DEPARTMENT OF ANALYTICAL SKILLS

Analytical skills 1 – PEA305

Quantitative and Logical Aptitude

hp

2019

LOVELY PROFESSIONAL UNIVERSITY

INDEX

NUMBER SYSTEM

Natural Numbers

The counting numbers are commonly called natural numbers.
For example Natural Number, N = {1, 2, 3 …}

- All natural numbers are positive.
- The smallest natural number is 1.
- Zero (0) is not a natural number.

Whole Numbers

All the natural numbers including Zero are called Whole Numbers. It is also known as non-negative integers.
For example Whole Numbers, W = {0, 1, 2, 3 …}.

Integers

Whole numbers as well as negative numbers form the set of integers. It can be classified into two types,
(i) Positive integers → {1, 2, 3…}
(ii) Negative integers → {– 1, – 2, – 3…}
(iii) Zero is neither a positive nor a negative integer.

Even Numbers

All the counting numbers which are divisible by 2 are called even numbers.
For example 2, 4, 6, 8, 10…2n

- Unit place of an Even number is 0, 2, 4, 6, or 8.

Odd Numbers

The numbers which are not divisible by 2 are called odd numbers.
For Example 1, 3, 5, 7, 9, 11 … (2n-1).

- Unit place of an odd number is 1, 3, 5, 7,or 9.

Odd * Odd = Odd
Even * Even = Even
Odd * Even = Even

Prime Numbers

The numbers which are having exactly 2 distinct factors namely itself and 1 are called Prime Numbers.
For Example: 2, 3, 5, 7, 11, 13 …
The number 5 is a prime number and the factors of 5 are 1 and 5. These are two distinct factors and so 5 is a Prime number.

- The smallest odd prime number is 3.
- 2 is the only even prime number.
- All prime numbers greater than 3 can be represented by 6n+1 or 6n-1, where n is an integer.

How to check if a number is Prime or not?
If A is a given number,
(i) Find a number S, such that $S > \sqrt{A}$.
(ii) Consider all the prime numbers less than equal to S.
(iii) If none of these divides A, then A is prime.
Example: Find A= 137 is prime or not?

$$12 > \sqrt{137}$$

Prime numbers up to 12 are: 2, 3, 5, 7, and 11.
None of these divide 137 exactly, so 137 is a Prime number.

Composite Numbers

Composite numbers are non-prime natural numbers. They must have at least one factor except 1 and itself.

- 1 is neither prime nor composite.

Co Primes

Two natural numbers are said to be Co primes if the HCF of the two numbers is 1.
For example (7, 9) and (18, 19)

- Two composite numbers having no common factor except 1 are always co prime.
- Two consecutive numbers are always co prime.

DIVISIBILITY TESTS

Divisibility by 2
When the unit digit of a number is even, the number is divisible by 2.
For example
16, 98, 1000 etc., are divisible by 2.

Divisibility by 3
When the sum of the digits of a number is a multiple of 3, then the number is divisible by 3.
For example
4518 = 4 + 5 + 1 + 8 = 18 which is a multiple of 3, so 1233 must be divisible by 3.

Divisibility by 4
When the last two-digits of a number are a multiple of 4, then the number is divisible by 4.
For example
4596 is divisible by 4 as the last two digits 96 of the number are divisible by 4.

Divisibility by 5
Numbers having 0 or 5 at the unit place are divisible by 5.
For example
55, 2350, 22850 etc., are divisible by 5 as they have 0 or 5 at the unit place.

Divisibility by 6
When a number is divisible by both 3 and 2, then the number is divisible by 6 also.
For example
12, 1440 etc., are divisible by 6 as they are divisible by both 3 and 2.

Divisibility by 7
A number is divisible by 7 when the difference between twice the digit at the units place and the number formed by the other digits is either zero or a multiple of 7.
For example
679 is divisible by 7 because 67 – (2 × 9) = 67 - 18 = 49. As 49 is a multiple of 7, the number 679 is divisible by 7.

Divisibility by 8
When the number made by last three digits of a number is a multiple of 8, then the number is divisible by 8.
For example
2208, as 208 (the last three digits of 2208) is divisible by 8, the number 2208 is also divisible by 8.

Divisibility by 9
When the sum of all the digits of a number is a multiple of 9, then the number is also divisible by 9.
For example
936819 → 9+3 + 6 + 8 + 1 + 9= 36 which is divisible by 9. Therefore, 936819 is divisible by 9.

Divisibility by 10
When the digit at the unit place of a number is zero, then the number is divisible by 10.
For example
20, 40, 150, 123450, 478970 etc., are divisible by 10 as they all end with zero.

Divisibility by 11
When the difference between the sums of odd position digits of the number and the even position digits of the number are multiples of 11 or zero, the number is divisible by 11.
For example
661749 → Sum of digits at odd places (A) = 6 + 1 + 4 = 11
Sum of digits at even places (B) = 6 + 7 + 9 = 22 →A – B = 22 – 11 = 11.
661749 is divisible by 11.

HCF or GCD

HCF of a given set of numbers is the greatest common number that divides all the numbers of the set. Hence it is called HCF of the given set.
To find the HCF of the given numbers
- Factorize each of the given set of numbers into prime factors and their powers thereof
- Take the common prime factors that contain the minimum power available and multiply. The product is known as the HCF of the given set of numbers.

Least Common Multiple

LCM of any given set of numbers is the smallest such number which is divisible by each number of the given set.
To find the LCM of the given numbers,
- Factorize the number into prime factors and their powers thereof.

- Select all the prime factors, with their respective maximum power, and multiply them.

For Example, Consider 12, 24
$12 = 2 \times 2 \times 3 = 2^2 \text{ X } 3^1$
$24 = 2 \times 2 \times 2 \times 3 = 2^3 \text{ X } 3^1$
HCF of 12, 24 $\rightarrow 2^2 \text{ X } 3^1 = 12$
LCM of 12, 24 $\rightarrow 2^3 \text{ X } 3^1 = 24$

FACTORS or DIVISORS

In order to find the factors of a number Nidentify the prime factors and their respective powers thereof and rewrite the number where a, band c are the prime factors and x, y and z are their respective powers as
$N=a^x * b^y * c^z$
Number of factors = (x+1)(y+1)(z+1)

Remainder theorem

The basic remainder theorem formula is:
Dividend = Divisor* Quotient + Remainder
If remainder = 0, then the number is divisible by the divisor and divisor is a factor of the number.
For example when 8 divides 40, the remainder is 0 and it can be said that 8 is a factor of 40.

Cyclicity of Remainders:

Cyclicity is the property of remainders, due to which the remainders start repeating after a certain point.
Euler's theorem
Euler's theorem states that for any co prime numbers P and Q,
$R(\frac{P^{\varphi(n)}}{Q}) = 1$. Where φ (n) is Euler's totient.
It is applicable only for co-prime numbers.
Euler's totient
$\varphi(n) = n \times (1 - 1/P_1) \times (1 - 1/P_2) \times (1 - 1/P_3) \times \ldots$
Fermat's theorem
Remainder of $\frac{a^{p-1}}{} = 1$, which is Fermat's little theorem,where p is a prime number and a and p are co primes.

CLASSWORK PROBLEMS

1. Find the rational form of the recurring rational 0.2333333333
(a)11/99
(b) 1/3
(c) 7/30
(d) 13/30

2. What two numbers have a product of 48 and, when the larger number is divided by the smaller, a quotient of 3?
(a) 4 and 12
(b) 6 and 12
(c) 6 and 12
(d) 5 and 10

3. When a two digit number is reversed it gets decreased by 72, what is the number?
(a) 81
(b) 72
(c) 91
(d) 64

4. Find the number of 7's between 100 and 700.
(a) 120
(b) 101
(c) 121
(d) 100

5. If all the 6 are replaced by 9, then the algebraic sum of all the numbers from 1 to 100 (both inclusive) varies by ____.
(a) 500
(b) 360
(c) 450
(d) 330

6. Rahul scored 78, 56 and 89 marks in Science, Social and Mathematics. Later it was found that his marks were reversed and entered. How much marks should be added to get correct total?
(a) 18
(b) 24
(c) 27
(d) 15

7. A group of friends goes for dinner and gets bill of Rs 2400. Two of them says that they have forgotten their purse so remaining make an extra contribution of Rs 100 to pay up the bill. Tell the no. of person in that group.
(a) 8 persons
(b) 7 persons

(c) 12 persons
(d) None of these

8. If 14p0p0p4 which is a 8 digit number and is divisible by 12 then the number of possible values of p is:
(a) 2
(b) 3
(c) 4
(d) 5

9. If 21pq33pq is a 8-digit number which is divisible by 12 then how many 2 digit numbers as pq are possible?
(a) 8
(b) 18
(c) 12
(d) 28

10. Let N = 80pq2pq (7digit number). If N is exactly divisible by 120 then the sum of the digits in N is equal to:
(a) 18
(b) 22
(c) 24
(d) 12

11. If 53p26p3 is a 7 digit number divisible by 9 and if 757qp is divisible by 8 then the minimum value of p + q is:
(a) 4
(b) 12
(c) 16
(d) 8

12. Find the LCM of 12, 15, 72 and 75
(a)1800
(b) 1500
(c) 1440
(d) 1040

13. 6 bells of a Church toll at different intervals of 5seconds, 8 seconds, 10 seconds, 6 seconds, 12 seconds and 15 seconds respectively. If they toll together at 12 noon, how many times will they toll together till 1 pm?
(a) 15 times
(b) 20 times
(c) 31 times
(d) None of these

14. Find the HCF 2/4, 10/8, 4/12, 6/15
(a) 1/60
(b) 1/2
(c) 2/56
(d) 4/60

15. If HCF and LCM of two numbers 15 and 1440 respectively, one of the numbers is 75 find the other number.
(a) 240
(b) 288
(c) 250
(d) 285

16. If 24586 and 22584 both leaves a same remainder when divided by a divisor which of the following can be the maximum possible value of the divisor?
(a) 143
(b) 77
(c) 91
(d) 2

17. Find the number of factors of 35.
(a) 4
(b) 6
(c) 8
(d)10

18. Find the number of factors of 120
(a) 4
(b) 8
(c) 12
(d) 16

19. Find the number of factors of 330.
(a) 2
(b)8
(c) 16
(d) 32

20. Find the number of factors of 1000.
(a) 12
(b) 16
(c) 10
(d) 18

21. Find the number of factors of 1560.
(a) 6
(b) 16
(c) 12
(d) 32

22. How many factors of 340 are even?
(a) 12
(b) 16
(c) 8
(d) 6

23. How many factors of 408 are even?
(a) 12
(b) 16
(c) 8
(d) 10

24.How many factors of 1024 are even?
(a) 12
(b) 10
(c) 8
(d) 6

25. In how many ways can 120 be written as a product of two numbers?
(a) 12
(b) 8
(c) 16
(d) 10

26. In how many ways can 200 be written as a product of two numbers?
(a) 4
(b) 6
(c) 8
(d) 10

27. In how many ways can 450 be written as a product of two numbers?
(a) 12
(b) 16
(c) 18
(d) 6

28. In how many ways can 840 be written as the product of 2 numbers?
(a) 6
(b) 16
(c) 18
(d) 32

29. In how many ways 12 can be written as a product of two co-prime factors?
(a) 2
(b) 6
(c) 8
(d) 6

30. In how many ways 320 can be written as a product of two co-prime factors?
(a) 2
(b) 6
(c) 1
(d) 5

31. In how many ways 540 can be written as a product of two co-prime factors?
(a) 1
(b) 2
(c) 3
(d) 4

32. In how many ways 1024 can be written as a product of two co-prime factors?
(a) 2
(b) 1
(c) 3
(d) 4

33. Find the number of zeroes in 154!.
(a) 35
(b) 31
(c) 34
(d) 37

34. Find the number of trailing zeroes in 56!
(a) 13
(b) 11
(c) 12
(d) 6

35. Find the remainder when 234! is divided by 560.
(a) 2
(b) 0
(c) 1
(d) 13

36. Find the unit digit of 2354^{1048}
(a) 4
(b) 6
(c) 8
(d) None of these

37. Find the unit digit of 248^{1587}.
(a) 2
(b) 4
(c) 8

(d) 6

38. Find the first non zero digit in 100!
(a) 6
(b) 8
(c) 4
(d) 3

39. Find the remainder when 171054 is divided by 15.
(a) 4
(b) 11
(c) 12
(d) 13

40. Find the remainder when 2145123 is divided by 6.
(a) 0
(b) 3
(c) 4
(d) 5

ASSIGNMENT PROBLEMS

1. What minimum number must be added to 454 so that the number is divisible by both 5 and 7?
(a) 1
(b) 5
(c) 34
(d) 35

2. What minimum number must be added to or subtracted from 261 so that the number is exactly divisible by 2, 6 and 8?
(a) 1
(b) 2
(c) 3
(d) 21

3. What is the smallest number which gives a remainder of 2 when divided by 3, 6 and 5?
(a) 5
(b) 8
(c) 32
(d) None

4.Which is the smallest number greater than 1000 that gives a remainder of 5 when divided by both 6 and 8?
(a) 1008
(b) 1001
(c) 1013
(d) 1012

5. What is the largest number smaller than 300 which when divided by both 4 and 7 gives a remainder of 3?
(a) 3
(b) 31
(c) 283
(d) 308

6. Find the largest 4 digit number that will give a remainder of 6 when divided by 8 and 7?
(a) 9974
(b) 9984
(c) 9969
(d) none of these

7. In a leap race ram takes a leap of 6 feet and shyam takes a leap of 8 feet. Find the distance of the point (from starting point) where both will land at the same spot 3rd time. (Assume their average speed is same)
(a) 24 feet
(b) 72 feet
(c) 36 feet
(d) 144 feet

8.What is the maximum possible length of a thread required to exactly measure 352 cm, 220 cm and 308 cm?
(a) 22
(b) 44
(c) 11
(d) 88

9. Find the largest number which will divide 458, 515 and 648 leaving same remainder in all cases.
(a) 19
(b) 57
(c) 38
(d) 133

10. LCM of three numbers are in the ratio 7:3:12 is 2016. What is the HCF of these numbers?
(a) 4
(b) 8
(c) 12
(d) 24

11. Find the largest 4 digit number which when divided by 42 and 24 leaves 33 and 15 as remainders respectively.
(a) 9921
(b) 9903
(c) 9912
(d) 9901

12. Alarms of three clocks ring at the interval of 4 minutes, 8 minutes and 6 minutes respectively. All of them rang together at 8.00 a.m. Now, find the number of times they will ring together before 9.45 a.m.
(a) 5
(b) 4
(c) 6
(d) 8

13. In a circular race, A completes 1 round in 15 minutes and B completes 1 round in 25 minutes. After making how many rounds will A meet B again at the starting point, if they start running together from the starting point?
(a) 3
(b) 5
(c) 6
(d) 2.5

14. Find the number of composite factors of 42.
(a) 1
(b) 4
(c) 5

15.Find the number of prime factors of 300.
(a) 2
(b) 3
(c) 4
(d) 5

16. Find the number of factors of 72.
(a) 9
(b) 10
(c) 11
(d) 12

17. Find the last digit of $456^{87}*307^{42}$
(a) 1
(b) 4
(c) 5
(d) 7

18. . What will be the last digit of 48^{67}?
(a) 2
(b) 4
(c) 8
(d) 6

19. A number 1245674567 is divided by 11. What will be the remainder?
(a) 8
(b) 9
(c) 10
(d) 5

20. What is the remainder when $(259^{19}+34^{17})$ is divided by 10?
(a) 3
(b) 5
(c) 7
(d) 9

AVERAGE

Average : An average or more accurately an arithmetic mean is, in crude terms, the sum of n different data divided by n.
Averages of a group are defined as the ratio of sum of all the items in the group to the number of items in the group.

