22-29 (b) 2-9-16-23-30 (c) 3-10-17-24 (d) 4-11-18-25
8. How many days are there in x weeks x days?
   (a) 7.x.x (b) 8.x (c) 14.x (d) 7
9. The last day of a century cannot be
   (a) Mon (b) Wed (c) Tue (d) Fri
10. On 8th Feb, 2005 it was Tuesday. What was the day of the week on 8th Feb, 2004?
    (a) Tue (b) Mon (c) Wed (d) Sun
11. The calendar for the year 2007 will be the same for the year:
    (a) 2014 (b) 2016 (c) 2017 (d) 2018
12. Which of the following is not a leap year?
    (a) 700 (b) 800 (c) 1200 (d) 2000
13. On 8th Dec, 2007 Saturday falls. What day of the week was it on 8th Dec, 2006?
    (a) Sun (b) Thu (c) Tue (d) Fri
14. January 1, 2008 is Tuesday. What day of the week lies on Jan 1, 2009?
    (a) Mon (b) Wed (c) Thu (d) Sun
15. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?
    (a) Mon (b) Tue (c) Wed (d) Sun
16. What was the day of the week on 24th July 2011?
    (a) Mon (b) Sun (c) Fri (d) None of these
17. What was day of the week on 21-September-1987?
    (a) Sun (b) Mon (c) Fri (d) Sat
18. What was the day of the week on 26-January-1950?
    (a) Sun (b) Mon (c) Wed (d) Thu
19. Today is Monday, after 61 days, the day will be:
    (a) Wed (b) Sat (c) Tue (d) Thu
20. Today is Friday, after 126 days, it will be:
    (a) Sun (b) Tue (c) Fri (d) Mon

## 7.2 Calendars (Home Assignment)

1. Find the number of odd days in 164 days.
   (a) 2 (b) 1 (c) 3 (d) None of these
2. How many days are there from 3rd Jan to 23rd March (both inclusive) in an ordinary year.
   (a) 80 (b) 81 (c) 82 (d) 83
3. Today is Wednesday, after 65 days it will be
   (a) Thursday (b) Sunday (c) Friday (d) Saturday
4. It was Monday on 3rd January 1994. What day of the week it will be on January 3rd, 1995?
   (a) Monday (b) Tuesday (c) Wednesday (d) Sunday
5. February 9th 1932 was Tuesday. What was the day of the week on 11th June 1932?
   (a) Sunday (b) Monday (c) Tuesday (d) Saturday
6. September 15th 1943 was Wednesday. What was the day of the week on 19th September 1944?
   (a) Tuesday (b) Wednesday (c) Thursday (d) Friday
7. The year next to 1989, having the same calendar as that of 1989 is ….?
   (a) 1991 (b) 1992 (c) 1995 (d) 1999
8. Find the day of the week on 27th March 1967?
   (a) Sunday (b) Monday (c) Tuesday (d) Wednesday
9. If 1st January of year 2004 is Thursday, then 17th July 2004 will be
   (a) Thursday (b) Wednesday (c) Saturday (d) Sunday
10. If 15th August 1947 was Friday then 26th January 1950 was
    (a) Saturday (b) Thursday (c) Wednesday (d) Sunday
11. If instead of every fourth year, every third year is a leap year what day will it be on 1st January 2020, if year 2013 is a leap year and 1st January 2013 is Friday
    (a) Monday (b) Tuesday (c) Wednesday (d) Thursday
12. If 3rd July 2006 is Monday then 1st July 2001 will be
    (a) Tuesday (b) Monday (c) Sunday (d) Friday
13. Calendar of 1993 is same as for
    (a) 1998 (b) 1999 (c) 2000 (d) 1997
14. In a particular year, the month of January had exactly 4 Thursdays and 4 Sundays. On which day of the week did January 1st occur in the year.
    (a) Monday (b) Tuesday (c) Wednesday (d) Thursday
15. How many months contain 29 days in 400 consecutive years?
    (a) 97 (b) 100 (c) 4700 (d) 4497
16. Which of the following is not a leap year?
    (a) 1600 (b) 1700 (c) 2000 (d) 2400
17. If the 7th day of a month is three days earlier than Friday, what day will be on the 30th day of the month?
    (a) Sunday (b) Monday (c) Thursday (d) Friday
18. At the end of 1994, Rahul was half as old as his grand-mother. The sum of the years in which they were born is 3844. How old Rahul was at the end of 1999?
    (a) 48 (b) 55 (c) 49 (d) 53
19. My sister is 562 days older to me, while my brother is 75 weeks older to her. If my brother was born on a Tuesday, on which day was I born?
    (a) Sunday (b) Thursday (c) Tuesday (d) Friday
20. What was the day of the week on 28th May, 2006?
    (a) Thursday (b) Friday (c) Saturday (d) Sunday

### 8.1 Statements & Arguments (Class Work)

1. The Census Bureau reported that the median family income, after adjustment, increased 1.6 percent in 2007. Poverty normally declines when family income goes up, but the national poverty rate remained at its highest level in eighteen years in 2007. The Census Bureau offered two possible explanations: the lingering effects of the deep and lengthy 2005-2006 recession, and increases in the number of adults not living with any relatives. Both groups are likely to be poorer than the population as a whole.

   Which of the following conclusions can be properly drawn from this report?

(a) The national poverty rate has increased steadily over the last eighteen years.

(b) The national poverty rate will increase when there are lingering effects of an earlier recession.

(c) The median family income can increase even though the family income of some subgroups within the population declines of fails to increase.

(d) The category of adults not living with any relatives is the most critical group in the determination of whether the economy has improved.

(e) The median family income is affected more by changes in family patterns than by the extent of expansion or recession of the national economy.

2. Literary historians today have rejected conventional analyses of the development of English Renaissance dram. They no longer accepts the idea that the sudden achievement of Elizabethan playwrights was a historical anomaly, a sort of magical rediscovery of ancient Greek dramatic form applied to contemporary English subject matter. Instead, most students of the theater now view Elizabethan drama as being organically related to traditional local drama, particularly medieval morality plays.

   Which of the following is NOT consistent with the passage above?

(a) England had a dramatic tradition before the Renaissance period.

(b) Elizabethan drama, once thought to be a sudden blossoming forth of creativity, is now seen as part of a historical continuum.

(c) Historians' views of the antecedents of English renaissance drama have changed considerably.

(d) Current scholarship applied an evolutionary model to English Renaissance drama.

(e) Although English Renaissance drama treats English subject matter, its source of form and method is classical Greek drama.

3. A study of illusionistic painting inevitably begins with the Greek painter Zeuxis. In an early work, which is the basis for his fame, he painted a bowl of grapes that was so lifelike that birds pecked at the fruit. In an attempt to expand his achievement to encompass human figures, he painted a boy carrying a bunch of grapes. When birds immediately came to peck at the fruit, Zeuxis judged that he had failed.

   Zeuxis' judgment that he had failed in his later work was based on an assumption. Which of the following can have served as that assumption?

(a) People are more easily fooled by illusionistic techniques than are birds.

(b) The use of illusionistic techniques in painting had become commonplace by the time Zeuxis had completed his later work.

(c) The grapes in the later painting were even more realistic than the ones in the earlier work.

(d) Birds are less likely to peck at fruit when they see that a human being is present.

(e) After the success of his early work, Zeuxis was unable to live up to the expectations of the general public.

4. It is important to use computers effectively. Therefore, students should be taught computer programming in school.

Which of the following, if true, most weakens the argument above?

(a) Only people who use computers effectively are skilled at computer programming.

(b) Only people skilled at computer programming use computers effectively.

(c) Some people who used computers effectively cannot write computer programs.

(d) Some schools teach computer programming more effectively than others.

(e) Most people who are able to program computers use computers effectively.

