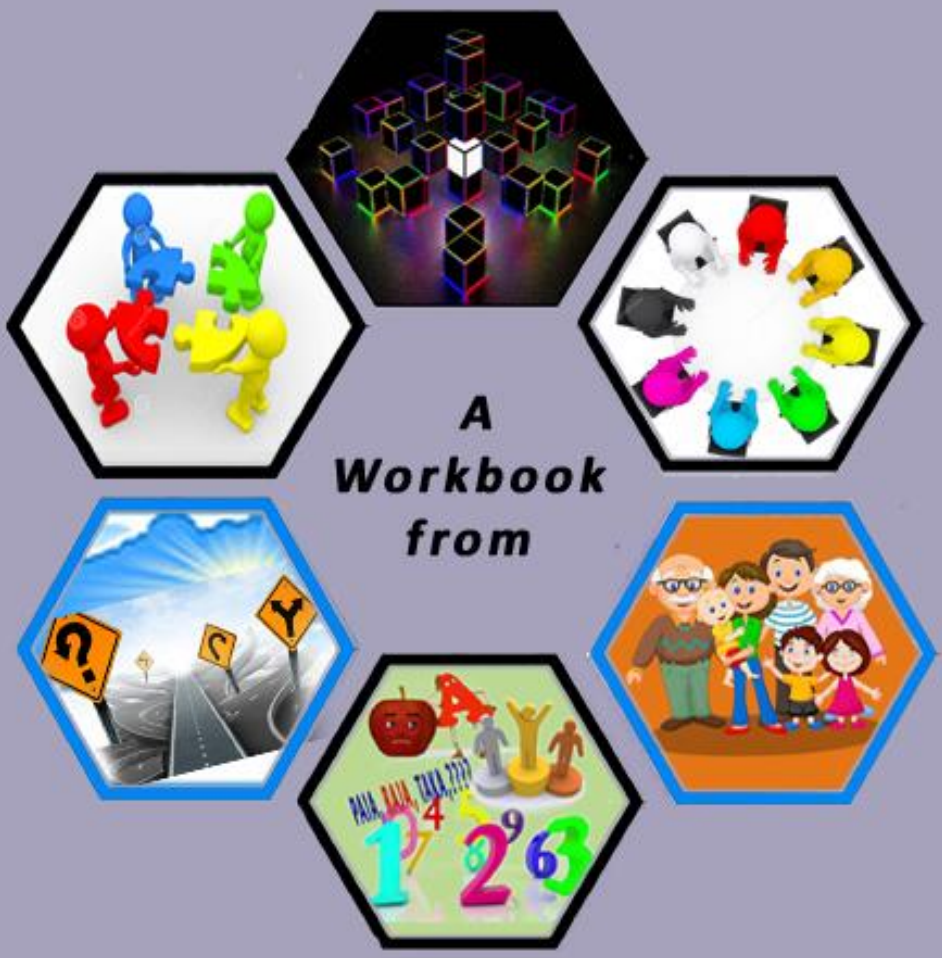
ANALYTICAL SKILLS

PEA-506



A Workbook from

DEPARTMENT OF ANALYTICAL SKILLS
CENTER FOR PROFESSIONAL ENHANCEMENT

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Number System

1. **Natural Numbers: –** The numbers 1, 2, 3, 4, 5……..are called natural numbers or positive numbers.

   Example: 1, 2, 3, 4, 5……..

2. **Whole Numbers: –**The numbers including "0" and all natural numbers are called the while numbers.

   Example: 0, 1, 2, 3, 4, 5……..

3. **Integers –** The numbers including 0 and all the positive and negative of the natural numbers are called integers.

   Example: ……-3, -2, -1, 0, 1, 2,3……

4. **Rational Numbers: –** A number which can be expressed in the form p/q where p and q are integers and $q \neq 0$ is called a rational number.

   For example, 4 is a rational number since 4 can be written as 4/1 where 4 and 1 are integers and the denominator $1 \neq 0$. Similarly, the numbers ¾, -2/5, etc. are also rational numbers.

   Between any two numbers, there can be infinite number of other rational numbers.

5. **Irrational Numbers: –** Numbers which are not rational but which can be represented by points on the number line are called irrational numbers. Examples for irrational numbers are

   Example: $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{8}$, etc.

   Numbers like π, e are also irrational numbers.

   Between any two numbers, there are infinite numbers of irrational numbers.

   Another way of looking at rational and irrational numbers is

   Any terminating or recurring decimal is a rational number.

   Any non-terminating non-recurring decimal is an irrational number.

6. **Real numbers: –** The set of natural numbers, integers, whole numbers, rational numbers, and irrational numbers constitute the set of real numbers.

7. **Even Numbers: –** The numbers that are divisible by 2 are called even numbers.

   Example: 2, 4, 6, 8, 16, 32 etc.

8. **Odd Numbers: –** The numbers that are not divisible by 2 are called odd numbers.

   Example: 3, 5, 7, 9, 15 etc.

9. **Prime Numbers: –** Those numbers which are divisible by themselves and 1 are called prime numbers or a number which has only two factors 1 and itself is called a prime number.

   Example: 2, 3, 5, 7 etc.

10. **Twin Primes: –** A pair of prime numbers when they differ by 2 is called twin prime numbers.

    Example: (3, 5), (5, 7), (11, 13), (17, 19) etc.

11. **Co-prime Numbers: –** A pair of two natural numbers are said to be co-prime if their G.C.D. or H.C.F. is 1.

    Example: H.C.F. (3, 4) = 1, H.C.F. (13, 15) = 1 then (3, 4) and (13, 15) are co-prime numbers.

12. **Composite Numbers: –** The natural numbers which are not prime are called composite numbers OR numbers that have factors other than itself and 1, are called composite numbers.

    Example: 4, 6, 9, 16, 25 etc.

    Note: 1 is neither a composite number nor a prime number.

13. **Perfect Numbers: –** If the addition of all the factors of a number excluding the number itself happens to be equal to the number, it is called a perfect number.

    First perfect number is 6.

    Factors of 6 are 1, 2, 3, 6.

    Now add all the factors excluding 6.

    1+2+3 = 6, hence 6 is a perfect number.

    Example: 28, 496 and 8128.

14. **Complex Numbers: –** The number which have real and imaginary component is called a complex number.

    Example: 3+4*i*, 5+6*i*, where $i = \sqrt{-1} = a\ imaginary\ number$

15. **Face Value** of a digit in a number is its own value.

    Example: 6728, Face Value ⇒ 6 = 6, 7 = 7, 2 = 2 and 8 = 8

16. **Place Value** of a digit is given by multiplying it with value of place where it is placed.

    Example: 6729

Place Value of 9 ⇒ 9 × 1 = 9

Place Value of 2 ⇒ 2 × 10 = 20

Place Value of 7 ⇒ 7 × 100 = 700

Place Value of 6 ⇒ 6 × 1000 = 6000

17. Fractions: A fraction is a quantity which expresses a part of the whole, eg: ¼ means one fourth of the whole

✓ **Types of Fractions**:

- A **Proper Fraction** is one whose numerator is less than its denominator

  Example: 2/3 is proper fraction, as 2<3
- An **Improper Fraction** is one whose numerator is equal to or greater than its denominator

Example: 3/2 is an improper fraction, as 3>2 ;

3/3 is an improper fraction, as 3=3

Squares of Numbers

Numbers	Method
1 – 25	Memorization
Numbers ending in a five 15, 25, 35, 45, …	Remove the last digit (five), multiply the resulting number (n) by the next number (n + 1), and tag on a 25 at the end of the product. Example: 45 × 45 4 × 5 = 20 Tag on a 25 to make 2025. Calculate 45 × 45 = 2025
25 – 50	Calculate the difference (d) from 50. Subtract 100 × d from 2500. Add d × d to the result. Example: To calculate 47 × 47: d = 3 Calculate 47 × 47 = 2500 – 300 + 9 = 2209
50 – 75	Subtract 50 from the number to give d. Add 100 × d to 2500. Add d × d to the result. Example: To calculate 53 × 53: d = 3 Calculate 53 × 53 = 2500 + 300 + 9 = 2809

75 – 100	Subtract the number (n) from 100 to give d. Calculate (n – d) × 100 + d × d Example: To calculate 96 × 96: d = 4 Calculate 96 × 96 = (96 – 4) × 100 + 4 × 4 = 9200 + 16 = 9216.
100 – 125	Subtract 100 from the number (n) to give d. Calculate (n + d) × 100 + d × d Example: To calculate 108 × 108: d = 8 Calculate 108 × 108 = (108 + 8) × 100 + 8 × 8 = 116 × 100 + 64 = 11664.

Exercise -1

1. The difference between a number and its three-fifth is 50. What is the number?

   A] 75 B] 100 C] 125 D] None of these

2. A number is doubled and 9 is added. If the resultant is trebled, it becomes 75. What is that number?

   A] 3.5 B] 6 C] 8 D] None of these

3. Three-fourth of a number is 60 more than its one-third. The number is:

   A] 84 B] 108 C] 144 D] None of these

4. A number whose fifth part is increased by 4 is equal to its fourth part diminished by 10, is:

   A] 240 B] 260 C] 270 D] 280

5. The difference of two numbers is 20% of the larger number. If the smaller number is 12, the larger one is:

   A] 15 B] 16 C] 18 D] 20

6. If the sum of a number and its square is 182, what is the number?

   A] 15 B] 26 C] 28 D] None of these

7. Thrice the square of a natural number decreased by 4 times the number is equal to 50 more than the number. The number is:

   A] 4 B] 5 C] 6 D] 10

8. The sum of a number and its reciprocal is one-eighth of 34. What is the product of the number and its square root?

   A] 8 B] 27 C] 32 D] None of these

9. Find a positive number which when increased by 17 is equal to 60 times the reciprocal of a number.

A] 3 B] 10 C] 17 D] 20

10. Two numbers are such that the ratio between them is 4:7. If each is increased by 4, the ratio becomes 3:5. The larger number is:

A] 36 B] 48 C] 56 D] 64

11. The sum of three numbers is 264. If the first number be twice the second and third number is one-third of the first. Then the second number is:

A] 48 B] 54 C] 72 D] 84

12. The sum of two numbers is 25 and their difference is 13. Find their product.

A] 104 B] 114 C] 315 D] 325

13. If the sum of two numbers is 33 and their difference is 15, the smaller number is:

A] 9 B] 12 C] 15 D] 18

14. What is the unit digit of the expression 317^{171} ?

A] 3 B] 1 C] 7 D] 9

15. What is the unit digit of the expression 14^{17} ?

A] 4 B] 6 C] 2 D] 8

16. Which of the following is a prime number?

A] 91 B] 51 C] 33 D] 41

17. The sum of the digits of a two-digit number is 15 and the difference between the digits is 3. What is the two-digit number?

A] 69 B] 78
C] Can't be determined D] None of these

18. What is the unit digit of 51x52x55x56 ?

A] 6 B]0 C]3 D] 8

19. Find the least value of * for which 6967*4 becomes divisible by 4.

A] 1 B] 2 C] 3 D] 4

20. The sum of the numerator and denominator of a fraction is 11. If 1 is added to the numerator and 2 is subtracted from the denominator, it becomes $\frac{2}{3}$. The fraction is:

A] $\frac{5}{6}$ B] $\frac{6}{5}$ C] $\frac{3}{8}$ D] $\frac{8}{3}$

21. Find the least value of * for which 5967*13 becomes divisible by 3.

A] 1 B] 2 C] 3 D] 4

22. Find the least value of * for which 7*5462 is divisible by 9.

A] 3 B] 6 C] 9 D] None of these

23. Find the least value of * for which 4832*18 is divisible by 11.

A] 5 B] 3 C] 7 D] 11

24. Is 52563744 divisible by 24?

A] Yes B]No C] Can't be determined D] None of these

25. What least number must be subtracted from 1672 to obtain a number which is completely divisible by 17?

A] 5 B] 7 C] 3 D] 6

26. What least number must be added to 2010 to obtain a number which is completely divisible by 19?

A] 5 B] 4 C] 19 D] None of these

27. What is the unit digit of the expression 6619^{179} ?

A] 3 B] 1 C] 7 D] 9

28. What is the unit digit of the expression $31^{56} \times 35^{17}$?

A] 3 B] 1 C] 5 D] 9

29. What is the unit digit of the expression $314^{564} \times 351^{17\,4}$?

A] 3 B] 1 C] 5 D] 6

30. What is the unit digit of the expression 31x32x33x……..x89 ?

A] 3 B] 0 C] 5 D] 9

31. Which of the following cannot be at the end of a perfect square ?

A] 4 B] 6 C] 7 D] 9

32. 32*A*76589*B* is divisible by 72. What is the value of $A + B$?

A] 9 B] 11 C] 5 D] 14

33. 23*a*7*b* is divisible by 45 but not by 10. Find the value of *a*.

A] 1 B] 2 C] 3 D] 4

34. How many numbers of the form 34a5b are divisible by 36?

A] 3 B] 2 C] 5 D] None of these

35. The number of 2 digit prime number is

A] 25 B] 17 C] 21 D] None of these

36. Two alarm clocks ring their alarms at regular intervals of 50 seconds and 48 seconds. If they first beep together at 12 noon, at what time will they beep again?

A] 12:10P.M B] 12:12P.M. C] 12:11P.M. D] None of these

37. If n^2 = 12345678987654321, what is n?

A] 12344321 B] 1235789 C] 111111111 D] 11111111

38. The sum of the digits of a two-digit number is 10, while when the digits are reversed, the number decreases by 54. Find the changed number.

A] 28 B] 19 C] 37 D] 46

39. When we multiply a certain two digit number by the sum of its digits, 405 is achieved. If you multiply the number written in reverse order of the same digits by the sum of the digits we get 486. Find the number.

A] 81 B] 45 C] 36 D] 54

40. A five-digit number is taken. Sum of the first four digits (excluding the number at the unit's digit) equals sum of all the five digits. Which of the following will not divide the number necessarily?

A] 10 B] 2 C] 4 D] 5

"Average is a very simple but effective way of representing an entire group of by a single value.

"Average of observations is defined as

$$\text{Average} = \frac{\text{Sum of the observations}}{\text{Total number of observations}}$$

"Sum of all the items in the observations" means "sum of the values of all the items in the group."

A batsman's performance can be expressed as the average number of runs scored per innings rather than giving the scores in individual innings. For example, let us say a cricketer scored the following runs in 9 different innings in a year: 35, 56, 124, 29, 0,87,98,45 and 75. Then his average score (per innings) for the year is

$$\frac{35+56+124+29+0+87+98+45+75}{9} = 61$$

Similarly, if there are 60 students in a class, instead of talking of the height of each individual student, we can talk of "average" height of the class. The average height of the class is equal to the sum of the heights of all the students of the class divided by the number of students in the class.

Average is also called the "mean" or mean value of all the values.

Effect on average

(i) If the value of each item is increased by the same value P, then the average of the group or items will also increase by p.

(ii)If the value of each item is decreased by the same value p, then the average of the group or items will also decreased by p.

(iii)If the value of each item is multiplied by the same value, then the average of the group or items will also be multiplied by p.

(iv)If the value of each item is divided by the same value P ($P \neq 0$), then the average of the group or items will also be divided by p.

(v)The average of a group of items will always lie between the smallest value in the group and largest value in the group – i.e., the average will be greater than the smallest value and less than the largest value in the group.

Weighted Average

When two groups of items are combined together, then we can talk of the average of the entire group. However, If we know only the average of the two groups individually, we cannot find out the average of the combined group of items.

For example, there are two sections A and B of a class where the average height of section A is 150 cm and that of section B is 160 cm. On the basis of this information alone, we cannot find the average of the entire class (of the two sections). As discussed earlier the average height of the entire class is

$$\frac{\textit{total height of the entire class}}{\textit{total number of students in the entire class}}$$

Since we do not have any information regarding the number of students in the two sections, we cannot find the average of the entire class. Now, suppose that we are given that there are 60 students in the section A and 40 students in section B, then we can calculate the average height of the entire class which, in this case will be equal to

$$\frac{60x150+40x160}{60+40} = 154\text{cm.}$$

This average height 154 cm of the entire class is called "weighted average" of the class.

The above step in calculating the weighted average of the class can be rewritten as below:

$$\frac{60x150+40x160}{60+40} = \frac{60}{100}150 + \frac{40}{100}160$$

$$= \frac{3}{5}150 + \frac{2}{5}160$$

It is clear from the above step that we would have been able to calculate the average height of the entire class even if we had not been given the number of students in the individual sections but only the ratio of the number of students in two sections (which in this caso is 3: 2).

Even if there are more than two groups of items to be combined, then also the weighted average can be calculated by the same method. For example, if three sections in a class have their average marks as 75, 76 and 79 respectively and their respective strengths are 30, 35 and 35, then the average mark of the entire class is given by

$$\frac{30x75+35x76+35x79}{30+35+35} = 76.75$$

The method of deviations we use for calculating averages can be applied to calculate weighted average also. Here, that method will involve finding out deviations from the arbitrarily chosen number and calculating the weighted average of these deviations. In the above example, if we take 70 as the arbitrary figure, then the deviations of the three observed values given from 70 are +5,+6 and +9. The weighted average of these deviations is

$$\frac{30x5+35x6+35x9}{30+35+35} = \frac{675}{100} = 6.75$$

Hence, the weighted average will be

70+6.75 = 76.75

The arbitrary figure chosen can be any figure and if it is selected, as in the previous case, between the smallest and largest observed figure, some of the deviations will be positive and some negative making the final division relatively simpler. For example, in the above case, if we take with 76 as the arbitrary figure, the deviations are -1, 0 and +3. Then the weighted average will be

$$\frac{30x(-1)+35x0+35x(+3)}{30+35+35} = \frac{75}{100} = 0.75$$

Hence, the weighted average will be 76 + 0.75 = 76.75.

Example 1: Find out the average of 308, 125, 45, 120 and 102.

Solution: Required average $= \frac{\text{Sum of given observations}}{\text{No.of Observations}} = \frac{308+125+45+120+102}{5} = \frac{700}{5} = 140$

Example 2: If the weight of A is 60 kg, weight of B is 45 kg and weight of C is 54 kg, what is the average weight of three persons?

Solution: Required average $= \frac{60+45+54}{3} = \frac{159}{3} = 53$ kg.

Example 3: The average expenditure of Chandan in four days is Rs. 90. If his expenditure for the first three days is Rs. 100, Rs. 125 and Rs. 85, respectively, what is the expenditure of Chandan for the fourth day?

Solution: Let, the expenditure for the fourth day = R x

Then, average expenditure $= \frac{\text{Sum of the expenditure of four days}}{4}$

$90 = \frac{100+125+85+x}{4} \Rightarrow 310 + x = 360$ or $x = 360 - 310 = R50$

Example 4: What will be the average of numbers from 1 to 51?

Solution: According to the formula

The average of 1^{st}'n' natural numbers $= \frac{n+1}{2}$

Where n = 51

$\therefore$ Required average $= \frac{51+1}{2} = \frac{52}{2} = 26$

Exercise

1. The average of first five prime number is:
   A] 4.5 B] 5 C] 5.6 D] 7.5

2. The average of first five multiples of 3 is:
   A] 3 B] 9 C] 12 D] 15

3. The average height of 30 boys out of a class of 50 is 160 cm. If the average height of the remaining boys is 165 cm, the average height of the whole class (in cm) is:
   A] 161 B] 162 C] 163 D] 164

4. The average of three numbers is 20. If the two numbers are 16 and 22, the third number is:
   A] 22 B] 20 C] 19 D] 18

5. The average of five results is 46 and that of the first four is 45. The fifth result is:
A] 1 B] 10 C] 12.5 D] 50

6. The average score of a cricketer in three matches is 22 runs and in two other matches, it is 17 runs. Find the average in all the five matches.
A] 20 B] 19.6 C]21 D]19.5

7. The average of 8 numbers is 18. The average of 6 of these numbers is 15. The average of the remaining two numbers is
A] 30 B] 20 C] 27 D] 24

8. Find the average of the first 97 natural numbers
A] 47 B]37 C]48 D]49

9. If the average of three numbers is 135 and the difference between the numbers is 25 then find the lowest number…
A]10 B] 135 C]160 D] 115

10. A man covers a half distance at the rate of at 30 kmph and another half at 40 kmph. Find his average speed of man during the whole journey?
A] 35.5km/h B] 37km/h C] 35km/h D] None of these

11. If the average marks of a class of 50 students in English is 25 and the average marks of the top 20 students is 40, then the average marks of the rest of the students is
A]20 B] 30 C]15 D]10

12. The mean of 100 items was found to be 30. If at the time of calculation two items were wrongly taken as 32 and 12 instead of 23 and 11. What is the correct mean?
A]29 B] 30.5 C] 34.9 D]None of these

13. The average marks of 24 candidates taking an examination are 42. Find what the average marks would have been if one candidate, who scored 88, had been absent.
A] 40 B] 50 C]30 D] 60

14. There are 30 students in a class. The average age of the first 10 students is 12.5 years. The average age of the next 20 students is 13.1 years. The average age of the whole class

A] 12.5 B] 12.7 C] 12.8 D] 12.9

15. The average salary of 3 workers is 95 Rs. per week. If one earns Rs.115 and second earns Rs.65 how much is the salary of the 3rd worker.
A]75 B] 85 C] 95 D]105

16. If the average score of 15 boys in a class is 85 and the average score of 10 girls in the same class is 95, what is the class average score approximately?
A] 90 B] 89 C] 88 D] 81

17. In a group of 15 persons, the average weight is 63.25 kg. A new person joined the group and the average weight decreased to 62.875 kg. Find the weight of the new person.
A] 56.25kg B] 58.5 kg C] 57.25kg D] 58.65kg

18. The average weight of a class of 24 students is 36 kg. When the weight of the teacher is also included the average weight increases by 1 kg. What is the weight of the teacher in kg?.

A]60 B] 61 C]37 D] None of these

19 .The average weight of 8 person's increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. What might be the weight of the new person?

A]65 B] 75 kg C]85 kg D] none of these

20. The average monthly income of P and Q is $5050. The average monthly income of Q and R is $6250 and the average monthly income of P and R is $5200. The monthly income of P is:
A] $3500 B]$4000 C]$4050 D]$ 5000

21. The average of 5 quantities is 10 and the average of 3 of them is 9. What is the average of the remaining 2?
A] 11 B] 12 C] 11.5 D] 12.5

22. The average weight of a class of 29 students is 40kg .if the weight of the teacher he included the average rises by 500gm.what is the weight of teacher?
A]40.5kg B]30.5kg C]45kg D])55 kg

23. The average weight of A, B, C is 45 kg. If the average weight of A and B is 40 kg and that of B and C is 43 kg, find the weight of B.
A] 31 kg B] 35 kg C] 38 kg D] 36 kg

24. The average temperature for Wednesday, Thursday and Friday was 40° c. the Average for Thursday Friday and and Saturday was 41°c.if the temperature on Saturday was 42°c,what was the temperature on Wednesday?