Average = (Sum of all items in the group)/ Number of items in the group

Some Important Concepts:

Average =total of data/No. of data

If the value of each item is increase by the same value a, then the average of the group or items will also increase by a.

If the value of each item is decreased by the same value a, then the average of the group of items will also decrease by a.

If the value of each item is multiplied by the same value a, then the average of the group or items will also get multiplied by a.

If the value of each item is multiplied by the same value a, then the average of the group or items will also get divided by a.

If we know only the average of the two groups individually, we cannot find out the average of the combined group of items.

- Average of n natural no's = (n+1)/2
- Average of even No's = (n+1)
- Average of odd No's = n

CLASSWORK PROBLEMS

1.The average weight of 39 Students in a class is 23 Among them Sita is the heaviest while Tina is the lightest. If both of them are excluded from the class still the average remains same. The ratio of weight of Sita to Tina is 15:8.Then what is the weight of the Tina?
(a) 15
(b) 16
(c) 18
(d) 19

2.The ages of Four members of a family are in the year 2010 are „X", "X+12", "X+24" and „X+36". After some years Oldest among them was dead then average reduced by 3 After how many years from his death, the average age will same as in 2010?
(a) 2 Years
(b) 3 Years
(c) 4 years
(d) 6 Years

3.The average of Four numbers is 24 1/2 of the four numbers, the first is 1 1/2 times the second, the second is 1/3 rd of the third, and the third is 2 times the fourth number. Then what is smallest of all those numbers?
(a) 12
(b) 13
(c) 14
(d) 15

4.There are 459 students in a hostel. If the number of students increased by 36, the expenses of the mess increased by Rs .81 Per day while the average expenditure per head reduced by 1 Find the original expenditure of the mess?
(a) 7304
(b) 7314
(c) 7324
(d) 7344

5.The average cost 32 different Mobiles is Rs. 9000. Among them, Oppo which is the costliest is 70% higher price than the cheapest Mobile Lav(a) Excluding those both mobiles, the average of the Mobiles is Rs.8880. Then what is the cost of Oppo Mobile?
(a) Rs. 10000
(b) Rs. 11600
(c) Rs. 12400
(d) Rs.13600

6.The average age of a family of 9 members is 22 years. Surya is the youngest and his age is 6 years, then what was the average age of the family just before Surya was born?
(a) 15
(b) 16
(c) 18

(d) 20

7.Dhoni scored 8000 runs in a certain number of innings. In the next five innings, he was out of form and hence, could make only 85 runs, as a result his average reduced by 1 run. How many innings did he play in total?
(a) 160
(b) 165
(c) 170
(d) 175

8.The weights of 19 people are in Arithmetic progression. The average weight of them is 19. If the heaviest is 37 Kgs. Then what is the weight of the Lightest?
(a) 1 Kg
(b) 2 Kg
(c) 3 Kg
(d) 4 kg

9.The average weight of 40 Students is 32 If the Heaviest and Lightest are excluded the average weight reduces by 1 If only the Heaviest is excluded then the average is 31 Then what is the weight of the Lightest?
(a) 30
(b) 31
(c) 32
(d) 33

10.Average of 17 students in a class is X. When their marks are arranged in ascending order it was found to be in Arithmetic Progression. The class teacher found that rank the students who ranked 15th, 11th, 9th and 7th had copied the exam and hence they are suspende(d) Now the average of the remaining class is Y. Then
(a) X =Y
(b) X >Y
(c) X<Y
(d) X = 2Y

11.The average price of 80 mobile phones is Rs.30,000. If the highest and lowest price mobile phones are sold out then the average price of remaining 78 mobile phones is Rs. 29,500. The cost of the highest mobile is Rs.80,000. The cost of lowest price mobile is?
(A) Rs. 18000
(B) Rs. 15000
(C) Rs. 19000
(D) Can't be determined

12.In a Company the average income of all the employees is Rs. 20000 per month. Recently the company announced increment of Rs. 2000 per month for all the employees. The new average income of all the employees is?
(A) 22000
(B) 24000
(C) 28000
(D) 26000

13.Pranav went to the bank at the speed of 60 kmph while returning for his home he covered the half of the distance at the speed of 10 kmph, but suddenly he realized that he was getting late so he increased the speed and reached the home by covering rest half of the distance at the speed of 30 kmph.The average speed of the Pranav in the whole length of journey is?
(A) 24 kmph
(B) 14 kmph
(C) 16 kmph
(D) 10 kmph

14.The average expenditure of Sharma for the January to June is Rs. 4200 and he spent Rs. 1200 in January and Rs.1500 in July. The average expenditure for the months of February to July is:
(A) 2750
(B) 3250
(C) 4250
(D) 4500

15.The average weight of all the 11 players of CSK is 50 kg. If the average of first six lightest weight players of CSK is 49 kgand that of the six heaviest players of CSK is 52 kg. The average weight of the player which lies in the sixth position in the list of players when all the 11 players of CSK are arranged in the order of increasing or decreasing weights.
(A) 54 kg
(B) 50 kg
(C) 53 kg
(D) 56 kg

16.The average presence of students of a class in a College on Monday, Tuesday and

Wednesday is 32 and on the Wednesday, Thursday, Friday and Saturday is 30. if the average number of students on all the six days is 26 then the number of students who attended the class on Wednesday is?
(A) 50
(B) 40
(C) 60
(D) 70

17.Suresh started his journey from P to Q by his bike at the speed of 40 kmph and then, the same distance he travelled on his foot at the speed of 10 kmph from Q to R. Then he returned from R to P via Q at the speed of 24 kmph. The average speed of the whole trip is:
(A) 18.5 kmph
(B) 19.8 kmph
(C) 18.2 kmph
(D) 19.2 kmph

18.Ramesh walked 6 km to reach the station from his house, then he boarded a train whose average speed was 60 kmph and thus he reached his destination. In this way he took a total time of 3 hours. If the average speed of the entire journey was 32 kmph then the average speed of walking is:
(A) 5 kmph
(B) 8 kmph
(C) 2 kmph
(D) 4 kmph

19.Bala travels first one-third of the total distance at the speed of 10 kmph and the next one-third distance at the speed of 20 kmph and the last one – third distance at the speed of 60 kmph. What is the average speed of Bala?
(A) 18 kmph
(B) 19 kmph
(C) 16 kmph
(D) 12 kmph

20.The average income of Arun, Bala and Chitra is Rs. 12,000 per month and average income of Bala, Chitra and David is Rs. 15,000 per month. If the average salary of David be twice that of Arun, then the average salary of Bala and Chitra is in Rs?
(A) 15,000
(B) 20,000
(C) 14500
(D) 13500

21.The average monthly expenditure of Mr.Ravi‟s family for the first three months is Rs 2,750, for the next three months is Rs 2,940 and for the last three months Rs 3,150. If his family saves Rs 4980 for nine months, find the average monthly income of the family for the 9 months?
(A) Rs. 3800
(B) Rs. 3500
(C) Rs. 3400
(D) Rs. 4200

22.The average age of a family of 8 members is 24 years. If the age of the youngest member be 6 years, the average age of the family at the birth of the youngest member was?
(A) 23.42 years
(B) 21.42 years
(C) 27.42 years
(D) 26.42 years

23.Mr. Ravi‟s family has 10 males and a few females, the average monthly consumption of rice per head is 8 kg. If the average monthly consumption of rice per head be 10 kg in the case of males and 6 kg in the case of females, find the number of females in Ravi‟s family?
(A) 2
(B) 4
(C) 6
(D) 10

24.In a famous hotel the rooms were numbered from 201 to 230, each room gives an earning of Rs. 5000 for the first fifteen days of a month and for the latter half, Rs. 3000 per room. Find the average income per room per day over the month. (September)?
(A) 2000
(B) 3000
(C) 4000
(D) 5000

25.In a famous hotel, the rooms are numbered from 101 to 130 on the first floor, 201 to 220 on the second floor and 301 to 330 on the third floor. In the month of September, the room occupancy was 50% on the first floor, 80% on the second floor and

40% on the third floor. If it is also known that the room charges are Rs 200, Rs. 250 and Rs. 300 on each of the floors respectively, then find the average income per room in the hotel for
the month of September?
(A) Rs. 123.75
(B) Rs. 132.50
(C) Rs. 128.50
(D) Rs. 143.50

26.There were 46 students in a Boys hostel. Due to the admission of eight new students the expenses of the hostel mess were increased by Rs.42 per day while the average expenditure per head diminished by Rs 1 What was the original expenditure of the hostel mess?
(A) Rs.562
(B) Rs.542
(C) Rs.532
(D) Rs.552

27.The average salary of the entire staff in a office is Rs 250 per month. The average salary of officers is Rs 520 and that of non-officers is Rs. 200. If the number of
officers is 15, then find the number of non–officers in the office
(A)823
(B) 81
(C) 87
(D) 56

28.Mr.Suresh‟s average monthly expenditure for the first four months of the year was Rs.260 For the next five months,the average monthly expenditure was Rs.40 more than what it was during the first four months. If he spent Rs.560 in all during the remaining three months of the year, Find what percentage of his annual income of Rs.5000 did he save in the year?
(A) 42%
(B) 48%
(C) 38%
(D) 24%

29.The average age of a group of persons going for tour to Shimla is 22 years. 25 new persons with an average age of 10 years join the group and their average age becomes 12 years. The number of persons initially going for tour is?
(A) 10
(B) 8
(C) 7
(D) 5

30.In English exam, the average of Class “A” was found to be “x” marks. After deducting a computational error, the average marks of 100 candidates got reduced from 74 to 54 The average thus came down by 25 marks. The total numbers of candidates who took the English exam were?
(A) 50
(B) 20
(C) 80
(D) 70

31.The average salary of 90 employees in an organization is Rs.14500 per month. If the no of executive is twice the no of clerks, then find the average salary of clerk ?
(a)11,500
(b)12,000
(c)13,200
(d)Can’t be determined

32.The average value of property of Agil, Mugilan and Anitha is Rs.130cr.The Property of Agil is 20cr greater than the property value of Mugilan and Anitha property value is 50cr greater than the Agil property value. The value of property of Anitha is
(a)120cr
(b)170cr
(c)100cr
(d)150cr

33.If the average marks of 1/5th of class is 70% and 2/5th class is 45% and the average mark of remaining class is 60%, then the average % of the whole class is
(a)73%
(b)45%
(c)62%
(d)56%

34.The average price of 100 mobiles in an electronic shop is Rs.27,000. If the highest and lowest mobiles are sold out then the remaining 98 mobiles average price is

26,400.The cost of lowest mobile is Rs.18,000.Find the cost of highest mobile price
(a)76500
(b)94800
(c)96400
(d)82000

35.There are 10 compartments in passenger train carries on average 15 passengers per compartment. If atleast 15 passengers were sitting in each compartment, no any compartment has equal no of passengers , and any compartment does not exceed the number of average passengers except 10th compartment. Find how many passengers can be accommodated in 10thcompartment ?
(a)38
(b)51
(c)47
(d)50

36.There are five times the number of two wheelers as there are three wheelers. The no of four wheelers are equal to the number of two wheelers. Find the average number of wheel per vehicle ?
(a)5
(b)4
(c)2
(d)3

37.In a particular week the average number of people visited the museum is 70. If we exclude the holidays then the average number is increased by 28. Further if we exclude the day which the maximum of 210 visitors visited the museum, then the average become 40.Find the no of holidays in the week
(a)None
(b)One
(c)Three
(d)Two

38.The average salary of 120 employees in the bank is Rs.15,000 per month. If the no of assistant is thrice the no of POs and average salary of assistant is 1/3rdof the average salary of POs then find the average salary of POs ?
(a)18,000
(b)25,000
(c)36,000
(d)30,000

39.In a class of 60 students 23 are girls. The average mark of boys is 45 and average mark of girls is 5(b) What is the average mark of the class?
(a)42.7
(b)52.2
(c)47.7
(d)62.1