5. Excessive amounts of mercury in drinking water, associated with certain types of industrial pollution, have been shown to cause Hobson's disease. Island Q has an economy based entirely on subsistence-level agriculture; modern industry of any kind is unknown. The inhabitants of Island Q have an unusually high incidence of Hobson's disease.

Which of the following can be validly inferred from the above statements?

I. Mercury in drinking water is actually perfectly safe.

II. Mercury in drinking water must have sources other than industrial pollution.

III. Hobson's disease must have causes other than Mercury in drinking water.

(a) II only (b) III only

(c) I & II only (d) I & III only

(e) II & III only

6. Those who oppose the new water project claim to have the best interest of this community at heart. Yet they are the same people who, only three years ago, opposed the building of the new state highway, which now provides half a million commuters with fast, easy motoring every day. What could be a better argument in favor of the water project?

Which of the following statements is most like the argument above?

(a) Those who oppose nuclear power are unable or simply unwilling to recognize the fact that the nuclear energy industry has a safety record unparalleled by that of any other industry.

(b) The new gun control law is misguided and dangerous proposal, which has been denounced by every sportsman's club and gun-owner's association in the state.

(c) We must fight the proposed anti-pornography statute, for its principal sponsors have voted against every major piece of women's rights legislation introduced in the last twenty years.

(d) The polls show that over 60% of the concerned parents in the state favor the school bond issue; cast your vote with the concerned majority on Election Day.

(e) The so-called tax reform bill now before the state senate must be defeated; its only true beneficiaries would be the wealthy corporations, which already pay too little in taxes.

7. Ram: I want to stay out of Professor Sharma's classes if I can. I've heard she's very strict when it comes to giving out the grades.

   Sam: That's not true. My friend Monu took her class year, and she gave him an A.

   From the conversation above, it can be inferred that Sam interpreted Ram's statement to mean the Professor Sharma

(a) makes unfair demands on her students

(b) only gives good grades to a few favored students

(c) has become increasingly strict in her grading over the past year

(d) gives out fewer good grades than most teachers in the department

(e) never gives out grades of A

8. The nursing shortage in this country is a phony one, caused by the concentration of nurses in the geographical regions with the highest paid and most generous fringe benefits for nurses. In addition, the League of American Nurses has artificially worsened the shortage by encouraging nursing schools to keep enrollments low in order to boost nurses' salaries to even higher levels.

   All of the following statements, if true, would tend to WEAKEN the argument above except:

(a) Although nurses are paid less in Texas than in Connecticut, there are 35% more nurses in Texas than in Connecticut.

(b) Nationwide, the salaries of nurses have risen at a slower rate than inflation over the last ten years.

(c) The number of students who earned degrees in nursing last year was almost double the number six years ago.

(d) Those areas of the country with the highest pay for nurses also have correspondingly higher living costs.

(e) The League of American Nurses has almost no influence on the policies of American nursing schools.

**Direction (9 & 10):** Read the following passage and answer the questions.

In a laboratory study, 160 rabbits in an experimental group were injected with Serum D, while 160 rabbits in a control group were injected with a harmless sugar solution. Within two weeks, 39% of the experimental group rabbits had contracted jungle fever, a highly contagious and usually fatal disease. Therefore, jungle fever must be caused by some substance similar to the substances found in Serum D.

9. The above argument would be most greatly strengthened if it were shown that

(a) The normal rate of jungle fever among rabbits is less than 0.01%

(b) 40% of the rabbits in the control group had also contracted jungle fever within two weeks

(c) Serum D contains substances extracted from the root of a certain poisonous jungle wildflower

(d) The blood of jungle fever victims invariably contains a high level of a certain toxic substance also found in Serum D

(e) Nearly all the rabbits who contracted jungle fever died within two days of the appearance of the first symptoms

10. The above argument would be most seriously weakened if it were shown that

(a) None of the substances in Serum D occurs naturally in the habitats of most species of rabbit

(b) The rabbits in the experimental group had been kept strictly isolated from one another

(c) Jungle fever is usually found only among victims of the bite of the South American Lesser Hooded Viper.

(d) The scientists administering the injections were unaware of the contents of the solutions they were using

One of the rabbits in the experimental group had had jungle fever prior to the start of the experiment

## 9. Symbol-based Operations (Class Work)

1. It being given that: > denotes +, < denotes - , + denotes ÷, - denotes =, = denotes 'less than' and x denotes 'greater than', find which of the following is a correct statement.

   (a) 3 + 2 > 4 = 9 + 3 < 2 (b) 3 > 2 > 4 = 18 + 3 < 1 (c) 3 > 2 < 4 x 8 + 4 < 2 (d) 3 + 2 < 4 x 9 + 3 < 3

2. If + means 'divided by', - means 'added to', x means 'subtracted from' and ÷ means multiplied by, then what is the value of 24 ÷ 12 – 18 + 9?

   (a) - 25 (b) 0.72 (c) 15.30 (d) 290

3. If $ means +, # means –, @ means x and * means ÷, then what is the value of 16 $ 4 @ # 72 * 8?

   (a) 25 (b) 27 (c) 29 (d) 36

4. If ÷ means x, x means +, + means – and – means ÷, find the value of 12 + 6 ÷ 3 – 2 x 8 =?

   (a) 9 (b) 10 (c) 19 (d) none of these

5. If + means 'divided by' – means 'add', x means 'minus' and / means 'multiplied by', what will be the value of the following expression [{(17 x 12) – (4/2)} + (23 – 60]/0

   (a) Infinite (b) 0 (c) 118 (d) 219

6. If Q means 'add to', J means 'multiply by', T means 'subtract from' and K means 'divide by', then 30 K 2 Q 3 J 6 T 5 = ?

   (a) 18 (b) 28 (c) 31 (d) 103

7. If P means 'division', T means 'addition', M means 'subtraction' and D means 'multiplication', then what will be the value of the expression 12 M 12 D 28 P 7 T 15?

   (a) – 30 (b) – 15 (c) 15 (d) none of these

8. If 'when' means x, 'you' means ÷, 'come' means – and 'will' means +, then what will be the value of "8 when 12 will 16 you 2 come 10"?

   (a) 45 (b) 94 (c) 96 (d) 112

   **Directions (9-12): Answer the questions based on the following information-**

   In an imaginary language, the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 are substituted by *a, b, c, d, e, f, g, h, i* and *j*. And 10 is written as *ba*.

9. (*cd + ef) x bc* is equal to

   (a) 684 (b) 816 (c) 14 (d) 16

10. *dc x f* – (*bf* – *d*) *x d* is equal to

    (a) abb (b) abe (c) bce (d) bcf

11. *baf* ÷ *bf x d* is equal to

    (a) df (b) cb (c) be (d) d

12. *bee + fg – (ca x h/be)* is equal to

(a) bhc (b) bic (c) bib (d) bja

**Directions (13-14):** In each of the following questions, some symbols are represented by letters as shown below-

| + | – | x | ÷ | = | > | < |
|---|---|---|---|---|---|---|
| B | G | E | C | D | A | F |

Now, identify the correct expression in each case.

13. (a) 18 C 3 D 6 B 8 C 4 G 12 (b) 18 A 3 E 3 B 8 G 4 B 12 (c) 18 C 3 G 6 B 8 B 4 D 12 (d) 18 F 3 B 6 E 8 G 4 E 12

14. (a) 15 B 5 G 8 B 4 G 6 F 3 (b) 15 C 15 B 8 F 4 B 6 C 3 (c) 15 A 5 E 8 C 4 B 6 E 3 (d) 15 C 5 F 8 C 4 B 6 C 3

15. If the given interchanges namely: signs + and ÷ numbers 2 and 4 are made in signs and numbers, which one of the following four equations would be correct?