A]39°c B]44°c C]38 °c D] 41°

25. The average weight of Ram, Lakhan and Pavan is 67 kg. If the average weight of Ram and Lakhan is 62 kg and that of Lakhan and Pavan is 68 kg, the weight of Lakhan in kg is
A]60 B] 62 C]58 D] None

26. A class has 20 boys and 30 girls. The average age of boys is 15 years and that of girls is 12 years, what is the avg age of the whole class?
A]13.1 yrs B]13.2 yrs C]13.3yrs D] 13.5 yrs

27. The average of 50 numbers is 38 .if two numbers namely 45and 55 are discarded the average of the remaining numbers is .
A] 36.5 B] 37 C] 37.6 D] 37.5

28. The average of 5 quantities is 6. The average of 3 of them is 8. What is the average of the remaining two numbers?

A]6.5 B] 4 C] 3 D] 3.5

29. The average mark obtained by 22 candidates in an examination is 45. The average of the first ten is 55 while that of the last eleven is 40. The marks obtained by the 11th candidate is
A]0 B] 3 C] 4 D]None of these

30. The average of 6 numbers is 30. If the average of first four is 25 and that of last three is 35, the fourth number is
A]35 B] 30 C] 25 D] 40

31. The average of certain number of terms is equal to 18. When the number 100 is added to the terms, the average becomes 20. Find the initial number of terms.
A]60 B] 50 C] 40 D] 80

32. A housewife has to pick one watermelon from the vegetable cart containing a dozen watermelons with an average weight of 2.5 kg per watermelon. If it is known that the lightest of the watermelons weighs not less than 1 kg and the heaviest not more than 6 kg, then which of the following could not be the average weight of the watermelon (all in kg) in the cart after the house wife has taken her pick?
A] 2.24 B] 2.31 C] 2.8 D] 2.19

33. In a family of 8 males and few ladies .The average monthly consumption of grain per head is 10.8 kg. If the average monthly consumption per head be 15kg in the case of males and 6 kg in the case of females, find the number of females in the family
A]8 B]7 C]9 D]15

34. The difference between the largest and the second largest of 3 numbers is added to the smallest number. Now, the average of the largest, second largest and the new number formed exceeds the average of the original 3 numbers by 5. The largest number exceeds the 2nd largest number by how much?
A]10 B] 15 C] 20 D] 30

35. The average number of shirts with Salman, Ambani and Dalmiya is 60, if all of them reached a shopping mall in Delhi and purchased 6 shirts each of them then the average number of shirts each of them now has:
A]66 B] 63 C] 62 D] Can't be determined

36. If average marks of 3 batches of 55, 60 and 45 students respectively are 50,55 and 60, then average marks of all the students is:

A]53.33 B] 54.68 C] 55 D] none of these

37. The average of 1st five multiples of 3 is:

A]8 B] 9 C]10 D] 11

38. The distance between two stations A and B is 778 km. A train covers the journey from A to B at 84 km per hour and returns back to A with a uniform speed of 56 km per hour. Find the average speed of train during the whole journey.
A]60.3 km/hr B] 35 km/hr C] 57.5 km/hr D]67.2 km/hr

39. The average of runs of a cricket player of 10 innings was 32. How many runs must he made in his next innings so as to increase his average of runs by 4?

A]70 B] 72 C] 74 D] 76

40. A Batsman makes a score of 87 runs in the 17th inning and thus increases his average by 3. Find his average after 17th inning.
A]40 B] 39 C] 52 D] 55

Percentages

It is one of the most important chapters which is backbone of calculations either involved in commercial arithmetic or in real life. So in context of calculation it is necessary to know the clear concepts of percentage which plays a vital role in Data Interpretation.

Percentage – A fraction with denominator 100 is called percent. Basically percent means per hundred.

Conversion of a fraction into percentage- To convert a fraction into percentage, multiply the fraction by 100 and put % sign.

Ex. If fraction is 1/2 then 1/2 x 100 = 50%

If fraction is 7/8 then 7/8 x 100 = 87.5%

Conversion of a percentage into fraction- To convert a percentage into fraction, replace the % sign with 1/ 100 and reduce the fraction into simplest form.

Ex. 20% = 20/100 = 1/5

45% = 45/100 = 9/20

200% = 200/100 = 2

Relation between Fraction and Percentage

Sr. No.	Fraction	Percentage
1	½	50%
2	1/3	33.33%
3	¼	25%
4	1/5	20%
5	1/6	16.66% $= 16\frac{2}{3}\%$
6	1/7	14.28 % $= 14\frac{2}{7}\%$
7	1/8	12.5 % $= 12\frac{1}{2}\%$
8	1/9	11.11% $= 11\frac{1}{9}\%$
9	1/10	10% =
10	1/11	9.09% $= 9\frac{1}{11}\%$
11	1/12	8.33 % $= 8\frac{1}{3}\%$

12	1/13	7.69% = $7\frac{9}{13}\%$
13	1/14	7.14 % = $7\frac{1}{7}\%$
14	1/15	6.67 % = $6\frac{2}{3}\%$
15	1/16	6.25 % = $6\frac{1}{4}\%$
16	1/17	5.88 % = $5\frac{15}{17}\%$
17	1/18	5.55% = $5\frac{5}{9}\%$
18	1/19	5.26 % = $5\frac{5}{19}\%$
19	1/20	5%

Concept of percentage change-

Percentage increase/decrease in a quantity = (change in quantity/original quantity) x 100 %

Example 1: The height of Kapil some time ago was 110 cm. Now the height is 120 cm. Find the percentage change in height.

Solution: % change = 120-110 /110 % = 1/11% = 9.09%

Example 2: Salary of Raja in 2001 was Rs 1000 per day and his salary in 2002 was Rs 1250 per day. Again in 2003 his salary was Rs 100 per day

A) What is the % increase in salary in 2002?

B) What is the % decrease in salary in 2003 over 2002?

Solution: In A part the increase is 125- 100 = 25 hence % increase will be 25/ 100 x 100 = 25%

In B part the decrease is 125- 100 = 25 hence % decrease will be 25/ 125 x 100 = 20%

Advance Concept of percentage change-

If a value p is increased by q%, then we have to decrease the resultant value by (q/q+100)x 100%

Example 3: If the price of a commodity be raised by 20% then by how much % a house holder reduce his consumption so that the expenditure does not change?

Solution: Expenditure = rate x consumption

Here the expenditure remains constant in both the cases

Initially 1x1=1

After change 1.2 x a=1

This means 1.2a = 1 and a = .833 and hence decrease will be 16.66%

Example 4: Two numbers are 25% and 40% less than the third number. What % is the second of the first?

Solution : let three numbers be A,B and C. If C=100 it means B=60 and A=75

Hence B is 60/75 x 100 of A = 80%

Example 5: In a election between two candidates , the candidate who got 57% of valid votes won by majority of 420 votes. Find the total valid votes?

Solution. let total valid votes be v

According to question if one candidate got 57% then second will get 100-57 = 43%

therefore .57v - .43v = 420

.14v=420 and hence v = 3000 votes.

- **If the original population is P and increase in population is at the rate of r % every year then**

  The population after n years will be = $P(1+r/100)^n$

  Similarly

- **If the original population is P and decrease in population is at the rate of r % every year then**

  The population after n years will be = $P(1-r/100)^n$

Example 6: If the present population of a town is 10000 and annual increase is 20%. Then what will be the population after 3 years?

Solution: population after three years = $10000(1+20/100)^3 = 10000(1.2)^3 = 17280$

Exercise

1. What percent of 100 is 60
   A] 80% B] 60% C] 30% D] 45%

2. What is the 20% of 50% of 75% of 50% ?
   A] 5.25 B] 6.75 C] 7.25 D] 5.5

3. If the cost of a calculator worth Rs 250 is increased by Rs 100, the rate of increase is
   A] 100% B] 40% C] 25% D] none

4. A number increased by 10% gives 88. the number is:
   A] 80 B] 60 C] 70 D] 83

5. Ram sells his goods 25% cheaper than Shyam and 25% dearer than Bram. How much percentage is Bram's goods cheaper than Shyam's ?
   A] 33.33% B] 50% C] 66.66% D] 40%

6. In a exam 52% of the candidates failed in science, 42% in maths and 17% in both. The number of those who passed in both the subjects is
   A] 83% B] 64% C] 23% D] 55.5%

7. The price of an item is increased by 20% and then decreased by 20%. The final price as compared to original price
   A] 4% more B] 20% more C] 20% less D] 4% less

8. If A's height is 40% less than that of B, how much percent B's height is more than that of A?
   A] 66.66% B] 76.66% C] 96.66% D] 86.66%

9. A student multiplied a number by 3/5 instead of 5/3, What is the percentage error in the calculation?
   A] 54 % B] 64% C] 74% D] 84%

10. If the price of a book is first decreased by 25% and then increased by 20%, then the net change in the price will be :
    A] 10% B] 20% C] 30% D] 40%

11. If the price of a pen is increased from 20to 25 then the % change in the price will be :
    A] 10% B] 20% C] 30% D] 40%

12. A batsman scored 120 runs which included 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets?
    A] 40 B] 45 C] 50 D] 55

13. A man spends 35% of his income on food, 25% on children's education and 80% of the remaining on house rent. What percent of his income he is left with?

    A] 6 B] 8 C] 10 D] 12

14. A's salary is 40% of B's salary which is 25% of C's salary. What percentage of C's salary is A's salary?
A] 10% B] 20% C] 30% D] 40%

15. Of the 1000 inhabitants of a town, 60 % are males of whom 20 % are literate. If, of all the inhabitants, 25% are literate, then what percent of the females of the town are literate ?
A] 32.5% B] 43% C] 46.6% D] 53.2%

16. X is 75% of Y. The percentage of Y to X is:
A] 25% B] $33\frac{1}{3}\%$ C] 125% D] $133\frac{1}{3}\%$

17. X is 80% of y. The percentage of y to y - x is:
A] 120% B] 400% C] 500% D] None of these

18. Verma gets 10% more than Akbar, then Akbar gets
A] 10% less than Verma B] 9% less than Verma
C] $9\frac{1}{11}\%$ less than Verma D] 10% more than Verma

19. The price of sugar having risen. By 50% by what fraction must a householder reduce his consumption of sugar so as not to increase his expenditure?
A] ¼ B] ⅓ C] ½ D] none

20. The population of a town is 12000, if the number of males be increased by 6% and that of females by 8%, the population would be increased to 12800. Find the strength of females in the town.
A] 3500 B] 4000 C] 4500 D] 5000

21. In a mixture of 80 litres of milk and water, 25% of the mixture is milk. How much water should be added to the mixture so that milk becomes 20% of the mixture?
A] 20 litres B] 15 litres C] 25 litres D] 24 litres

22. 300 gm of sugar solution has 30% sugar in it. How much sugar should be added to make it 60% in the solution?
A] 90 gm B] 180 gm C] 225 gm D] 315 gm

23. A man spent 6.25% of what he had. If his expenditure amounted toRs75, what amount he had?
A] Rs 1000 B] Rs 1200 C] Rs 1600 D] Rs 1100

24. An Engineering student has to secure 40% marks to pass. He get 80 marks and fails by 40 marks. Find his maximum marks.
A] 200 B] 300 C] 250 D] 400

25. The population of a town increased from 70000 to 71050. Find the increase percent.
A] 1.5% B] 1.75% C] 1.25% D] 2%

26. If the income tax be reduced from 3½% to 3⅓% what difference does it make to a man whose annual income in Rs 8400?
A] Rs 7 B] Rs 28 C] Rs 21 D] Rs 14

27. A man spent 12.50% of his money and after spending 75% of the remainder, he had Rs175 left. How much had he at first?
A] Rs. 800 B] Rs1200 C] Rs1600 D] None of these

28. Two numbers are respectively 20% and 50% more than a third number. What percentage is the first of the second?
A] 60% B] 70% C] 80% D] 40%

29. Candidate who gets 30% of the marks in an examination fails by 50 marks. Another candidate who gets 320 marks fails by 30 marks. Find the maximum number of marks.
A] 800 B] 900 C] 1000 D] None of these

30. In an examination paper is set to 2500 pupils of whom ‘one fifth are girls and the rest boys. 5% of the boys fail and 40% of the girls fail. What percent of the whole passed?
A] 82% B] 75% C] 80% D]88%

31. The length, breadth and height of a room in the shape of a cuboid are increased by 10%, 20% and 50% respectively. Find the percentage change in the volume of the cuboid.
A] 77% B] 75% C] 88% D] 98%

32. The price of the sugar is reduced by 25% but in spite of the decrease, Aarush ends up increasing his expenditure on sugar by 20%. What is the percentage change in his monthly consumption of sugar?
A] +60% B] -10% C] +33.33% D] -50%

33. The population of the village of Gavas is 10,000 at this moment. It increases by 10% in the first year. However, in the second year, due to immigration, the population drops by 5%. Find the population at the end of the third year if in third year the population increase by 20%
A] 12,340 B] 12,540 C] 1, 27, 540 D] 12, 340

34. Ram spends 20% of his monthly income on his household expenditure, 15% of the rest on books, 30% of the rest on clothes and saves the rest. On counting, he comes to know that he has finally saved Rs. 9520. Find his monthly income.
A] 10000 B] 15000 C] 20000 D] 12000

35. The population of a village is 5500. If the number of males increases by 11% and the number of females increases by 20% , then the population becomes 6330. Find the population of females in the town.
A] 2500 B] 3000 C] 2000 D] 3500

36. Last, year the Indian Cricket team played 40 one-day cricket matches out of which

they managed to win only 40%. This year, so far it has played some matches, which made it mandatory for it to win 80% of the remaining matches to maintain its exiting winning percentage. Find the number of matches played by India so far this year.
A] 30 B] 25 C] 28 D] Insufficient information

37. In the recent, climate conference in New York, out of 700 men, 500 women, 800 children present inside the building premises, 20% of the men, 40% of the women and 10% of the children were Indians. Find the percentage of people who were not Indian.
A] 73% B] 77% C] 79% D] 83%

38. In an examination, 48% students failed in Hindi and 32% students in History, 20% students failed in both the subjects. If the number of students who passed the examination was 880, how many students appeared in the examination if the examination consisted only of these two subjects?
A] 2000 B] 2200 C] 2500 D] 1800

39. A machine depreciates in value year at the rate of 10% of its previous value. However, every second year there is some maintenance work so that in that particular year, depreciation is only 5% of its previous value. If at the end of the fourth year, the value of the machine stands at Rs. 1,46,205, then find the value of machine at the start of the first year.
A] Rs. 1, 90, 000 B] Rs. 2, 00, 000
C] Rs. 1, 95, 000 D] 2,10,000

40. After three successive equal percentage rise in the salary the sum of 100 rupees turned into 140 rupees and 49 paise. Find the percentage rise in the salary.
A] 12% B] 22% C] 66% D] 82%

Cost Price: The price, at which an article is purchased, is called its ***cost price***, abbreviated as C.P.

Selling Price: The price, at which an article is sold, is called its ***selling price***, abbreviated as S.P.

Profit or Gain: If S.P. is greater than C.P., the seller is said to have a ***profit*** or ***gain***.

Loss: If S.P. is less than C.P., then the seller is said to have incurred a ***loss***.

- Gain = (S.P.) – (C.P.)
- Loss = (C.P.) – (S.P.)

  Loss or gain is always reckoned on C.P.

- Gain% = $\left(\frac{\text{Gain}\times 100}{\text{C.P.}}\right)$
- Loss% = $\left(\frac{\text{Loss}\times 100}{\text{C.P.}}\right)$

- S.P. = $\frac{(100+\text{Gain}\%)}{100}\times \text{C. P.}$

- S.P. = $\frac{(100-\text{Loss}\%)}{100}\times \text{C. P.}$

- C.P. = $\frac{100}{(100+\text{Gain}\%)}\times \text{S. P.}$

- C.P. = $\frac{100}{(100-\text{Loss}\%)}\times \text{S. P.}$

- If an article is sold at a gain of say, 35%, then S.P. = 135% of C.P.
- If an article is sold at a loss of say, 35%, then S.P. = 65% of C.P.

- When a person sells two similar items, one at a gain of say, x%, and the other at a loss of x%, then the seller always incurs a loss given by:

$$\text{Loss}\% = \left(\frac{\text{Common Loss and Gain}\%}{10}\right)^2 = \left(\frac{x}{10}\right)^2$$

- If a trader professes to sell his goods at a cost price, but uses false weights, then

$$\text{Gain}\% = \left[\frac{\text{Error}}{(\text{True Value})-(\text{Error})}\times 100\right]\%$$

Example 1: If the CP of 2 table is equal to the SP of 3 tables, then loss % is :-

Solution: Here m = 2 n = 3 $\therefore \frac{m-n}{n} = \frac{2-3}{3} = \frac{1}{3}$ or $33\frac{1}{3}\%$

Example 2: Two successive discounts of 10 % & 20 % is provided on an article having marked price of 500. What is its SP

Solution: Equivalent successive discount = $10 + 20 - \frac{10x20}{100} = 28\%$

Discount,

∴ 28% of 500 = 140 %

∴ Selling Price = MP –D = 500 – 140 =Rs 360

Example 3: An article is sold at Rs 360 with a gain % of 20% what should be the price of article when there is a loss of 10 %

Solution: $\frac{S1}{100+x} = \frac{S2}{100+y} = \frac{360}{100+20} = \frac{SP}{100-10}$

⇨ SP = 270

We found the SP, with finding the CP of the article.

Example 4: **Raman purchased a car for Rs 5 lac and sold it for Rs 4 lac. Find profit/loss in this transaction.**

Solution: Here SP < CP

∴ Loss is incurred in this case.

According to the formula,

Loss = CP – SP

∴ Loss = Rs 5 lac – Rs 4 lac = Rs 1 lac

Example 5 : **A person buys a toy for Rs 50 and sells it for Rs 75. What will be his gain percent?**

Solution*:* Given that CP = Rs 50, SP = Rs 75

Profit = SP – CP = R (75 – 50) = R 25

According to the formula,

Gain % = $\frac{\text{Profit}}{\text{CP}}$ X 100% = $\frac{25}{50}$ X 100% = 50%

Example 6: **A person buys a cycle for Rs 450 but because of certain urgency, he sells it for Rs 350. Find his loss percent.**

Solution*:* Given that CP = Rs 450, SP = Rs 350

Loss = CP – SP = Rs (450 – 350) = Rs 100

According to the formula,

Loss % = $\frac{\text{Loss}}{\text{CP}}$ X100% = $\frac{100}{450}$ X 100% = $\frac{200}{9}$ % = $22\frac{2}{9}\%$

Example 7: **Find the SP when CP is Rs 80 and gain is 20%.**

Solution*:* SP = 120% of CP

= 120% of 80 = $\frac{120}{100}$ X 80

= Rs 96

Example 8: **Find the CP when SP is Rs. 40 and gain is 15%.**

Solution: CP $= \frac{100}{115}$ of SP $= \frac{100}{115}$ x 40 = Rs 34.78

Example 9: **Find the CP when SP is Rs. 200 and loss is 35%.**

Solution: CP $= \frac{100}{65}$ of SP $= \frac{100}{65}$ x 200 = Rs 307.6

Example 10: **A vendor sells apples at 10 for a rupee gaining 40%. How many apples did he buy for a rupee?**

Solution: SP of 10 apples = Rs 1, gain = 40%

CP of 10 apples = 1 x $\frac{100}{140} = \frac{5}{7}$

$\because$ Rs$\frac{5}{7}$ yields 10 apples

$\therefore$ Rs 1 will yield 10 x $\frac{7}{5}$ = 14 apples

Exercise

1 . A man buys an article for Rs. 27.50 and sells it for Rs 28.60. Find his gain percent

A] 1% B] 2 % C] 3 % D] 4 %

2. A TV is purchased at Rs. 5000 and sold at Rs. 4000, find the lost percent.

A] 10% B] 20% C] 25% D] 28%

3. A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What is the selling price of the cycle?

A] Rs 1090 B] Rs 1160 C] Rs 1190 D] Rs 1202

4. Some articles were bought at 6 articles for Rs. 5 and sold at 5 articles for Rs. 6. Gain percent is:

A] 34 % B] 40 % C]54 % D] 44%

5. When a plot is sold for Rs. 18,700, the owner loses 15%. At what price must that plot be sold in order to gain 15%?

A] Rs 21000 B] Rs 22500 C] Rs 25300 D] Rs 25800

6. 100 oranges are bought at the rate of Rs. 350 and sold at the rate of Rs. 48 per dozen. The percentage of profit or loss is:

A]14 2/7 % gain B] 14 2/7 % loss C]15% gain D] 15% loss

7. A trader mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. His profit percent is:

A] 5 % B] 10% C] 15% D] 8%

8. Alfred buys an old scooter for Rs. 4700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5800, his gain percent is

A]6/19% B] 6/11 % C]60/11% D]38/1 %

9. The cost price of 20 articles is the same as the selling price of x articles. If the profit is 25%, find out the value of x

A] 13 B] 14 C]15 D]16

10. Sahil purchased a machine at Rs 10000, then got it repaired at Rs 5000, then gave its transportation charges Rs 1000. Then he sold it with 50% of profit. At what price he actually sold it.

A] 22000 B]24000 C]26000 D] 28000

11. If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is ?

A]12% B]30% C] 50% D] 60%

12. A shopkeeper sold goods for Rs. 2400 and made a profit of 25% in the process. Find his profit percent if he had sold his goods for Rs. 2040.

A] 6.25% B] 7% C] 6.20% D] 6.5%

13. By selling bouquets for Rs. 63, florist gains 5%. At what price should he sell the bouquets to gain 10% on the cost price?

A] Rs.66 B] Rs. 69 C] Rs. 72 D] Rs. 72.50

14. 125 toffees cost Rs. 75, Find the cost of one million toffees if there is a discount of 40% on the selling price for this quantity.

A] Rs. 3,00,000 B] Rs. 3,20,000

C] 3,60,000 D]Rs. 4,00,000

15.A shopkeeper marks the price of an article at Rs. 80. Find the cost price if after allowing a discount of 10% he still gains 20% of the cost price.

A] Rs. 53.33 B] Rs. 70 C] Rs. 75 D] Rs. 60

16.A dozen pairs of gloves quoted at Rs. 80 are available at a discount of 10%. Find how many pairs of gloves can be bought for Rs. 24.

A] 4 B] 5 C] 6 D] 8

17.A trader mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. His profit percent is:

A] no profit no loss B] 5% C] 8% D] 10%

18.If books bought at prices ranging from Rs. 200 to Rs. 350 are sold at prices ranging from Rs. 300 to Rs. 425, what is the greatest possible profit that might be made in selling eight books ?

A] 600 B] 1200 C] 1800 D] none

19.Ajay bought 15 kg of dal at the rate of Rs 14.50 per kg and 10 kg at the rate of Rs 13 per kg. He mixed the two and sold the mixture at the rate of Rs 15 per kg. What was his total gain in this transaction ?

A] Rs 1.1 B] Rs 11 C] Rs 16.5 D] Rs 27.5

20.A dealer sold two of his cattle for Rs. 500 each. On one of them he lost 10% on the other, he gained 10%. His gain or loss percent in the entire transaction was:

A] 10% loss B] 1% loss C] 1% gain D] 10% gain

21. An item was sold at a price after giving two successive discount of 30% and 50 %. If the selling price of the item was Rs 448, then what was the marked price of the item ?

A] 840 B] 1280 C] 1140 D] 1640

22.If after giving a discount of 12%, a profit of 10% was made on an article, then by what % was the price marked up?

A] 20% B] 25% C] 32.5% D] 35%

23.Anil bought an article at Rs. 200 and sold it at a profit of 10%. What would have been the increase in the profit percent if it was sold for Rs. 230?

A] 5% B] 10% C] 15% D] None of these

24.The cost price of a table is Rs 330. It is sold for a profit of Rs 30 after giving 10% discount find its marked price

A] Rs 400 B] Rs 380 C] Rs 420 D] none

25.How many litres of water should be added to 25 litres of milk costing Rs. 12 per litre, so that by selling the mixture at the cost price, profit of 20% is made?

A] 2 litres B] 5 litres C] 8 litres D] 10 litres

26.By selling 80 oranges a man gains the selling price of 20 oranges. Find the gain %

A] 20% B] 25% C] $33\frac{1}{3}\%$ D] 40%

27.A sold a table to B at a profit of 15%. Later on, B sold it back to A at a profit of 20%, thereby gaining Rs. 69. How much did A pay for the table originally?