40.Arjun gets 62 marks out of 100 in English, 81 out of 120 in Chemistry and 75 out of 150 in maths. The average marks of Arjun(in %) in all the three subjects is
(a)60%
(b)53%
(c)47%
(d)72%

ASSIGNMENT PROBLEMS

1.The average age of 30 students is 16years. If the age of the teacher is also included then the average age increased by 1 year, find the age of the teacher.
a) 45 year
b) 46 year
c) 47 year
d) 49 year

2. The present average age of a family of 5 members is 40 years. If the youngest member of the family is 12 years old, then find the average age of the family at the time of birth of the youngest member.
a) 32
b) 33
c) 34
d) 35

3. The average age of a husband and wife at the time of marriage is 22 years. After 3 years, they have a one year old child. Find the average age of the family of three at the time of birth of the child.
a) 14 years
b) 15 years
c) 16 years

d) 17 years

4.In a certain year the average monthly salary of a person is 5000 rupees. If for the first 7 months the average salary is 5300 and for the last 6 months, the average salary is 4600 rupees. Find the income of the person in 7th month.
a) 3700
b) 4700
c) 5700
d) can't be determined

5.The average age of a husband and his wife was 25 years when they were married 7 years ago. Now the average age of husband, wife and his son is 23 years. Find the age of son now.
1.3yr
2.4yr
3.5yr
4.6yr

6.The average of 10 reading is 25.5. In this the average of first three is 20 and the next four is 26. If the eight reading is 5 less than the night one and also 8 less than the tenth one, then find the eight reading?
1.22
2.24
3.26
4.28

7.The average of first and second number is 25 more than the average off the second and third number. Find the difference between the first and the third number
1.20
2.30
3.40
4.50

8.In a hostel there are 30 students and if the number of students increased by 5 then the expense is increased by 40 per day. But the average expenditure diminishes by 3. Find the original expenditure.
1.810
2.870
3.910
4.950

9.The average age of a class is 19 years. While the average age of boys is 20 and the average age of girls is 17. If the number of boys is 20 then find the number of girls in the class
1.10
2.15
3.16
4.18

10.The average age of a family of 4 members 3 years ago is 21 years. A baby
is born and now the average age of the family is same as before. Find the age of baby.
1.8yrs
2.9yrs
3.10yrs
4.11yrs

11.The average height of 50 students in a class is 165cm. On a particular day, three students P,Q and R are absent, so the average of the remaining students becomes 163cm. If the height of P and Q is equal and height of R is 2 cm less than P, then find the height of P.
1.187
2.192
3.197
4.198

12. The average age of a committee of 12 members is 48 years. A member of the committee age 62 retired and in place of him a new person aged 26 joined the committee. Find the new average of the committee.
1.44
2.45
3.46
4.48

13.The average weight of 12 people gets increased by 3.5kg when a person weighs 56 kg got replaced by another man. Find the weight of the new man
1.90kg
2.92kg
3.96kg
4.98kg

14.In an examination the average marks of risha is 74. If she got 16 more marks in hindi and 20 more marks in English then her average would have been 78. Find the total

number of subjects he studied?
1.7
2.8
3.9
4.10

15.While calculating the weight of a group of men, the weight of 63 kg of one of the member was mistakenly written as 83 kg. Due to this the average of the weights increased by half kg. What is the number of men in the group?
A) 25
B) 20
C) 40
D) 60

16.A cricketer had an average number of runs as 32 after playing 10-innings. If he wants to make his average run rate increased by 4, then how much runs will he have to take in his next inning?
A) 66
B) 84
C) 62
D) 76

17.The average temperature in Delhi for the first four days of the month was reported as 58. It reported as 60 for 2nd, 3rd, 4th and 5th days. The ratio of the temperatures of 1st and 5th day was 7 : 8. Find the temperature on the first day. (All temperatures are in degree celcius)
A) 42
B) 46
C) 63
D) 56

18.For three successive years, the cost of petrol were Rs 20 per litre, Rs 22 per litre and Rs 23.50 per litre respectively. If a man spent an average of Rs 8000 per year on petrol, then he spent what average cost of petrol per litre for the three years?
A) Rs 20
B) Rs 25.3
C) Rs 28.2
D) Rs 21.7

19.In a group of 8 boys, 2 men aged at 21 and 23 were replaced two new boys. Due to this the average cost of the group increased by 2 years. What is the average age of the 2 new boys?
A) 17
B) 30
C) 28
D) 23

20.The average age of the group having 3 members is 84. One more person joins the group and now the average becomes 80. Now a fifth person comes whose age is 3 years more than that of fourth person replaces the first person. After this the average age of the group becomes 79. What is the weight of the first person?
A) 75
B) 65
C) 68
D) 82

A.P and G.P

Arithmetic progression

Arithmetic progression(AP) or arithmetic sequence is a sequence of numbers in which each term after the first is obtained by adding a constant, d to the preceding term. The constant d is called common difference.
An arithmetic progression is given by a, (a + d), (a + 2d), (a + 3d), ...
where a = the first term , d = the common difference
If a, b, c are in AP, 2b = a + c
Examples
1, 3, 5, 7, ... is an arithmetic progression (AP) with a = 1 and d = 2
7, 13, 19, 25, ... is an arithmetic progression (AP) with a = 7 and d= 6
n^{th} term of an arithmetic progression
$t_n = a + (n - 1)d$

where $t_n = n^{th}$ term, a= the first term , d= common difference
Number of terms of an arithmetic progression
$N = [(l-a)/d]+1$
where n = number of terms, a= the first term , l = last term, d= common difference
Sum of first n terms in an arithmetic progression
$Sn=n/2[\ 2a+(n-1)d\ ]$
$Sn=(n/2)(a+l)$

where a = the first term,
d= common difference,
$l = t_n = n^{th}$ term = a + (n-1)d

Arithmetic Mean

If a, b, c are in AP, b is the Arithmetic Mean (AM) between a and c. In this case, b=(a+c)/2
The Arithmetic Mean (AM) between two numbers a and b = (a+b)/2

Geometric Progression

Geometric Progression(GP) or Geometric Sequence is sequence of non-zero numbers in which the ratio of any term and its preceding term is always constant.
A geometric progression(GP) is given by a, ar, ar^2, ar^3, ...
where a = the first term , r = the common ratio
If a, b, c are in GP, $b^2 = ac$
Examples
1, 3, 9, 27, ... is a geometric progression(GP) with a = 1 and r = 3
2, 4, 8, 16, ... is a geometric progression(GP) with a = 2 and r = 2
n^{th} term of a geometric progression(GP)
$tn=ar^{(n-1)}$

where $t_n = n^{th}$ term, a= the first term , r = common ratio, n = number of terms
Sum of first n terms in a geometric progression(GP)
$Sn = a(r^n - 1)/ (r-1)$ when $r \neq 1$
Sn = na When r = 1
a= the first term , r = common ratio, n = number of terms
Sum of an infinite geometric progression(GP)
$S\infty=a/(1-r)$ (if $-1 < r < 1$)

where a= the first term , r = common ratio
Geometric Mean
If three non-zero numbers a, b, c are in GP, b is the Geometric Mean(GM) between a and c. In this case, $b=\sqrt{ac}$
The Geometric Mean(GM) between two numbers a and b = $\sqrt{ab}$ab

(Note that if a and b are of opposite sign, their GM is not defined.)

CLASSWORK PROBLEMS

1.How many terms are there in the AP 20, 25, 30, ..., 130?
(a)21
(b)22
(c)23
(d) 24

2.Find the first term of an AP whose 8^{th} and 12^{th} terms are 39 and 59 respectively.
(a)3
(b)4
(c)5
(d)6

3.A number of squares are described whose perimeters are in GP. Then their sides will be in

(a)AP
(b)GP
(c)HP
(d)Nothing can be said

4.1,3,5,.....Which term of this AP is 55?
(a)25th
(b)26th
(c)27th
(d)28th

5.How many terms are identical in the two APs 1,3,5,.....upto 120 terms and 3,6,9,,,,upto 80 terms?
(a)38
(b)39
(c) 40
(d)41

6.Find the lowest term of an AP whose sum of all terms is 105 and greatest term is 6 times the lowest term.
(a)5
(b)10
(c) 5 or 10
(d) Cannot be determined

7.Find the 15th term in the series 20,15,10,.....
(a)-45
(b)-50
(c)-55
(d)0

8.A sum of money amounts to Rs.1240 in 4 years and Rs.1600 in 10 years at simple interest. Find the sum.
(a)Rs.800
(b)Rs.900
(c)Rs.1150
(d)Rs.1000

9.A number 15 is divided into three parts which are in AP and the sum of their squares is 83. Find the smallest number.
(a)3
(b)5
(c)6
(d)8

10.The sum of the first 16 terms of an AP whose first term and third term are 5 and 15 respectively is
(a)600
(b)765
(c)640
(d)680

11.The number of terms of the series 54+51+48+ .....such that the sum is 513 is
(a)18
(b)19
(c)15
(d) Both a and b

12.The least value of n for which the sum of the series 5+8+11.....n terms is not less than 670 is
(a)19
(b)20
(c)21
(d)22

13.A man receives Rs.60 for first week and Rs.3 more for every week than the preceding week. How much does he earn by the 20th week?
(a)Rs.1770
(b)Rs.1790
(c)Rs.1890
(d)Rs.1620

14.How many terms are there in the GP 5,20,80,320,.....20480?
(a)5
(b)6
(c)7
(d)8

15.Bobby was appointed to KFC in the pay scale of Rs.7000-500-12500. Find how many years he will take to reach the maximum of the scale.
(a)8 years
(b)9 years
(c)10 years
(d)11 years

16.A boy agrees to work at the rate of one rupee on the first day, two rupees on the next day and four rupees on the subsequent day and so on. If he starts 1st February and finishes the work by 20th February, how much will he receive?
(a)2^{20}

(b)2^{19}
(c)2^{20}-1
(d)2^{19}-1

17.If the first term and fifth term of a GP are 16 and 81 respectively, find the fourth term.
(a)18
(b)24
(c)36
(d)54

18.The seventh term of a GP is eight times the fourth term. Find the 1st term if 5th term is 48.
(a)2
(b)3
(c)4
(d)5

19.Sum of three terms of a GP is 14 and the sum of their squares is 84. Find the largest among them.
(a)4
(b)6
(c)8
(d)12

20.1st term of an AP is 1 and common difference is 4, which of the following will be the term of this AP?
(a)4551
(b)7881
(c)10091
(d)13531

21.How many natural numbers between 300 and 500 are divisible by 7?
(a)27
(b)28
(c)29
(d)30

22.Sum of the first and third terms of a GP is 20 and sum of the first three terms is 26. Find the GP.
(a)2,6,18
(b)18,6,2
(c) both a and b
(d)None of these

23.If a man saves Rs.4000 more than previous year's savings and he saves Rs.20000 on the first year, after how many years can he save more than Rs.10 lacs?
(a)18 years
(b)19 years
(c)20 years
(d)21 years

24.The 4th term and 10th term of a GP are 1/3 and 243 respectively. Find the 2nd term.
(a)1
(b)3
(c)1/27
(d)1/9

25.The 7th and 21st terms of an AP are 6 and -22 respectively. Find the 26th term.
(a)-34
(b)-32
(c)-12
(d)-10

26.Sum of 5 terms of an AP is 30 and the sum of their squares is 220. Which of the following is the third term?
(a)5
(b)6
(c)8
(d)9

27.Find the sum of all numbers from 10 to 50 excluding the numbers which are divisible by 8?
(a)1070
(b)1320
(c)1220
(d)1160

28.Sum of first 4 terms of an AP is 28 and first 8 terms is 88, find the sum of first 16 terms of that AP.
(a)268
(b)304
(c)340
(d)346

29.Find the general term of an GP with third term 1 and seventh term 8.
(a)$(2^{3/4})^{n-3}$
(b)$(2^{3/2})^{n-3}$
(c) $(2^{3/4})^{3-n}$
(d) $(2^{3/4})^{2-n}$

30.Find the number of terms of the series 1/81,-1/27,1/9.....-729.
(a)10
(b)11
(c)12
(d)13

31.Four geometric means are inserted between 1/8 and 128. Find the third geometric mean.
(a)4
(b)8
(c)16
(d)32

32.A and B are two terms whose AM is 25 and GM is 7. Which of the following may be the value of A?
(a)10
(b)25
(c)49
(d)20

33.Two number A and B, whose GM is 20% lower than their AM. Find the ratio of A to B.
(a)2:1
(b)3:1
(c)4:1
(d)3:2

34.A man saves Rs.100 in Jan 2018 and increases his savings by Rs.100 than preceding months. What is the annual savings for the man in 2018?
(a)Rs.6400
(b)Rs.4800
(c)Rs.8400
(d)Rs.7800

35.How many zeroes are there at the end of $(2!)^{2!}+(4!)^{4!}+(8!)^{8!}+(9!)^{9!}+(10!)^{10!}+(11!)^{11!}$?
(a)$(0!)^{0!}$
(b)$(10!)^{10!}$
(c)$(2!)^{2!}$
(d) None of these

36.1st , 8th and 22nd terms of an AP are three consecutive terms of a GP. Find the common ratio of the GP if sum of first 22 terms of the AP is 385.
(a)1
(b)2
(c) Either 1 or 2
(d)Either 1 or ½

37.The internal angle of a polygon are in AP and smallest angle is 100 and the common difference is 10. Find the number of sides of the polygon.
(a)8
(b)9
(c) Either 8 or 9
(d) None of these

38.After striking a floor, a ball bounces back to 7/8th of its previous height, find the distance it travels before coming to rest. Intially the ball was dropped from a height of 420 m.
(a)2940 m
(b)6300 m
(c) 1080 m
(d)3360 m