(a) 2 + 4 ÷ 3 = 3 (b) 4 + 2 ÷ 6 = 1.5 (c) 4 ÷ 2 + 3 = 4 (d) 2 + 4 ÷ 6 = 8

16. Which of the four interchanges in signs and numbers would make the given equation (3 + 5 – 2 = 4) correct?

(a) + and –, 2 and 3 (b) + and – , 2 and 5 (c) + and –, 3 and 5 (d) none of these

**Directions (17-20):** In each of the following questions, which one of the four interchange in signs and numbers would make the given equation correct?

17. 6 x 4 + 2 = 16

(a) + and x, 2 and 4 (b) + and x, 2 and 6 (c) + and x, 4 and 6 (d) none of these

18. (3 ÷ 4) + 2 = 2

(a) + and ÷, 2 and 3 (b) + and ÷, 2 and 4

(c) + and ÷, 3 and 4 (d) no interchange, 3 and 4

19. 4 x 6 – 2 = 14

(a) x to ÷, 2 and 4 (b) – to ÷ , 2 and 6 (c) – to +, 2 and 6 (d) x to +, 4 and 6

20. (6 ÷ 2) x 3 = 0

(a) ÷ and x, 2 and 3 (b) x to –, 2 and 6 (c) ÷ and x, 2 and 6 (d) x to –, 2 and 3

21. If A + B > C + D and B + C > A + D, then it is definite that

(a) D > B (b) C > D (c) A > D (d) B > D

22. If A + D = B + C, A + E = C + D, 2C < A + E and 2A > B + D, then

(a) A > B > C > D > E (b) B > A > D > C > E (c) D > B > C > A > E (d) B > C > D > E > A

23. If A + B = C + D, B + D = 2A, D + E > A + B, C + D > A + E, then

(a) A > B > D > E > C (b) A > D > B > E > C (c) D > A > B > E > C (d) D > B > E > A > C

24. If A + B = C + D and A + D > B + C, then which one of the following is definitely wrong?

(a) A > B (b) A > C (c) C > D (d) B > D

25. If A + B = 2C and C + D = 2A, then

(a) A + C = B + D (b) A + C = 2D (c) A + D = B + C (d) A + C = 2B

**Directions (26-30):** In the following questions, the symbols @, ©, %, * and $ are used with the following meanings as illustrated below:
I. P @ Q means 'P is either greater than or equal to Q';
II. P © Q means 'P is either smaller than or equal to Q';
III. P % Q means 'P is greater than Q';
IV. P * Q means 'P is smaller than Q';
V. P $ Q means 'P is neither greater than nor smaller than Q'.
Now in each of the following questions, assuming the given statements to be true, find which of the two conclusions I and II given below them is/are definitely true?

Give answer (a) if only conclusion I is true; (b) if only conclusion II is true; (c) if either conclusion I or II is true; (d) if neither I nor II is true; and (e) if both conclusions I and II are true.

26. Statement: M@ R, R% T, T $ K Conclusions: I. K * M II. T * M

27. Statement: H % J, B © J, B @ F Conclusions: I. F $ J II. J % F

28. Statement: D $ M, M % W, W @ R Conclusions: I. R * D II. W © D

29. Statement: A @ N, N * V, V $ J Conclusions: I. J @ N II. A © V

30. Statement: K * T, T @ B, B © M Conclusions: I. M % T II. K © B

Arrange the following in a logical order:

31. 1. Birth 2. Death 3. Funeral 4. Marriage 5. Education

(a) 1, 3, 4, 5, 2 (b) 1, 5, 4, 2, 3 (c) 2, 3, 4, 5, 1 (d) 4, 5, 3, 1, 2

32. 1. Shoulder 2. Wrist 3. Elbow 4. Palm 5. Finger

(a) 2, 4, 5, 3, 1 (b) 3, 1, 4, 2, 5 (c) 3, 4, 5, 2, 1 (d) 5, 4, 2, 3, 1

33. 1. Bungalow 2. Flat 3. Cottage 4. House 5. Palace 6. Mansion

(a) 3, 2, 1, 6, 4, 5 (b) 3, 2, 4, 1, 5, 6 (c) 3, 2, 4, 1, 6, 5 (d) 5, 6, 4, 1, 2, 3

34. 1. Euphoria 2. Happiness 3. Ambivalence 4. Ecstasy 5. Pleasure

(a) 1, 4, 2, 5, 3 (b) 2, 1, 3, 4, 5 (c) 3, 2, 5, 1, 4 (d) 4, 1, 3, 2, 5

35. 1. Frog 2. Eagle 3. Grasshopper 4. Snake 5. Grass

(a) 1, 3, 5, 2, 4 (b) 3, 4, 2, 5, 1 (c) 5, 3, 1, 4, 2 (d) 5, 3, 4, 2, 1

## 10.1 Rankings & Arrangements (Class Work)

**Directions (1-3): Answer the questions based on the following information:**

I. There is a group of five girls.
II. Kanta is second in height but younger than Reena.
III. Pooja is taller than Mona but younger in age.
IV. Reena and Mona are of same age but Reena is taller.
V. Neena is taller than Pooja and elder to Reena.
VI. Kanta is not the youngest in the group.

1. If the girls are arranged in the ascending order of heights, who will be in the third position?

   (a) Mona (b) Reena (c) Mona or Reena
   (d) data inadequate (e) none of these

2. If they are arranged in the descending order of their ages, who will be at fourth position?

   (a) Mona or Reena (b) Kanta (c) Mona
   (d) data inadequate (e) none of these

3. Which of the given statements is superfluous to answer the question, 'who is the eldest person in the group?'

   (a) only I (b) only II (c) only VI
   (d) either I or IV (e) none of these

**Directions (4-6): Answer the questions based on the following information:**

I. Muskan is older than Aarti but younger than Kashish.
II. Aarti is older than Sanya.
III. Kashish is elder than Sanya.
IV. Sanya is younger than Muskan.
V. Gargi is the eldest.

4. Who is the youngest?

   (a) Kashish (b) Aarti (c) Muskan (d) Sanya

5. Agewise, who is in the middle?

   (a) Kashish (b) Aarti (c) Muskan (d) Sanya

6. Which of the following statements is/are superfluous and can be dispensed with while answering the above questions?

   (a) either II or III (b) only IV (c) either II or IV
   (d) both III and IV (e) none of these

7. A, B, C, D and E are five friends. A is shorter than B but taller than E. C is the tallest. D is shorter than b and taller than A. Who has two person taller and two persons shorter than him/her?

   (a) A (b) B (c) C (d) D

8. If (i) P is taller than Q, (ii) R is shorter than P, (iii) S is taller than T but shorter than Q, then who among them is the tallest?

   (a) P (b) Q (c) S (d) T

9. In an examination, Raj got more marks than Mukesh but not as many as Priya. Priya got more marks than Gaurav and Kavita. Gaurav got less marks than Mukesh but his marks are not the lowest in the group. Who is second in the descending order of marks?

(a) Priya (b) Kavita (c) Raj

(d) can't be determined (e) none of these

10. Garima is taller than Sarita but not taller than Reena. Reena and Tanya are of the same height. Garima is shorter than Anu. Amongst all the girls, who is the shortest?

(a) Anu (b) Reena and Tanya (c) Garima (d) Sarita

**Directions (11-15): Answer the questions based on the following information-**

Anita, Mahima, Rajan, Lata and Deepti are five cousins. Anita is twice as old as Mahima. Rajan is half the age of Mahima. Anita is half the age of Deepti and Rajan is twice the age of Lata.