A] Rs. 300 B] Rs. 320 C] Rs. 345 D] Rs. 350

28.A bag marked at Rs80 is sold for Rs68. The rate of discount is:

A] 20% B] $17\frac{11}{17}\%$ C] 15% D] 12%

29.If the cost price of 12 tables is equal to the selling price of 16 tables, the loss percent is:

A] 15% B] 20% C] 25% D] 30%

30.A man sold 250 chairs and had a gain equal to selling price of 50 chairs. His profit percent is:

A] 5% B] 10% C] 25% D] 50%

31.A man buys oranges at Rs. 5 a dozen and an equal number at Rs. 4 dozen. He sells them at Rs 5.50 a dozen and makes a profit of Rs. 50. How many dozen oranges did he buy?

A] 30 B] 40 C] 50 D] 60

32.Two mixers and one T.V. cost Rs7000, while two T.V.s and a mixer cost Rs9800. The value of one T.V. is:

A] Rs2800 B] Rs2100 C] Rs4200 D] Rs8400

33.A horse and a cow were sold for Rs12000 each. The horse was sold at a loss of 20% and the cow at a gain of 20%. The entire transaction resulted in:

A] No loss or gain B] Loss of Rs1000

C] Gain Rs1000 D] Gain of Rs2000

34.Hemant sold 10 sarees for a total profit of Rs. 460 and 12 sarees for a total profit of Rs. 144. At what profit per saree should he sell the remaining 20 sarees so that he gets an average profit of Rs. 18 per saree?

A] 7.40 B] 7.60 C] 7.80 D] 8.00

35.If an article is sold at 5% gain instead of 5% loss, the seller gets Rs. 6.72 more. The C.P. of the article is:

A] Rs67.20 B] Rs120 C] Rs134.40 D] Rs240

36.A man bought an article and sold it at a gain of 5%. If he had bought it at 5% less and sold it for Rs 1 less, he would have made a profit of 10%. The C.P. of the article was:

A] Rs100 B] Rs150 C] Rs200 D] Rs500

37.The sale price of an article including the sales tax is Rs616. The rate of sales tax is 10%. If the shopkeeper has made a profit of 12%, then the cost price of the article is:

A] Rs500 B] Rs515 C] Rs550 D] Rs600

38.At what profit percent must an article be sold so that by selling at half that price, there may be a loss of 30%?

A] 25% B] 36% C] 40% D] 42%

39.Jacob bought a scooter for certain sum of money. He spent 10% of the cost on repairs and sold the scooter for a profit of Rs. 1100. How much did he spend on repairs if he made a profit of 20%?

A] Rs400 B] Rs440 C] Rs500 D] Rs550

40.A man gains 20% by selling an article for a certain price. If he sells it at double the price, the percentage of profit will be:

A] 40% B] 100% C] 120% D] 140%

- ✓ Ratio is the relation which one quantity bears to another to the same kind, the comparison made by considering what multiple, part or parts, one quantity is of another.
- ✓ The ratio of two quantities "a" and "b" is represented as "a : b" and read as "a as to b". Here "a" is called antecedent and "b" is called as consequent.
- ✓ Since the ratio expresses the number of times one quantity contains the other, it's **an abstract** quantity.
- ✓ Ratio of any number is expressed after removing all the common factors in the terms. For example, if there are two quantities having values of 8 and 6, then their ratios will be "4 : 3" because a common factor of 2 was removed from both the terms. So to obtain real quantities from the 4:3 , a common factor 2 must be multiplied.

There comes a very important point. If the ratios are given, to find out the real number one has to multiply them by a common factor and if the common factor is not given just assume it. For example, the ratio of two quantities is "a:b" the real numbers can be assumed as "ak" and "bk" respectively.

Types of Ratios:

1. Duplicate Ratio: If a: b is a ratio, then its duplicate ratio is a^2: b^2

   Example: If 2: 3 is a ratio, then its duplicate ratio is 2^2: 3^2 i.e. 4:9
2. Sub-duplicate Ratio: If a: b is a ratio, then its sub-duplicate ratio is $\sqrt{a}$: $\sqrt{b}$

   Example: If 16: 25 is a ratio, then its sub-duplicate ratio is $\sqrt{16}$: $\sqrt{25}$ = 4: 5
3. Triplicate Ratio: If a: b is a ratio, then its triplicate ratio is a^3: b^3

   Example: If 2: 3 is a ratio, then its triplicate ratio is 2^3: 3^3 = 8: 27
4. Sub-triplicate Ratio: If a: b is a ratio, then its sub-triplicate ratio is $a^{1/3}$: $b^{1/3}$

   Example: If 8: 27 is a ratio, then its sub-triplicate ratio is $8^{1/3}$: $27^{1/3}$ = 2: 3
5. Inverse or Reciprocal Ratio: The inverse ratio of a: b is 1/a: 1/b

   Example: If 2: 3 is a ratio, then its inverse ratio is (1/2) : (1/3)
6. Compounded Ratio: Compound ratio is the ratio of the products, of the corresponding terms of two or more simple ratios.

   Example: The compounded ratio of the ratios: (A : B), (C : D), (E : F) is (ACE : BDF).

PROPORTIONS:

When two ratios are equal then the four quantities involved in the two ratios are said to be proportional i.e., if a/b = c/d, then a, b, c and are proportional.

This is represented as a : b :: c : d and is read as "a is to b as c is to d".
A and d is called the EXTREMES and b and c are called the MEANS.

- If a/b=c/d, then:

b:a = d:c	[Invertendo]
a:c = b:d	[Alternendo]
(a+b):b = (c+d):d	[Componendo]
(a-b):b = (c-d):d	[Dividendo]
(a+b)(a-b) = (c+d)(c-d)	[Componendo-Dividendo]

- If (a/b) = (c/d) = (e/f) = ….. =K
  Then, a/b = c/d = e/f = ……. = (a+c+e+…..) / (b+d+f+….) = K

Types of Proportions

1. Mean Proportion – If the given ratio is a : b :: b : c , then b is said to be the mean proportion.
2. Third proportion –

   Case 1. If the given proportion is a : b :: b : c then c is said to be the third proportion of a and b.

   Case 2. If the given proportion is a : b :: c : d then c is said to be the third proportion of a and b.
3. Fourth Proportion – if the given proportion is a : b :: c : d then d is said to be the fourth proportion of a, b and c.

Examples

1. If a : b = 2 : 3 and b : c = 4 : 3, then find a : b : c ?

   Solution:

   a : b = 2 : 3

   b : c = 4 : 3 = (4∗(3/4) : 3 ∗ (3/4)) = 3 : (9/4)

   a :b : c=2 : 3 : (9/4) = 8 : 12 : 9
2. The sum of two numbers is 72. If the two numbers are in the ratio of 5:3. Find the two numbers.

   Solution: As discussed in the theory of this topic, if the two numbers are in the ratio 5:3, let the actual number is 5k and 3k. the sum of two numbers is 72. We have,

   5k + 3k = 72

   K = (72/8) = 9

   Hence 5k = 45 and 3k = 27
3. The numbers of blue and green balls are in the ratio of 9:17. If the blue balls are 24 less than the green balls then find the number of blue and green balls.

   Solution: Let the number of blue and green balls are 9k and 17k. The difference of green and blue balls is 24.

   17k – 9k = 24

   K = (24/8) = 3

   Blue balls, 17k = 17 * 3 = 51

   Red balls, 9k = 9 * 3 = 27
4. A number is divided into parts such that 4 times the first part, 3 times the second part, 6 times the third part and the 8 times the four parts are all equal. In what ratio is the number divided?

   Solution: Let the four parts into which the number is divided is a, b, c and d.

   4a = 3b = 6c = 8d= e (let)

A = (e/4), b = (e/3), c = (e/6), d = (e/8)

Hence, a : b : c : d = (e/4) : (e/3) : (e/6) : (e/8)

= (1/4) : (1/3) : (1/6) : (1/8)

= (24/4) : (24/3) : (24/6) : (24/8)

= 6 : 8 : 4 : 3

5. Two numbers are in the ratio 4:5, if 7 is added to each, the ratio between the numbers becomes 5:6. Find the numbers.

Solution : let the numbers be x and y.

$(x/y) = (4/5) \Rightarrow x = (4/5)y$

$[(x+7)/(y+7)] = 5/6 \Rightarrow 6[(4/5)y + 7)] = 5(y + 7)$ {on cross multiplication and substituting the value of x }

$\Rightarrow (24/5)y + 42 = 5y + 35 \Rightarrow y = 35$

$\Rightarrow X = (4/5)y = 28$

Alternate Method:

Let the numbers be 4k and 5k.

$[(4k + 7) / (5k + 7)] = 5/6$

$\Rightarrow K = 7$

$\Rightarrow$ Numbers are 4k = 28 and 5k = 35

Exercise

Q1. If a:b = 2:3 and the value of a=30, find 'b'?

A]20 B] 35 C] 40 D] 45

Q2. If x:y = 5:4 and x+y = 135, find 'y'?

A] 75 B] 60 C] 50 D] 90

Q3. If p:q = 9:7 and p-q = 40, then find value of 'p'?

A] 90 B] 140 C] 180 D]320

Q4. If a:b = 2:5,then which of the following is equals to the given ratio?

A] 1:4 B] 5:2 C] 4:7 D] 14:35

Q5. If 3x:4y = 3:4, and 3x =75 then find the value of y?

A] 100 B] 75 C]25 D]40

Q6. If 2p:7q = 4:7 and the value of p = 20,then find the value of 10q?

A] 10 B] 70 C]40 D]100

Q7. If p:q = 2:3, q:r = 2:3 then find p:q:r ?

A]2:3:3 B]2:2:3 C] 2:6:3 D] 4:6:9

Q8. If p:q = 1:2 r:q = 2:3 then find q:r:p?

A]1:2:3 B]3:1:2 C] 6:4:3 D]4:3:6

Q9. If p:r=3:5 the which of the following is the possible value of 'p'?

A] 10 b) 11 c) 12 d)13

Q10. If p:q = 3:5 the what is difference between the p&q?

A] 20 b) 24 c) 30 d) can't be determined

Q11. If a:b = 3:4,find 3a+4b : 4a+5b ?

A] 1:1 b) 20:23 c)25:32 d)32:25

Q12. If the current age of a person is 27, then the age after 7 years and age 5 years ago is ?

A] 30,20 b) 25,35 c) 34,22 d)22,34

Q13. If the current age of a person A is double the age of a person B,whose 7 years younger to C.Then what is the age of person A,if age of C is 20 years two years ago?

A] 26yrs b) 30yrs c)34 yrs d)15yrs

Q14. If 0.75 : *x* :: 5 : 8, then *x* is equal to:

A]1.12 b) 1.2 c) 1.25 d) 1.30

Q15. Sharad is 60 years old and Santosh is 80 years old. What is the ratio of their ages?

A] 5:8 b) 3:4 c)10:12 d)15:16

Q16. There are 12 animals in a zoo, what is their head to leg ratio if there are 4 goats, 2 ducks and 6 gorillas?

A] 8:3 b) 3:8 c) 4:5 d) 7:9

Q17. A and B started a business with Rs.60000/- and Rs.80000/- respectively. What is the ratio of their profits after 3 years? A] 1:2 b) 1:1 c) 4:3 d) 3:4

Q18. If 2.4P=0.08q then (p+q)/(q-p)= ?

A] 31/28 b)31/27 c)31/29 d)39/35

Q19. Kiran is younger than Bineesh by 7 years and their ages are in the respective ratio of 7 : 9, how old is Kiran?

A]25 b)24.5 c)26 d)26.5

Q20. What is the duplicate ratio of 3:4 ?

A] 3:4 b) 4:3 c) 9:16 d) 27:64

Q21. What is the sub-triplicate ratio of 64:125?

A] 8:25 b) 4:5 c) 5:4 d) 4:25

Q22. The ratio of Boys & Girls is 10:3, when 36 girl more joined the ratio becomes 10:7. Find the no. of boys?

A] 90 b)100 c)60 d)None

Q23.The income ratio of A & B is 5:8, if income of A increases by 60000, then the new ratio is 5:4, Find current income of A.

A] 120000 b) 240000 c) 360000 d) None

Q24. Ratio of boys and girl is 4:5 when 100 girl left the ratio becomes 6:7, find no. of boys

A] 1200 b) 600 c) 800 d) None

Q25. The salaries A, B, C are in the ratio 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be new ratio of their salaries?

A] 3 : 3 : 10 b) 10 : 11 : 20 c) 23 : 33 : 60 d) Cannot be determined

Q26. If Rs. 782 be divided into three parts, proportional to 1/2: 2/3 : 3/4, then the first part is:

A] Rs. 182 b) Rs. 190 c) Rs. 196 d) Rs. 204

Q27. If x:y = 3:4 and y:z = 8:9, z:a is 15:16, find x:y:z:a

A] 78:82:65:45 b) 30:40:45: 48 c) 76:90:56:80 d) None of these

Q28. A, B, C Started a business with capitals Rs.60,000, Rs.50,000 and Rs.40,000 respectively. After 9 months C left them. If profit after one year us Rs.14,000 then profit of C is

A] Rs.5000 b) Rs.4000 c) Rs.6000 d) Rs.3000

Q29. The ratio of marks obtained by Vinod and Basu is 6:5.If the combined average of their percentage is 68.75 and their sum of the marks is 275, find the total marks for which exam was conducted.

A]150 b)200 c)400 d)none of these

Q30. The ratio of ages of four members of a family is 9:8:3:2.The average age of the family is 22 years. What is the age of eldest person in the family?

A]36yrs b)32yrs c)12yrs d)6yrs

Q31. P,Q,R are three quantities , P varies directly with the sum of Q and R.If both Q and R decreases by 1, find the change in P.?

A]No change b) A decrease of 2 c) An increase of 2 d) cannot be determined

Q32. X varies directly as Y^2 and when Y=12,X=4.Find X when Y=18?

A]$9^{1/16}$ b)9 c)1/9 d) 16/9

Q33. Three positive numbers p,q,r satisfy q+r/p=p+r/q=p+q/r=K, K=?

A]3/2 b) 5/2 c) 3 d) 2

Q34. Alok distributed a certain number of toffees among his brothers bala, chetan and david in the ratio 4:4:9. David distributed the toffees that he had received among his sisters Amitha, Bama and Chandra in the ratio 1:7:8. If Amitha received 18 toffees, the number of toffees distributed by Alok is ?

A] 544 b) 324 c) 574 d) 600

Q35. Divide 66 into 3 parts such that the sum of first two parts equals to third part and second part is three less than twice the first part. What is the ratio of the parts as arranged in the ascending order?

A]14:17:19 b) 5:9:11 c) 11:7:4 d) 4:7:11

Q36. The present ages of A and B are as 6 : 4. Five years ago their ages were in the ratio 5 : 3. Find their present ages.

A] 42, 28 b)36, 24 c) 30, 20 d) 25, 15

Q37. Among 3 men A,B,C ; the money of B is equal to half of the difference between the money of C and double of A. If at the end of the year, total profit = 28000, How much did C gave ?

A]11200 b)11000 c)11400 d)11600

Q38. Ayisha's age is 1/6th of her father's age. Ayisha 's father's age will be twice the age of Shankar's age after 10 years. If Shankar's eight birthdays was celebrated two years before, then what is Ayisha 's present age.

A]6 yrs b) 5yrs c)15 yrs d) 16yrs

Q39. One year ago, the ratio of Sooraj's and Vimal's age was 6: 7 respectively. Four years hence, this ratio would become 7: 8. How old is Vimal?

A]34 b) 36 c) 38 d) 33

Q40. Rahul is 15 years elder than Rohan. If 5 years ago, Rahul was 3 times as old as Rohan, then find Rahul's present age.?

A] 32.5 years b) 27.5 years c) 25 years d) 24.9 years

Time and Work

1. **Work from Days:**

   If A can do a piece of work in *n* days, then A's 1 day's work = $\frac{1}{n}$.

2. **Days from Work:**

   If A's 1 day's work = $\frac{1}{n}$, then A can finish the work in *n* days.

3. **Ratio:**

   If A is thrice as good a workman as B, then:

   Ratio of work done by A and B = 3 : 1.

   Ratio of times taken by A and B to finish a work = 1 : 3.

Exercise

1. A can do a piece of work in 30 days while B alone can do it in 20 days. In how many days can A and B working together do it?
   A. 10 days B. 10.5 days C. 12 days D. 15 days
2. To complete a piece of work A and B take 8 days, B and C 12 days. A, B and C take 6 days. A alone will take **:**
   A. 10 days B. 11 days C. 12 days D. 13 days
3. To complete a piece of work A and B take 18 days, B and C 12 days. A, B and C take 6 days. A and C will take **:**
   A. 6 1/7 days B. 5 1/7 days C. 5.5 days D. 6 days
4. A is thrice as good a workman as B. Together, they finish the work in 9 days. In how many days can it be done by A separately?
   A. 9 days B. 15 days C. 12 days D. 10 days
5. A is thrice as good a workman as B. Together, they finish the work in 9 days. In how many days can it be done by B separately?
   A. 18 days B. 36 days C. 45 days D. 30 days
6. If A can finish a work in 20 days and B is 4 times efficient than A, then the time taken by both A and B working together to complete the work is
   A. 4 daysB. 5 days C. 6 days D. 7 days
7. Mr. Ram is on tour and he has Rs 360 for his expenses. If he exceeds his tour by 4 days he must cut down daily expenses by Rs 3. The number of days of Mr. Ram's tour programme is
   A. 28 days B. 25 days C.24 days D. 20 days

8. A and B together can complete a piece of work in 20 days while A alone can complete the same work in 60 days. B alone will be able to complete the same working in:
   A. 30 days B. 35 days C. 45 days D. 40days
9. A takes thrice as much time as B or 5 times as much time as C to finish a piece of work. Working together, they can finish the work in 2 days. B can do the work alone in:
   A. 6 days B. 8 days C. 10 days D. 12 days
10. A and B can complete a work in 10 days and 15 days respectively. They started doing the work together but after 3 days B had to leave and A alone completed the remaining work. The whole work was completed in
   A. 8 days B. 10 days C. 15 days D. 20 days

11. Eighteen women can do a work in 20 days. 15 men can complete the same work in 30 days. What is the ratio between the capacity of a man and a woman?

   A. 3:4 B. 4:5 C. 5:4 D. 4:3

12. A man, a woman and a boy can complete a job in 3, 4 and 12 days. How many boys must assist 1 man and 1 woman to complete the job in 1/4 of a day?

   A. 1 B. 14 C. 19 D. 41

13. A and B can do a piece of work in 10 days, B and C in 15 days and C and A in 20 days, C alone can do the work in:
   A. 60 days B. 120 days C. 80 days D. 30 days

14. A contractor undertook to finish a certain work in 124 days and employed 120 men. After 64 days, he found that he had already done 2/3 of the work. How many men can be discharged now so that the work may finish in time?
   A. 48 B. 56 C. 40 D. 50

15. The wages of 8 men and 10 boys amount to Rs. 37. If 4 men together receive Rs.1 more than 6 boys, what are the wages of each man and boy respectively?
   A. 2.6 and 1.6 B. 3 and 1 C. 3 and 1.8 D. 2.8 and 3

16. If a pipe A can fill a tank 3 times faster than pipe B. If both the pipes can fill the tank in 32 minutes, then the slower pipe alone will be able to fill the tank in?
   A. 128 minutes B. 124 minutes C. 154 minutes D. 168 minutes

17. A pipe can fill a cistern in 16 hours. After half the tank is filled, three more similar taps are opened. What is the total time taken to fill the cistern completely?
   A. 3 hours B. 2 hours C. 9 hours D. 4 hours

18. Three taps P, Q and R can fill a tank in 12, 15 and 60 hours respectively. If P is open all the time and Q, R are open for one hour each alternatively, the tank will be full in
A. 3 hours B. 2 hours C. 7 hours D. 8 hours

19. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?
A. 10 days B. 12 days C.15 days D. 20 days

20. Two workers A and B are engaged to do a piece of work. A working alone would take 4 hours more to complete the work that when work together. If B worked alone, would take 9 hours more than when work together. The time required to finish the work together is
A. 5 hours B. 8 hours C. 4 hours D. 6 hours

21. A cistern can be filled by a tap in 4 hours while it can be emptied by another tap in 9 hours. If both the taps are opened simultaneously, then after how much time cistern will get filled?
A.7 hours B. 7.1 hours C.7.2 hours D. 7.3 hours

22. Pipe A can fill a tank in 5 hours, pipe B in 10 hours and pipe C in 30 hours. If all the pipes are open, in how many hours will the tank be filled?
A. 2.5 hours B.2 hours C. 3.5 hours D. 3 hours

23. 12 buckets of water fill a tank when the capacity of each buckets is 13.5 litres. How many buckets will be needed to fill the same tank, if the capacity of each bucket is 9 litres?
A.15 buckets B.17 buckets C.18 buckets D.19 buckets

24. Pipes A and B can fill a tank in 5 hours and 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in.
A. 24/9 B. 60/17 C.22/7 D. 58/7

25. A tank is filled by three pipes with uniform flow. The first two pipes operating simultaneously fill the tank in the same time during which the tank is filled by the third pipe alone. The second pipe fills the tank 5 hours faster than the first pipe and 4 hours slower than the third pipe. The time required by the first pipe is:
A. 30 hours B. 15 hours C. 10 hours D.6 hours

26. Two pipes A and B together can fill a cistern in 4 hours. Had they been opened separately, then B would have taken 6 hours more than A to fill the cistern. How much time will be taken by A to fill the cistern separately?
A. 6 hours B. 2 hours C. 4 hours D. 3 hours

27. A tank is filled in 10 hours by three pipes A, B and C. The pipe C is twice as fast as B and B is twice as fast as A. How much time will pipe A alone take to fill the tank?
A. 70 hours B. 30 hours C. 35 hours D. 50 hours

28. A large tanker can be filled by two pipes A and B in 60 minutes and 40 minutes respectively. How many minutes will it take to fill the tanker from empty state if B is used for half the time and A and B fill it together for the other half?
A. 15 min B. 20 min C. 27.5 min D. 30 min

29. A booster pump can be used for filling as well as for emptying a tank. The capacity of the tank is 2400 m3. The emptying of the tank is 10 m3 per minute higher than its filling capacity and the pump needs 8 minutes lesser to empty the tank than it needs to fill it. What is the filling capacity of the pump?
A. 20 m^3 / min. B. 40 m^3 / min. C. 50 m^3 / min. D. 60 m^3 / min.

30. Two pipes A,B can fill a tank in 24 min. and 32 min. respectively. If both the pipes are opened simultaneously, after how much time B should be closed so that the tank is full in 18 min.?
A. 8 min B. 12 min C. 15 min D. 20 min

31. The work done by a woman in 8 hours is equal to the work done by a man in 6 hours and by a boy in 12 hours. If working 8 hours per day 8 men can complete a work in 12 days then in how many days can 12 men, 8 women and 28 boys together finish the same work working 8 hours per day?

A. 4/3 days B. 11/3 days C. 3 days D. 3/2 days

32. Sekar, Pradeep and Sandeep can do a piece of work in 15 days. After all the three worked for 2 days, Sekar left. Pradeep and Sandeep worked for 10 more days and Pradeep left. Sandeep worked for another 40 days and completed the work. In how many days can Sekar alone complete the work if Sandeep can complete it in 75 days?

A. 25 days B. 20 days **C.** 30 days D. 35 days

33. Rahul can finish a work in 5 hours. He invites Sweta and Swati who can work 3/4th as fast as he can to join him. He also invites Manoj and Mohani who can work only 2/5th as fast as he can to join him. If the five person team works the same job and they start together, how long will it take for them to finish the job?