39.Each of the series 13+15+17 .....and 14+17+20 ..... are continued till 100 terms. Find how many terms are identical between the two series.
(a)32
(b)33
(c)34
(d)35

40.How many terms of the series 1+3+5+7+.....amount to 123454321?
(a)10111
(b)11011
(c)11101
(d)11111

ASSIGNMENT PROBLEMS

1.Find the nth term of the following sequence :
5 + 55 +555 + ... T_n
(a)$5(10^n - 1)$
(b)$5^n(10^n - 1)$
(c) $(5/9)*(10^n - 1)$
(d) $(5/9)^n *(10^n - 1)$

2.The first term of an Arithmetic Progression is 22 and the last term is -11. If the sum is 198, the number of terms in the sequence are:
(a)8
(b)9

(c)10
(d)12

3.A bacteria gives birth to two new bacteria in each second and the life span of each bacteria is 5 seconds. The process of the reproduction is continuous until the death of the bacteria. initially there is one newly born bacteria at time t = 0, the find the total number of live bacteria just after 10 seconds :
(a)$3^{10}/2$
(b)$3^{10}-2^{10}$
(c)$3^5(3^5-1)$
(d) None of these

4.After striking the floor, a rubber ball rebounds to $4/5^{th}$of the height from which it has fallen. Find the total distance that it travels before coming to rest if it has been gently dropped from a height of 120 metres.
(a)540 m
(b)960 m
(c)1080 m
(d)None of these

5.What is the sum of all 3 digit numbers that leave a remainder of '2' when divided by 3?
(a)164850
(b)164749
(c)149700
(d) None of these

6.What is the sum of all positive integers up to 1000, which are divisible by 5 and are not divisible by 2?
(a)10050
(b)5050
(c)5000
(d)50000

7.The sum of the three numbers in A.P is 21 and the product of the first and third number of the sequence is 45. What are the three numbers?
(a)5,7 and 9
(b)9,7 and 5
(c) 3,7 and 11
(d)Both a and b

8.A piece of equipment cost a certain factory 600,000. If it depreciates in value, 15% the first year, 13.5 % the next year, 12% the third year, and so on, what will be its value at the end of 10 years, all percentages applying to the original cost?
(a)200000
(b)105000
(c)405000
(d)650000

9.The sum of third and ninth term of an A.P is 8. Find the sum of the first 11 terms of the progression.
(a)44
(b)22
(c)19
(d)None of these

10.Given A = 2^{65} and B = $(2^{64}+2^{63}+2^{62}+...+2^0)$, which of the following is true?
(a)B is 2^{64} larger than A
(b)A and B are equal
(c)B is larger than A by 1
(d)A is larger than B by 1

11.How many 2-digit positive integers are divisible by 4 or 9?
(a)32
(b)33
(c)31
(d)34

12.If a rubber ball consistently bounces back ⅔ of the height from which it is dropped, what fraction of its original height will the ball bounce after being dropped and bounced three times without being stopped?
(a)16/81
(b)16/27
(c) 4/9
(d)37/81

13.What is the sum of the following series? -64, -66, -68, ... , -100
(a)-1458
(b)-1558
(c)-1568
(d)-1664

14.If log 2, log $(2^x -1)$ and log $(2^x + 3)$ are in A.P, then x is equal to ___
(a)$\log_2 5$
(b)$\log_3 2$
(c)Either a or b

(d)None of these

15. The first traveler starts from city X and travels north on a certain day and covers 1 km on the first day and on subsequent days, he travels 2 km more than the previous day. After 3 days, a second traveler sets out from city X in the same direction as the first traveler and on his first day he travels 12 km and on subsequent days he travels 1 km more than the previous day. On how many days will the second traveler be ahead of the first?
(a)2 days
(b)6 days
(c)From the 2nd day after the 2nd traveler starts
(d)From the 3rd day after the 2nd traveler starts

16.Find the average of 17 arithmetic means which are inserted between 20 and 60.
(a)40
(b)32
(c)36
(d)44

17.What is the geometric mean of 12,16 and 21 1/3.
(a)12
(b)16
(c)18
(d)24

18.Find the sum of first 200 terms of the even numbers.
(a)40000
(b)40200
(c)10100
(d)20200

19.Find the average of first 999 odd numbers.
(a)999
(b)1001
(c)1000
(d)500

20.Find the sum of first 23 odd numbers.
(a)576
(b)529
(c)525
(d)None of these

PERCENTAGE

A percentage is a ratio expressed in terms of a unit being 100. A percentage is usually denoted by the symbol "%".
To express a% as a fraction, divide it by 100
⇒ a% = a/100
To express a fraction as %, multiply it by 100
⇒ a/b = [(a/b) × 100] %
x% of y is given by (y × x/100)
Point to remember for faster Calculation
1 = 100% 1 /2= 50%
1 /3= 33.33% 1/4 = 25%
1/5 = 20% 1 /6= 16.66%
1/7 = 14.28% 1/8 = 12.5%
1/9 = 11.11% 1/10 = 10%
1/11 = 9.09% 1/12 = 8.33%
Some Short tricks based on Condition
If A's income is r% more than B's income, the B's income is less than A's income by
[r / (100+r)] * 100%
If A‟s income is r% less than B‟s income, the B‟s income is more than A‟s income by
[r / (100-r)] * 100%
If 'A' is x% of 'C' and 'B' is y% of 'C' then 'A' is (x/y) * 100% of 'B'.
If the sides of the triangle, rectangle, square, circle, rhombus etc is
(i) Increased by x%. Then its area is increased by $2x+(x^2 /100)$
(ii) If decreased by x%. Then its areas is decreased by, $-2x+(x^2 /100)$
If a number x is successively changed by a%, b%, c%. then final value
x (1+a/100) (1+b/100) (1+c/100)
The net change after two successive changes of a% and b% is
(□+ □+□□/100) %
The population of a town is 'P'. It increased by x% during 1st year, increased by y% during 2nd year and again increased by z% during 3rd year. Then the population after 3 years will be,
P * [(100+x)/100] * [(100+y)/100] * [(100+z)/100]

Mixture problems
If x% of a quantity is taken by the first person, y% of the remaining quantity is taken by the second person, and z% of the remaining is taken by the third person and if A is left, then initial quantity was
A/(1-x%)(1-y%)(1-z%)
The same concept we can use, if we add something, then the initial quantity was
A/(1+x%)(1+y%)(1+z%)

CLASWORK PROBLEMS

1. 33.33% of a value is 41. What is 60% of the same number?
   (a) 73.8
   (b) 72.6
   (c) 75.4
   (d) None of these

2. Find the value 12.66% of 600.
   (a) 76
   (b) 66
   (c) 77
   (d) 67

3. Manish saves 3/11th of his salary and spends 28% on food grains. He invests the remaining amount in mutual funds and stocks in the ratio 7:5 respectively. What is his monthly salary, if he has invested Rs.22176 in mutual funds?
   (a) Rs.82995.11
   (b) Rs.87995.13
   (c) Rs.84995.12
   (d) Rs.83995.13

4. Ayesha's income is Rs.12,000 per month. She pays 20% tax on her monthly income and spends 30% for her living expenses. How much does she save annually?
   (a) Rs.70, 000
   (b) Rs.72,000
   (c) Rs.74,000
   (d) Rs.76,000

5. Neha scored 1.2 times as many marks in Maths as in History. In Biology, she scored 20 more marks than in Maths. If she secured in aggregate 85.5% out of a total of 600, what was her score in Biology?
   (a) 174
   (b) 194
   (c) 170
   (d) 185

6. The turnover of a company increased by 10%, when the price of the product sold increased by 10%. Find the change in the quantity sold.
   (a)11%
   (b) 10%
   (c) 20%
   (d) 21%

7. A, B, C and D wrote an exam for a total of 500 marks. A scored 25% more marks than B, B scored 40% more marks than C and C scored 60% more marks than D. If A got 320 marks, what percentage of marks did D score?
   (a) 22.8
   (b)21.7
   (c) 15.6
   (d) 23

8. If the area of a rectangle is increased by 32% and its breadth increased by 20%, what is the percentage increase in its length?
   (a) 32%
   (b) 10%
   (c) 12%
   (d) 15%

9. The population of a town at the end of the year 2015 was 2, 45,000. It increased by 15% in the year 2016 and 12% in the year 2017. What is the current population of the town in the beginning of the year 2018?
   (a) 315590
   (b) 315560
   (c) 316650
   (d) 320000

10. Ruby scored 32% marks in History and failed by 16 marks. Robin scored 48% marks and scores 16 marks more than the pass mark. Find the maximum marks in the subject.
    (a)160
    (b) 200
    (c) 320
    (d) 400

11. In an examination A scored 25% of the total marks but failed by 56 marks while B scored 50% of the total marks which were 144 marks more than the minimum passing mark. Find the minimum passing mark?
    (a) 256
    (b) 196
    (c) 284
    (d)180

12. A number is reduced by 10%. Its present value is 270. What was its original value?
    (a) 300
    (b) 253
    (c) 297
    (d) 303

13. The weight of a cow is 25 % more than that of the calf. By what percentage is the weight of the calf less than that of the cow?
    (a) 75%
    (b) 50%
    (c) 30%
    (d) 20%

14. A mineral contains 26 % copper. What quantity of the mineral is required to extract 260 g of copper?
    (a) 260g
    (b) 500g
    (c) 1000g
    (d) 1500g

15. The price of a pair of sweaters was decreased by 22% and was sold at $30. What was the original price of the pair of sweaters?
    (a) $35
    (b) $36.5
    (c) $38.5
    (d) $40

16. What percentages of numbers between 1 and 90 both inclusive have 2 or 9 in the unit digit?
    (a) 10%
    (b) 50%
    (c) 17%
    (d) 20%

17. If A= 11.11% of 72 and B= 8.33% of 84, then which of the following is true?
(a) A is greater than B
(b) B is greater than A
(c) A = B
(d) Cannot be determined

18. Two numbers A and B are such that the sum of 7% of A and 6% of B is three-fourth of the sum of 5% of A and 11% of B. Find the ratio of A: B.
(a) 9:13
(b) 2:3
(c) 5:12
(d) 7:11

19. Rajesh bought a pair of headphones costing Rs.1848 including the sales tax of 12%. He asked the shopkeeper to reduce the price of the headphones so that he could save the amount now equal to the tax. Find the reduction in the price of the headphones.
(a) Rs.190
(b) Rs.195
(c) Rs.198
(d) Rs.203

20. Initially, Swetha has Rs.600 in her Paytm wallet. She initially increases the amount by 30% and the next day it is further increased by 15%.Find the percentage by which her wallet grows.
(a) 42.5%
(b) 45.5%
(c) 49.5%
(d) 52.5%

21 In a school of strength 2000, 36% consists of girls. The monthly tuition fees of a boy are Rs.480 and that of a girl is 25% less than that of a boy. What are the total fees per month paid by the girls and the boys to the school?
(a) Rs.873600
(b)Rs.863700
(c) Rs.867700
(d)Rs.876300

22. Mr. Samanth earns Rs.579600 per annum. He spends 32% of his monthly income on payment of bills, 12% on rent and donates 10% to an NGO; he further invests 50% of his remaining income on stocks. Find his monthly savings?
(a)Rs.43308
(b) Rs.23308
(c) Rs.11109
(d) Rs.35480

23. A businessman purchased 600 ICs and 400 Arduinos. He discovered 15% of the ICs and 8% of Arduinos were defective. Find the percentage of instruments that are in working condition.
(a) 87.8%
(b) 85%
(c) 82.8%
(d) 80.5%

24. The difference between a single discount of 35% and two successive discounts of 20% each on a certain bill was Rs.22. Find the bill amount.
(a)Rs.3200
(b) Rs.2200
(c) Rs.3300
(d) Rs.2800

25. Mahi's salary increases every year by 10% in June. If there is no other increase or deduction in the salary and his salary in June 2017 was Rs.22,385, what was his salary in June 2015?
(a) Rs.18650
(b) Rs.20350
(c) Rs.19250
(d) Rs.18500

26. The product of 1/3 of a number and 150% of a second number is what percent of the product of the two numbers?
(a) 80
(b) 50
(c) 70
(d) 90

27. Given that the product of two consecutive even numbers is 7568, what is 150% of the sum of the two numbers?
(a) 204
(b) 261
(c) 255

(d)198

28. Sum of three consecutive numbers is 2262. What is 41% of the highest number?
(a) 301.51
(b) 309.55
(c) 308.73
(d) 303.14

29. Dev invested 20% more than Ratul. Ratul invested 10% less than Mohit. If the total sum of their investments is Rs.17880, what was the investment of Mohit?
(a) Rs.5000
(b) Rs.6000
(c) Rs.7000
(d) Rs.8000

30. The male and female ratio was 6:7 in the year 2014 in a village. After a year the male and female population of the village increased by 15% and 12% respectively. The population stood at 5896 in the year 2015.. Find the female population in the village for the year 2015.
(a) 3136
(b) 2564
(c) 2760
(d) 3240

31. Rajkumar won a competition and received some prize money. He gave Rs. 2000 less than the 50% of the prize money to his son and Rs. 1000 more than two – third of the remaining to his daughter. Both his son and the daughter received the same amount. He saved the remaining amount. What percentage of the amount did he save?
(a) 9.09%
(b) 11.11%
(c) 13.95%
(d) 15.38%

32. Balaji spends 40% of his wage on transport, 20% on stationary materials, and 60% of the remaining on food. He saves Rs. 450, which is half of the remaining amount after spending on the transport, stationary materials and food. How much is his wage?
(a)Rs.1258
(b) Rs.2625
(c) Rs.5625
(d) Rs.6525

33. B as a percentage ofAis equal toAas a percentage of(A+B).How much percent of A is B?
(a) 60%
(b) 62%
(c) 64%
(d) 66%

34. The cost of crude material and the processing cost of a product increase by 30% and 20% respectively, whereas the selling price increases by 60%. The crude material and the processing cost, initially contributed 40% and 60% of the aggregate cost respectively. If the original profit was one-fourth the original processing cost, find the new profit percentage.
(a) 48.38%
(b)45%
(c) 43.88%
(d) 36.36%