11. Who is the youngest?

(a) Deepti (b) Rajan (c) Lata (d) Anita

12. Who is the eldest?

(a) Deepti (b) Lata (c) Anita (d) none of these

13. Which of the following pairs of persons are of the same age?

(a) Mahima and Lata (b) Anita and Mahima (c) Mahima and Rajan (d) none of these

14. Anita is younger than

(a) Rajan (b) Mahima (c) Deepti (d) none of these

15. If Mahima is 16 years old, then what is the age of Lata?

(a) 4 years (b) 5 years (c) 7 years (d) 14 years

**Directions (16-19): Answer the questions based on the following information-**

I. Eight doctors P, Q, R, S, T, U, V and W visit a charitable dispensary every day except on a holiday i.e. Monday

II. Each doctor visits for one hour from Tuesday to Sunday except Saturday. The timings are 9 am to 1 pm and 2 pm to 6 pm; 1 pm to 2 pm is lunch break.

III. On Saturdays, it is open only in the morning i.e. 9 am to 1 pm and each doctor visits for only half an hour.

IV. No other doctor visits the dispensary before doctor Q and after doctor U.

V. Doctor W comes immediately after lunch break and is followed by R.

VI. S comes in the same order as P in the afternoon session.

16. Doctor P visits in between which of the following pairs of doctors?

(a) S and V (b) U and W (c) R and W

(d) R and U (e) none of these

17. At what time the visit of doctor R is over on Sunday?

(a) 1 pm (b) 3 pm (c) 4 pm

(d) 5 pm (e) none of these

18. At what time the visit of doctor T would be over on Saturday?

(a) 10 am (b) 11 am (c) either 10 am or 11 am

(d) data inadequate (e) none of these

19. If the lunch break and subsequent visiting hours are reduced by 15 minutes, at time doctor U is expected to attend the dispensary?

(a) 3.15 pm (b) 4 pm (c) 4.15 pm

(d) 4.45 pm (e) none of these

**Directions (20-24): Answer the questions based on the following information-**

Six lectures A, B, C, D, E and F are to be organized in a span of seven days – from Sunday to Saturday, only one lecture on each day in accordance with the following:

I. A should not be organized on Thursday.

II. C should be organized immediately after F.

III. There should be a gap of two days between E and D.

IV. One day there will be no lecture (Friday is not that day), just before that day D will be organized.

V. B should be organized on Tuesday and should not be followed by D.

20. On which day there is no lecture?

(a) Monday (b) Friday (c) Sunday

(d) Can't be determined (e) none of these

21. How many lectures are organized between C and D?

(a) none (b) one (c) two

(d) three (e) none of these

22. Which day will the lecture F be organized?

(a) Thursday (b) Friday (c) Saturday

(d) Sunday (e) none of these

23. Which of the following is the last lecture in the series?

(a) A (b) B (c) C

(d) can't be determined (e) none of these

24. Which of the following information is not required in finding the complete sequence of organization of lectures?

(a) I only (b) II only (c) I and II only

(d) V only (e) all are required

**Directions (20-24): Answer the questions based on the following information-**

A training college has to conduct a refresher course for teachers of seven different subjects – Mechanics, Psychology, Philosophy, Sociology, Economics, Science and Engineering from 22nd July to 29th July.

I. Course should start with Psychology.

II. 23rd July, being Sunday, should be holiday.

III. Science subject should be on the previous day of the Engineering subject.

IV. Course should end with Mechanics subject.

V. Philosophy should be immediately after the holiday.

VI. There should be a gap on one day between Economics and Engineering.

25. The refresher course will start with which one of the following subjects?

(a) Psychology (b) Mechanics (c) Philosophy (d) Economics

(e) none of these

26. Which subject will be on Tuesday?

(a) Mechanics (b) Engineering (c) Economics (d) Psychology

(e) none of these

27. Which subject precedes Mechanics?

(a) Economics (b) Engineering (c) Philosophy (d) Psychology

(e) none of these

28. How many day's gap is there between Science and Philosophy?

(a) one (b) two (c) three (d) no gap

(e) none of these

29. Which subject is followed by Science?

(a) Engineering (b) Psychology (c) Philosophy (d) Economics

(e) none of these

## 10.2 Ranking & Arrangements (Home Assignment)

**Directions (1-5): Answer the questions based on the following information-**

Anu is older than Minu. Gagan is older than Minu but younger than Anu. Kalpu is younger than Raj and Minu. Minu is older than Raj.

1. Whose age is between Gagan and Raj?

   (a) Minu (b) Kalpu (c) Anu (d) none of these

2. If they are arranged agewise in a sequence, whose age is between Minu and Kalpu?

   (a) Gagan (b) Raj (c) Anu (d) none of these

3. Whose age is exactly in the middle ofall the five?

   (a) Minu (b) Gagan (c) Raj (d) Anu

4. Who is the eldest?

   (a) Anu (b) Minu (c) Kalpu (d) Gagan

5. Who is the youngest?

   (a) Minu (b) Raj (c) Anu (d) Kalpu

6. In a shop, there were 4 dolls of different heights A, B, C and D. D is neither as tall as A nor as short as C. B is shorter than D but taller than C. If Maina wants to purchase the tallest doll, which one should she purchase?

   (a) only A (b) only D (c) either A or D

   (d) either B or D (e) either B or D

7. Five candidates A, B, C, D and E for a research work were administered psychological tests to know their intellectual levels. In the report said, that A is less intelligent than B. C is less intelligent than D. B is less intelligent than C; and A is more intelligent than E. Which candidate is the most intelligent?

   (a) A (b) B (c) D (d) None of these

8. Donald is taller than Manjit but not as tall as Rishabh. Salim is shorter than Donald but taller than Farukh. Who among them is shortest?

   (a) Donald (b) Manjit (c) Farukh (d) Can't be made

9. D is taller than C and E. A is not as tall as E. C is taller than A. D is not as tall as B. Who among them is next to the tallest one?

   (a) A (b) D (c) B or D (d) none of these

**Directions (10-11): Answer the questions based on the following information-**

A. Gopal is shorter than Ashok but taller than Kunal. B. Navin is shorter than Kunal.

C. Jayesh is taller than Navin. D. Ashok is taller than Jayesh.

10. Who is among them is the tallest?

    (a) Gopal (b) Ashok (c) Kunal

    (d) Navin (e) Jayesh

11. Which of the given statements is not sufficient to answer the above question?

    (a) A (b) B (c) C

(d) D (e) none of these

**Directions (12-17): Answer the questions based on the following information-**

A blacksmith has five iron articles A, B, C, D and e, each having a different weight.

I. A weighs twice as much as B. II. B weighs four and a half times as much as C.

III. C weighs half as much as D. IV. D weighs half as much as E.

V. E weighs less than A but more than C.

12. Which of the following is the lightest in weight?

(a) A (b) B (c) C (d) D

13. E is lighter in weight than which of the other two articles?

(a) A, B (b) D, C (c) A, C (d) B, E

14. E is heavier than which of the following two articles?

(a) D, B (b) D, C (c) A, C (d) A, B

15. Which of the following articles is the heaviest in weight?

(a) A (b) B (c) C (d) E

16. Which of the following represents the descending order of weights of the articles?

(a) A, B, E, D, C (b) B, D, E, A, C (c) E, C, D, A, B (d) A, B, D, E, C

17. Which of the above given statements is not necessary to determine the correct order of articles according to their weights?

(a) I (b) III (c) IV (d) V

**Directions (18-22): Answer the questions based on the following information-**

I. P, Q, R, S, T and U are six players in a team. II. Q and R are shorter than U but heavier than P.

III. S is heavier than Q and taller than R. IV. T is shorter than S but taller than U.

V. U is heavier than S. VI. P is shorter than T but taller than U.

18. Who among them is the tallest?

(a) P (b) Q (c) S

(d) T (e) none of these

19. Who is third from the top when they are arranged in descending order of heights?

(a) P (b) Q (c) R

(d) T (e) none of these

20. Which of the following groups of friends is shorter than P?

(a) Q, R only (b) S, Q, R only (c) T, Q, R only

(d) U, Q, R only (e) none of these

21. Who among them is the lightest?

(a) P (b) Q (c) R

(d) Q or R (e) data inadequate

22. Which of the following statements is true for U as regards height and weight?

(a) He is lighter than T and taller than T.
(b) He is heavier than Q and taller than T.
(c) He is heavier than Q and R but shorter than S.
(d) He is lighter than T and also shorter than T.
(e) He is lighter than Q and R but taller than S.