A. 50 days B. 50/29 days C**.** 50/33 days D. 50/30 days

34. Akshay starts working on a job and continues for 15 days and completes 36% of the work. To complete the work, he employs Monika and together they work for 20 days and completed the work. What will be the efficiency ratio of Akshay and Monika? A. 4 : 3 B. 5 : 3 C. 1 : 3 D. **3 : 1**

35. A bath can be filled by the cold water pipe in 40 minutes and by the hot water pipe in 60 minutes. A person leaves the bathroom after turning on both pipes simultaneously and returns at the moment when the bath should be full. Finding, however, that the waste pipe has been open, he now closes it. In 12 minutes more the bath is full. In what time would the waste pipe empty it?

A. 32 min B. 58 min C. 48 min D. 54 min

36. A man makes 60 articles in the 1st hour. His efficiency decreases by 25% in the 2nd hour, increases by 40% in the 3rd hour, decreases by 33% in the 4th hour and increases by 50% in the 5th hour. If he has to work for more than1 hour, then in which hour the average number of articles produced per hour then would be minimum?

A. After 5th hour B. 3rd hour
C. None of these D. Cannot be determined

37. The cost of building a wall is Rs. 1,347. Wages of workmen is increased by 1/8 of the former wages and working hours per day have been increased by 1/20 of the former duration. What is the new cost (approximately) of building a wall, the length of which is two times the length of this wall and the other dimensions of this wall are same?

A. Rs. 2,692 B. Rs. 2,724 C. Rs. 2,886 D. Rs. 2,484

38. Kishore can do a piece of work in a certain number of days. To do the same piece of work, Sheetal takes thrice the number of days as Kishore takes whereas Pankaj takes thrice as many days as Sheetal does and Shweta takes thrice as many days as Pankaj does. Now, they are paired and two groups are formed. The first pair takes one-third the time taken by the second pair to complete the work. Which is the first pair?

A. Kishore and Shweta B. Kishore and Pankaj
C. Pankaj and Sheetal D. Sheetal and Shweta

39. Six men and three women can do a job in 5 days. When ten men and eight women work on the same job, the work gets completed in 2 days. How long will a woman take to do the job, if she works alone on it

A. 24 B. 18 C. 26 D. 27

40. A, B and C can do a piece of work in 12, 18 and 24 days respectively, they work at it together, A stops the work after 4 days and B is called off 2 days before the work is done. In what time was the work finished?(**ELITMUS**)

A. 12 days B. 14 days C. 16 days D. 8 days

Simple Interest

Principal: The money borrowed or lent out for a certain period is called the principal or the sum.

Interest: Extra money paid for using other's money is called interest.

Simple Interest (S.I.): If the interest on a sum borrowed for a certain period is reckoned uniformly, then it is called simple interest.

Let principal = P, Rate = $R\%$ per annum (p.a.) and Time = T years. Then,

S.I.$= \left(\frac{P \times R \times T}{100}\right)$

Compound Interest

Let principal = P, Rate = $R\%$ per annum (p.a.) and Time = T years. Then,

1. When interest is compounded Annually: Amount $= P\left(1 + \frac{R}{100}\right)^n$

2. When interest is compounded Half – yarely: Amount $= P\left(1 + \frac{R/2}{100}\right)^{2n}$

3. When interest is compounded Quarterly: Amount $= P\left(1 + \frac{R/4}{100}\right)^{4n}$

4. When the interest is compounded Annually but time is in fraction, say $3\frac{2}{5}$ years.

   Amount $= P\left(1 + \frac{R}{100}\right)^3 \times \left(1 + \frac{\frac{2}{5}R}{100}\right)$

5. When Rates are different for different years, say $R_1\%$, $R_2\%$, $R_3\%$ for 1st, 2nd and 3rd year respectively.

   Then, Amount$= P\left(1 + \frac{R_1}{100}\right)\left(1 + \frac{R_2}{100}\right)\left(1 + \frac{R_3}{100}\right)$

6. Present worth of x due n years hence is given by:

   Present Worth $= \frac{x}{\left(1+\frac{R}{100}\right)^n}$

Example 1: ***Find the simple interest on Rs. 200 for 5 years at 6% per annum.***

Solution: Here P = R 200, T = 5 years, R = 6%

$\therefore$ SI $= \frac{P \times R \times T}{100} = \frac{200 \times 5 \times 6}{100}$ = R 60

Example 2: ***In what time, 1200 will become Rs.1450 when annual rate of interest is 20%?***

Solution: Here P = R 1200, A = 1450, R = 20%

As we know, A = P + SI

$\Rightarrow$ 1450 = 1200 + SI

$\Rightarrow$ SI = 1450 – 1200 = R 250

Again, $SI = \frac{P \times R \times T}{100}$

Or $250 = \frac{1200 \times 20 \times T}{100} = 240T$

$\therefore$ $T = \frac{25}{24} = 1\frac{1}{24}$ years

Example 3: ***A sum at simple interest of 4% per annum amounts to Rs. 3120 in 5 years. Find the sum.***

Solution: According to the question, T = 5 years, R = 4%, A = R 3120

As we know, $P = \frac{100 \times A}{100+RT} = \frac{100 \times 3120}{100+4 \times 5} = \frac{100 \times 3120}{120}$ = R 2600

Example 4: ***Find the compound interest on Rs. 8000 at 4% per annum for 2 years compounded annually.***

Solution: Here, P = R 8000, R = 4%, Time = 2 years

Now, according to the formula,

Amount $= P\left(1 + \frac{R}{100}\right)^n = 8000\left(1 + \frac{4}{100}\right)^2 = 8000 \text{ X } \frac{26}{25} \text{ X } \frac{26}{25}$ = R 8652.80

$\therefore$ CI = R (8652.80 – 8000) = R 652.80

Example 5: ***Ruchi invested Rs. 1600 at the rate of compound interest for 2 years. She got Rs. 1764 after the specified period. Find the rate of interest.***

Solution: Here, P = R 1600, n = 2 years, A = R 1764

Now, according to the formula,

$$\text{Amount} = P\left(1 + \frac{R}{100}\right)^n$$

$$1764 = 1600\left(1 + \frac{R}{100}\right)^2$$

$\Rightarrow$ $\frac{1764}{1600} = \left(\frac{100+R}{100}\right)^2$ $\Rightarrow$ $\left(\frac{21}{20}\right)^2 = \left(\frac{100+R}{100}\right)^2$

$\Rightarrow$ $\frac{100+R}{100} = \frac{21}{20}$ $\Rightarrow$ $100 + R = \frac{21}{20} \text{ X } 100$

$\Rightarrow$ 100 + R = 105

$\therefore$ R = 105 – 100 = 5%

Example 6: ***Find the compound interest on Rs. 5000 in 2 years at 4% per annum, the interest being compounded half yearly.***

Solution: Here, Principal P = Rs. 5000

Rate R = 4% pa

Time n = 2 years

Now according to the formula,

$$\text{Amount} = P\left(1+\frac{R}{2\times100}\right)^{2n} = 5000\left(1+\frac{4}{200}\right)^{4}$$

$$= \left(5000\times\frac{51}{50}\times\frac{51}{50}\times\frac{51}{50}\times\frac{51}{50}\right) = \left(\frac{51\times51\times51\times51}{1250}\right)$$

$$= R\ 5412.16$$

∴ Compound Interest = R (5412.16 – 5000) = R 412.16

Example 7: ***Find the compound interest on Rs. 8000 at 20% per annum for 9 months, compounded quarterly.***

Solution: Here, P = Rs. 8000, n = 9 months = ¾ years, R = 20%

According to the formula,

$$\text{Amount} = P\left(1+\frac{R}{4\times100}\right)^{4n}$$

$$= 8000\left(1+\frac{20}{400}\right)^{¾\times4} = 8000\left(1+\frac{5}{100}\right)^{3}$$

$$= 8000\ X\ \frac{21}{20}\ X\ \frac{21}{20}\ X\ \frac{21}{20} = \text{Rs. } 9261$$

CI = (9261 – 8000) = Rs. 1261

Exercise

1. Find the simple interest earned on Rs.20000 for 2 years at 10% p.a.
A] Rs.4500 B] Rs.2000 C] Rs.4000 D] Rs.6000

2. Find the compound interest earned on Rs.20000 for 2 years at 10% p.a. the interest being compounded annually.
A] Rs.2100 B] Rs.4200 C] Rs.6300 D] Rs.5600

3. If Rs.2000 amounts to Rs.2500 in 2 years at simple interest, what is the rate of interest per annum?
A] 8% B] 37.5% C] 25% D] 12.3%

4. If Rs.2000 amounts to Rs.2880 in 2 years at compound interest, what is the rate of interest per annum if the interest is being compounded annually?
A] 10% B] 20% C] 15% D] 25%

5. Find the interest earned in the first year on Rs.400 at 20%p.a. compound interest, the interest being compounded half yearly.
A] Rs.42 B] Rs.72 C] Rs.84 D] Rs.144

6. The difference between the interests earned on a principal under a certain rate of compound interest in pth year and (p + 1)th year is more than that in the qth year and (q + 1)th year if
A] p > q B] p<q C] p = q D] can't say

7. Find the effective rate of interest if the normal rate of interest is 10% p.a. and the interest is compounded every six months.
A] 21.5% B] 10.25% C] 5.25% D] 10%

8. The interest for the 3rd year on a certain sum at a certain rate of simple interest is Rs.3000. find the sum of the interests accrued on it in the 6th, 7th and 8th years.
A] Rs.6000 B] Rs.9000 C] Rs.4500 D] Rs.12000

9. The interest on a certain sum lent at compound interest, the interest being compounded annually, in the 2nd year is Rs.1200. The interest on it in the 3rd year is Rs 1440. Find the rate of interest per annum.
A] 10% B] 15% C] 20% D] 25%

10. A certain sum when lent at compound interest, the interest being compounded annually, amounts to Rs.1331 in 3 years and Rs. 1464.10 in 4 years. Find the rate of interest per annum.
A] 10% B] 15% C] 20% D] 5%

11. A sum doubles in 8 years at simple interest. In how many years will the sum become 4 times the original sum?
A] 16 B] 24 C] 64 D] 32

12. A sum doubles in 8 years at compound interest. In how many years will the sum become 4 times the original sum if the interest is compounded annually?
A] 16 B] 24 C] 64 D] 32

13. Which of the following rates of interest yield the maximum interest in 2 years on a certain sum?
A] Interest compounded per month at 1% p.m.
B] Interest compounded per quarter at 3% per quarter
C] Interest compounded per half year at 6% per half year
D] Interest compounded per year at 12% p.a.

14. Find the present value (in Rs.) of Rs.3000 due after 5 years at 10% p.a. simple interest.
A] 1500 B] 1800 C] 2000 D] 2500

15. A sum was lent at 20%p.a compound interest, the interest being compounded annually. Rs.1200 was paid back after 1 year. After another year Rs. 1400 was repaid to clear the loan. Find the sum lent.
A] Rs.8000 B] Rs.6000 C] Rs 2000 D]Rs 4000

16. What would a sum of Rs.8800 amount to in 16 years at a simple interest rate of 12% every year?
A] Rs.14440 B] Rs.18846 C] Rs.25696 D] Rs.32322

17. A sum of money invested at simple interest amounts to Rs 2480 at the end of four years and Rs.4080 at the end of eight years. Find the principal.
A] Rs.2040 B]Rs. 1480 C] Rs.1240 D] Rs.880

18. A man borrowed Rs.50000 at simple interest with the rate of interest not remaining constant for the entire period. He repaid the entire amount after 8 years. The rate of interest for the first two years is 8% p.a., for the next three years it is 10% p.a., for the next two years

it is 5% p.a. and 7% for the last year. How much amount did he repay to clear his loan at the end of the period?
A] Rs.68500 B] Rs.81500 C] Rs.88500 D] Rs.101500

19. A man borrowed Rs.80000 at the rate of 10% p.a. compound interest, interest being compounded annually. How much amount should he have repaid at the end of the first year, if by repaying Rs.55000 at the end of the second year he can clear the loan?
A] Rs.38000 B] Rs.40000 C] Rs.45000 D] Rs.50000

20. Ashok has to deposit a total of Rs.18000 in two savings schemes of a bank, of which the first one yields a simple interest of 6% p.a. and the second one yields 8% p.a. simple interest. How much should Ashok deposit in the first scheme so that the total amount deposited earns interest at a rate of 7.6% p.a.?
A] Rs.4400 B] Rs.3600 C] Rs.7200 D] Rs.5600

21. A certain loan amounts, under compound interest, compounded annually earns an interest of Rs.1980 in the second year and Rs.2178 in the third year. How much interest did it earn in the first year?
A] Rs.1600 B] Rs.1800 C] Rs.1900 D] None of these

22. The difference between the interest earned under compound interest, interest being compounded annually and simple interest for two years on the same sum and at the same rate of interest is Rs.25.60. Find the sum if the rate of interest is 8% p.a.
A] Rs.2000 B] Rs.2500 C] Rs.3200 D] Rs.4000

23. A sum of money under compound interest doubles itself in 4 years. In how many years will it become 16 times itself?
A] 12 years B] 16 years C] 8 years D] None of these

24. Raju took a loan at 8% per annum simple interest for a period of 5 years. At the end of five years he paid Rs.10640 to clear his loan. How much loan did he take?
A] Rs.8500 B] Rs.8000 C] Rs.7700 D] Rs.7600

25. What annual instalment will discharge a debt of Rs.1815 due in 3 years at 10% simple interest?
A] Rs.500 B] Rs.520 C] Rs.550 D] Rs.580

26. A man borrowed Rs.55000 from two banks under compound interest, compounded annually. One bank charged interest at the rate of 8% per year and the other bank at 12% per year. If at the end of the year the man paid Rs.4900 as the total interest to the two banks, how much loan did he take from the first bank?
A] Rs.47500 B] Rs.42500 C] Rs.32500 D] Rs.12500

27. Abhay borrowed some money from Ajay at 15% per annum simple interest. He then added some more amount and lent to Vijay at 20% per annum simple interest. At the end of the year, the difference between the interest received and paid by Abhay is Rs.325. If Abhay lent Rs.3500 to Vijay, then how much loan did Abhay take from Ajay?
A] Rs.1000 B] Rs.1800 C] Rs.2200 D] Rs.2500

28. A man lent Rs. 25000 for one year under compound interest, to five persons. He lent Rs.5500 at 5% p.a. to the first person, Rs 4000 at 13/2 % p.a. to the second person, Rs.3500 at

11/2% p.a to the third person and Rs.7000 at 17/2% p.a. to the fourth person. At what rate of interest should he lend the remaining amount so that he gets an interest at 8% p.a. on the entire amount?
A] 12.25% B] 12.75% C] 13.55% D] 14.05%

29. The difference between the compound interest and simple interest on a certain sum at 12% per annum for 2 years is Rs.126.72. Find the sum.
A] Rs.8000 B] Rs.8800 C] Rs.10200 D] Rs.12400

30. A sum of money is lent at a certain rate of interest at compound interest. If, instead the same amount was lent at simple interest the interest for the first two years reduces by Rs.160 and that for the first three years reduces by Rs.488. Find the sum
A] Rs.22000 B] Rs.46000 C] Rs.52000 D] Rs.64000

31. I invested Rs.50000 in a business. In the first year I suffered a loss of 5%. In the second and the third years (assuming that profit was reinvested for the next year), I made profits of 10% and 15%. Instead had I invested the money at 10% p.a. compound interest for the three years, how much additional amount would I have earned?
A] Rs.3842.50 B] Rs.4242.50 C] Rs.6462.50 D]Rs 8842

32. A certain sum of money increased by 72.8% at a certain rate in three years with interest being compounded annually. If the same sum is lent at simple interest at the same rate of interest, in how many years would it become four times itself?
A] 5 years B] 8 years C] 11 years D] 15 years

33. The compound interest earned in the third and the fourth years on a certain sum of money are Rs.576 and Rs.691.2. Find the sum.
A] Rs.1000 B] Rs.1200 C] Rs.1600 D] Rs.2000

34. A man borrowed Rs.25000 from a bank at 20% compound interest. At the end of every year he paid Rs.8000. At the end of the third year, he wanted to clear the loan. How much should he pay to clear the loan'?
A] Rs.12400 B] Rs.16040 C] Rs.20800 D] Rs.22080

35. Find the present worth of Rs.1749.6 due in 2 years at 8% per annum compound interest.
A] Rs.1200 B] Rs.1400 C] Rs.1500 D] Rs.1650

36. A sum of Rs.2310 is due to be repaid at the end of two years. If it has to be repaid in two equal annual instalments (the instalments being paid at the beginning of the year) at 10% p a. compounded annually, find the value of each instalment.
A] Rs.1210 B] Rs.1000 C] Rs.1100 D] Rs.1331

37. A loan is taken today and repaid in two annual instalments (paid at the end of the year) of Rs.2662 each. The rate of interest is 10% p.a and it is compounded annually. Find the sum borrowed.
A] Rs.4540 B]Rs 4620 C] Rs.2848 D] Rs.2152

38. A man saves Rs.20000 at the beginning of each year and puts the money in a bank that pays 5% interest per year, interest being compounded annually. How much would be the total savings of the man at the end of 5 years? (Given that $(1.05)^5 = 1.276$)
A]Rs. 115920 B] Rs.125570 C] Rs.140460 D] None of these

39. A sum of money compounded annually amounts to Rs.1375 in 5 years and Rs.1980 in 7 years. Find the annual rate of interest

A] 12% B] 20% C] 15% D] 10%

40. The difference in compound interest earned on a certain sum, for which interest is compounded annually, in the first and the second year is Rs.140. If the rate of interest becomes thrice the original rate, then the difference in the amount would be

A] Rs. 420 B]Rs. 1260 C]Rs 1820 D]Rs. 2520

Number Series

A series is a sequence of numbers obtained by some predefined rules and by that predefined rules; it is possible to find out the next term of the series. A series can be created in many ways. So to solve any question based on series, it is not possible to create a generic approach. However a basic understanding of the way using which a series is created is helpful in solving such questions. Depending upon the logic applied for creating the series, they can be classified as follows:

Direct Series: A direct series is that in which any term is found by performing a certain operation on the previous term. AP, GP are some examples of direct series.
Example: 101, 95, 89, 83, 77, ….

Indirect Series: An indirect series is a series which is derived using another series. Such series are created by performing a set of operations on some standard series.
Example: 1, 4, 9, 16, ….

Twin Series: A twin series is that which is made by clubbing of two series. Generally in such series alternative terms, i.e. odd terms & even terms form independent series.
Example: 1, 3, 5, 1, 9, -1, 13, -3, ….

Exercise

1. 380, 188, 92, 44, 20, 8, ?
   A] 1 B] 2 C] 3 D] 4
2. 8, 15, 27, 44, 66, ?
   A] 93 B] 94 C] 95 D] 103
3. 10, 19, 31, 46, 64, ?
   A] 82 B] 92 C] 102 D] 85
4. 2, 10, 60, 420, 3360, ?
   A] 30240 B] 20160 C] 20250 D] 30340
5. 8, 16, 14, 28, 26, 52, 50, ?
   A] 92 B] 98 C] 100 D] 89
6. 1, 2, 2, 5, 3
   10, 4, 17, 5,?
   A] 24 B] 25 C] 26 D] 27
7. 1, 6, 9, 14, 17, ?
   A] 24 B] 22 C] 21 D] None
8. 1, 4, 9, 16, 25, ?
   A] 28 B] 36 C] 48 D] 49

9. 8, 24, 12, ?, 18, 54

A] 28 B] 36 C] 46 D] 38

10. 260, 216, 128, 108, 62, 54, ?, 27

A] 39 B] 49 C] 29 D] 19

11. 28, 33, 31, 36, 34, ?

A] 36 B] 37 C] 38 D] 39

12. 5, 6, 10, 19, ?, 60

A] 35 B] 24 C] 25 D] 45

13. 6, 9, 18, 21, 42, 45, ?,?

A] 80,85 B] 90,93 C] 80,87 D] 88,93

14. 2, 7, 24, 77, ?

A] 238 B] 138 C] 338 D] 438

15. 20, 19, 17, ?, 10, 5

A] 12 B] 13 C] 14 D] 15

16. 1, 6, 13, 22, 33, ?

A] 44 B] 45 C] 46 D] 47

17. 3, 9, 27, 81, ?

A] 324 B] 243 C] 210 D] 162

18. 2, 5, 9, ?, 20, 27

A] 14 B] 16 C] 18 D] 24

19. 19, 2, 38, 3, 114, 4,?

A] 228 B] 256 C] 352 D] 456

20. 3, 6, 18, 72, ?

A] 144 B] 216 C] 280 D] 360

21. 2, 3, 8, 63, ?

A] 1038 B] 3968 C] 1998 D] 3008

22. 12, 32, 72, 152, ?

A] 312 B] 325 C] 515 D] 613

23. 4, 10, ?, 82, 244, 730

A] 24 B] 28 C] 77 D] 218

24. 2, 5, 9, 19, 37, ?

A] 76 B] 75 C] 74 D] 72

25. 1, 4, 2, 8, 6, 24, 22, 88, ?

A] 86 B] 90 C] 154 D] 352

26. 11, 12, 17, 18, 23, 24, ?

A] 12 B] 29 C] 30 D] 35

27. 840, 168, 42, 14, 7, ?

A] 1 B] 7 C] 9 D] 12

28. 2, 8, 4, 64, 7, 343, 11, 1331, 16, ?

A] 23 B] 24 C] 25 D] 26

29. 7, 10, 16, 28, 52, 100, ?

A] 192 B] 162 C] 164 D] 196

30. 0, 2, 8, 14, ?, 34

A] 24 B] 22 C] 20 D] 18

31. 5, 17, 37, 65, ?, 145

A] 95 B] 97 C] 99 D] 101

32. 3, 8, 22, 63, 185, ?

A] 550 B] 310 C] 295 D] 285

33. 97, 86, 73, 58, 47, ?

A] 34 B] 54 C] 55 D] 56

34. 3, 3, 6, 18, 72, 360, ————

A] 2160 B] 2430 C] 1880 D] 2040

35. 113, 136, 161, 188, ----------, 248

A] 213 B] 217 C] 223 D] 219

36. 24, 30, 36, 42, 52, 60, ----------

A] 76 B] 64 C] 90 D] 68

37. 11, 12, 13, 10, 15, 8, ----------,6

A] -17 B] 6 C] 16 D] 19

38. 49, 1625, 3649, 6481, ----------

A] 81100 B] 100144 C] 100121 D] 121169

39. 48, 43, 39, ----------34, 33

A] 35 B] 38 C] 34 D] 32

40. 4, 8, 12, 7, 11, 18, 9, ----------, 22

A] 11 B] 15 C] 13 D] 7

Alphabetic Series

A series is a sequence of numbers obtained by some predefined rules and by that predefined rules; it is possible to find out the next term of the series.

A series can be created in many ways. So to solve any question based on series, it is not possible to create a generic approach. However a basic understanding of the way using which a series is created is helpful in solving such questions.

The numbers are replaced by alphabets and the operations to be done are same as in case of number series.

Example: A, C, E, G, I, ...

Example: AC, EG, IK, MO,....

Directions for questions 1–14: Select from the answer choices an appropriate term to replace the question mark (?) and continue the sequence of the series.