35. Among a group of pilots, the ratio of category-A and category-B pilots is 4:1. If 10 category-B pilots are asked to leave, then the percentage of category A pilots becomes 96. What was the initial number of pilots in the group?
(a) 100
(b) 80
(c) 60
(d) 50

36. An apple vendor sells 75% of the apples and discards 20% of the remaining fruit. Next day, he sells 50% of the remaining, and discards 20%. On the third day, he sells 75% of the remainder and discards the rest. Find the percentage of the discarded apples.
(a)8%
(b)7%
(c)9%
(d)10%

37. In an election between two candidates, one has got 48% of the total valid votes. 30% of the votes were invalid. If the total number of votes was 7500, find the number of valid votes that the other candidate got.
(a) 2250
(b) 2530
(c) 2730
(d) 2850

38. 62.5% of the voters decide to vote for candidate A and the rest assure to vote for B. On the day of polling, 50% of the voters who envisaged voting for A voted for B and 30% of voters who promised to vote for B voted for A. B won by 30000 votes. Find the total number of voters.
(a) 200000
(b) 210000
(c) 215000
(d) 205000

39. An organization wanted to raise money for a blind school. They invited their selected donors who on paying an average of Rs500 make up the entire amount. If 75% of the donors who have been invited have promised to pay but during the course of events only 65% of the donors turn up with an average donation of Rs.600, then what should be the amount to be paid per head by the remaining 10% donors so that they raise the entire amount?
(a) Rs.800
(b) Rs.1000
(c) Rs.1100
(d) Rs.900

40. A grocer buys 60 articles at Rs.60 each. He sells 'n' articles at a profit of n% and the remaining at a profit of (100 – n) %. What is the minimum profit the grocer could derive from this transaction?
(a) Rs.1240
(b) Rs.1680
(c) Rs.1440
(d) Rs.1860

ASSIGNMENT PROBLEMS

1.Veena bought a watch costing Rs. 1404 including sales tax at 8%. She asked the shopkeeper to reduce the price of the watch so that she can save the amount equal to the tax. The reduction of the price of the watch is?
(a) Rs.108
(b) Rs.104
(c) Rs.112
(d) Rs.120

2.A Sales Executive gets a commission on total sales at 8%. If the sale is exceeded Rs.10,000 he gets an additional commission as a bonus of 4% on the excess of sales over Rs.10,000. If he gets the total commission of Rs.950, then the bonus he received is?
(a) 40
(b) 50
(c) 36
(d) 48

3.In a College there are 1800 students. Last day except 4% of the boys all the students were present in the college. Today except 5% of the girls all the students are present in the college, but in both the days number of students present in the college, were same. The number of girls in the college is?
(a) 1000
(b) 400
(c) 800
(d) 600

4.In a library 60% of the books are in Hindi, 60% of the remaining books are in English rest of the books are in Malayalam. If there are 4800 books in English, then the total number of books in Malayalam are?
(a) 3400
(b) 3500
(c) 3100
(d) 3200

5.80% of a small number is 4 less than 40% of a larger number. The larger number is 125 greater than the smaller one. The sum of these two numbers is
(a) 325
(b) 345
(c) 355
(d) 365

6.In a private company 60% of the employees are men and 48% of the employees are Engineer and 66.6% of Engineers are men. The percentage of women who are not engineers is?
(a) 60%
(b) 50%
(c) 55%
(d) 65%

7.Initially, Suresh has Rs.200 in his paytm wallet then he increased it by 20%. Once again he increased his amount by 25%. The final value of money in his wallet will be how much % greater than the initial amount?
(a) 40%
(b) 50%
(c) 80%
(d) 60%

8.Mr.Ramesh gives 10% of some amount to his wife and 10% of the remaining to hospital expenses and again 10% of the remaining amount to charity. Then he has only Rs.7290 with him. What is the initial sum of money with that person?
(a) Rs.8000
(b) Rs.9000
(c) Rs.10000
(d) Rs.20000

9.Initially, a shopkeeper had "x" pens. A customer bought 10% of pens from "x" then another customer bought 20% of the remaining pens after that one more customer purchased 25% of the remaining pens. Finally, shopkeeper is left with 270 pens in his shop. How many pens were there initially in his shop?
(a) 200
(b) 800
(c) 400
(d) 500

10.The cost of packaging of the oranges is 20% the cost of fresh oranges themselves. The cost of oranges increased by 30% but the cost of packaging decreased by 50%, then the percentage change of the cost of packed oranges, if the cost of packed oranges is equal to the sum of the cost of fresh oranges and cost of packaging
(a) 14.5%
(b) 16.66%
(c) 14.33%
(d) 13.66%

11.Cost Price of two laptops is same. One of the laptops is sold at a profit of 15% and the Selling Price of another one laptop is Rs. 3400 more than the first one. The net profit is 20%. What is the Cost Price of Each laptop?
(a)36000
(b)40000
(c)48000
(d)34000

12.In an office there are 40% female employees. 50% of the male employees are UG graduates. The total 52% of employees are UG graduates out of 1800 employees. What is the number of female employees who are UG graduates?
(a) 362
(b) 412
(c) 396
(d) 428

13.Ravi got 70% in English and 56% in Biology and the maximum marks of both papers is 100. What percent does he score in Maths, if he scores 60% marks in all the three subjects?. Maximum Marks of Maths paper is 200.
(a) 30%
(b) 40%
(c) 45%
(d) 57%

14.Ankita is 25 years old. If Rahul's age is 25% greater than that of Ankita then how much percentAnkita's age is less than Rahul's age?
(a) 40%
(b) 35%
(c) 10%
(d) 20%

15.Mr.Ravi's salary was reduced by 25% for three months. But after the three months, his salary was increased to the original salary. What is the percentage increase in salary of Mr.Ravi?
(a) 33.33%

(b) 42.85%
(c) 28.56%
(d) 16.66%

16.In an election only two candidates A and B contested 30% of the voters did not vote and 1600 votes were declared as invali(d) The winner, A got 4800 votes more than his opponent thus he secured 51% votes of the total voters on the voter list. Percentage votes of the loser candidate, B out of the total voters on the voter list is:
(a) 3%
(b) 4%
(c) 5.6%
(d) 4.6%

17. 500 kg of ore contained a certain amount of iron. After the first blast furnace process,200 kg of slag containing 12.5% of iron was removed. The percentage of iron in the remaining ore was found to be 20% more than the percentage in the original ore. How many kg of iron were there in the original 500 kg ore?
(a) 54.2
(b) 58.5
(c) 46.3
(d) 89.2

18.A school has raised 75% of the amount it needs for a new building by receiving an average donation of Rs. 1200 from the parents of the students. The people already solicited represent the parents of 60% of the students. If the School is to raise exactly the amount needed for the new building, what should be the average donation from the remaining students to be solicited?
(a) Rs.800
(b) Rs.900
(c) Rs.850
(d) Rs.600

19.The monthly income of Shyama and Kamal together is Rs.28000. The income of Shyama and Kamal is increased by 25% and 12.5% respectively. The new income of Kamal becomes 120% of the new salary of Shyam(a) What is the new income of Shyama?
(a) Rs.12000
(b) Rs.18000
(c) Rs.14000
(d) Rs.15000

20.In a school there are 2000 students. On January 2nd, all the students were present in the school except 4% of the boys and on January 3rd, all the students are present in the school except 28/3% of the girls, but in both the days number of students present in the school, were same. The number of girls inthe school is?
(a) 400
(b) 1200
(c) 800
(d) 600

Profit Loss Discount

Cost Price (CP):
The amount paid to purchase a product or the cost incurred in manufacturing a product is known as the Cost Price.
Selling Price (SP):
The amount at which a product is sold is called the Selling Price.
Profit or Gain:
When the selling price is greater than the cost price, then the seller makes Profit or Gain.
Profit = SP – CP

Loss:
When the selling price is less than the cost price, then the seller incurs Loss.
Loss = CP – SP
Marked Price (MP):
The initial amount labeled as selling price on the product is called the Marked Price.
Discount:
The reduction extended on the marked price of a product in effecting its sale is called Discount. When there is no discount, selling price is equal to the marked price.
Mark-up:
The amount increased from the actual cost price to the listed price is called the Mark-up.

SP

Percentage Calculation:
The change in percentage can be calculated as

$$\%C = \frac{\text{Final Value} - \text{Initial Value}}{\text{Initial Value}} * 100$$

1. Profit percentage (%P)

$$\%P = \frac{SP - CP}{CP} * 100$$

2. Loss percentage (%L)

$$\%L = \frac{CP - SP}{CP} * 100$$

3. Discount percentage (%D)

$$\%D = \frac{MP - SP}{MP} * 100$$

4. Mark-up percentage (%M)

$$\%M = \frac{MP - CP}{CP} * 100$$

Profit, loss and mark-up percentage are always calculated over the cost price and discount percentage is calculated over the marked price.
Types of Discount:
There are two types of discount.
1. Flat discount:
The discount given at once on the whole amount is called as Flat discount.
2. Successive discount:
Successive percentage reduction on previously discounted prices is called as Successive discount.
Note:
The total discount in case of 2 successive-discounts can be calculated using the formula below.
If the first discount is x% and second discount is y% then,
Total discount = $(x + y + \frac{(xy)}{100})\%$
In general, if there are successive increases or decreases of P%, Q% and R% to a value, the effective multiplication factor is $\left\{\left(\frac{100 \pm P}{100}\right)\left(\frac{100 \pm Q}{100}\right)\left(\frac{100 \pm R}{100}\right)\right\}\%$

CLASSWORK PROBLEMS

1.If the cost price of a pen is Rs.150 and its selling price is Rs.137.50, then calculate the percentage loss on the pen.
(a) 8.33%
(b) 12.5%
(c) 12%
(d) 15%

2. If the cost price of 15 pencils is equal to the selling price of 20 pencils, find the loss percentage.
(a)20%
(b)25%
(c)30%
(d)33.33%

3. Selling price of an article is Rs.120. If the gain is 50%, then what is the cost price of the given article?
(a)Rs.100
(b)Rs.120
(c)Rs.80
(d)Rs.60

4. A vendor sells a product for Rs.1800 after a discount of 25%. What is the list price of the product?
(a) Rs.2000
(b) Rs.2300
(c) Rs.2400
(d) Rs.2500

5. Alan marks up the price of an article by 20%. If he decreases the discount from 10%

to 5%, he gains Rs.12 more. What is the profit, if the discount is 15%?
(a)Rs.8
(b)Rs.12
(c)Rs.6
(d)Rs.4

6. Find the single discount equivalent to successive discounts of 30% and 50%.
(a) 60%
(b)75%
(c)70%
(d)65%

7. A shopkeeper sells 2 shirts at the same price; on one he makes a profit of 20% and on the other, a loss of 20%. Find the loss or gain percentage on the whole transaction.
(a) 4% loss
(b) 5% gain
(c) No loss, No gain
(d) Data Inadequate

8. A Shopkeeper sells sugar using false weights and gains 120/9%. He claims that he sells the product at its cost price. What weight would the customer receive instead of one kilogram?
(a) 882.35 grams
(b) 880 grams
(c) 881.33 grams
(d) 885 grams

9. A watch was priced at Rs.800. After 2 successive discounts, it was sold for Rs.640. If the first discount was 10%, find the rate of the second discount.
(a)11.11%
(b)12%
(c)33.33%
(d)33%

10. Suresh sold 20 pens for Rs.160.The loss incurred was equal to cost price of 4 pens. Find the cost price of 1 pen.
(a) Rs.30
(b) Rs.25
(c) Rs.10
(d) Rs.15

11.In a business transaction, the profit earned is 80% of the cost price. If the cost price is increased by 20% and the selling price remains unchanged, findthe decrease in profit percentage.
(a) 30%
(b) 20%
(c) 35%
(d) 40%

12. Anitha sold her bike at 30% discount still she makes 20% profit. Find the cost price of bike if marked price is Rs.60000.
(a) Rs.37000
(b) Rs.36000
(c) Rs.32000
(d) Rs.35000

13. A shopkeeper allows a discount of 37.5% on the marked price of a certain article which costs Rs.500.If the profit is 30% then what is the marked price of the article?
(a) Rs.1000
(b) Rs.1020
(c) Rs.1040
(d) Rs.990

14. Devi purchased 10 dozens of mangoes at Rs.750 a dozen. She sold each mango for Rs.65. What is her profit percentage?
(a) 4%
(b) 5%
(c) 8%
(d) 10%

15.On selling 10 toys at Rs.525 there is a loss equal to the cost price of 3 toys. Find the cost price of each toy.
(a) Rs.60
(b) Rs.75
(c) Rs.65
(d) Rs.70

16..A man bought 10 apples and 10 oranges for Rs.400 and sold them for Rs.430. If he gains 15% on apples and loses 15% on oranges, find the cost prices of apples and oranges.
(a) Rs.40,Rs.10
(b) Rs.40,Rs.20
(c) Rs.30, Rs.10
(d) Rs.30, Rs.20

17. If the shopkeeper allows 20% discount for an article, he earns 16% profit. What would be his profit percentage if he allows 12% discount?
(a)17.6%
(b) 15%
(c)20%
(d)27.6%

18. The marked price of a book is Rs.150. After allowing 20% discount, the loss incurred on the book is 4% .Find the cost price of the book.
(a) Rs.125
(b) Rs.110
(c) Rs.140
(d) Rs.135

19. The selling price of a shirt is Rs.1700 after giving two successive discounts of 20%, 15%.What is the marked price of the shirt?
(a)Rs.3000
(b) Rs.2500
(c) Rs.2000
(d) Rs.4000