**Directions (23-27): Answer the questions based on the following information-**

Six films – P, Q, R, S, T and U are to be released on consecutive Fridays. The schedule of the release is to be in accordance with the following conditions:

I. P must be released a week before T.

II. R must not be released immediately after the first release .

III. Q must be released on the Friday following the Friday on which U is released.

IV. S must be released on fifth Friday and should not be immediately preceded by Q.

V. T must not be released in the last.

23. Which of the following films preceded T?
(a) P (b) Q (c) S (d) U

24. Which of the following films released immediately after Q?
(a) P (b) R (c) T (d) U

25. Film R cannot be released on which of the following Fridays in addition to second Friday?
(a) First (b) Third (c) Fourth (d) Fifth

26. In between which of the two films S is to be released?
(a) Q and T (b) R and T (c) P and T (d) T and U

27. Which of the following films released first?
(a) P (b) Q (c) R (d) U

28. A family of five people sat for dinner. Ram finished before Mohan but after Gita. Anu finished before Sania but after Mohan. Who finished first?
(a) Ram (b) Gita (c) Mohan (d) Anu

**Directions (29-30): Answer the questions based on the following information-**

Five men A, B, C, D and E read a newspaper. The one who reads first gives it to C. The one who reads last had taken from A. E was not the first or last to read. There were two readers between B and A.

29. To whom did B pass the newspaper?
(a) A (b) C (c) D (d) E
(e) none of these

30. Who read the newspaper last?
(a) A (b) B (c) C (d) D
(e) none of these

**Directions (31-35): Answer the questions based on the following information-**

At an Electronic Data Processing Unit, five out of the eight program sets P, Q, R, S, T, U, V and W are to be operated daily. On any one day, except for the first day of a month, only three of the program sets must be the

ones that were operated on the previous day. The program operating must also satisfy the following conditions:

I. If program P is to be operated on a day, V cannot be operated on that day.

II. If Q is to be operated on a day, T must be one of the programs to be operated after Q.

III. If R is to be operated on a day, V must be one of the programs to be operated after R.

IV. The last program to be operated on any day must be either S or U.

31. Which of the following could be the set of programs to be operated on the first day of a month?

(a) V, Q, R, T, S (b) U, Q, S, T, W (c) T, U, R, V, S (d) Q, S, R, V, U

(e) P, R, V, S, U

32. Which of the following is true of any day's valid program set operation?

(a) P can't be operated at 3rd place. (b) Q can't be operated at 3rd place.

(c) R can't be operated at 4th place. (d) T can't be operated at 3rd place.

(e) U can't be operated at 4th place.

33. If R is operated at third place in a sequence, which of the following can't be the second program in that sequence?

(a) Q (b) S (c) T (d) U

(e) W

34. If the program sets R and W are to be operated on the first day, which of the following could be the other programs on that day?

(a) P, T, V (b) Q, S, V (c) Q, T, V (d) T, S, U

(e) T, S, V

35. If the sequence of program sets operated on a day is P, Q, W, T, U, each of the following could be the next day's program set except?

(a) W, T, U, V, S (b) W, T, S, P, U (c) W, R, V, T, U (d) Q, T, V, W, S

(e) Q, R, V, T, U

### 10.3 Ranking & Arrangements (Home Assignment)

1. Manu is fourteenth from the right end in a row of 40 boys. What is his position from the left end?

   (a) 24th (b) 25th (c) 26th (d) 27th

2. Three persons A, B and C are standing in a queue. There are five persons between A and B and eight persons between B and C. If there are three persons ahead of C and 21 behind A, then what could be the minimum number of persons in the queue?

   (a) 27 (b) 28 (c) 40 (d) 41

3. Aman is $16^{th}$ from the left end in a row of boys and Vivek is $18^{th}$ form the right end. Gagan is $11^{th}$ from Aman towards the right and $3^{rd}$ from Vivek towards the right end. How many boys are there in the row?

   (a) 40 (b) 42 (c) data inadequate (d) none of these

4. A class of boys stands in a single line. One boy is nineteenth in order from both the ends. How many boys are there in the class?

   (a) 27 (b) 37 (c) 38 (d) 39

5. If Atul finds that he is twelfth from the right in a line of boys and fourth from the left, how many boys should be added to the line such that there are 28 boys in the line?

   (a) 12 (b) 13 (c) 14 (d) none of these

6. In a row of boys, J is seventh from the start and eleventh from the end. In another row of boys, V is tenth from the start and twelfth from the end. How many boys are there in both the rows together?

   (a) 36 (b) 39 (c) can't be determined (d) none of these

7. Sachin ranks eighteenth in a class of 49 students. What is his rank from the last?

   (a) 18 (b) 19 (c) 31 (d) 32

8. Manoj and Sachin are ranked seventh and eleventh respectively from the top in a class of 31 students. What will be their respective ranks from the bottom in the class?

   (a) $20^{th}$ and 24th (b) $24^{th}$ and $20^{th}$ (c) $26^{th}$ and $22^{nd}$ (d) $25^{th}$ and $21^{st}$

   (e) none of these

9. In a class of 35 students, Kunal is placed seventh from the bottom whereas Sonali is placed ninth from the top. Pulkit is placed exactly in between the two. What is Kunal's position from Pulkit?

   (a) 9 (b) 10 (c) 11 (d) 13

   (e) none of these

10. In a class, among the passed students, Amisha is twenty-second from the top and Sajal, who is 5 ranks below Amisha, is thirty-forth from the bottom. All the students from the class have appeared fro the exam. If the ratio of the students who passed in the exam to those who failed is 4:1 in that class, how many students are there in the class?

(a) 60 (b) 75 (c) 90 (d) data inadequate

11. In a row of girls, there are 16 girls between Pinky and Nancy. Pinky is thirty-second from the left end of the row. If Pinky is nearer than Nancy to the right end of the row, then how far away is Nancy from the left end of the row?

(a) data inadequate (b) $14^{th}$ (c) $15^{th}$ (d) none of these

**Directions (12-15): Answer the questions based on the following information-**
Consider a group comprising of 4 students – Rita, Sita, Mita and Nita, who stand in a row. Rita and Sita stand in sixth and seventh positions respectively from the left. Mita and Nita stand in the fourth and fifth positions respectively from the right. When Sita and Mita exchange their positions, then Sita will be fifteenth from the left.

12. Originally, Nita's position from the left is

(a) 5 (b) 13 (c) 14 (d) 16

13. Rita's position from the right is

(a) 6 (b) 13 (c) 14 (d) 18

14. If Nita and Rita also exchange their positions between themselves, then after the exchange, Nita's position from the left will be

(a) 6 (b) 10 (c) 11 (d) none of these

15. After exchange of positions between themselves Sita and Mita, Mita's position from the right is

(a) 5 (b) 10 (c) 12 (d) none of these

16. A bus for Delhi leaves every thirty minutes fro ma bus stand. An enquiry clerk told a passenger that the bus had already left ten minutes ago and the next bus will leave at 9.35 am. What time did the enquiry clerk give this information to the passenger?

(a) 9.10 am (b) 8.55 am (c) 9.05 (d) 9.15 am

17. If the seventh day of a month is three days earlier than Friday, what day will it be on the nineteenth day of the month?