1. A, P, C, Q, E, R, G?

   A] S B] H C] I D] T

2. C, L, E, M, G, N, I?

   A] J B] K C] P D] O

3. Z, X, U, Q, L,?

   A] K B] I C] F D] G

4. H, J, M, O, R, T,?

   A] W B] S C] U D] V

5. B, D, G, K, M, P,?

   A] Q B] R C] T D] S

6. G, J, M, P, S, V,?

   A] W B] Z C] X D] Y

7. F, L, Q, U, X,?

   A] B B] Z C] Y D] A

8. Z, T, O, K, H, ?

   A] G B] F C] E D] C

9. C, E, H, L, Q,?

   A] W B] D C] N D] X

10. H, V, G, T, F, R, E, P, ?, ?

    A] N, D B] M, E C] D, N D] E, M

11. KPA, LQB, MRC, NSD,?

    A] OTE B] PTE C] NST D] DMO

12. FAG, HEI, JIK, LMM,?
A] NUO B] NQU C] NQO D] OQO
13. ABA, EDE, IFI,?
A] NHN B] MHM C] HMH D] KIK
14. ADG, EHK, ILO,?
A] MPS B] UPS C] CPU D] SMS
15. B1A, D8E, F271, ----------, J125Q
A] H81M B] H64M C] H64L D] H64K
16. BDFH, EHKJ, ----------, OLP, UOT
A] HLPK B] HLOL C] HLPL D] HLQL
17. CDF, EFH, HIK, ----------, TUW, EFH
A] MNP B] LMO C] MOP D] MNO
18. BDFH, CBID, DZLZ, EXOV, ----------
A] FVRS B] FVQR C] FVRR D] FURR
19. FTJ, LON, RJR, XEV, ----------
A] YFU B] DZZ C] YFV D] DYZ
20. TUW, VWY, XYA, ZAC, ----------
A] CDJ B] BCE C] BLM D] ADF
21. AN, BO, CP, DQ, ----------
A] ER B] FG C] EJ D] FR
22. JL, MO, PR, SU, ----------
A] VZ B] WY C] WC D] VX
23. 1L2, 1Q7, 2TO, ----------, 2X4, 2Z6
A] 2WI B] 2V2 C] 1M4 D] IP5
24. 4B2, 8G1, 9H1, ----------, 7B5
A] 8E2 B] 9C7 C] 6C3 D] 7D4
25. a_bb_a_bb_
A] bbba B] abab C] baba D] abaa
26. aba_aba_aba_aba_
A] bbbb B] abab C] bbba D] abba
27. BAZ, DCY, FEX, ?
A] FXW B] FEX C] FEY D] None of these
28. a_bbaa_baa_b
A] aba B] aab C] abb D] bab
29. ab_a_b_a_bba
A] aaab B] baba C] abba D] baab
30. aa_cb_aa_ _bba_ccb_
A] cbccab B] cabaac C] abababab D] aaabca

Coding Decoding

A CODE is a 'system of signals'. Therefore, Coding is a method of transmitting a message between the ender and the receiver without a third person knowing it. Before transmitting, the data is encoded and at receiver side encode 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. The Coding and Decoding is classified into seven types according to the on what way it is doing. They are of following types.

Type 1: Letter Coding.

Type 2: Number Coding.

Type 3: Substitution.

Type 4: Mixed Letter Coding.

Type 5: Mixed Number Coding.

Description of different types with solved examples

Type1: 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. If **TAP** is coded as **SZO**, then how is **FREEZE** coded?

Sol. Clearly each letter in the word **TAP** is moved one step backward to obtain the corresponding letter of the code.

S Z O

-1↑

T A P

Thus, in **FREEZE**, F will be coded as E, R as Q,E as D and Z as Y.

So, the code becomes **EQDDYD**.

3. 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 **PATTERN**, P will be coded as O, and the sequence of the remaining letter in the cod 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)

4. I f 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 analyse the code as per the directions.

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

5. 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 given the 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**.

6. 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**.

Case2: Number to letter coding.

7. 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: 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.

9. 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.

10. If **DIAMOND** is called **GOLD** , **GOLD** is called **SILVER**, **SILVER** is called **RUBY** and **RUBY** is called **EMERALD**, which is the cheapest jewel ?

Sol: We know that '**SILVER'** is cheapest. But, as given, '**SILVER'** is called '**RUBY'**. So, **RUBY** is the cheapest.

TYPE 4: 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 analyses 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.

11. 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 5: 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.

12. 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'**.

Exercise

Directions for Questions 1 to 5:-In each of the following questions find out the correctly coded alternative from amongst the given four alternatives (a),(b),(c),(d).if there is no correct alternative your answer will be (e)

LETTER: C Z N V R S W F D

CODE DIGIT: 8 6 4 7 2 9 3 5 1

1. FRCSNW
A] 528243 B] 5269435 C] 578943 D] 528963
E] NONE OF THESE

2. ZDRCVF
A] 612875 B] 619875 C] 612845 D] 612835
E] NONE OF THESE

3. WNCSZV
A] 348267 B] 318267 C] 348957 D] 348967
E] NONE OF THESE

4. RDNFVS
A] 21679 B] 216549 C] 214579 D] 218579
E] NONE OF THESE

5. NWZDVS
A] 438179 B] 423179 C] 456179 D] 436189
E] NONE OF THESE

FIND THE MISSING LETTERS IN THE FOLLOWING SERIES.

6.A,C,E,G_____
A] I B] k C] M D] H
7. A, D , H ,M ,_____
A] Q B] R C] S D] P
8. AZ, CX, FU, _____
A] JQ B] KP C] IR D] JV
9. LOAD is coded as 'MPBE' and DRIVE as ESJWF HOW YOU CODE LADDER?
A] NCFFGT B] MBEEFS C] MDEEFS D] MBEESP
10. 'START=WALKA' and BUDPI=XZFMQ what should be 'STUPID' = ?
A] WAZMQF B] BAZMQF C] WAZNOF D] WAZMMF

Questions (11-15):

NOTE: Here the coding scheme is A=Z,B=Y,C=X AND so on answer the following
11. LIMIT
A] KNRNG B] JKOKG C] ORNRG D] MHLHS

12. SOUR
A] HLFI B] IFLT C] IHIF D] FLTI

13. POCKET
A] KLXPUG B] KLXVPG C] KLXPUC D] KLXPVG

14. GROUP
A] TILEL B] TILFK C] TFGFK D] TILGH

15 ZERO
A] BUHN B] AUTL C] AVIL D] AYTI

Questions (16-18):
NOTE: IN THE FOLLOWING THE CODE USED IS ASED ON THE SKIPPING PATTERN.EACH LETTER IS CODED WITH THE FOURTH ONE IN ALPHABETIC ORDER,I.E A=(BC)D,B=(CD)E,C=(DE)F AND SO ON

16. SHOOT
A] TJPPR B] VKRRW C] UMSSX D] VKSSW

17. VWDUW
A] START B] STAIN C] STEPS D] STAND

18. GRZQ
A] OWNS B] DONE C] SHUT D] DOWN

19. IF 'DBMDVUUB' STANDS FOR CALCUTTA, HOW will you write 'BOMBAY'?
A] DPNCBX B] CPMCBZ C] CPNCBZ D] DQODDX

20. In Certain Code 'DELHI' Is Written as 'CDKGH''MADRAS' as LZCQZR' how will PATNA be coded?
A] OZSMZ B] QBUMB C] OZTMZ D) OZMSZ

Questions (21-23):
NOTE: if "TENDER" is coded as "SDMCDQ". Select appropriate code for the words

21. SOUPS
A] PNTQS B] RMTOR C] RNTOR D] TRQUT

22. LIMITED
A] DETIMIL B] KHLHSDC C] DETIMIL D] KHLHSDE

23. PEONS
A] ODNMS B] ODNMT C] ODNMR D] ODMNR

NUMBER CODING:

24. if 12345671586 stands for "TERMINATION" what number code stands for "MOTION"?
A] 458569 B] 481586 C] 438586 D] 458685

25. If BAD is coded as "5-4-7",how will you code NATION?

A] 17-4-23-12-18-17 B] 17-4-22-18-18-17
C] 17-4-23-12-14-17 D] 17-5-21-11-18-16

26. If “ACT” is coded as “23-25-16”, HOW you code the “BELOW”
A] 23-8-11-19 B] 24-8-10-19 C] 23-8-11-18 D] 24-8-11-19

27. If “BOOK” IS 43 and “PEN” IS 35 and “COPY” is
A] 48 B] 59 C] 60 D] 79

28. “DRAMA” is coded as 37 and “STAGE” as 52.how you will code “ACTOR”?
A] 50 B] 56 C] 65 D] 57

29. SUPER=79, SUPREME =97, LABOUR=?
A] 49 B] 69 C] 79 D] 89

30. LIME =39, WHITE=?
A] 65 B] 66 C] 56 D] 75

31. If “BARS”=10 and “BEERT”=10,”DEEZ” will be ?
A] 12 B] 15 C] 14 D] 10

32. PEN=32, PAPER=51,DESK=?
A] 35 B] 40 C] 80 D] 10

33. if M=13 and O=15 code DEAF
A] 4316 B] 4516 C] 4518 D] 4616

34. HIGH=5645, and “DEEM”=12210, how will you code “feel”?
A] 3449 B] 4337 C] 3229 D] 2336

35. if B=25 and C=24, encoded “96872”
A] RUSTY B] POSTS C] DUSTY D] HASTY

Questions (1, 2) :
NOTE:”GOPAL” is coded as “84321”and “TREES”AS 56779.Based on the above coding give codes for the following

1. GREAT
A] 85725 B] 86925 C] 86725 D] 86625

2. PETER
A] 37576 B] 39596 C] 97576 D] 84346

3. If CASE is coded as 5231, chair is coded as 58206 and TEACH is coded as 71258,

what does 586037 stand for?
A] CHASTE B] CHRIST C] STREET D] CHEESE

4. In certain code BELOW is written as FCKVN. How is GIVEN written in that code?
A] JHWMD B] HJUMD C] JHMUD D] JHUMD

5. In a certain code BOARD is written as 54#12 and MORE IS written as 941$.how is DREAM written on that code?
A] 21$#9 B] 2$1#9 C] 51$#9 D] 25$#9

Alphabet test

1.Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Wasp (B) Waste (C) War (D) Wrinkle (E) Wrist

2. Arrange the given words Alphabetical Order and choose the one that comes first
(A) Science (B) Scrutiny (C) Scripture (D) Scramble (E) Script

3. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Intense (B) Intellect (C) Intend (D) Intelligent (E) Integument

4. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Nature (B) Native (C) Narrate (D) Nascent (E) Naughty

5. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Didactic (B) Dictum (C) Dictionary (D) Diastole (E) Dictate

6. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Praise (B) Practical (C) Prank (D) Prayer (E) Practices

7. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Animate (B) Animosity (C) Anguish (D) Ankle (E) Announce

8. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Probe (B) Proclaim (C) Proceed (D) Problem (E) Probate

9. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Guarantee (B) Group (C) Grotesque (D) Guard (E) Groan

10. Arrange the given words Alphabetical Order and choose the one that comes first.
(A) Signature (B) Sight (C) Shrine (D) Shrill (E) Shrink

11. How many pairs of letters in the word 'CHAIRS' have as many letters between them in the word as in the alphabet?
(A) 2 (B) 3 (C) 1 (D) 4

12.How many pairs of letters are there in the word " CASTRAPHONE" which have as many letters between them in the word as in the alphabet?
(A)4 (B)5 (C)6 (D)1

13.A B C D E F G H I J K L M N O P Q R S T U V W X Y Z .
Which letter in this series is the eighth letter to the right of the letter which is tenth letter to the left of the last but one letter of the series?
(A) A (B) X (C) C (D)W

14. How many meaningful English words can be formed with the letters ESRO using each letter only once in each word?
(A) NONE (B) 1 (C) 3 (D) 2

15.If in the word 'DISTURBANCE', the first letter is interchanged with the last letter, the second letter is interchanged with the tenth letter and so on, which letter would come after the letter T in the newly formed word ?
(A) S (B) I (C) N (D)T

16. If the first and second letters in the word DEPRESSION' were interchanged, also the third and the fourth letters, the fifth and the sixth letters and so on, which of the following would be the seventh letter from the right ?
(A) R (B)P (C)D (D)S

17. What should come next in the following letter sequence?
A A B A B C A B C D A B C D E A B C D
(A)A (B)E (C)C (D)B

18. If the first half of the English alphabet is reversed and then next portion of English alphabet is reversed so as 'A' takes the portion of 'M' and 'N' takes the portion of 'z' then which letter will be 6th to the left of 17th letter to the right of 7th letter from the left?
(A) U (B) V (C) C (D) D

19.From the word 'LAPAROSCOPY' how many independent meaningful words can be made without changing the order of the letters and using each letter only once ?
(A) 3 (B)4 (C)2 (D)1

20.From the word 'ASTOUNDER', how many independent words can be made with-out changing the order of the letters and using each letter only once ?
(A)1 (B)2 (C)3 (D)4

21.Arrange these words in alphabetical order and tick the one that comes last
1. Abandon 2. Actuate 3. Accumulate 4. Acquit 5. Achieve
(A) Actuate (B) Abandon (C) Accumulate (D) Achieve

22. S L U A Y J V E I O N Q G Z B D R H
What will come in place of question (?) mark in the following series :
LA UJ YI EG ?
(A)QH (B) VN (C) FG (D)UV

23. How many pairs of letters are there in theword 'HORIZON' which have as many letter between them in the word as in the English alphabet ?
(A) 2 (B) 3 (C) 1 (D) MORE THAN 3

24. If the first and second letters in the word 'MISFORTUNE' were interchanged, also the third and the fourth letters, the fifth and the sixth letters and so on, which letter would then be the eighth letter counting to your left ?
(A) O (B) F (C) T (D) I

25.How many independent words can 'HEARTLESS' be divided into without changing the order of the letters and using each letter only once ?
(A) 2 (B) 3 (C) 4 (D) 5

26.Arrange the following words will come middle if all of them are arranged alphabetically as in a dictionary?
(A)SAVE (B) SAVIOUR (C) SAVAGE (D) SAVOUR

27.How many meaningful English words can be made from the letters EOPR using each letter only once?
(A) NONE (B) 1 (C) 2 (D) 3

28. If the sequence of the English alphabet isreversed then which letter is 7th to the left of second vowel from the right of English alphabetin the new series?
(A) U (B) V (C) L (D) M

29.Q 2 3 B 9 V 5 L S R F P012
If one is subtracted from each of the numbers,which of the following will be the fourth to the right of the thirteenth from the right ?
(A)4 (B) 8 (C) 2 (D) 1

30. If the positions of the third and tenth letter of the word 'DOCUMENTATION' are interchanged, and likewise the position of thefourth and seventh letters, the second and sixth letters, is also interchanged, which of thefollowing will be eleventh letter from the right end ?
(A) U (B) C (C) T (D)I

31. How many letters are there in the word'CREATIVE' which have as many letters between them in the word as in the alphabet ?
(A) 1 (B) 2 (C) 3 (D) 4

32. If the last four letters of the word 'CONCENTRATION' are written in reverse order followed by next two in the reverse order and next three in the reverse order and then followed by the first four in the reverse order, counting from the end, which letter would be eighth in the new arrangement ?
(A) E (B) N (C) R (D) T

33. If the position of the first letter of English alphabet is interchanged with the position of the fourteenth letter, second letter with fifteenth letter, and so on, in such a way that M is interchanged with Z, then which of the following letters will be 7th to the right of 13th letter from the right?
(A) U (B) G (C) H (D) I

34. LAP BUT CAR SON HID
If the positions of the first and the thirdalphabets of each of the words are interchanged, which of the following wouldform a meaningful word in the new arrangement?
(A)HID (B) SON (C) LAP (D)BOTH LAP AND BUT

35. Of the six members of a panel sitting in arow X is to left of Q but on the right of P. Y is in the right of Q but is on the left of Z, Z is to theleft of R. Find the members who are at the extreme?
(A) QZ (B)PR (C) XY (D) AZ

36.C U B A E D E D A B E B A U C D B C A D B D U
B C A C B E D A
If all the A's are dropped from the above arrangement, which of the following will be eleventh from the left end of the above arrangement?
(A)E (B) D (C) C (D)U

37. If it is possible to form a word with the first ,fourth, seventh and eleventh letters in the word “SUPERFLUOUS" write the first letter of that word otherwise x is the answer
(A) S (B) L (C) E (D) X

38.If it is possible to make a meaningful word from the third, fifth, sixth, eighth and tenth letters of the word PAROCHIALISM using each letter only once, third letter of the word would be your answer. If more than one such word can be formed, your answer would be 'y' and ifno such word can be formed, answer is 'G'.
(A) Y (B) G (C) A (D) X

39.In the following Color sequence, R stands for Red, Y for Yellow , G for Green, B for Blue and W for white of the sequence is continued, which colour will come next?
B B R B R W B R W G B R W G Y B R B R W B R W
(A)White (B) Yellow (C) Red (D) Green

40. How many pairs of letter are there in the word 'BUCKET' which have as many letters Between them in the word as in the alphabet?
(A)1 (B)3 (C) more than 3 (D) 2

1. **Odd Days:**

We are supposed to find the day of the week on a given date.

For this, we use the concept of 'odd days'.
In a given period, the number of days more than the complete weeks are called **odd days**.

2. **Leap Year:**

(i). Every year divisible by 4 is a leap year, if it is not a century.
(ii). Every 4^{th} century is a leap year and no other century is a leap year.
Note: **A leap year has 366 days.**
Examples:

i. Each of the years 1948, 2004, 1676 etc. is a leap year.

ii. Each of the years 400, 800, 1200, 1600, 2000 etc. is a leap year.

iii. None of the years 2001, 2002, 2003, 2005, 1800, 2100 is a leap year.

3. **Ordinary Year:**
The year which is not a leap year is called an **ordinary years**. An ordinary year has 365 days.

4. **Counting of Odd Days:**

1. 1 ordinary year = 365 days = (52 weeks + 1 day.)

∴ 1 ordinary year has 1 odd day.

2. 1 leap year = 366 days = (52 weeks + 2 days)

∴ 1 leap year has 2 odd days.

3. 100 years = 76 ordinary years + 24 leap years

= (76 x 1 + 24 x 2) odd days = 124 odd days.

= (17 weeks + days) ≡ 5 odd days.

∴ Number of odd days in 100 years = 5.

Number of odd days in 200 years = (5 x 2) ≡ 3 odd days.

Number of odd days in 300 years = (5 x 3) ≡ 1 odd day.

Number of odd days in 400 years = (5 x 4 + 1) ≡ 0 odd day.

Similarly, each one of 800 years, 1200 years, 1600 years, 2000 years etc. has 0 odd days.

Day of the Week Related to Odd Days:

No. of days:	0	1	2	3	4	5	6

Day:	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.

Exercise

1. If the day before yesterday was Thursday. When will Sunday be?
   (a) Tomorrow (b) Day after tomorrow (c) Today (d) Two days after today

2. What was the day of week on March 31, 1995?
   (a) Sunday (b) Monday (c) Friday (d) Wednesday

3. If the fifth day of a month is Friday, which of the following will be the Seventh day from 10th of that month?
   (a) Tuesday (b) Monday (c) Wednesday(d) Thursday

4. My uncle shall visit me after 64 days of my father's birthday. If my father's birthday falls on Tuesday, what shall be the day on my Uncle's visit?
   (a) Wednesday (b) Sunday (c) Tuesday (d) Monday

5. If the Seventh day of a month is three (3) days earlier than Friday. What day will it be on the nineteenth day of the month?
   (a) Monday (b) Wednesday(c) Friday (d) Tuesday

6. Day after tomorrow is my birthday. On the same day next week falls 'Holi'. Today is Monday. What will be the day after 'Holi'?
   (a) Wednesday (b) Thursday (c) Friday (d) Saturday

7. The year after 1996 having the same calendar as of 1996 will be
   (a) 1999 (b) 1998 (c) 2001 (d) 2024

8. What was the day of the week on January 1998?
   (a) Wednesday (b) Friday (c) Monday (d) Thursday

9. Prabir started for office every morning at 9.15 a.m. and reached there at 9.55 a.m. On Wednesday he started five minutes later than the time he started on Friday. Three days out of five days in the week he started late, out of which Friday was one of the days. On how many days did he start in time?
   (a) Two (b) Three (c) Four (d) One

10. What was the day of the week on December 26, 1995?
    (a) Friday (b) Tuesday (c) Sunday (d) Monday

11. Today is Wednesday, what will be the day after 94 days?
    (a) Monday (b) Tuesday (c) Wednesday(d) Sunday

12. Today is Thursday. The day after 59 days will be _____
    (a) Friday (b) Thursday
    (c) Saturday (d) Monday

13. Today is Friday. The day after 63 days will be
    (a) Friday (b) Thursday
    (c) Saturday (d) Monday

14. What is the number of odd days in a leap year?
    (a) 1 (b) 2
    (c) 3 (d) 4

15. Find the day of the week on 27th December 1985
    (a) Saturday (b) Friday
    (c) Sunday (d) Monday

16. On what days of July, 1976 did Sunday fall?
    (a) Sunday 1st, 8th, 16th
    (b) Sunday 6th, 20th, 27th
    (c) Sunday 4th, 11th, 18th,25th
    (d) Sunday 14th, 21st, 28th

17. What was the day on 26th January 1950, when 1st Republic day of India was celebrated?
    (a) Monday (b) Tuesday
    (c) Thursday (d) Friday

18. What was the day on 1st January 1901?
    (a) Monday (b) Wednesday
    (c) Sunday (d) Tuesday

19. What was the day on 31st October 1984?
    (a) Friday (b) Sunday
    (c) Wednesday (d) Monday

20. What was the day on 14th March 1993?
    (a) Friday (b) Thursday
    (c) Sunday (d) Saturday

21. What was the day of the week on 2nd July 1984?
    (a) Wednesday (b) Tuesday
    (c) Monday (d) Thursday

22. The year next to 1990 will have the same calendar as that of the year 1990 is _____
    (a) 2001 (b) 1997
    (c) 1996 (d) 1992

23. On what dates of December 1984 did Sunday fall?
    (a) 6th, 13th, 20th, 27th
    (b) 7th, 14th, 21st, 28th
    (c) 2nd, 9th, 16th, 23rd, 30th
    (d) 1st, 8th, 15th, 22nd

24. Find the year from 2015 to 2030 which have the same calendar as that of 2015.
    (a) 2019 (b) 2023
    (c) 2026 (d) 2029

25. Consider the dates 9.11.99 or 11.9.99, depending on how you write the date. Either way, Day * Month = Year, where the year is written as the last two digits. How many other days in the 20th century can you find that will have this property?
    (a) 211 days (b) 212 days
    (c) 214 days (d) 215 days

26. What dates of July 2004 were Mondays?
    (a) 1th, 8th, 15th, 22nd, 29th
    (b) 5th, 12th, 19st, 26th
    (c) 4nd, 11th, 18th, 25th
    (d) 6th, 13th, 20th, 27nd

27. Find the percentage of people whose birthday falls on the last day of February in a leap year if number of births everyday remains the same?
    (a) 2.74 (b) 0.2732 (c) 0.0684 (d) 0.0027

28. A person born on 25th March 1925 used to enjoy every Monday as a holiday after attaining his 25th birthday. How many weekends could he have enjoyed such a holiday before attaining his 30th birthday?
    (a) 260 (b) 261 (c) 272 (d) 250

29. How many times the 29th day of the Month does occur in 400 consecutive years?
    (a) 4500 (b) 4498
    (c) 4497 (d) 4495

Blood Relations

Family tree logical problems mainly deals with the hierarchical structure of a family i.e. grandparents, parents, children etc. Various relationships b/w family members of two or three generations will be given. The entire family tree has to be constructed by putting the various relationships together.

The typical relationships that are seen in family tree problems are parent-child, husband-wife, grandparent-grandchild, uncle/aunt-nephew/niece, brother-in-law/sister-in-law/parents-in-law

One of the many kinds of questions generally asked in logical reasoning tests is the FAMILY/ Blood RELATION questions. These questions start with a series of related statements, usually about 5 to 7 with one statement directly under the other. Following the series of statements, several multiple-choice questions are given. Careful analysis of each of the statements, singly and collectively, is required in order to arrive at the correct choices.