20. The selling price of an article is one and half times its cost price. If the selling price is 90% of the marked price, what is the mark-up percentage?
(a) 66.66%
(b) 50%
(c) 33.33%
(d) 37.5%

21. A shopkeeper sells 100 watches for Rs.3,02,400/- for the entire year. For the first 6 months he sells the watches at a profit of 30% and the next 6 months he sells at a profit of 20%. If the number of watches sold for the first and the second 6 months gets interchanged, then the total selling price becomes Rs.2,97,600/-. Find the cost price of one watch.
(a) Rs.1600
(b) Rs.1800
(c) Rs.2000
(d) Rs.2400

22. The selling price of two articles is same, when one article is sold at 10% profit and the other at 5% loss. If the sum of their cost price is Rs.8200, then find the cost price of each article.
(a) Rs.4000, Rs.4200
(b) Rs.3800, Rs.4400
(c) Rs.3600, Rs.4600
(d) Rs.5400, Rs.2800

23. Ram purchased a few books at the rate of 6 for Rs.150 and next time the same number of books at the rate of 5 for Rs.150. He combined both and then sold them at the rate of 11 for Rs.300. In this exchange he suffered a loss of Rs.400. What is the total number of books he purchased?
(a) 1770
(b) 1760
(c) 880
(d) 1990

24. John purchased a piece of open land at a price of Rs.1,20,000. He sells $3/5^{th}$ of the land at a loss of 7%. If he intends to make an overall profit of 15% by selling the entire land, at what percentage of profit should he sell the rest of his land?
(a) 48%
(b) 50.58%
(c) 43%
(d) 57.12%

25. A product was sold at a profit of 6%. But due to general price increase, the manufacturing cost of the product increased by 40%. As a normal measure to watch the market trend, the company decided not to increase the price of the product for five months. What percentage of loss would the company suffer on the product during this five month period?
(a) 24.28%
(b) 34%
(c) 28.23%
(d) 25%

26. Ramesh purchased 300 books at Rs.24 each. He sold 150 books at a gain of 15%.Find the gain percentage at which he should sell the rest of the books in order to make 20% profit on the entire transaction.
(a) 25%
(b) 29%
(c) 35%

(d) 20%

27. AShopkeeper purchases 90 smart phones and marks up the price by 40%. He allows a discount of 20% on themarked price for each cash purchase and 10% discount for each card purchase. If three-fifth of the phones are sold by cash and the remaining by card and the total profit earned is Rs.1,42,560, what is the cost price of a phone?
(a) Rs.6000
(b) Rs.8500
(c) Rs.9000
(d) Rs.7100

28. Two persons invested some amount of money in the ratio 2:5 for the same period in a business venture. At the end of the year, they decided that 25% profit was to be set aside for donations. One third of the remaining was reinvested and the rest of the profit was to be shared in the ratio of their investments. If the difference in their final share of the profit is Rs.3000, find the total profit.
(a) Rs.14000
(b) Rs.42000
(c) Rs.35000
(d) Rs.24000

29. A dealer marked the price of an air conditioner at Rs.64000. He offers a 20% discount and also gives a gift voucher worth Rs.1200 along with it. If he receives a profit of 15%, what is the approximate cost price of the air conditioner?
(a) Rs.45000
(b) Rs.43321
(c) Rs.50000
(d) Rs.55000

30. Kumar is a dishonest shopkeeper and uses a 940gm weight instead of 1kg. His cost price and selling price per unit kg of a commodity are Rs.32 and Rs.38 respectively. What is his profit % if he sells 15kg of the commodity?
(a) 26.32%
(b) 29.33%
(c) 30.25%
(d) 32.52%

31. A man sells his computer at a profit of 22.5% and his printer at a loss of 15% but on the whole he gains Rs.4500. On the other hand, if he sells the computer at a loss of 15% and the printer at a profit of 22.5%, then has no gain or loss. Find the cost price of the computer.
(a) Rs.36000
(b) Rs.45000
(c) Rs.59000
(d) Rs.67000

32. Guhan purchased a banquet hallthe cost of which is Rs.15000 per square foot He also lays a new carpet which costs Rs.1000 per square foot. Guhan sold the hall along with the carpet to Kumar at 30% profit. When Kumar was in need of money, he sold it to Kathir at aloss of30%. Kathir acquired the new hall at an amount Rs.6912000 less than Guhan.Find the area of the hall.
(a) 4800 sq.ft
(b) 4500 sq.ft
(c) 3000 sq.ft
(d) 3500 sq.ft

33. A certain type of alloy is made up of two metals A and B. Metals A and B account for 45% and 35% of the total cost of the alloy respectively. The remaining 20% is the manufacturing cost which remains constant. The alloy is sold at 65% above the cost price. Find the percentage profit, if the cost price of the metals A and B increase by 8% and 9% respectively and the selling price of the alloy remains unchanged.
(a) 42%
(b) 41 %
(c) 41.02%
(d) 42.02%

34. Nirmal purchased a guitar and sold it at a loss of 30%. If he had bought it for 15% less and sold it at Rs.1225 more than the previous selling price, he would have made a profit of 40%. Find the original cost price of the guitar.
(a) Rs.2000
(b) Rs.2500
(c) Rs.3000
(d) Rs.4000

35. A Shopkeeper buys 3 bundles of garmentsworth Rs.150000. He makes a profit of 15% by sellingthe first bundle of worth Rs.30000 and a profit of 25% for the next bundle worth Rs.60000. He plans to make an overall profit of 20%. Find the profit that he must make on the third bundle.
(a)Rs.11000
(b)Rs.10000
(c)Rs.10500
(d)Rs.12000

36. An unscrupulous vegetable merchant weighs 25% less than the actual weight of vegetables. For a particular customer, he weighs $\frac{1}{2}^{th}$ more than the quantity he usually weighs. If the percentage profit in this transaction is 28.56%, then what would be the profit if he had weighed correctly at the same price?
(a) 10.25%
(b) 12%
(c) 12.5%
(d) 15%

37. By selling two books for Rs.90 each, a shopkeeper gains 20% on one and loses 20% on the other book. Find the overall percentage profit or loss.
(a)4% profit
(b) 4% loss
(c) 5% loss
(d) 5% profit

38. A man sells three articles, one at a loss of 25%, another at a profit of 60% and the third one at a loss of 20%. If the selling prices of all the three are same, find by how much percentage is their average CP lower than or higher than their average SP.
(a) 6.94%
(b) 7.14%
(c) 8.33%
(d) 10%

39.Tom and John both sell similar products which have a labelled price of Rs.33,000. Tom gives a discount of 9.09% on the whole, while John gives a discount of 11.11% on the first Rs.27000 and one-fifth on rest. What is the difference between the two selling prices?
(a) Rs.950
(b) Rs.1200
(c) Rs.1800
(d) Rs.800

40. The ratio of selling price of 3 shirts is 5:7:9 and the ratio of percentage profit is 1:5:3 respectively. If the profit percentage of shirt 1 is 11.11% and cost price of shirt 2 is Rs.600, what is the overall percentage gain?
(a) 26.36%
(b) 33.31%
(c) 30.23%
(d) 20.19%

ASSIGNMENT PROBLEMS

1.A dishonest shopkeeper sells his goods at cost price. But he uses a false weight and thus gains 8.1%(approx). Find the weight he uses in place of the 1kg.weight.
(a) 900gm
(b) 850gm
(c) 925gm
(d) 870gm

2.If a refrigerator is sold for Rs.40000, the retailer incurs a loss of20%. At what price must he sell the refrigerator in order to gain 20%?
(a) Rs.60000
(b) Rs.55000
(c) Rs.65000
(d) Rs.50000

3.100 pens are purchased at the rate of Rs.500 and 12 pens are sold for Rs.48. What is the profit or loss percentage?
(a) 20% gain
(b) 10% loss
(c) 20% loss
(d) 10% gain

4. Ranjith bought a second hand bike for Rs.25000 and spent Rs.4000 on repairs. He then sells it for Rs.43500. Find his profit %.
(a) 40%
(b) 30%
(c) 45%
(d) 50%

5.A floristmarks up the price of a bouquet by 15% over the cost price. He offers a discount

of 5% on the bouquet. Find his profit percentage.
(a) 9.25%
(b) 9%
(c) 9.6%
(d) 9.85%

6.A fruit seller sold 2kgs of orange for Rs.200 at a loss of 20%. At what price must he sell a kg of orange to gain 25%?
(a) Rs.156.25
(b) Rs.176.25
(c) Rs.159.25
(d) Rs.136.25

7. A book seller marks a book up by 40% of its cost. What % of discount musthe offer to his customers so that he ends up selling it at 10% profit?
(a) 21.42%
(b) 20%
(c) 37.5%
(d) 32.85%

8. A merchant sells rice to a customer using false weights and gains 150/7% on selling at cost. What weight would a customer receiveinstead of a kilogram?
(a) 891.91 grams
(b) 930 grams
(c) 942.66 grams
(d) 823.53 grams

9. The cost of manufacturing a perfumecomprises the cost of materials, labour and overheads in the ratio 5:4:3. The labour cost is Rs.200. If the perfume is sold at a price one-third more than the cost price, find the profit.
(a) Rs.250
(b) Rs. 150
(c) Rs.200
(d) Rs.300

10. The selling price of a watch is Rs.2100 after giving three successive discounts of 20%, 33.33%, and 25%. What is the marked price of the watch?
(a) Rs.5000
(b) Rs.5250
(c) Rs.4500
(d) Rs.4000

11.A shopkeeper offers 30% discount on cash purchase but offers additional 20% discount if the customer uses a gift coupon for payment. A customer pays Rs.5600 using a gift coupon. Find the marked price of the article.
(a) Rs.11000
(b) Rs.13000
(c) Rs.10000
(d) Rs.12000

12. A manufacturer allows 20% discount to his clients and still earns 28% profit. As the manufacturing cost of the goods increased by 14%, he issued a new list price which is 15% higher than the previous list price. If he still allows the same percentage of discount to his clients, find the new profit or loss percentage.
(a) 29.12%
(b) 28.43%
(c) 26.23%
(d) 25.9%

13. A merchant marks the price of 25kg of rice at Rs.1200. A customer bargains with the merchant and receives 20% discount but the merchant cheats him by giving 6% less quantity of rice. What is the actual discount the customer received?
(a) 28.25%
(b) 14.89%
(c) 38.52%
(d) 42.56%

14. The Maximum Retail Price (MRP) of a product is 65% above its manufacturing cost. The productis sold through a retailer, who earns 27% profit on his purchase price. What is the profit percentage for the manufacturerwho sells his product to the retailer? The retailer gives 10% discount on MRP.
(a) 15.7%
(b) 17.5%
(c) 16.9%
(d) 18.1%

15. 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) Rs.1800
(b) Rs.1600
(c) Rs.2400
(d) Rs.1200

16. The cost price of 20 articles is the same as selling price of 15 articles. The profit percent in the transaction is
(a) 33.33%
(b) 20%
(c) 25%
(d) 30%

17. A man sells 320 mangoes at the cost price of 400 mangoes. His gain perecent is
(a)25%
(b) 30%
(c) 35%
(d) 12%

18. If the cost price of 12 tables is equal to the selling price of 16 tables, the loss percent is
(a) 25%
(b) 20%
(c) 33%
(d) 12%

19. If the selling price of 18 articles is equal to the CP of 21 articles the loss or gain percent is
(a) 16.66%
(b) 12%
(c) 10%
(d) 15%

20. A man sold 250 chairs and had a gain equal to selling price of 50 chairs. His profit percent is
(a) 25%
(b) 20%
(c) 33%
(d) 35%

SIMPLE AND COMPOUND INTEREST

It is money paid by the borrower for using the lender's money for a specified period of time. Denoted by I.

Principal
The original sum borrowed. Denoted by P.

Time
Time is a period for which the money is borrowed. Denoted by n

Rate of Interest
The rate at which interest is calculated on the original sum. Denoted by r.

Amount
Sum of Principal and Interest and is denoted by A.

Simple Interest
The interest calculated every year on original principal, i.e. the sum at the beginning of the first year. It is denoted by SI.

SI = Pnr

A=P+SI

Compound Interest
The interest is added to the principal at the end of each period to arrive at the new principal for the next period.

OR

The amount at the end of year will become principal for the next year and so on.

Let P be principal borrowed at the beginning of period 1.

Amount at end of period n=1 is

A= P (1+r/100)

Then,

New Principal at the beginning of period 2 will be A i.e.
P (1+r/100) = P*R where R=(1+r/100).