(a) Sunday (b) Monday (c) Wednesday (d) Friday

18. Standing on a platform, Amit told Sunita that Aligarh was more than ten kilometers but less than fifteen kilometers from there. Sunita knew it was more than twelve but less than fourteen kilometers from there. If both of them were correct, which of the following could be the distance of Aligarh from the platform?

(a) 11 km (b) 12 km (c) 13 km
(d) 14 km (e) 15 km

19. Ajay left home for the bus stop 15 minutes earlier than usual. It takes 10 minutes to reach the stop. He reached the stop at 8.40 am. What time does he usually leave home for the bus stop?

(a) 8.30 am (b) 8.45 pm (c) 8.55 am (d) none of these

20. The priest told the devotee, "The temple bell is rung at regular intervals of 45 minutes. The last bell was rung five minutes ago. The next bell is due to be rung at 7.45 am." At what time did the priest give this information to the devotee?

(a) 7.40 am (b) 7.05 am (c) 7.00 am (d) none of these

21. A monkey climbs 30 feet at the beginning of each hour and rests for a while when he slips back 20 feet before he again starts climbing in the beginning of the next hour. If he begins his ascent at 8.00 am, what time will he first touch a flag at 120 feet from the ground?

(a) 4 pm (b) 5 pm (c) 6 pm (d) none of these

**Directions (22-24): Answer the questions based on the following information-**

I. Kamal is available at home from 12 noon to 4 pm on Tuesday, Thursday and Sunday.

II. His younger brother Navin is available at home on Monday, Thursday, Friday and Sunday between 10 am to 2 pm.

III. The eldest brother Rajiv is available between 9 am to 12 noon on Monday, Wednesday and Thursday and 2 pm to 4 pm on Friday, Saturday and Sunday.

22. At a time on which day of a week all the three brothers are available at home?

(a) No one is available (b) Sunday (c) Thursday

(d) can't be determined (e) none of these

23. For how many days only one brother is available at a particular time in a week?

(a) one (b) two (c) three (d) four

24. On which day(s) of a week, the youngest and the eldest brothers are available at home at the same time?

(a) only Monday (b) only Thursday (c) only Friday

(d) both Monday and Tuesday (e) both Sunday and Friday

25. If day after tomorrow is Saturday, what day was three days before yesterday?

(a) Sunday (b) Monday (c) Thursday (d) Saturday

26. If the day before yesterday was Thursday, when will Sunday be?

(a) today (b) two days after today

(c) tomorrow (d) day after tomorrow

27. Mohini went to the movies nine days ago. She goes to the movies only on Thursday. What day is today?

(a) Sunday (b) Monday (c) Thursday (d) Saturday

28. If every second Saturday and all Sundays are off in a 30 days month beginning on Saturday, then how many working days are there in that month?

(a) 20 (b) 21 (c) 22 (d) 23

## 11.1 Group Reasoning (Class Work)

**Directions (1-5): Answer the questions based on the following information-**

B, M, T, R, K, H and D are travelling in a train compartment with III-tier sleeper berth. Each of them has a different profession of Engineer, Doctor, Architect, Pharmacist, Lawyer, Journalist and Pathologist. They occupied two lower berths, three middle berths and two upper berths. B, the Engineer, is not on the upper berth. The Architect is the only other person who occupies the same type of berth as that of B. M and H are not on the middle berth and their professions are Pathologist and lawyer respectively. T is a Pharmacist. D is neither a Journalist nor an Architect. K occupies the same type of berth as that of the Doctor.

1. Who is the Architect?

   (a) D (b) H (c) R

   (d) data inadequate (e) none of these

2. What is D's profession?

   (a) Pharmacist (b) Lawyer (c) Doctor

   (d) Engineer (e) data inadequate

3. Which of the following pairs occupy the lower berth?

   (a) BT (b) BD (c) BK

   (d) data inadequate (e) none of these

4. Which of the following groups occupies the middle berth?

   (a) DKT (b) HKT (c) DKR

   (d) DHT (e) none of these

5. Which of the following combinations of person-berth-profession is correct?

   (a) K-upper-Lawyer (b) D-upper-Doctor (c) M-lower-Journalist

   (d) R-lower-Architect (e) all correct

**Directions (6-10): Answer the questions based on the following information-**

I. There is a group of five persons – A, B, C, D and E.

II. One of them is horticulturist, one is a physicist, one is a journalist, one is an industrialist and one is an advocate.

III. Three of them – A, C and advocate prefer tea of coffee and two of them – B and the the journalist prefer coffee to tea.

IV. The industrialist and D and A are friends to one another but two of them prefer coffee to tea.

V. The horticulturist is C's brother.

6. Who is the horticulturist?

   (a) A (b) B (c) C

   (d) D (e) E

7. Who is the industrialist?

(a) E (b) C (c) B

(d) A (e) D

8. Which of the following groups includes a person who likes tea but is not an advocate?

(a) ACE (b) DE (c) BCE

(d) BD (e) none of these

9. Who is a physicist?

(a) A (b) E (c) D

(d) C (e) B

10. Which of the statements given above is superfluous?

(a) III (b) IV (c) II

(d) V (e) none of these

**Directions (11-14): Answer the questions based on the following information-**

Three ladies and four men are a group of friends i.e. P, K, R, Q, J, V and X. Each one has a different profession i.e. Lawyer, Travel Agent, Air-hostess, Doctor, Professor, Consultant and Jeweller; and each one own a different car i.e. Alto, Corolla, Santro, Lancer, Ikon, Scorpio and Esteem, not necessarily in that order. None of the ladies is a Consultant, or a Lawyer. R is an Air-hostess and she owns an Ikon car. P owns a Scorpio. K is not a Doctor. J is a Jeweller and he owns Corolla. V is a Lawyer and does not own Alto. X is a Consultant and owns Santro. The Doctor owns Esteem car whereas the Professor owns Scorpio. The travel Agent owns an Alto. None of the ladies owns a Scorpio.

11. Who are the three ladies in the group?

(a) V, R, K (b) R, P, J (c) R, K, Q (d) data inadequate

12. What car does Q own?

(a) Esteem (b) Lancer (c) Alto (d) Santro

(e) none of these

13. Who owns the car Lancer?

(a) V (b) X (c) K

(d) data inadequate (e) none of these

14. What is the profession of K?

(a) Doctor (b) Professor (c) Travel Agent

(d) data inadequate (e) none of these

**Directions (15-19): Answer the questions based on the following information-**

I. A, B, C, D, E, F and G are sitting around a circle and are facing the centre.

II. G is second to the left of C, who is to the immediate left of F.

III. A is third to the left of E.

IV. B is between D and E.

15. Which of the following is false?

(a) A is fourth to the right of E (b) G is to the immediate right of D

(c) F is the third to the right of D (d) B is to the immediate left of D

(e) none of these

16. Which of the following is true?

(a) C is fourth to the left of B (b) A is to the immediate right of G

(c) D is second to the left of E (d) B is second to the right of G

(e) none of these

17. Which of the following pairs has the first person sitting to the immediate left of the second person?

(a) BE (b) CA (c) GD

(d) DG (e) none of these

18. Which of the following pairs has the middle person sitting between the remaining two?

(a) FCE (b) EFB (c) DEB

(d) GDA (e) none of these

19. Which of the following is the position of F?

(a) fourth to the right of D (b) to the immediate left of C

(c) between A and E (d) to the immediate right of A (e) none of these

**Directions (22-26): Answer the questions based on the following information-**

I. Six flats on a floor in two rows facing North and South are allotted to P, Q, R, S, T and U.

II. Q gets a North facing flat and is not next to S.

III. S and U, gets diagonally opposite flats.

IV. R, next to U, gets a South facing flat and T gets a North facing flat.

20. The flats of which of the other pairs than SU, are diagonally opposite to each other?

(a) QP (b) PT (c) QR (d) TS

21. Which of the following combinations gets South facing flats?

(a) UPT (b) URP (c) QTS (d) data inadequate

**Directions (22-26): Answer the questions based on the following information-**

I. A, B, C, D, E, F and G are sitting in a circle facing at the centre and playing cards.

II. E is a neighbor of A and D.

III. G is not between F and C.

IV. F is to the immediate right of A.

22. Which of the following does not have the pair of persons sitting adjacent to each other?

(a) BA (b) CB (c) DE (d) GD

(e) none of these

23. Which of the following pairs has the second person sitting immediately to the right of the first?

(a) AB (b) CB (c) EA (d) DG

(e) none of these

24. What is the position of F?

(a) Third to the left of C (b) Second to the right of C (c) to the immediate left of A