In most of such questions, it is very useful to draw a diagram relating to what is mentioned in the passage or in the set of statements. Another way to improve your ability to answer family/blood relation questions is to compose your own questions about your own or any other family known to you. Accordingly, test the validity of your own questions by trying them on some of your friends.

On the following pages, you will find several practice situation/questions for this type.

A list of important relations that are mostly asked in the examinations

1.	Brother	Son of mother or father
2.	Sister	Daughter of mother or father
3.	Aunt	Sister of mother or father
4.	Uncle	Brother of mother or father
5.	Cousin	Son/daughter of uncle/aunt
6.	Grandmother	Mother of father or mother
7.	Grandfather	Father of father or mother
8.	Niece	Daughter of brother/sister
9.	Nephew	Son of brother/sister
10.	Brother-in-law	Sister's husband, brother of wife or husband
11.	Sister-in-law	Brother's wife, sister of wife or husband
12.	Daughter-in-law	Wife of son

Exercise

1. T is the son of Q. Q is the daughter of Z, Z is the Husband of W and W is the mother of only son X. What is X to T?
   A] Uncle B] Father C] Son D] Grandfather
2. Q is the sister of S and S is the wife of K. What is K to Q?
   A] Father-in-law B] Sister-in-law
   C] Brother-in-law D] Mother-in-law

3. D and C are children of E, E is the mother of D but C is not the brother of D. What is C to E?
A] Son B] Daughter C] Sister D] Brother

4. Z is the father of X and Y is the brother of X. What is Y to Z?
A] Daughter B] Brother C] Sister D] Son

5. Mona is the sister of Ravi, Ravi is the brother of Money, Money is the son of Pushpa. What is Pushpa to Mona?
A] Sister-in-law B] Sister C] Mother D] Daughter

6. L is the father of K, K is the brother of M and M is the wife of P. What is P is K?

A] Father-in-law B] Sister-in-law
C] Son-in-law D] Brother-in-law

7. R is the sister of F, F is the Husband of G's Sister and L is Sister of G. what is L to R?
A] Mother-in-law B] Sister-in-law
C] Sister D] Daughter-in-law

8. U is the brother of Q. Q is the Husband of K and L is the father of U. What is L to K?
A] Mother-in-law B] Father-in-law
C] Mother D] Sister

9. Mohan is the brother of Dinesh. Dinesh is the son of Murti. Murti is the wife of Mehar Chand. What is Mehar Chand to Mohan?
A] Father B] Brother C] Mother D] Uncle

10. A is the brother of T. T is the daughter of Q. Q is the wife of S. What is S to A.?
A] Father B] Mother C] Brother D] Sister

11. Santosh is the brother of Dinesh. Dinesh is the brother of Paritosh. Paritosh is the Husband of Garima. Haider is the father of Santosh. What is Haider to Garima?
A] Brother B] Father C] Father-in-law D] Uncle

12. A is the sister of B. B is the daughter of C. C is the daughter of D. What is D to A?
A] Father B] Mother C] Brother D] Grandmother

13. U is the father of W. W is the sister of X. X is the husband of Z. What is Z to U?
A] Son-in-law B] Daughter-in-law C] Daughter D] Sister

14. Ajit is the brother of the son of Sethi's son. What is the relationship between Ajit and Sethi?
A] Ajit is the grandson of Sethi
B] Ajit is the son of Sethi
C] Ajit is the brother of Sethi
D] Ajit has no relation with Sethi

15. Raghu is the father of Romi and Raghav is the son of Ramesh. Amit is the brother of Raghu. If Romi is the sister of Raghav, how is Ramesh related to Amit?

A] Brother-in-law B] Sister-in-law C] Husband D] Daughter

16. Q's mother is sister of P and Daughter of M. S is the daughter of P and sister of T. How is M related to T?

A] Father B] Grandfather
C] Grandmother D] Grandfather/Grandmother

Directions: A is the son of B. C, B's sister has a son D and a daughter E. F is the maternal Uncle of D.

17. How is A related to D?

A] Cousin B] Nephew C] Uncle D] Brother

18. How is E related to F?

A] Sister B] Daughter C] Niece D] Wife

19. How many Nephews does F have?

A] None B] One C] Two D] Three

Directions:

A is the father of C, but C is not his son.
E is the daughter of C. F is the spouse of A.
B is the brother of C. D is the son of B.
G is the spouse of B. H is the father of G.

20. Who is the Grandmother of D?

A] A B] C C] F D] G

21. Who is the son of F?

A] B B] C C] D D] E

22. C is A's father's nephew. D is A's cousin but not the brother of C. How is D related to C?

A] Father B] Sister C] Mother D] Aunt

23. P is the son of Q, while Q and R are sisters to one another. T is the mother of R. If S is the son of T which of the following statements is correct?

A] T is the brother of Q B] S is the cousin of P
C] Q and S are sisters D] S is the maternal uncle of P

24. A is the brother of B, B is the brother of c. D is the father of A. Based on these three statements which of the following statements cannot be definitely true?

A] B is the brother of A B] B is the son of D
C] A is the brother of C D] C is the brother of A

25. A is the father of X; B is the mother of Y. The sister of X and Z is Y. which of the following statements cannot be definitely true?

A] B is the mother of Z B] X is the sister of Z
C] Y is the son of A D] B has one daughter
E] B is the wife of A

26. Rajan is the brother of Sachin and Manik is the father of Sachin. Jagat is the brother of Priya and Priya is the daughter of Sachin. Who is the Uncle of Jagat?

A] Rajan B] Manik C] Sachin D] None

Directions:

Six persons A, B, C, D, E and F are travelling together. B is the son of C but C is not the mother of B. A and C are married couple. E is the brother of C. D is the daughter of A and F is the brother of B.

27. How many male members are there in the Family?

A] 1 B] 2 C] 3 D] 4

28. Who is the mother of B?

A] D B] F C] E D] A

29. How many children does A have?

A] One B] Two C] Three D] Four

Directions:

A + B means A is the daughter of B; A*B means A is the son of B and A-B means A is the wife of B.

30. If P*Q-S which of the following is true?

A] S is wife of Q B] S is the father of P
C] P is the daughter of Q D] Q is the father of P

31. If T-S*B-M, which of the following is not true?

A] B is the mother of S B] M is the husband of B
C] T is wife of S D] S is daughter of B

32. If Z*T-S*U+P, what is U to Z?

A] Mother B] Grandmother
C] Can't be determined D] None of these

33. P*Q means P is the sister of Q: P+Q means P is the father of Q:P-Q means P is the mother of Q. Which of the following means S is the Aunt of T?

A] T*M+S B] S+T*M
C] S*M+T D] S*M+R-T

34. If A+B means A is the son of B, A-B means A is the husband of B, A*B means A is the sister of B. Then which of the following shows that the relation Q is the maternal uncle of P?

A] P+B-R*Q B] P-B+R*Q
C] P+B*R-Q D] P*B-R+Q
E] None of these

35. Pointing to a man on the stage, Rita said, "He is the brother of the daughter of the wife of my husband. " How is the man on the stage related to Rita?

A] Son B] Husband C] Cousin
D] Nephew E] Brother-in-law

36. Showing the man receiving the prize, Saroj said, “He is the brother of my uncle’s daughter.” Who is man to Saroj?
A] Son B] Brother-in-law C] Nephew
D] Uncle E] Cousin

37. Pointing to a photograph, a person tells his friend,” she is the granddaughter of the elder brother of my father.” How is the girl in the photograph related to this man?
A] Niece B] Sister C] Aunt
D] Sister-in-law E] Maternal aunt

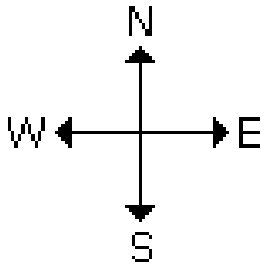
38. Pointing to a photograph, Vipul who is a male said,” She is the daughter of my grandfather’s only son.” How is Vipul related to the girl in the photograph?
A] Father B] Brother C] Cousin
D] Data inadequate E] None of these

39. Pointing out to a lady, a girl said, “She is the daughter-in-law of the grandmother of my father’s only son.” How is the lady related to the girl?
A] Sister-in-law B] Mother C] Aunt
D] Mother-in-law E] Cousin

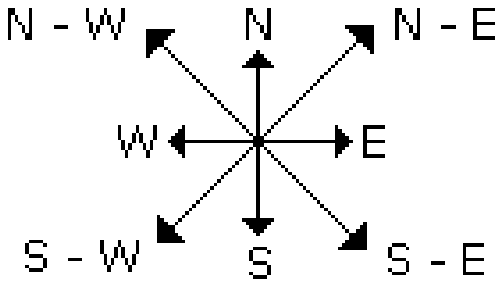
40. Rita told Mani, “The girl I met yesterday at the beach was the youngest daughter of the brother-in-law of my friend’s mother.” How is the girl related to Rita’s friend?
A] Cousin B] Daughter C] Niece
D] Friend E] Aunt

DIRECTION SENSE

There are four main directions - **East**, **West**, **North** and **South** as shown below:



There are four cardinal directions - **North-East (N-E)**, **North-West (N-W)**, **South-East (S-E)**, and **South-West (S-W)** as shown below:



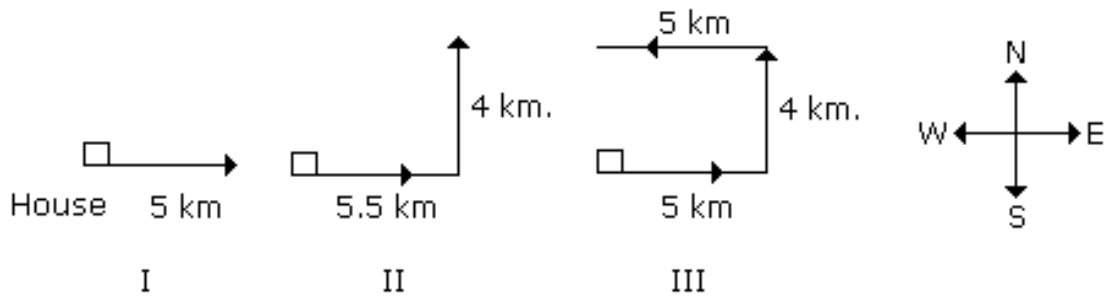
- ✓ At the time of sunrise if a man stands facing the east, his shadow will be towards west.
- ✓ At the time of sunset the shadow of an object is always in the east.
- ✓ If a man stands facing the North, at the time of sunrise his shadow will be towards his left and at the time of sunset it will be towards his right.
- ✓ At 12:00 noon, the rays of the sun are vertically downward hence there will be no shadow.
- ✓ There is generally two types of rotation called clockwise which means the manner in which clock revolve and second is anticlockwise which means opposite of the manner in which the clock revolve.

Main types of questions are given below:

Type 1:

Siva starting from his house, goes 5 km in the East, then he turns to his left and goes 4 km. Finally he turns to his left and goes 5 km. Now how far is he from his house and in what direction?

Solution:

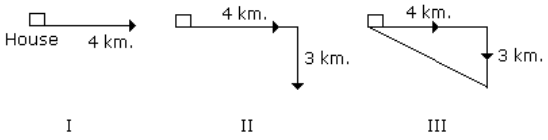


From third position it is clear he is 4 km from his house and is in North direction.

Type 2:

Suresh starting from his house, goes 4 km in the East, then he turns to his right and goes 3 km. What minimum distance will be covered by him to come back to his house?

Solution:



$$\text{Minimum distance} = \sqrt{(4)^2 + (3)^2}$$

$$= \sqrt{16 + 9}$$

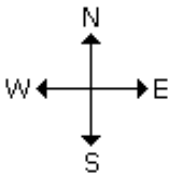
$$= \sqrt{25}$$

$$= 5 \text{ km.}$$

Type 3:

One morning after sunrise Juhi while going to school met Lalli at Boring road crossing. Lalli's shadow was exactly to the right of Juhi. If they were face to face, which direction was Juhi facing?

Solution: In the morning sunrises in the east.



So in morning the shadow falls towards the west.

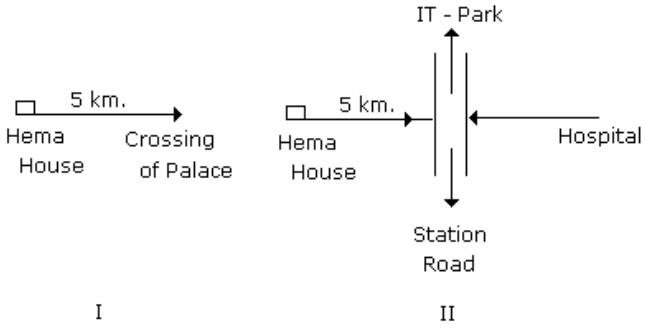
Now Lalli's shadow falls to the right of the Juhi. Hence Juhi is facing South.

Type 4:

Hema starting from her house walked 5 km to reach the crossing of Palace. In which direction she was going, a road opposite to this direction goes to Hospital. The road to the right goes to

station. If the road which goes to station is just opposite to the road which IT-Park, then in which direction to Hema is the road which goes to IT-Park?

Solution:



From II it is clear that the road which goes to IT-Park is left to Hema.

Excercise

1. Santosh goes first 7 km north then turns left and move 10 km, again he turns left and moves 7 km, how far is he from the starting point?
   A] 7km B] 10km C] 17 km D] 24 km

2. One morning Udai and Vishal were talking to each other face to face at a crossing. If Vishal's shadow was exactly to the left of Udai, which direction was Udai facing?
   A] East B] west C] north D] south

3. Mohan travels 7 km to the north direction from where he is standing and turns to his right. He then walk straight for another 3 km. turning to his right he moves 7 km. how many km away from starting point is he?
   A] 1 B] 2 C] 3 D] 5

4. If South-East becomes North, North-East becomes West and so on. What will West become?
   A] north east B] north west C] south east D] south west

5. A man walks 5 km toward south and then turns to the right. After walking 3 km he turns to the left and walks 5 km. Now in which direction is he from the starting place?
   A] west B] south C] north east D] south west

6. Ranuka started walking from her house, she first walked for 3 km towards west, then she turned towards north and moved 4 km in that direction. How far is ranuka from her house?
   A] 3 km south B] 3 km S-E C] 5 km west D] 5 km N-W

7. Rahul put his timepiece on the table in such a way that at 6 P.M. hour hand points to North. In which direction the minute hand will point at 9.15 P.M.?
   A] South-East B] south C] north D] west

8. Rasik walked 20 m towards north. Then he turned right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Finally he turns left and walks 15 m. In which direction and how many metres is he from the starting position?
A] 15 m west B] 30 m east C] 30 m west D] 45 m east

9. A started on Monday morning for his office from his home in Mumbai. He first drove 4 km towards east and then turned right and moved for another 2 km and again he turn right and drove for another 2 km. From that very point he drive 1 km north and moved 2 km towards west. Then he is how far from the starting point and in which direction?
A] 2 km east B] 2 km west C] 1 km south D] 1 km north

10. A man ran 20 m to the east, then he turned left and walk for 15 m, then turned right and went 25 m and then turned right again and went 15 m. how far is he from starting point?
A] 45 m B] 35 m C] 25 m D] 15 m

11. Starting from the point X, Jayant walked 15 m towards west. He turned left and walked 20 m. He then turned left and walked 15 m. After this he turned to his right and walked 12 m. How far and in which directions is now Jayant from X?
A] 32 m, South B] 47 m, East C] 42 m, North D] 27 m, South

12. One evening before sunset Rekha and Hema were talking to each other face to face. If Hema's shadow was exactly to the right of Hema, which direction was Rekha facing?
A] north B] south C] east D] data inadequate

13. A boy rode his bicycle northward, then turned left and rode 1 km and again turned left and rode 2 km. He found himself 1 km west of his starting point. How far did he ride northward initially?
A] 1 km B] 2 km C] 3 km D] 5 km

14. K is 40 m South-West of L. If M is 40 m South-East of L, then M is in which direction of K?
A] east B] west C] north- east D] south

15. A man walks 2 km towards North. Then he turns to East and walks 10 km. After this he turns to North and walks 3 km. Again he turns towards East and walks 2 km. How far is he from the starting point?
A] 10 km B] 13 km C] 15 km D] none

Directions for 16 to 19: If u start running from a point to north and after covering 4 kms you turn to your left and run 5 km, and then again turn to your left and run 5 km and then turn to the left again and run another 6 km and before finishing you take another left turn and run 1 km then answer the following questions.

16. How many km are you from the place you started?
A] 1 km B] 2 km C] 3 km D] 4 km

17. In which direction you will be running while finishing?
A] east B] west C] north D] south

18. After taking the second turn, in which direction will you be running?

A] east B] west C] north D] south

19. From the finishing point if you have to reach the point where you started, in which direction will you have to run?

A] east B] west C] north D] south

Direction for 20 to 22 : Ram walks 2 km. towards north and turn to his right and walked 4 km more. He then turns to his right and walks 4 km and turn again to his right and walk another 4 km. Here he meets Renu coming from the opposite direction. They both stop here.

20. What is the distance between the starting point and ending point?

A] 10 km B] 8 km C] 6 km D] 2 km

21. From which direction Renu was coming?

A] south B] north C] west D] east

22. If Ram is to go again reach the point from where he started in which direction will he have to go from where he's standing now?

A] east B] north C] south-east D] north-east

23. Neeta starting from point X and walked straight 5 kn west, then turned left and walk 2 km and again turn left and walked 7 km. In which direction is she from X?

A] N-E B] S-W C] S-E D] N-W

24. Four friends M, N, O and P are playing cards. M and N are partners. P faces towards North. If M faces towards west, then who faces towards south?

A] O B] N C] P D] none

25. 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^{o} and to cover 30 m. In which direction should he go?

A] west B] south C] south west D] south east

26. Rohan walked 50 m towards East, took a righ turn and walked 30 m. Which direction is he now from his starting position ?

A] South-West B] North-East C] North-West D] South-East E] None of these

27. Pranav started walking straight facing West . After walking some distance he took a left turn and again after walking some distance he took a left turn. Which direction is he facing now?

A] West B] North C]East D] South E] Cannot be determined

28. Nishtha lives to the North of Nihar who lives to the West of Harry. Arun who lives to the South of Nishtha has house in which direction with respect to Harry ?

A] North-West B] North C]South-West D] Cannot be determined E] None of these

29. R is to the West of P.T is to the East of S.P is to the North of S. T is in which direction with reference to R ?

A] West B] East C] North D] South E] None of these

30. There are four towns P,Q,R & T. Q is to the South-West of P, R is to the East of Q and South-East of P, and T is to the North of R in line with QP. In which direction of P is T located?
A] South-East B] North C]North-East D] East E] None of these.

31. Kamal is facing South . Kunal is walking towards him , stops, and turns to his right . He sees Komal standing before him facing him. Which direction Komal is facing ?
A] West B] South C] East D] Date inadequate E] None of these

32. Ashok walked five metres towards North, took a right turn and walked 10 metres and again he took a right turn and walked 10 metres and in the end turns left . Which direction is he facing now ?
A] South B] West C] North D] South-West E] None of these

33. Karan walked 40 m towards North, took a left turn and walked 20 m and again took a left turn and walked 40 m. How far he is from his starting position and in which direction ?
A] 10 m North B] 50 m South C] 20 m West. D] 10 m South E] None of these

34. Sahil cycled 10 miles from point P towards the East. He then took right turn and peddled 5 miles and taking another right turn cycled again for another 5 miles. In which direction is point P from where Sahil is standing now ?
A] West B] North-West C] North-East D] Cannot be determined E] None of these

35. Amit walked 30 metres towards East, took a right turn and walked 40 meters. Then he took a left turn and walked 30 metres. In which direction is he now from the starting point and how far?
A]50 m East B] 10 m South-East C] 20□13 m South East D] 20 m North-East E] None

36. Kunal walks 10 kms towards North, from here he goes 6 kms towards South. Then he goes 3 kms towards East. How far and in which direction is he from the starting point?
5 km West B] 5 km North-East C] 7 km East D] 7 km West E] None of these.

37. A man goes 30 km to South and then turning left he goes 20 km. Then turning to North he goes 30 km. After this, turns to his left and goes 40 km. How far is the from his starting point?
A] 10 km (B] 6 km C]20 km D] 25 km (5) None of these

38. A boy walks northwards. After a while he turns towards his right and a little further to his left. Finally after walking a distance of one kilometer, he turns to his left again. In which direction he is moving now ?
A] North B] South C] East D] West (5) None of these

39. From his office, Rakesh walks 10 km to the East turns left walks 6 km and turns left and walks another 14 km. Which direction is he facing ?
A] South B] East C] West D] North (5) None of these

Ranking and Seating in a line

Set I – Ranking Questions where you Find the Number of People in a Row and the Position of One Person from Both the Ends is Known

One of the ways, in which ranking questions are framed, is where you have to find out the total number of people in a row and the only data you are given for such reasoning questions is the position of one person from both the ends.
In a row of people, if the position of a particular person is 'r' from the right end and 'l' from the left end, then the total number of people in the row is-

$$\text{No. of People} = l+r-1$$

Similarly in ranking questions, where a group of people have been ranked in an order and you know the rank of one person from the top and the bottom, then you can find the number of people in the group using the above formula.

Problem 1: Rahul ranked 9th from the top and 38th from the bottom in a class. What is the total number of students in the class?
Solution 1:
From the concept discussed above, you know that ranking questions that need you to find the total number of people in a group can be solved by use of the formula-

$$\text{No. of People} = l+r-1$$

Substituting values in the above formula we get-
Total No. of Students in the Class = 9 + 38 – 1 = 46
Therefore, the total number of students in the class is 46.

Set II – Ranking Questions where you Find the Position of a Person from one End and the Position of the Person from other End is Known

Another way in which ranking questions are asked in competitive exams, is where you have to find the position the person from one end of the order and the position from the other end is already given. This can again be done by the use of a simple formula-
In a row or queue where total people are't', if the position of a particular person is 'p' from one of the end, then his position from the other end will be-

$$\text{Position from other end} = t-p+1$$

Problem 1: In a class of 36 students, Ravi's rank from the top is 12. Radhika ranks 3 places over Ravi. What is Radhika's rank from the bottom?
Solution 1:
In this question we can find Radhika's rank from the bottom only if we know her rank from the top, so let's first find Radhika's rank from the top-
Rank from Top = 12 – 3 = 9
So, Radhika's rank from the top is 5, knowing this we can use the formula to get the answer-

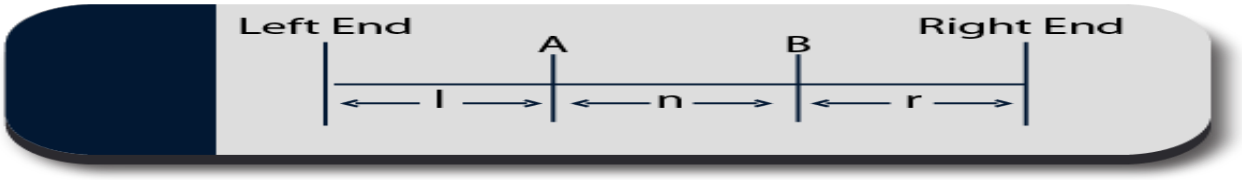
$$\text{Position from other end} = t-p+1$$

Substituting values in the above formula, we get-
Radhika's rank from the bottom = 36 – 9 + 1 = 28
So Radhika's rank from the bottom is 28.

Set III – Ranking Questions where you Find the Position of a Person when Positions of Two Different People from Two Ends is Known

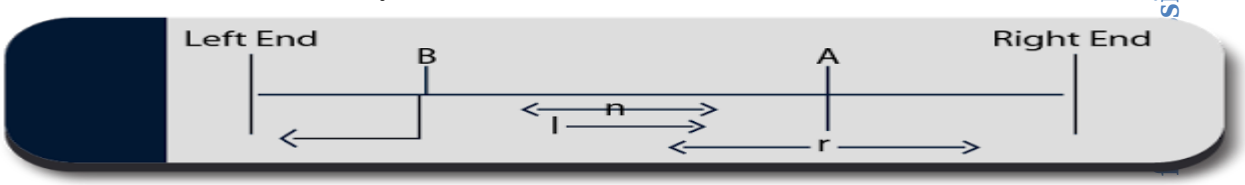
One of the most popular ranking questions asked in competitive exams like IBPS PO, SBI PO and SSC CGL, is where you have to find the position of a person in a row and for reference you are given the positions of two different people from two ends.
In a row of people, if the positions of A and B from the left end and the right end are 'l' and 'r' respectively, and there are 'n' people between A and B, then the total number of people in that row can be given in two ways, let's see both of them-

Possibility 1: A is closer to Left Hand Side and B is closer to Right Hand Side
Let us consider the two ends and the position of A and B, the position of A from the left end is 'l', the position the B from the right end is 'R' and the difference of positions between A and B is 'n'.
Based on this information we can say that-



Total number of people in the row = l + n + r

Possibility 2: A is closer to Right Hand Side and B is closer to Left Hand Side
Let us once again consider the two ends and the position of A and B, the position of A from the left end is 'l', the position the B from the right end is 'R' and the difference of positions between A and B is 'n'. However, the diagram will be slightly different this time because we reverse the position of A and B in the row.
In this case, A is closer to the right hand and B is closer to the left hand.
Based on this information we can say that-



Now when we find the total number of people in the row we add 'l' and 'r', but if you look carefully at the diagram, you will realize that 'n', which is the number of ranks between A and B, also A and B have been counted twice, so to justify these the formula will be-
Total number of people in the row = l + r – n – 2 = l + r – (n +2)

Now since we have 2 possibilities in such cases, you must be wondering what will be the correct answer in such ranking questions. The way to approach to solve such ranking questions is to get your answer by both the formulas and then based on the options choose your correct answer.

Problem 1: P is 14th from the left and Q is 7th from the right end in a row of boys. What is the total number of boys in the row if there are 4 boys between P and Q?

1) 25 2) 23 3) 21 4) 19 5) 20

Solution 1:

Based on the discussion above about such reasoning questions, we know there are two possibilities, so we can simply substitute the values in the formulas-

Possibility 1:

Substituting values we get-
Total Number of People in the Row= 14 + 7 + 4 = 25

Possibility 2:

Substituting values we get-
Total Number of People in the Row= 14 + 7 – (4 + 2) = 15
Now we have 2 possible options for the given question- 25 and 15
Like mentioned before, in such reasoning questions we look at the given options and arrive at the correct answer. 15 in not in the given options while 25 is there.
Therefore, the correct answer is Option 1- 15

Ranking Questions for Practice

Question 1: Rahul ranked ninth from the top and thirty-eighth from the bottom in a class. How many students are there in the class?
1) 45 2) 46 3) 47 4) 48 5) None of these
Question 2: In a class of 40 children, Sunetra's rank is eight from the top. Sujit is five ranks below Sunetra. What is Sujit's rank from the bottom?
1) 27 2) 29 3) 28 4) 26 5) None of these
Question 3: In a row of boys, A is fifteenth from the left and B is fourth from the right. There are three boys between A and B. How many boys are there in the row?
1) 9 2) 10 3) 14 4) 22 5) 18

Exercise

Q1. Which is the third number to the left of the number which is exactly in the middle of the following sequence of numbers?

1 2 3 4 5 6 7 8 9 2 4 6 8 9 7 5 3 1 9 8 7 6 5 4 3 2 1

a)2 b)4 c)5 d)6 e)7

Q2. How many 3s are there in the following sequence which are neither preceded by 6 nor immediately followed by 9?

9 3 6 6 3 9 5 9 3 7 8 9 1 6 3 9 6 3 9

a)One b) Two c) Three d) Four e)None of these

Q3. Count each 7 which is not immediatelyPreceded by 5 but is immediately

followed by either 2 or3.How many such 7s are there ?

5 7 2 6 5 7 3 8 3 7 3 2 5 7 2 7 3 4 8 2 6 7 8

a)2 b)3 c) 4 d) 5

Q4. In the following sequence, if the positions of the letters in the sequence remain unchanged and the positions of the numbers in the sequence are reversed then which of the following letter/number is fifth to right of ninth letter/number from the right?

Q D T P 5 2 3 F G 5 4 B 7 H J 9 K 6 M N 8

a)P b) 6 c) 3 d) None of these

Q5. How many letters are there in the following sequence which are immediately preceded by a number and immediately followed by a letter?

Q D T P 5 2 3 F G 5 4 B 7 H J 9 K 6 M N 8

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

Q6. If letter of below given series arewritten in reverse order then whichletter will be third to the left of eighteenth letter from your right?

N O P Q Y B Z A R S H I J K L M T U V G F E W X D C

a)Z b)F c)I d)L

Q7. Which of the following is exactly in the midway between the ninth from left end

and the seventh from the right end?

E G 4 B H 7 5 @ K 8 D N £ Q Z $ W 3 C 1 9 * L B 2 S 6

a)Z b) B c) $ d)W

Q8. Which of the following is neither immediately preceded by a letter nor \ immediately followed by a letter?

M K 3 $ R E 5 F % T U J * 8 P H B N 2 I S # A 3 7 D 4

a)None b) B c) $ d) 7

Q9. How many such numbers are there in the series which are immediately followed by its multiple?

6 7 5 4 3 7 4 8 9 3 2 5 4 7 9 8 6 8 7 1 2 5 3 7 6 8 9 3 6

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

Q10. If the order of the digits in each of the following numbers is reversed and

then newly formed numbers are arranged in ascending order, what will be the middle digit of the fourth number from the top?

845, 632, 489, 398, 817, 546, 279, 638

a)1 b) 3 c) 4 d) 8

Q11. How many letters are there in the series which are immediately preceded

as well as immediately followed by a number?

F 6 Z 7 1 T 3 U X R 5 2 9 P 4 B A 7 8 D 4 6 F G H 2 P 3 Q R

a)2 b) 3 c) 5 d) 4

Q12. If all the numbers are dropped from theseries and the order of letters is reversedwhich letter will be 6th to the right to fifth letter from left?

F 6 Z 7 1 T 3 U X R 5 2 9 P 4 B A 7 8 D 4 6 F G H 2 P 3 Q R

a)F b) X c) R d) G

Q13. If the sequence is given below the sum of the two digits which immediately precede the digit '4' exceeds the sum of the two digits which immediately follow the digit 4 and sum of the two digits which immediately follow the digit 6 exceeds the sum of the two digits which immediately precede the digit 6. How many such 4s and 6s together are there?

5 4 4 6 2 4 6 3 5 6 4 2 8 4 3 7 6 6 4 8 3

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

Q14. How many 6s are there in the following series of numbers which are

preceded by 7 but not immediately followed by 9 ?

6 7 9 5 6 9 7 6 8 7 6 7 8 6 9 4 6 7 7 6 9 5 7 6 3

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

Q15.Aruna ranks twelfth in a class of forty-six. What will be her rank from the last?

a)33 b) 34 c) 35 d) 37 e) None of these

Q16. 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)20th and 24th b) 24th and 20^{th} c)25th and 21^{st} d)26th and 22nd e) None of these

Q17. Ravi is 7 ranks ahead of Sumit in a class of 39. If Sumit`s rank is seventeenth from the last, what is Ravi`s rank from the start ?

a)14^{th} b) 15th c) 16th d) 17 th

Q18. Rahul ranked 9th from the top and 38th from the bottom in a class. What is the total number of students in the class?

a) 46 th b) 47 th c)45 th d) none of these

Q19. In a class of 36 students, Ravi's rank from the top is 12. Radhika ranks 3 places over Ravi. What is Radhika's rank from the bottom?

a) 28 th b) 29 th c) 27 th d) 30 th

Q20. P is 14th from the left and Q is 7^{th} from the right end in a row of boys. What is the total number of boys in the row if there are 4 boys between P and Q?

a) 25 b) 23 c) 21 d) 19 e) 20

Q21. Rahul ranked ninth from the top and thirty-eighth from the bottom in a class. How many students are there in the class?

a) 45 b) 46 c) 47 d) 48 e) None of these

Q22. In a class of 40 children, Sunetra's rank is eight from the top. Sujit is five ranks below Sunetra. What is Sujit's rank from the bottom?

a) 27 b) 29 c) 28 d) 26 e) None of these

Q23. Nitin ranks eighteenth in a class of 49 students. What is his rank form the last?

A) 18 B) 19 C) 31 D) 32

Q24. Manoi 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 and 24 B) 24` and 20 C) 25 and 21 D) 26 and 22

Q25. Mohan is thirteenth from the left end in a row of children. Prabir is twelfth from the right and eighteenth from the left end. How many children are towards the right of Mohan in that row?

A) 12 B) 16 C) 17 D) Can't be determined

Q26. In a queue of 20 boys, D is fourteenth from the top and F is ninth from the bottom, how many boy are there between and F?

A) 2 B) 1 C) 4 D) Data inadequate

Q27.Sam ranked ninth from the top and thirty eighth from the bottom in a class. How many students are there in the class?

A)45 B) 46 C) 47 D)48

Q28. A class of boys stands in a single line. A boy is nineteenth in order from both the ends. How many boys are there in the class?

A) 27 B) 37 C) 39 D) None of these

Q29. If Atul finds that he is twelfth from right and fourth from the left, how many boys should be added to the queue so that there are 28 boys in the line?

A) 12 B) 13 C) 11 D) 20

Q30. In a row of boys, A is fifteenth from the left and D is seventeenth from the right. If in this row A is eleventh from the right.what is the position of D from the left?

A)6th B) 7th C) 9th D)12 th

Q31. Out of 60 students, where girls are twice to of boys, Kamala, a girl ranked sixteenth from the top. If there are 9 girls ahead of Kamala, how many boys are after her in the rank?

A) 12 B) 7 C) 14 D) 23

Q32. Today is Monday. After 61 days, it will be :

A)Sunday B) Monday C)Tuesday D)Saturday

Q33.Today is Tuesday. What day will be after 46 days?

A)Sunday B) Monday C)Tuesday D)Saturday

Q34.Monday falls on 4th April 1988. What was the day on 3rd Nov 1987?

A) Tuesday B) Wednesday C) Monday D) Thursday

Q35.Monday falls on 4th April 1988. What was the day on 4 th april 1989?

A) Tuesday B) Wednesday C) Monday D) Thursday

Q36.Monday falls on 17th Feb 1988. What was the day on 17 th Feb 1987?

A) Tuesday B) Wednesday C) Sunday D) Thursday

Q37.Sunday falls on 4th Feb 2016. What was the day on 4 th Feb 2017?

A) Tuesday B) Wednesday C) Monday D) Thursday

Seating Arrangement

Introduction –

Arrangement is fundamentally arranging the items given in a sequence. The questions comprise of arranging people (or objects) according to the given conditions. This chapter consists of all type of arrangements and we have to solve the problem precisely.

Types:

- Arrangements:
- Linear Arrangement
- Circular Arrangement

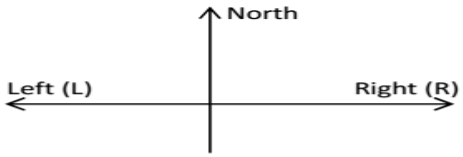
Linear Arrangement:

In linear (row) arrangement problems, we have to arrange the data linearly. The arrangement is done only one "axis" and hence, the position of people or objects assumes importance in terms of order like first position, second position and last position. In this type of arrangement, we take directions according to our left and right.

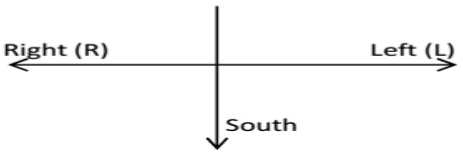
There are two types of problems asked in competitive exams, from this topic.

- One Row arrangement – In one row arrangement problems, people or objects sits in a row either facing North or South. So, we have to make arrangement according to the direction of face of the people.

Facing North –



Facing South –



For instance let us take three statements and evaluate them

Statement (a): A is to the left of B.

The data in the statement is basic but not definite as the statement ONLY says that A is to the left of B. but, it does not specify where A is located from B.

Statement (b): A is second to the left of B. The data in the statement is definite as it clearly states that A is placed second to the left of B.

Statement (c): T is between Q who plays football and P in order of seating in a row. It can be understood as 'T is between Q and P. So, they may be seated as QTP or PTQ (so, the data is not definite) and 'Q plays football'.

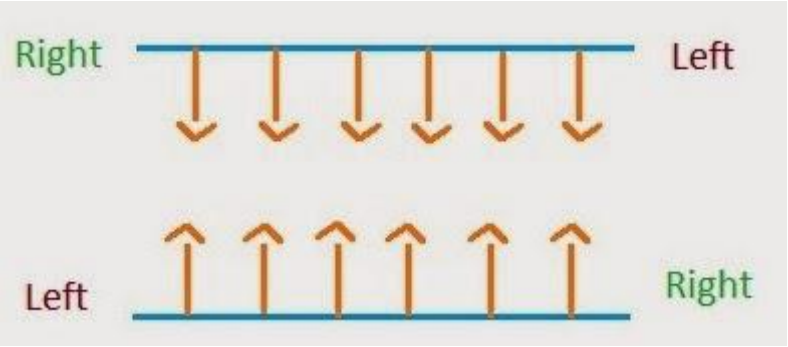
3. Search for the connecting information.

4. Figure out the seating arrangement by clearly identifying the directions

Persons sitting in a ROW all facing same direction:

Persons sitting in two ROWs facing each other:

- Two Row arrangements – In two row arrangement problems, there are two groups of people or objects sits in a two rows and people sitting in a first row facing north or south and vice versa.

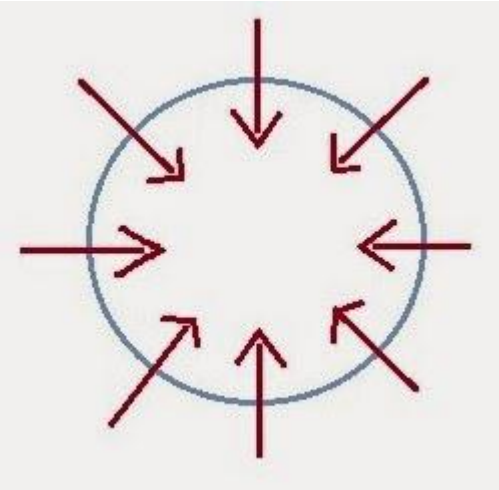


No matter what the model is, the following points are to be noted in order to solve the questions easily.

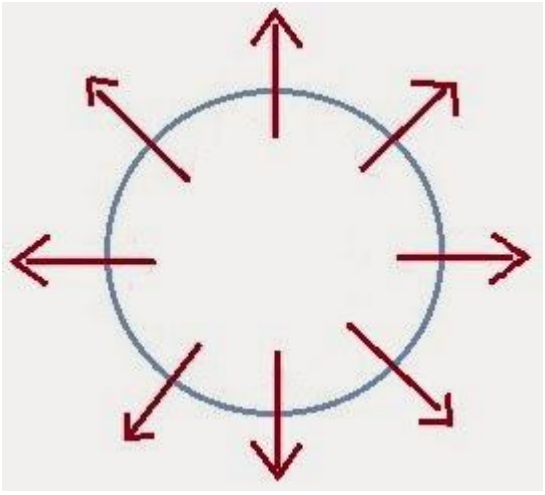
1. Read the entire puzzle and understand the statements correctly
2. Identify the statements that give definite information.

Circular Arrangement:

Persons sitting in a CIRCLE or RECTANGLE or SQUARE facing the centre:
Seated to the left = Take clockwise direction
Seated to the right = Take Anti-clockwise direction



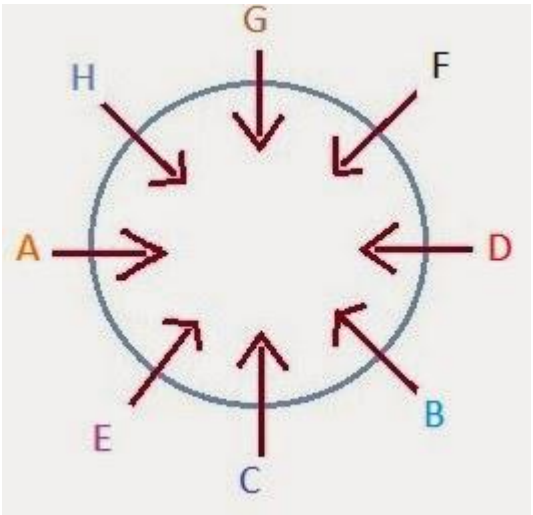
Persons sitting in two CIRCLE or RECTANGLE or SQUARE facing away from centre:
Seated to the left = Take Anti-clockwise direction
Seated to the right = Take clockwise direction



Now let us discuss this with an example:
A, B, C, D, E. F, G and H are sitting around a circle facing the centre.
a) E is to the immediate right o A, who is second to the right of G.
b) D is not an immediate neighbour of C or H.
c) F is third to the right of C and second to the left of H.

Now, let us discuss how to understand the statements correctly:
The statement (a) says: E is to the immediate right of A. A is second to the right of G.
The statement (c) says: F is third to the right of C. F is second to the left of H.

- Normally, we will be tempted to solve the question by picking up point by point from first.
- But, that is not correct. We should be careful in selecting the points to solve the puzzle by searching for definite information.
- Here, though (a) and (c) are definite points, we have to pick up (c) first as this point is connected to the point (b) (as 'C' and 'H' are discussed in both the points).
- In case, we take point (a) it is difficult to solve the question.



Q (1 – 5)Six people – C,D,E,F,G, and H are standing in a straight line facing North not necessarily in the same order. D is standing second to the right of F. C is standing fourth to the left of H and H is not standing on the extreme end of the line. E is standing second to0 the right of D

1.What is position of G with respect to E?

1). Immediate left 2) 2nd to the left 3) 3rd to the left 4) 3rd to the right

5) None of these

2.Which of the following pairs represent people standing at the extreme ends?

1) FH 2) CE 3) DE 4) CH

5) None of these

3. Who is standing 2nd to the right of C?

1) F 2) D 3) G 4) E

5) None of these

4. Four out of five are alike in a certain way based on their positions in the arrangement. One that does not belong to the group is?

1) CG 2) GE 3) GH 4) ED

5) None of these

5. If all the people are asked to stand in an alphabetical order from left to right, positions of how many will remain unchanged?

1) one 2) Two 3)three 4)None

5) None of these

(6 – 10) ABCXYZ are seated in a straight line facing North. C is third to the right of Z and B sits second to the right of C. X sits to the immediate right of A.

Q. 6 Which of the following represents the pairs of persons sitting exactly in the middle of the line?

1) XB 2) ZB 3) BX 4) XC 5) XY

Q. 7 What is X`s position with respect to Z?

1) Immediate right of Z 2)Second to the left

3) Third to the right 4)Second to the right

5) None of these

Q. 8 Four out of five are alike bases on their seating positions, find the one which does not belong to the group?

1) ZA 2) ZB 3) XA 4) XC 5) CY

Q. 9 How many persons are seated between A and C?

1) one 2)two 3)Three 4)Four 5) None

Q10. If A:X and Z:A , then Y :

(1) Y (2)B (3) X (4) A (5)None of these

(11– 13): Six trees namely Lemon, Ashoka, Banana, Mango, Apple and Papaya are planted in a line. Lemon is third to the left of Papaya tree. Ashoka is at the right end. Banana and Mango trees are immediate neighbours of Lemon. Banana tree is also neighbour of Apple tree.

Q 11. Which of the following trees is at the left end of the row?

(1) Mango (2)Apple (3) Banana (4)Papaya (5)Lemon

Q 12. Which among the following trees are not neighbours?

(1) Banana and Apple (2)Papaya and Ashoka

(3) Mango and Banana (4) Mango and Lemon

(5) Lemon and Banana

Q13. Which pair of trees represent the trees in the middle of the row?

(1) Lemon and Banana (2)Banana and Apple

(3) Ashok and Papaya (4) Mango and Apple (5) Ahoka and Banana

Circular Arrangements:

Directions – (Q. 14– 18) Study the following information to answer the given questions –

A, B, C, D, E, F and G are sitting along a circle facing at the centre and are playing cards.. E is the neighbour of A and D. G is not between F and C. F is on the immediate right of A.

Q 14. Who are the neighbours of B?

1) C and D 2) F and C 3) A and F 4) Data inadequate 5) None of these

Q 15. Which pair given below has the second person sitting immediately to the right of the first?

1) CB 2) DG 3) EA 4) AB 5) None of these

Q 16. Which of the following has the person sitting adjacent to each other from left to right in order as given?

1) CDG 2) EDG 3) BGC 4) FBC 5) None of these

Q 17. What is the position of F?

1) To the immediate left of A
2) To the immediate right of B
3) 2nd to the right of C
4) 3rd to the left of D
(5) None of these

Q 18. Which of the following does not have the pair sitting adjacent to each other?

1) BA 2) CB 3) DE 4) GD 5) All are sitting adjacent to each other

Directions (Q. 19-23):Study the following information and answer the questions given below: M, N, P, R, T, W, F and H are sitting around a circle facing the centre. P is third to the left of M and second to the right of T. N is second to the right of P. R is second to the right of W, who is second to the right of M. F is not an immediate neighbour of P.

Q 19. Who is to the immediate right of P?

1) H 2) F 3) R 4) Data inadequate 5) None of these

20Q . Who is to the immediate right of H?

1) R 2) F 3) M 4) Data inadequate 5) None of these

Q 21. Who is to the immediate left of R?

1) P 2) H 3) W 4) T 5) Data inadequate

Q 22. Who is third to the right of H?

1) T 2) W 3) R 4) F 5) Data inadequate

Q 23. Who is second to the right of F?

1) M 2) R 3)T 4) Data inadequate 5) None of these

Q 24. In which of the following is the first person sitting in between the second and the third person?

1) NHM 2) PHN 3)TRP 4) TWF 5) None of these

Directions (Q. 25-29):Study the following information and answer the questions given below:
A,B,C,D,E,F,G and H are sitting around a circle facing the centre . D is fourth to the right of H and second to the left of B.. F is fourth to the right of B**.** C is fourth to the right of E who is not immediate next to B or D. A is not an immediate neighbour of D.

Q 25 .What is B`s position with respect to G?

1) Third to the right 2) Third to the left
3) Fifth to the right 4) Fourth to the left 5) Fourth to the right

Q 26. In which of the following combinations is the third person sitting in between the first and the second person?

1) ABC 2)GCD 3) AHE 4) CBA 5)None of these

Q 27. Who is third to the right of A?

1) H 2) E 3)F 4) A 5) None of these

Q 28. Who is to the immediate left of D?

1) G 2) C 3) F 4) H 5) None of these

Q 29. Who is fourth to the left of G?
1) E 2) F 3) A 4) H 5) None of these

Puzzle

J K L M N O and P are seven kids playing in the garden. They are wearing clothes of colors Black, Blue, White, Green, Pink, Yellow and Brown. Out of the seven, three are girls. No girls is wearing either Black, Yellow or Brown. M`s sister O is wearing Pink. While L is wearing Brown. J is earing Blue while his sister K is not wearing Green. N is wearing Yellow while his best friend P is a boy.