(d) to the immediate right of B (e) none of these

25. Who are the neighbors of B?

(a) A and F (b) C and D (c) F and C

(d) data inadequate (e) none of these

## 11.2 Group Reasoning (Home Assignment)

**Directions (1-5): Answer the questions based on the following information-**

From amongst six boys A, B, C, D, E and F and five girls P, Q, R, S and T, a team of six is to be formed under the following conditions:

I. A and D have to be together.

II. C cannot go with S.

III. S and T have to be together.

IV. B cannot be teamed with E.

V. D cannot go with P.

VI. B and R have to be together.

VII. C and Q have to be together.

1. If there be five boys in the team, the lone girl member is

(a) P (b) Q (c) R (d) S

2. If including P, the team has three girls, the members are

(a) B, C, F, Q, R (b) A, D, E, Q, S, T (c) A, D, B, S, T (d) B, F, R, S, T

3. If the team including C consists of four boys, the members of the team other than C are

(a) A, D, E, P, Q (b) A, B, D, Q, R (c) D, E, F, A, Q (d) B, E, F, R, Q

4. If four members including E have to be boys, the members other than E are

(a) A, B, C, Q, R (b) A, D, F, S, T (c) B, C, F, Q, R (d) A, C, D, F, Q

5. If four members have to be girls, the members of the team are

(a) B, C, P, Q, R, S (b) B, F, P, R, S, T (c) B, C, Q, R, S, T (d) B, C, P, Q, R, T

**Directions (6-8): Answer the questions based on the following information-**

Eight students A, B, C, D, E, F, G and H are planning to enjoy car racing. There are only two cars and following are the conditions:

I. One car can accommodate maximum five and minimum four students.

II. A will sit in the same car in which D is sitting but H is not in the same car.

III. B and C can't sit in the same car in which D is sitting.

IV. F will sit in the car of four people only along with A and E but certainly not with G.

6. If H and C are sitting in the same car, who are other two students sitting in the same car?

(a) B and C (b) C and D (c) B and D

(d) E and B (e) none of these

7. If E and A are sitting in the same car, which of the following statements is true?

   (a) Five students are sitting in the same car
   (b) B is sitting in the same car
   (c) F is not sitting in the same car
   (d) G is not sitting in the same car
   (e) none of these

8. Which of the following statements is redundant for the above sitting arrangements?

   (a) only I (b) only II (c) only III (d) only IV
   (e) none of these

**Directions (9-13): Answer the questions based on the following information-**

There are five men A, B, C, D and E and six women P, Q, R, S, T and U. A, B and R are advocates; C, D, P, Q and S are doctors and the rest are teachers. Some teams are to be selected from amongst these eleven persons subject to the following conditions:

I. A, P and U have to be together
II. B cannot go with D or R.
III. E and Q have to be together
IV. C and T have to be together.
V. D and P cannot be together.
VI. C cannot go with Q.

9. If the team is to consist of two male advocates, two lady doctors and one teacher, the members of the team are

   (a) A, B, P, Q, U (b) A, B, P, U, S (c) A, P, R, S, U (d) B, E, Q, R, S

10. If the team is to consist of one advocate, two doctors, three teachers and C may not go with T, the members of the team are

    (a) A, E, P, Q, S, U (b) A, E, P, Q, T, U (c) B, E, Q, S, T, U (d) E, Q, R, S, T, U

11. If the team is to consist of one male advocate, one male doctor, one lady doctor and two teachers, the members of the team are

    (a) A, C, P, T, U (b) A, D, E, P, T (c) A, D, E, P, U (d) B, C, E, Q, U

12. If the team is to consist of one advocate, three doctors and one male teacher, the members of the team are

    (a) A, D, P, S, U (b) C, D, R, S, T (c) D, E, Q, R, S (d) D, E, Q, R, T

13. If the team is to consist of two advocates, two doctors and two teachers such that there are not more than three ladies, the members of the team are

    (a) A, B, C, P, T, U (b) A, C, P, R, T, U (c) A, E, P, Q, R, T (d) B, C, E, Q, R, T

**Directions (14-18): Answer the questions based on the following information-**

I. In a family of six persons – P, Q, R, S, T and U – there are three gents and three ladies. There are two married couples and two persons are unmarried. Each one of them reads different newspapers – The times of India, Indian Express, Hindustan Times, Business Herald, Navbharat Times and The Tribune.

II. T, who reads Indian Express, is mother-in-law of P who is wife of R. S is the father of U and he does not read The Times of India or The Tribune. Q reads Navbharat Times and she is the sister of U who reads Hindustan Times. R does not read The Tribune.

14. How many sons does T have?

(a) one (b) two (c) three

(d) data inadequate (e) none of these

15. Who among the following reads The Times of India?

(a) P (b) R (c) S

(d) data inadequate (e) none of these

16. Which of the following newspapers is read by P?

(a) Business Herald (b) The Time of India (c) Navbaharat Times

(d) data inadequate (e) none of these

17. How is U related to T?

(a) Son (b) daughter (c) brother

(d) data indequate (e) none of these

18. Which of the following is one of the married couples?

(a) QU (b) TU (c) SQ

(d) ST (e) data inadequate

**Directions (19-24): Answer the questions based on the following information-**

P, Q, R, S, T, V and W are seven members of a family. There are three female members. Each of them has a different profession – Lawyer, CA, Engineer, Teacher, Doctor, Architect and Pharmacist. No lady is either Pharmacist or CA. Each of them has a different monthly income. The CA earns the most. S, the engineer, earns less than V, the doctor. R, the teacher, earns more than P and less than S. W's wife earns the least. T is an unmarried lady lawyer and she earns less than P and more than only Q. The pharmacist's income is not the lowest.

19. Who earns the least?

(a) P (b) Q (c) P or Q

(d) R (e) none of these

20. Which of the following pairs represents the professions of husband and wife?

(a) Pharmacist, Architect (b) CA, Architect (c) Engineer, Pharmacist

(d) CA, Engineer (e) none of these

21. Which of the following statements is false?

(a) The architect earns more than the lawyer. (b) The teacher earns less than the engineer.

(c) The doctor earns more than the engineer. (d) The pharmacist earns more than the lawyer.

(e) none of these

22. What is P's profession?

(a) Pharmacist (b) Lawyer (c) Teacher

(d) data inadequate (e) none of these

23. How many members earn less than the doctor?

(a) two (b) three (c) four

(d) five (e) none of these

24. Which of the following represents the three female members of the family?

(a) PTQ (b) TRQ (c) VTQ

(d) VTR (e) data inadequate

**Directions (25-29): Answer the questions based on the following information-**

There are five persons P, Q, R, S and T. One if football player; one is chess player and one is hockey player. P and S are unmarried ladies and do not participate in any game. None of the ladies plays chess or football. There is a married couple in which T is the husband. Q is the brother of R and is neither a chess player nor a hockey player.