30.What color is K wearing?
1). Green 2). Pink 3).Brown 4)White

31. What color is P wearing?
1)Black 2)Blue 3)White 4) Green

32.What colors are the sisters of J and M wearing?
1).Pink and Green 2). Pink and Yellow 3). White and Pink 4). White and Green

33. Which is group denoting only girls?
1. KLM 2. KNO 3. KLO 4. KPO

SET - 2

Seven friends R,M,K,L,P,W and B live in three different buildings i.e X,Y,Z. Not less than two or more than three live any of the buildings. Each of them has a liking for different fruits among apple, jackfruit, watermelon, orange, grapes, pineapple and mango, not necessarily in the same order. Three among them are girls, one each in every building. W likes orange and stays in building Y along with only P. M lives in building Z and likes jackfruit. None in building X likes apple or grapes. R and L don`t stay in X. K is R`s close friend and she does not like watermelon. L likes pineapple. None of the girls like orange and one of them likes apple. R does not like grapes.

34. Who like mango?
1. B 2. P 3. K 4. Data inadequate 5. None of these

35. Who stay in building Z?
1. M,R 2. K,B,M 3. M,R,B 4. M,K,R 5. None of these

36. Which fruit does R like?
1. Apple 2. Grapes 3. Mango 4. Pineapple 5. None of these

37. Who are the three girls among the friends?
1. K,R,W 2. R,K,P 3. K,M,P 4. Data inadequate 5. None of these

38. Which fruit does B like?
1) Mango 2) Grapes 3) Apple 4) Water Melon 5) None of these

Data Interpretation

Data Interpretation is one of the easy sections of one day competitive Examinations. It is an extension of Mathematical skill and accuracy. Data interpretation is nothing but drawing conclusions and inferences from a comprehensive data presented numerically in tabular form by means of an illustration, viz. Graphs, Pie Chart etc. Thus the act of organizing and interpreting data to get meaningful information is Data Interpretation.

1 . Data Interpretation questions are based on information given in tables and graphs. These questions test your ability to interpret

the information presented and to select the appropriate data for answering a question.

2 . Get a general picture of the information before reading the question. Read the given titles carefully and try to understand its nature.

3 . Avoid lengthy calculations generally, data interpretation questions do not require to do extensive calculations and computations. Most questions simply require reading the data correctly and carefully and putting them to use directly with common sense.

4 . Breakdown lengthy questions into smaller parts and eliminate impossible choices

5 . Use only the information given and your knowledge of everyday facts, such as the number of hours in a day, to answer the questions based on tables and graphs.

6 . Answer the questions asked and not what you think the questions should be.

7 . Be careful while dealing with units.

8 . To make reading easier and to avoid errors observe graphs keeping them straight.

9 . Be prepared to apply basic mathematical rules, principles and formulae.

10. Since one of the major benefits of graphs and tables is that they present data in a form that enables you to readily make comparisons, use this visual attribute of graphs and tables to help you answer the questions. Where possible, use your eyes instead of your computational skills

Exercise

Expenditures of a Company (in Lakh Rupees) per Annum Over the given Years.

Year	Item of Expenditure				
	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

Q1) What is the average amount of interest per year which the company had to pay during this period?

Options: A) 35.4 lacs B) 36.2 lacs C) 36.4 lacs D) 36.6 lacs

Q2) The total amount of bonus paid by the company during the given period is approximately what percent of the total amount of salary paid during this period?

Options: A) 1% B) 2% C) 3% D) 4%

Q3) Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002?

Options: A) 544 lacs B) 544.44 lacks C) 454 lacks D) 454.44 lacks

Q4) The ratio between the total expenditure on Taxes for all the years and the total expenditure on Fuel and Transport for all the years respectively is approximately?

Options: A) 10:11 B) 10:13 C) 14:15 D) 12:17

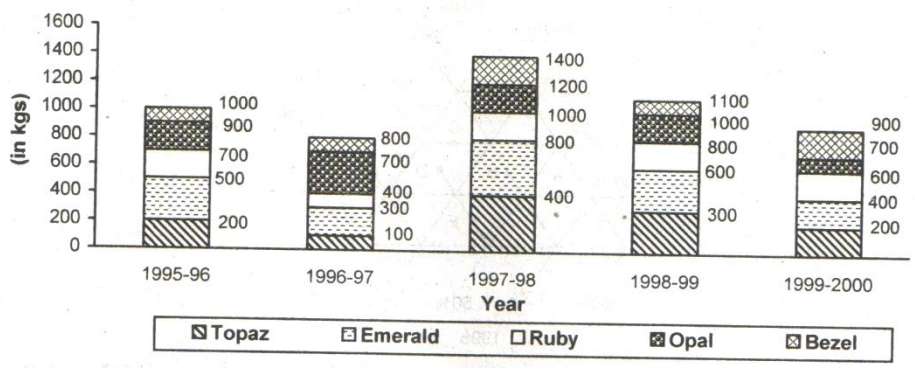
Q5) Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002?

Options: A) 62% B) 63% C) 64% D) 69%

The bar graph given below shows the sales of books (in thousand number) from six branches of a publishing company during two consecutive years 2000 and 2001.

Directions for 6 to 9: The following questions are based on the stacked bar graph given below.

Sales of various precious stones in India for the period of 1995-1996 to 1999-2000



6. What is the total sales of ruby as a percent of the total sales of precious stones for the given period?

A] 17.3% B] 19.23% C] 23.1% D] None of these

7. By what percent is the average annual sales of Emerald for the given period more than the sales of Opal in 1998-1999?

A] 120% B] 50% C] 25% D] 40%

8. For how many years is the sales of Bezel as a percentage of the total sales of precious stones less than that of Topaz?

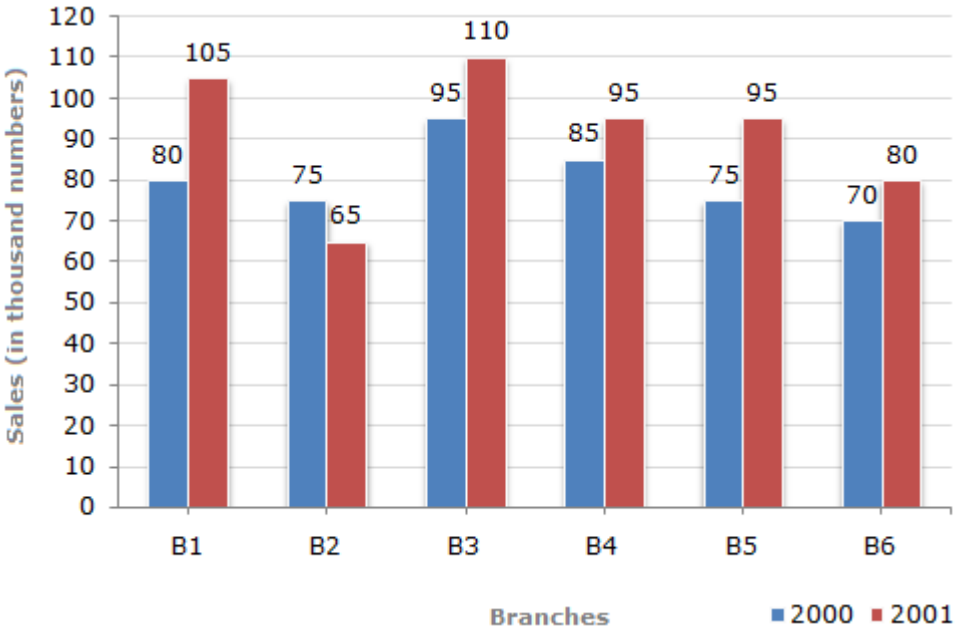
A] One B] Two C] Three D] Four

9. If the sales of Topaz increased from 1994-1995 to 1995-1996 by 25% and increased from 1999-2000 to 2000-01 by 50%, then what is the difference between the sales of Topaz in 1994-95 and that in 2000-01?

A] 50, 000 tonnes B] 100, 000 tonnes

C] 140, 000 tonnes D] 160, 000 tonnes

Sales of Books (in thousand numbers) from Six Branches - B1, B2, B3, B4, B5 and B6 of a publishing Company in 2000 and 2001.



Q10) What is the ratio of the total sales of branch B2 for both years to the total sales of branch B4 for both years?

Options: A) 7:9 B) 3:4 C) 2:3 D) 1:2

Q11) Total sales of branch B6 for both the years is what percent of the total sales of branches B3 for both the years?

Options: A) 72.13% B) 73% C) 73.17% D) 74.31%

Q1) What percent of the average sales of branches B1, B2 and B3 in 2001 is the average sales of branches B1, B3 and B6 in 2000?

Options: A) 82% B) 83% C) 84.31% D) 87.5%

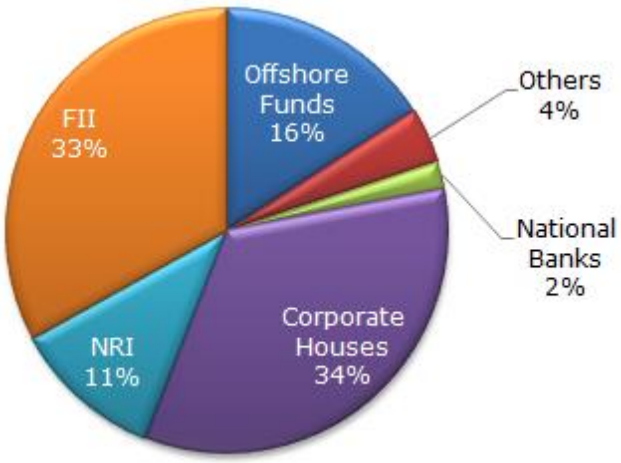
Q13) What is the average sales of all the branches (in thousand numbers) for the year 2000?

Options: A) 70 B) 80 C) 90 D) 100

Q14) Total sales of branches B1, B3 and B5 together for both the years (in thousand numbers) is?

Options: A) 520 B) 540 C) 550 D) 560

The following pie chart shows the amount of subscriptions generated for India Bonds from different categories of investors.



Q15) In the corporate sector, approximately how many degrees should be there in the central angle ?

Options: A) 120 B) 122 C) 124 D) 125

Q16) If the investment by NRI's are Rs 4,000 crore, then the investments by corporate houses and FII's together is:

Options: A) 24,363 crore B) 25.22 crore C) 24.65 crore D) 25 crore

Q17) What percentage of the total investment is coming from FII's and NRI's ?

Options: A) 22% B) 33% C) 44% D)55%

Q18) If the total investment other than by FII and corporate houses is Rs 335,000 crore, then the investment by NRI's and Offshore funds will be (approximately) ?

Options: A) 274,100 B) 242,434 C)245,533 D) None Of these

Directions for 25 to 29:Number of Candidates Appeared and Qualified in a Competitive Examination from Different States Over the Years.

State	Year									
	1997		1998		1999		2000		2001	
	App.	Qual.	App.	Qual.	App.	Qual.	App.	Qual.	App.	Qual.
M	5200	720	8500	980	7400	850	6800	775	9500	1125
N	7500	840	9200	1050	8450	920	9200	980	8800	1020
P	6400	780	8800	1020	7800	890	8750	1010	9750	1250
Q	8100	950	9500	1240	8700	980	9700	1200	8950	995
R	7800	870	7600	940	9800	1350	7600	945	7990	885

19. Total number of candidates qualified from all the states together in 1997 is approximately what percentage of the total number of candidates qualified from all the states together in 1998?
A] 72% B] 77% C] 80% D] 83%

20. What is the average candidates who appeared from State Q during the given years?
A] 8700 B] 8760 C] 8990 D] 8920

21. In which of the given years the number of candidates appeared from State P has maximum percentage of qualified candidates?
A] 1997 B] 1998 C] 1999 D] 2001

22. What is the percentage of candidates qualified from State N for all the years together, over the candidates appeared from State N during all the years together?
A] 12.36% B] 12.16% C] 11.47% D] 11.15%

23. The percentage of total number of qualified candidates to the total number of appeared candidates among all the five states in 1999 is?
A] 11.49% B] 11.84% C] 12.21% D] 12.57%

Directions for 24 to 25: The following table gives the percentage distribution of population of five states
, P, Q, R, S and T on the basis of poverty line and also on the basis of sex.

State	**Percentage of Population below the Poverty Line**	**Proportion of Males and Females**	
		Below Poverty Line	**Above Poverty Line**
		M : F	**M : F**
P	35	5 : 6	6 : 7
Q	25	3 : 5	4 : 5
R	24	1 : 2	2 : 3
S	19	3 : 2	4 : 3
T	15	5 : 3	3 : 2

24. If the male population above poverty line for State R is 1.9 million, then the total population of State R is?
A] 4.5 million B] 4.85 million
C] 5.35 million D] 6.25 million

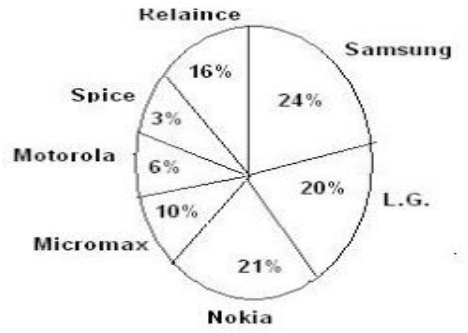
25. What will be the number of females above the poverty line in the State S if it is known that the population of State S is 7 million?
A] 3 million B] 2.43 million C] 1.33 million D] 5.7 million

26. What will be the male population above poverty line for State P if the female population below poverty line for State P is 2.1 million?
A] 2.1 million B] 2.3 million C] 2.7 million D] 3.3 million

27. If the population of males below poverty line for State Q is 2.4 million and that for State T is 6 million, then the total populations of States Q and T are in the ratio?
A] 1:3 B] 2:5 C] 3:7 D] 4:9

Direction for Question 34 to 38: Total numbers of users are 12 crores

Qs 1.



The table shows the ratio of male to female users among these mobile phone users.

Company Name	Male : Female
L.G.	5:3
Nokia	5:4
Reliance	1:1
Spice	2:1
Micromax	4:5
Motorola	5:7
Samsung	3:2

28. What is the total number of females using Nokia phones?
A] 0.96 crore B] 1.4 crore
C] 1.12 crore D] 1.32 crore
E] None of these

29. What is the difference between the total male and female mobile users?
A] 2.136 crores B] 1.326 crores
C] 0.854 crores D] 1.46 crore
E] None of these

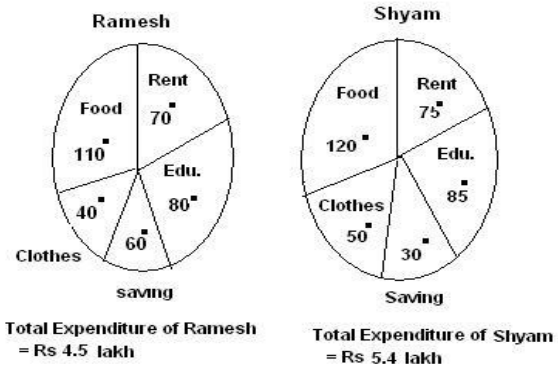
30. Number of females L.G. users is what percentage of number of male L.G. users?
A] 90% B] 80% C] 65% D] 60% E] None of these

31. What is the ratio of the total number of male Spice users and the total number of female Reliance users?
A] 1:2 B] 1:3 C] 1:4 D] 2:3 E] None of these

32. Number of male Motorola users is how much percentage less than that of the number of female Micromax users?
A] 50% B] 123.33% C] 60%
D] 55% E] None of these

Directions for Question 39 to 43: Following pie charts show the distribution of annual expenditure of two persons Ramesh and Shyam. Answer the following questions based on these charts. Total expenditure of Ramesh and Shyam is Rs 4.5 and 5.4 lakhs respectively.

Q. (6-10)



33. What is the amount Ramesh and Shyam save yearly?
A] 1.25 lakhs B] 1.20 lakhs
C] 1.15 lakhs D] 1.10 lakhs
E] 1.5 lakhs

34. What is the ratio of the amount spent on clothes by Ramesh than that of Shyam?
A] 4:5 B] 3:5 C] 2:3 D] 3:4 E] None of these

35. Money spent by Shyam on food is what percentage of the money spent by Ramesh on education?
A] 80% B] 100% C] 120% D] 150% E] 180%

36. What is the average of the amount spent for house rent by Ramesh and Shyam?
A] 0.75 lakhs B] 0.84 lakhs
C] 1 lakhs D] 1.2 lakhs
E] 1.25 lakhs

37. Money spent by Shyam on education is how much percentage more than that of money spent by Ramesh on education?
A] 20% B] 22.5% C] 25% D] 27.5% E] 32%

Chapter 1- Number system									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	C	2	C	3	C	4	D	5	A
6	D	7	B	8	A	9	A	10	C
11	C	12	B	13	A	14	A	15	A
16	D	17	A	18	B	19	B	20	C
21	B	22	A	23	C	24	A	25	D
26	B	27	D	28	C	29	D	30	B
31	C	32	D	33	A	34	A	35	C
36	A	37	C	38	A	39	B	40	C

Chapter 2 – Averages									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	C	2	B	3	B	4	A	5	D
6	A	7	C	8	D	9	A	10	D
11	C	12	D	13	A	14	D	15	D
16	B	17	C	18	B	19	C	20	B
21	C	22	D	23	A	24	A	25	D
26	B	27	D	28	C	29	A	30	C
31	C	32	A	33	B	34	A	35	A
36	B	37	B	38	D	39	D	40	B

CHAPTER 3 - Percentages									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	B	2	A	3	B	4	C	5	D
6	C	7	D	8	A	9	B	10	B
11	A	12	C	13	B	14	A	15	A
16	D	17	C	18	C	19	B	20	B
21	A	22	C	23	B	24	B	25	A
26	D	27	A	28	C	29	C	30	D
31	D	32	A	33	B	34	C	35	A
36	D	37	C	38	B	39	B	40	A

Chapter 4- Profit And Loss									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	D	2	B	3	C	4	D	5	C
6	A	7	A	8	C	9	D	10	B
11	C	12	A	13	A	14	C	15	D
16	A	17	B	18	C	19	D	20	B
21	B	22	A	23	C	24	C	25	C
26	C	27	C	28	B	29	B	30	A
31	C	32	A	33	C	34	C	35	D
36	D	37	B	38	B	39	D	40	B

Chapter -5 Ratio, Proportion									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	D	2	B	3	C	4	D	5	C
6	D	7	D	8	C	9	C	10	E
11	C	12	C	13	B	14	B	15	B
16	B	17	A	18	C	19	B	20	C
21	B	22	A	23	A	24	C	25	D
26	B	27	D	28	B	29	A	30	D
31	B	32	D	33	A	34	D	35	C

Chapter 6 –TIME WORK									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	C	2	C	3	B	4	C	5	C
6	A	7	D	8	A	9	A	10	A
11	C	12	D	13	B	14	**B**	15	A
16	A	17	C	18	D	19	C	20	D
21	C	22	D	23	C	24	D	25	C
26	C	27	C	28	B	29	B	30	D
31	C	32	C	33	C	34	D	35	C
36	C	37	C	38	B	39	B	40	D
36	A	37	B	38	B	39	B	40	B

Chapter 7 - Simple & Compound Interest									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	C	2	B	3	D	4	B	5	C
6	A	7	B	8	B	9	C	10	A
11	B	12	A	13	A	14	C	15	C
16	C	17	D	18	B	19	A	20	B
21	B	22	D	23	B	24	D	25	C
26	B	27	D	28	C	29	B	30	D
31	C	32	D	33	D	34	D	35	C
36	B	37	B	38	A	39	B	40	B

Chapter 8 –Series completion									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	B	2	A	3	D	4	A	5	C
6	C	7	B	8	B	9	B	10	C
11	D	12	A	13	B	14	A	15	C
16	C	17	B	18	A	19	D	20	D
21	B	22	A	23	B	24	B	25	A
26	B	27	B	28	C	29	D	30	A
31	D	32	A	33	A	34	A	35	B
36	D	37	A	38	C	39	D	40	C

Alpha Series									
Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	A	2	D	3	C	4	A	5	C
6	D	7	B	8	B	9	A	10	C
11	A	12	C	13	B	14	A	15	B
16	C	17	A	18	C	19	B	20	B
21	A	22	D	23	B	24	C	25	B
26	A	27	D	28	C	29	A	30	A

CHAPTER – 9
CODING DECODING

Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1.	E	2.	A	3.	D	4.	C	5.	B
6.	A	7.	B	8.	A	9.	B	10.	A
11.	C	12.	A	13.	D	14.	B	15.	C
16.	B	17.	A	18.	D	19.	C	20.	A
21.	D	22.	C	23.	A	24.	D	25.	B
26.	A	27.	D	28.	B	29.	D	30.	B
31.	A	32.	D	33.	A	34.	B	35.	C
36.	A	37.	C	38.	A	39.	C	40.	A

CHAPTER – 10 [Alphabet test]

Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1.	C	2.	A	3.	E	4.	C	5.	D
6.	B	7.	C	8.	C	9.	E	10.	B
11.	A	12.	C	13.	C	14.	D	15.	A
16.	B	17.	B	18.	B	19.	C	20.	C
21.	A	22.	A	23.	D	24.	C	25.	B
26.	A	27.	C	28.	C	29.	C	30.	C
31.	C	32.	C	33.	C	34.	D	35.	B
36.	D	37.	D	38.	C	39.	D	40.	A

Chapter 11 –Calendar

Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	A	2	C	3	C	4	A	5	A
6	A	7	D	8	D	9	C	10	B
11	D	12	D	13	C	14	B	15	B
16	C	17	C	18	D	19	C	20	C
21	C	22	A	23	C	24	C	25	C
26	C	27	C	28	B	29	C		

Chapter 12 - Blood Relations

Q. No.	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**	**Q. No.**	**Answer**
1	A	2	C	3	B	4	D	5	C
6	D	7	B	8	B	9	A	10	A
11	C	12	D	13	B	14	A	15	B

16	D	17	A	18	C	19	C	20	C
21	A	22	B	23	D	24	D	25	C
26	A	27	D	28	D	29	C	30	B
31	D	32	B	33	C	34	E	35	A
36	E	37	A	38	B	39	B	40	A

CHAPTER – 13[DIRECTION SENSE]

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	B	2	C	3	C	4	C	5	D
6	D	7	D	8	D	9	C	10	A
11	A	12	B	13	B	14	A	15	B
16	A	17	C	18	D	19	B	20	D
21	C	22	B	23	C	24	A	25	C
26.	A	27.	C	28.	D	29.	E	30.	C
31.	A	32.	E	33.	C	34.	B	35.	C
36.	B	37.	C	38.	D	39.	C	40.	B

CHAPTER – 14[RANKING]

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	A	2	B	3	B	4	D	5	C
6	B	7	A	8	A	9	B	10	B
11	C	12	C	13	B	14	C	15	E
16	C	17	D	18	A	19	A	20	A
21	B	22	C	23	D	24	C	25	C
26.	B	27.	B	28.	B	29.	B	30.	C
31.	C	32.	D	33.	D	34.	A	35.	A
36.	C	37.	A						

Chapter 15 –PUZZLE

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	3	2	2	3	3	4	2	5	1
6	4	7	4	8	2	9	1	10	2
11	3	12	1	13	3	14	2	15	3
16	4	17	5	18	1	19	1	20	5
21	4	22	4	23	3	24	1	25	4
26	1	27	3	28	1	29	3	30	1
31	4	32	3	33	4	34	1	35	1
36	5	37	4						

Chapter 16 –Data Interpretation

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	D	2	A	3	B	4	B	5	D
6	D	7	C	8	C	9	A	10	A
11	C	12	D	13	B	14	D	15	B
16	A	17	C	18	A	19	C	20	C
21	D	22	D	23	B	24	D	25	B
26	D	27	B	28	C	29	B	30	D
31	C	32	D	33	C	34	E	35	A
36	E	37	A						