25. Who is the football player?

(a) P (b) Q (c) R (d) S

(e) T

26. Who is the hockey player?

(a) P (b) Q (c) R (d) S

(e) T

27. Who is the chess player?

(a) P (b) Q (c) R (d) S

(e) T

28. Who is the wife of T?

(a) P (b) Q (c) R (d) S

(e) none of these

29. The three ladies are:

(a) P, Q, R (b) Q, R, S (c) P, Q, S (d) P, R, S

(e) none of these

## ANSWERS

### 1.1 Sequence & Series (Class Work)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | C | 2 | D | 3 | B | 4 | A | 5 | B |
| 6 | D | 7 | C | 8 | A | 9 | B | 10 | A |
| 11 | A | 12 | A | 13 | A | 14 | B | 15 | A |
| 16 | D | 17 | A | 18 | D | 19 | A | 20 | B |
| 21 | C | 22 | A | 23 | C | 24 | A | 25 | C |

### 1.2 Sequence & Series (Home Assignment)

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

### 1.3 Sequence & Series (Class Work)

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

### 1.4 Sequence & Series (Home Assignment)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | B | 2 | D | 3 | B | 4 | C | 5 | A |
| 6 | A | 7 | B | 8 | A | 9 | D | 10 | A |
| 11 | D | 12 | D | 13 | B | 14 | D | 15 | D |
| 16 | C | 17 | A | 18 | D | 19 | D | 20 | D |
| 21 | C | 22 | C | 23 | B | 24 | A | 25 | B |

### 2.1 Coding-decoding (Class Work)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | B | 2 | A | 3 | A | 4 | A | 5 | D |
| 6 | A | 7 | B | 8 | B | 9 | B | 10 | D |
| 11 | C | 12 | A | 13 | C | 14 | A | 15 | C |
| 16 | A | 17 | D | 18 | B | 19 | D | 20 | D |
| 21 | C | 22 | A | 23 | C | 24 | C | 25 | A |

### 2.2 Coding-decoding (Home Assignment)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | D | 2 | B | 3 | D | 4 | A | 5 | B |
| 6 | E | 7 | B | 8 | B | 9 | D | 10 | B |
| 11 | C | 12 | D | 13 | A | 14 | A | 15 | E |
| 16 | C | 17 | E | 18 | E | 19 | B | 20 | B |
| 21 | A | 22 | A | 23 | B | 24 | B | 25 | D |

### 3.1 Directions (Class Work)

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

### 3.2 Directions (Home Assignment)

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

### 4.1 Blood Relations (Class Work)

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

### 4.2 Blood Relations (Home Assignment)

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

### 5.1 Analogies (Class Work)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | B | 2 | C | 3 | A | 4 | B | 5 | D |
| 6 | C | 7 | B | 8 | B | 9 | C | 10 | A |
| 11 | D | 12 | A | 13 | C | 14 | D | 15 | A |
| 16 | C | 17 | B | 18 | B | 19 | C | 20 | B |
| 21 | A | 22 | C | 23 | A | 24 | A | 25 | B |

### 5.2 Analogies (Home Assignment)

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

### 6.1 Numerical Puzzles (Class Work)

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

### 6.2 Numerical Puzzles (Home Assignment)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | D | 2 | C | 3 | A | 4 | D | 5 | A |
| 6 | B | 7 | D | 8 | B | 9 | C | 10 | D |
| 11 | A | 12 | D | 13 | B | 14 | A | 15 | A |

### 7.1 Calendars (Class Work)

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

### 7.2 Calendars (Home Assignment)

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

### 8.1 Statements & Arguments (Class Work)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | C | 2 | E | 3 | D | 4 | C | 5 | E |
| 6 | C | 7 | E | 8 | A | 9 | D | 10 | E |

### 9.1 Symbol-based Operations (Class Work)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | C | 2 | D | 3 | B | 4 | D | 5 | B |
| 6 | B | 7 | D | 8 | B | 9 | B | 10 | C |
| 11 | B | 12 | D | 13 | C | 14 | D | 15 | D |
| 16 | C | 17 | C | 18 | A | 19 | C | 20 | D |
| 21 | D | 22 | B | 23 | C | 24 | D | 25 | A |
| 26 | E | 27 | C | 28 | A | 29 | D | 30 | C |
| 31 | B | 32 | D | 33 | C | 34 | C | 35 | C |

### 10.1 Ranking & Arrangements (Class Work)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | E | 2 | E | 3 | C | 4 | D | 5 | C |
| 6 | D | 7 | D | 8 | A | 9 | C | 10 | D |
| 11 | C | 12 | A | 13 | D | 14 | C | 15 | A |
| 16 | D | 17 | C | 18 | C | 19 | B | 20 | A |
| 21 | D | 22 | A | 23 | A | 24 | E | 25 | A |
| 26 | C | 27 | E | 28 | A | 29 | D | | |

### 10.2 Ranking & Arrangements (Home Assignment)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 2 | B | 3 | A | 4 | A | 5 | D |
| 6 | A | 7 | C | 8 | D | 9 | B | 10 | B |
| 11 | C | 12 | C | 13 | A | 14 | B | 15 | A |
| 16 | A | 17 | D | 18 | C | 19 | A | 20 | D |
| 21 | E | 22 | C | 23 | A | 24 | A | 25 | D |
| 26 | B | 27 | D | 28 | B | 29 | B | 30 | D |
| 31 | C | 32 | C | 33 | A | 34 | E | 35 | B |

### 10.3 Ranking & Arrangements (Home Assignment)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | D | 2 | B | 3 | D | 4 | B | 5 | B |
| 6 | D | 7 | D | 8 | D | 9 | B | 10 | B |
| 11 | C | 12 | C | 13 | B | 14 | A | 15 | C |
| 16 | D | 17 | A | 18 | C | 19 | D | 20 | B |
| 21 | C | 22 | A | 23 | D | 24 | D | 25 | A |
| 26 | C | 27 | D | 28 | D | | | | |

### 11.1 Group Reasoning (Class Work)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | C | 2 | C | 3 | A | 4 | E | 5 | D |
| 6 | A | 7 | C | 8 | E | 9 | D | 10 | E |
| 11 | C | 12 | A | 13 | A | 14 | C | 15 | C |
| 16 | B | 17 | D | 18 | E | 19 | A | 20 | A |
| 21 | B | 22 | A | 23 | C | 24 | E | 25 | C |

### 11.2 Group Reasoning (Home Assignment)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | B | 2 | A | 3 | B | 4 | B | 5 | B |
| 6 | A | 7 | D | 8 | A | 9 | B | 10 | B |
| 11 | A | 12 | C | 13 | A | 14 | D | 15 | B |
| 16 | E | 17 | D | 18 | E | 19 | B | 20 | B |
| 21 | A | 22 | A | 23 | D | 24 | E | 26 | B |
| 26 | C | 27 | E | 28 | C | 29 | D | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 2 | | 3 | | 4 | | 5 | |
| 6 | | 7 | | 8 | | 9 | | 10 | |
| 11 | | 12 | | 13 | | 14 | | 15 | |
| 16 | | 17 | | 18 | | 19 | | 20 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 2 | | 3 | | 4 | | 5 | |
| 6 | | 7 | | 8 | | 9 | | 10 | |
| 11 | | 12 | | 13 | | 14 | | 15 | |
| 16 | | 17 | | 18 | | 19 | | 20 | |
| 21 | | 22 | | 23 | | 24 | | 25 | |
| 26 | | 27 | | 28 | | 29 | | 30 | |
| 31 | | 32 | | 33 | | 34 | | 35 | |
| 36 | | 37 | | 38 | | 39 | | 40 | |
| 41 | | 42 | | 43 | | 44 | | 45 | |
| 46 | | 47 | | 48 | | 49 | | 50 | |