Installments under Simple Interest
P + Pnr/100 = (A+ (n-1)Ar/100) (A+ (n-2)Ar/100)+.....+ (A+ 1.Ar/100)+A
P – Principal r - rate of interest per annum
n – number of installments A – EMI amount
Installments under Compound Interest
$P(1+r\%)^n = A(1+r\%)^{n-1} + A(1+r\%)^{n-2} + A(1+r\%)^{n-3} + \ldots\ldots\ldots + A(1+r\%)^1 + A$
P – Principal r - rate of interest per annum
n – number of installments A – EMI amount

CLASSWORK PROBLEMS

1.If the simple interest on Rs. 1120 for 2 years is Rs.8000/-, what is the rate of interest percent per annum?
A) 4%
B) 7%
C) 8%
D) 5%

2.If the simple interest on Rs.400 for 3 years is Rs.4000/-, what is the rate of interest percent per annum?
A) 4 1/3%
B) 3 1/4%
C) 3 1/3%
D) None of these

3.Find the principle, interest on Rs.900/- at 6% p.a. for 3 years?
A) Rs.5000/-
B) Rs.4500/-
C) Rs.3500/-
D) Rs.2200/-

4.In how many years will sum of Rs 4000 yield an interest of Rs.1080/- at 9% p.a?
A) 1 year
B) 3 years
C) 4 years
D) 2 years

5.In how many years will sum of Rs.6000/- yield an interest of Rs.1200/- at 8% p.a?
A) 2 1/2 years
B) 2 years
C) 1 1/2 years
D) 3 years

6. Find the principle, interest on Rs.1200 at 8% p.a. for 2 years?
A) Rs.6500/-
B) Rs.7500/-
C) Rs.5500/-
D) None of these

7.Simple interest on a certain sum 16/25 of the sum. if both the rate of interest and time are same. then what is the rate of interest?
A) 12%
B) 10%
C) 8%
D) 13%

8.Find the simple interest on Rs.7300/- at 12% p.a. for the period from jan-2007 to 18-april-2007?
A) 247.20
B) 247
C) 346
D) 347

9.Find simple interest on Rs.4000/- at 15% p.a. for 9months?
A) Rs.350/-
B) Rs.450/-
C) Rs.125/-
D) Rs.450/-

10.Find simple interest on Rs.6000/- at 10% p.a. for 2years 3 months?
A) Rs.1350/-
B) Rs.1250/-
C) Rs.2350/-
D) None of these

11.Find simple interest on Rs.5000/- at 12% p.a. for 73days?
A) Rs.220/-
B) Rs.120/-
C) Rs.210/-
D) None of these

12. At what rate of percent per annum will a sum of money double in 8 years?
A) 13 ¼%
B) 12 ½%
C) 11 ½%
D) None of these

13.The borrow taken by a man, for every 6 years it will be 3 times, then how much time it will be taken For 8 times:
A) 20 years
B) 21 years
C) 22 years
D) 25 years

14. .Find the simple interest 0n Rs.3000/- at 5 1/3% p.a. for 2 ½ years?
A) Rs.150/-
B) Rs.200/-
C) Rs.400/-
D) None of these

15.Find simple interest on Rs.5000/- at 12% p.a, for 2 years?
A) Rs.1300/-
B) Rs.1400/-
C) Rs.1200/-
D) Rs.1000/-

16.Find simple interest on Rs.6000/- at 7 ½% p.a. for 3years?
A) Rs.1250/-
B) Rs.1350/-
C) Rs.1200/-
D) Rs.1400/-

17.An employ sell a t.v for Rs.9000/- with 10% simple interest for 5 years on an installment basis. Then How much amount he paid for each installment?
A) Rs.1200/-
B) Rs.1500/-
C) Rs.1400/-
D) Rs.1350/-

18.A person took some amount with some interest for 3 years, but increase the interest will be increase From 7% to 9%. He paid Rs. 240 extra, then howmuch amount he took?
A) Rs.7000/-
B) Rs.4000/-
C) Rs.5500/-
D) Rs.6000/-

19.A borrow took by a man, for every 5 years it will be doubled, then what is the rate of the interest?

A) 15%
B) 20%
C) 22%
D) 23%

20.A borrow took by a man, for every 8 years it will be 3 times, then what is the rate of the interest?
A) 15%
B) 20%
C) 25%
D) 28%

21.A borrow took by a man, for every 12 years it will be 5 times, then what is the rate of the interest?
A) 33 1/3%
B) 18 1/3%
C) 33 2/3%
D) 34%

22.A borrow taken by a man, for every 5 years it will be doubled, then how much time it will be taken
A) 12years
B) 15years
C) 16years
D) 13years

23.A man borrowed some amount, after 3 years he paid Rs.10,400/- with 10% interest, then how much Amount he borrowed?
A) Rs.7000/-
B) Rs.8000/-
C) Rs.9000/-
D) Rs.1000/-

24.A man took some money for borrowed, for 3 years the total will be Rs.4000 and 5 years it will be Rs.5000/-. Then how much amount he borrowed?
A) Rs.500/-
B) Rs.1500/-
C) Rs.2500/-
D) Rs.1000/-

25.A man took some money for borrowed, for 2 years the total will be Rs.9000/- and 5 years it will be13, Rs.500/-. Then how much amount he borrowed?
A) Rs.4500/-
B) Rs.6000/-
C) Rs.5000/-
D) Rs.5500/-

26.A person took some amount with some interest for 1 years, but increase the interest for 2%, he paid Rs.60/- extra, then how much amount he took?
A) Rs.3000/-
B) Rs.4000/-
C) Rs.2900/-
D) Rs.2000/-

27.A person took some amount with some interest for 2 years, but increase the interest for 1%, he paid Rs.120/- extra, then how much amount he took?
A) Rs.5500/-
B) Rs.6000/-
C) Rs.4000/-
D) Rs.7000/-

28.A principal of $2000 is placed in a savings account at 3% per annum compounded annually. How much is in the account after one year, two years and three years?.
A) 2185.45
B) 2175.50
C) 2180.50
D) 2150.25

29.What would $1000 become in a saving account at 3% per year for 3 years when the interest is not compounded (simple interest)? What would the same amount become after 3 years with the same rate but compounded annually?
A)1092.73
B) 1106.78
C) 1086.34
D) 1104.56

30.An amount of $1,500 is invested for 5 years at the rates of 2% for the first two years, 5% for the third year and 6% for the fourth and fifth years all compounded continuously. What is the total amount at the end of the 5 years?
A) 1850.51
B) 1860.45
C) 1560.25
D) 1650.25

31. In one year, the population of a village increased by 10% and in the next year, it decreased by 10%. If the end of the 2nd year, the population was 7920, what was it in the beginning?
(a) 8500
(b) 8000
(c) 8100
(d) 8400

32. What is the rate of simple interest for the first 4 years if the sum of Rs. 360 become Rs. 540 in 9 years and the rate of interest for the last 5 years in 6%?
A. 4%
B. 5%
C. 3%
D. 6%

33. A sum of money grows to Rs 200 after 1st year and to Rs 220 after 2nd year, at compound interest. The rate % is
(a) 15
(b) 10
(c) 25
(d) 12

34. How much more would Rs 20,000 fetch, after two years, if it is put at 20% p.a. compound interest Payable half yearly than if it is put at 20% p.a. compound interest payable yearly?
(a) 482
(b) 424
(c) 842
(d) 512

35. Find the principal of the interest compounded at the rate of 10% per annum for the two years is Rs. 420.
A. Rs. 2000
B. Rs. 2200
C. Rs. 1000
D. Rs. 1100

36. At what percentage per annum, will Rs 10,000 amount to 17, 280 in three years?(Compound interest being reckoned)
A. 20%
B. 14%
C. 24%
D. 11%

37. 32. If the amount is 2¼ times the sum after 2 years at compound interest, the rate of interest per annum is
(a) 25%
(b) 45%
(c) 40%
(d) 50%

38. A sum of money doubles itself in 5 years. In how many years will it become four fold (if interest is compounded)
A. 15
B. 10
C. 20
D. 12

39. Rakesh took a loan for 6 years at the rate of 5% p.a. S.I. if the total interest paid was Rs. 1230. the principal was:
A. Rs 4100
B. Rs 4920
C. Rs 5000
D. Rs 5300

40.A sum of money was lent at simple interest at 11% p.a. for 3½ years and 4½ years respectively. If the difference in interest for two periods was Rs. 41250, the sum is.
A. Rs. 3250
B. Rs. 3500
C. Rs. 3750
D. Rs. 4250

ASSIGNMENT PROBLEMS

1. A sum of Rs. 10,000 is borrowed at 8% per annum compounded annually. If the amount is to be paid in three equal installments, the annual installment will be
A) Rs 3520.25
B) Rs 3880.335
C) Rs 4200.15
D) Rs 4530.225

2. A sum was put at simple interest at a certain rate for 5 years. Had it been put at 2% higher rate, it would have fetched Rs. 450 more. Find the sum?
A) Rs 4500

B) Rs 3200
C) Rs 3800
D) Rs 4200

3. Stephen borrowed some money at 6% for the first 4 years, 8% for the next 6 years and 11% for the period beyond 2 years. If the total interest paid by him at the end of eleven years is Rs 5640, how much money did he borrow?
A) Rs 10000
B) Rs 6000
C) Rs 8000
D) Rs 9000

4. A financier lend money at simple interest, but he includes the interest every six months for calculating the principal. If he is changing an interest of 10%, the effective rate of interest becomes?
A) 10%
B) 11.5%
C) 10.25%
D) 12%

5. Ragav purchases a coat for Rs.2400 cash or for Rs.1000 cash down payments and two monthly installments of Rs.800 each. Find the rate of interest.
A) 80%
B) 100%
C) 110%
D) 120%

6. The difference between simple interest and compound interest on Rs. 1200 for one year at 10% per annum reckoned half-yearly is:
A) Rs.3
B) Rs.3.5
C) Rs.4
D) Rs.5

7. A borrows 5000 at simple interest. At the end of 3 years, he again borrows 3000 and finally pays 2340 as interest after 6 years from the time he made the first borrowing. Find the rate of interest per annum.
A) 4%
B) 5.5%
C) 6%
D) 4.5%

8. Arav fixes the rate of interest 5% per annum for first 3 years and for the next 4 years 6 percent per annum and for the period beyond 7 years, 7 percent per annum. If Mr. Kumar lent out Rs.2500 for 11 years, find the total interest earned by him?
A) 1650
B) 1565
C) 1840
D) 1675

9. A certain sum of money amounts to rupees 2900 at 4% per annum in 4 years. In how many years will it amount to rupees 5000 at the same rate?
A) 30
B) 25
C) 22
D) 18

10. Rs.100 doubled in 5 years when compounded annually. How many more years will it take to get another Rs.200 compound interest?
A) 5
B) 6
C) 8
D) 10

11.Out of a sum of Rs 850, a part was lent at6% SI and the other at 12% SI. If the interest on the first part after 2 years is equal to the interest on the second part after 4 years, then the second sum is
A) Rs350
B) Rs280
C) Rs170
D) Rs220

12. A sum of Rs. 550 was taken as a loan. This is to be paid back in two equal installments. If the rate of interest be 20% compounded annually, then the value of each installment is :
A) Rs360
B) Rs280
C) Rs250
D) Rs320

13. A certain sum of money amounts to Rs.1300 in 2 years and to Rs. 1525 in 3.5 years. Find the sum and the rate of interest.

A) Rs850, 10%
B) Rs900, 12%
C) Rs800, 13%
D) Rs1000,15%

14. The simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:
A) Rs1800
B) Rs1750
C) Rs2000
D) Rs1655

15. If the simple interest on a certain sum of money is 4/25 of the sum and the rate per cent equals the number years, then the rate of interest per annum is:
A) 4%
B) 5%
C) 8%
D) 10%

16. The ratio of the amount for two years under compound interest annually and for one
year under simple interest is 6:5. When the rate of interest is same, then the value of rate of interest is:
A) 20%
B) 15%
C) 18%
D) 22%

17. An automobile financier claims to be lending money at simple interest, but he includes the interest every six months for calculating the principal. If he is charging an interest of 10%, the effective rate of interest becomes:
A) 9.5%
B) 8%
C) 10.25%
D) 10%

18. A person borrows Rs. 3000 for 2 years at 5% p.a. simple interest. He immediately lends it to another person at 6 ¼ %p.a for 2 years. Find his gain in the transaction per year.
A) Rs42
B) Rs39.25
C) Rs35
D) Rs37.5

19. If the difference between CI and SI earned on a certain amount at 20% pa at the end of 3 years is Rs.640, find out the principal.
A) Rs5500
B) Rs6500
C) Rs4500
D) Rs5000

20. A Woman took a loan of Rs. 15,000 to purchase a mobile. She promised to make the payment after three years. The company charges CI at 20% per annum for the same. But, suddenly the company announces the rate of interest as 25% per annum for the last one year of the loan period. What extra amount she has to pay due to the announcement of new rate of interest?
A) Rs1230
B) Rs1135
C) Rs1080
D) Rs1100

NUMBER AND ALPHABET SERIES

Practice question:

1. 3 , 5, 9, 17, 33 __
a. 60 b. 62 c. 65 d. 64

2. 98 72 50 32 18 __
a.10 b.8 c.6 d.12

3. 46 ,60, 52, 54 ,58 ,48 __
a. 64 b. 54 c. 66 d. 58

4. 20,20,19,16,17,13,14,11 _ _
a. 11,13 b. 12,12 c.10,10 d. 10,12

5. 500,356,456,392 __
a. 400 b. 418 c. 430 d. 428

6. 41,42,41,45,37,46,__
a.56 b.19 c.28 d.62

7. 4,6,9,14,21,32,__
a.45 b.48 c.51 d.55

8. 3,7,17,31,53__
a.71 b.69 c.79 d.83

9. 6,24,96,384, __
a.1568 b.1563 c.1655 d.1536

10. 8,17,35,71,143,__
a.287 b.299 c.285 d.286

11. 1,2,6,21,88,445,__
a.2760 b.2600 c.2670 d.2676

12. 10,17,26,37,50,__
a.65 b.63 c.71 d.66

13. 20,30,42,56,72,__
a.91 b.88 c.92 d.90

14. 56,42,30,20,12,__
a.6 b.8 c.10 d.12

15. 65,126,217,344,__
a.516 b.315 c.513 d.520

16. 0,7,26,63,124,__
a.215 b.217 c.213 d.218

17. 64040,27030,8020,__
a.1000 b.1010 c.1800 d.1001

18. 0,6,24,60,120,__
a.212 b.200 c.210 d.212

19. 24,12,12,18,36,__
a.42 b.44 c.90 d.88

20. 5,16,49,104,__
a.181 b.180 c.172 d.176

21. 9,27,31,155,161,1127,__
a.1603 b.12764 c.1135 d.34178

22. 8,8,32,288,4608,___
a.115200 b.115300 c.115000 d.114200

23. 9,13.5,27,67.5__
a.198.5 b.200.5 c.134.5 d.202.5

24. 1,0,5,8,17,24,37,__
a. 49 b.42 c.48 d.43

25. 1,5,11,49,239__
a.1441 b.1444 c.1414 d.1244

26. 1,30,136,417,838,__
a.833 b.764 c.814 d.839

27. 3,4,12,45,196__
a. 1100 b.1005 c.1005 d.1092

28.25, 30, 49, 56, 81, 90, ?, 132
a. 90 b. 72 c. 99 d. 121

29. 2807,1400,697,346,171,__
a.80 b.66 c.88 d.84

30. 123, 444, 888, 1776, 8547,__
a.16000 b.15055 c.16566 d.16005

ALPHABET SERIES

Q31. HJB, IKC, JLD, KME, _____:
a) LNF b) LEF c) LFN d) None of These

Q32. DLM, ENO, FPQ, GRS, _____:
a) HTU b) FTU c) HUT d) None of These

Q33. ONM, LKJ, IHG, FED, _____:
a) CAB b) CBA c) ABC d) None of These

Q34. MN, KP, GT, W__:
a) X b) D c) C d) None of These

Q35. BFN, CFO, DFP, EFQ, ____
a) GGR b) FFR c) FGR d) None of These

Q36. QRD, RSE, STF, TUG ____:
a) HVU b) UUH c) UVH d) None of These

Q37. UTS, RQP, ONM, LKJ, ____:
a) IHG b) HIG c) HJI d) None of These

Q38. HJL, NPR, TVX, _____:
a) YAC b) ZBD c) ZAB d) None of These

Q39. AF, JO, ____, DI, NS:
a) SX b) TY c) HN d) None of These

Q40. OMK, IGE, ___, WUS:
a) FHJ b) CAY c) XYZ d)None of These

Q41. ACE, IKM, PRT, _____:
a) XZB b) UXZ c) VXZ d) None of These

Q42. QFG, RHI, SJK,_____, UNO
a) TLM b) LMN c) UMN d) None of These

Q43. FRT, GSU, HTV, _____, JVX:
a) KUZ b) WXY c) IUW d) None of These

Q44. ON:LM, QP:JK, UT:____, RQ:IJ :
a) FG b) VW c) WV d) None of These

Q45. OL, FCZ, ____, NKH:
a) WTQb) BEG c)GDA d) None of These

CODING & DECODING

In simple words code is a system in which message is sent in encrypted form by the sender, which is then decoded by the receiver following some rules or methods to decode it Such questions are set to test the ability of the candidate to understand the pattern or rule or method according to which the code is set & then to decipher the code accordingly .
As such , there are no fixed pattern or rules according to which these codes are set, however, to understand the topic better , we have classified the questions into few heads keeping in mind , the various types, of questions asked in all types of exams .
In order to understand these questions better & solve them quickly, it is recommended that students should do 2 things .
1. Learn the alphabet series with their number i-e, A-1, B-2, C-3, D-4 ---------- Z-26
2. Opposites- opposites of alphabets are obtained by subtracting their number from 27
Eg: letter opposite of A will be:- 27-1 (position of A is 1) = 26 i.e Z ,Similarly opposites of
B - Y, F- U, J - Q, C - X, G – T, K - P, D – W, H – S, L - O, E - V, I – R, M – N
Type of questions : -
Type – 1 Alphabet to alphabet coding : -
In such questions alphabets are coded by other alphabets according to some pattern.
eg : COSTLY is coded as DNTSMX in a certain language, how will SIPPER be coded as in same language ?
Sol: Code is made by just selecting the next alphabet in the alphabet series. So code for SIPPER will be TJOOFS
Type – 2 : - Numeric coding : - Codes are given in form of numbers which are usually according to position of the alphabets in alphabet series
eg : - Jaipur is coded as 1019162118, then how will Alwar be coded in the same pattern ,
10 1 9 16 21 18
J A I P U R -1 0 1 9 1 6 2 1 1 8
1 12 23 1 18
A L W A R - 1 1 2 2 3 1 1 8

Type – 3 : - Direct Coding:- codes are given to the alphabets irrespective of their position in alphabet series & these codes may be in form of numbers or alphabets or even symbols .
eg : - Course is coded as X Z Y T L U
SEAT is coded as LUPN, then how will CATERS be coded as : -

COURSE	SEAT
CATERS	
XZUTLU	LUPN
XPNUTL	

Here we see, code of C is X, A is P and so on for other alphabets directly based on their position in the word.

Type 4 :- Alpha-Numeric coding :- In some questions code is given in both number and alphabet forms

Alphabet to Alphabet coding

1. In a certain code language FILES is written as GJMFT, How will SCOUT be written in that code
(a) TDOPV (b) TDPVU (c) DTPOU
(d) TDPOU (e) None of these

2. In a certain code language NUMBER is written as MTLADQ, how will VIOLIN be written in that code?
(a) VHKNHM (b) WJNKMH (c) UHNKHM
(d) TDPOU (e) None of these

3. In a certain code language HOUSE is written as GPTTD, how will BROAD be written in that code?
(a) CQPBE (b) ASNBD (c) ASOBD
(d) ASNBC (e) None of these

4. In a certain code language DELHI is written as FGNJK, how will ALWAR be written in that code?
(a) CNYCT (b) DMXCT (c) CNWCT
(d) CNDTY (e) None of these

5. In a certain code language WALK is written as UYJI, how will TRIM be written in that code?
(a) RHGK (b) SGHK (c) ROGK
(d) PQGK (e) None of these
6. In a certain code language GUEST is written as ISGQV, how will MONEY be written in that code?
(a) ONPDA (b) KQPCA (c) OMPCA
(d) OMPDA (e) None of these

7. In a certain code language HURDLE is written as BPNAJD, how will TRAGIC be written in that code?
(a) NMWDGB (b) MNWDGB c) NMWCGC
d) MNYDGC e) None of these

8. In a certain code DESIGN is written as FCUGIL, how is REPORT written in that code ?
(a) TCRMPR (b) TCRMTR (c) TCTMPR
(d) TCTNTR (e) None of these

9. In a certain code language, the word 'IMAGINE' written as 'ENIGAMI'. How will the word 'FLOWERS' be written in that code?
(a) RESWFOL (b) SREWOLF (c) SRFWOLE
(d) WOLFSRE (e) None of these

10. In a certain code language the word 'SIMPLE' is written as 'LEMPSI'. How will the word 'JUNGLE' be written in that code?
(a) LENGJU (b) LEGNJU (c) LEJUGN
(d) LENGUJ (e) None of these

11. In a certain code language CONSUMER is written as ERUMNSCO. How will TRIANGLE be written in that code language?
(a) LENGIATR (b) ELNGIATR (c) LEGNIATR
(d) LEGNAITR (e) None of these

12. In a certain code language WONDERFUL is written as OWNEDRFUL. How will CONFUSING be written in that code language?
(a) OCNFUSNIG (b) OCNUFSNIG (c) ONCUFSNIG
(d) ONCFUNSIG (e) None of these

13. In a certain code language CROWD is written as DQPVE. How will BLEND be written in that code language?
(a)CMFOE (b) CKFME (c) AKDMC
(d) AMDOC (e) None of these

14. In a certain code language BREAKDOWN is coded as NOWDKAERB. How will TRIANGLES be written in that code language?
(a) AIRTGNSEL(b) SELGNTRIA (c) AIRTNSELG
(d) SELGNAIRT (e) None of these

15. In a certain code BROWN is written as CSPXO, How is PART written in that code?
(a) OBQU (b) QBSU (c) OZQS
(d) RBTU (e) None of these

16. In a certain code language UNIQUE is written as XQLOSC, How will FAVOUR be written in that code?
(a) IDYMSP (b) HEYNST (c) HEXMSP
(d) IEZMTPS (e) None of these

17. In a certain code, 'ROAMING' is written a 'APRNGOI'. How would 'PLATEAU' be written in the same code?
(a) AMPTUBE (b) PMAUEBU
(c) ALPUUAE (d) AMPUUBE

18. In a certain code language, 'TEMPORARY' is written as 'SFLQOQBQZ'. How would 'WONDERFUL' be written in the same code?
(a) VPMEFQGTM (b) VPMEESGTM
(c) XPMEFQGTM (d) VPMEFEVK
(e) None of these

19. In a certain code DETAIL is written as BJMUFE. How is SUBMIT written in that code?
(a) UJSWCVT (b) NJUCVT (c) NJUTVC
(d) UJNTVC (e) None of these

20. In a certain code DUPLICATE is written as MRVFJFVBE. How is CARTOUCHE written in that code?
(a) UTBEPWDJF (b) UTBFQFJDW
(c) UTBEQFJDW (d) UTBEPFJDW
(e) None of these

21. In a certain code 'MOTHER' is written as ONHURF. How will 'ANSWER' be written in that code?
(a) NBWRRF (b) MAVSPE
(c) NBWTRD (d) NBXSSE
(e) None of these

22. In a certain code CREAM is written as NBDBQ. How is BREAD written in that code?
(a) EBFAQ (b) EBDAQ
(c) BEDQA (d) BEFQA
(e) None of these

23. In a certain code 'TASK' is written as 'BUJR' and 'BIND' is written as 'JCCM'. How is 'SUIT' written in that code?
(a) VTSH (b) VSTH
(c) TRUJ (d) TRJU
(e) None of these

24. In a certain code 'CLEAR' is written as 'SBFMD' and 'BONDS' is written as 'TEOPF'. How is 'STALE' written in that code?
(a) BKZSR (b) CUTFM
(c) STUBMF (d) FMBUT
(e) None of these

25. In a certain code 'BEAMING' is written a 'BFCMHOJ' and 'CLEAR' is written as 'MDESB'. How is 'TRAIL' written in that code?
(a) USAMJ (b) USAJM (c) SUAMJ
(d) SUAJM (e) None of these

26. In a certain code 'TOWN' is written as 'POSY' and 'CARE' is written as 'BFBQ'. How is 'BELT' written in that code?
(a) FUAK (b) DSCM (c) DSAK
(d) FUCM (e) None of these

27. In a certain code language "MOSTLY" is coded as PUZLRK and TRUMPH is coded as SNISTO, then how is word SNISTO, then how is word STRENGTH is written in that code?
(a) TSOUSDFG (b) UFHIRQMS (c) TUSFMFSG
(d) USTDPFVE (e) None of these

28. In a certain code language word PLAYER is written as AELPRY and word WRITER is written as EIRRTW, then how is word MAGNET is written in that code ?
(a) GEAMTN (b) AEGMNT (c) GAETMN
(d) TENGAM (e) None of these

29. In a certain code FISH is coded as GKVL and REST is coded as SGVX, then how will be MAID is written is same language ?
(a) NBJE (b) EKDQ (c) NCLH
(d) BNEJ (e) None of these

30. If ion a certain code BOMBAY is written as FSQFEC then how is QCWSVI written in the same code ?
(a) MANDYA (b) UGAWZM (c) MANDAL
(d) MYSOER (e) None of these

31. DROWN = MXNSC, BREAK = ?
(a) BSNS (b) RGPQ (c) MNLO
(d) JBDSA (e) None of these

32. MONKEY = XDJMNL, TIGER= ?
(a) YQFMDU (b) FFQXDU (c) QYEEDU
(d) QDFHS (e) None of these

33. KINDLE = ELDNIK, EXOTIC = ?
(a) EXIOTC (b) COXITE (c) CXOTIE
(d) CITOXE (e) None of these

34. MASTER=RETSAM, FATHER=?
(a) RATEHF (b) RHETAF (c) REHTAF

(d) HERTAF (e) None of these

35. MOTHER=PQWJHT, SISTER=?
(a) VKVVHT (b) KHVNVN (c) KVNVNHT
(d) KHVVNT (e) None of these

36. ANEEL=NAEEL, NEERU=?
(a) ENREU (b) ENERU (c) EENRU
(d) Cannot be determined (e) None of these

37. If CENPNPJL is written as DOOK then how is FHNPNPCE is written ?
(a) FOOD (b) GOOD (c) ROOT
(d) FOUR (e) None of these

38. If COLD is coded as ALHY, then what is the code of IRON ?
(a) GUKI (b) GUSI (c) GOKI
(d) GKUL (e) None of these

39. POUR is coded as RSAZ, what is the code of WAKE ?
(a) EYGT (b) TGEY (c) YEQM
(d) YGET (e) None of these

40. In a code language COLD =DPME than what i the code for CHINA = ?
(a) DHIMB (b) DJKMB (c) DIJOB
(d) DUPBM (e) None of these

Alphabet to Symbols/ Numbers

1. If REMIT is written as ∗ £3 ∩ 7 and CONSUL is written as = %8ß$5 ; then OCELOT will be written as –
(a) %=3587 (b) %= £5%7 (c) %=35%∩
(d) %=35%7 (e) None of these

2. In a certain code FROM is written as #$52 and BASE is written as %7?@ . How is SOME written in that code ?
(a) 5?2@ (b) ?5@2 (c) ?52%
(d)?52@ (e) None of these

3. In a certain code SEAL is written as $75@ and DOSE is written as#8$7 . How is SOLD written in that code ?
(a) 58@# (b) #87$ (c) #8$7
(d) $5@# (e) None of these

4. Ion a certain code, 'SPRING' is written as ′#2%@4 = ′ and 'GONE' is written as =74©'. How would 'SIGN' be written in the same code ?
(a) #@4 = (b) 2@ = 4 (c) #@ = 4
(d) #% = 4 (e) None of these

5. 'GROW' is written as ′ = @%#′ andWITHIN' is written ′# ÷ +@ ÷ Δ′ in a certain code language. How would 'WING' be written in that code ?
(a) # ÷ Δ= (b) #%Δ= (c) %÷ Δ=
(d) # ÷ © = (e) None of these

6. In a certain code BOND is written as 1543 and DEAN is written as 3864. How is BED written in that code ?
(a) 153 (b) 183 (c) 138
(d) 143 (e) None of these

7. In a certain code 'BACK' is written as '5914' and 'KITE' is written as ' 4876' . How is 'BEAT' written in that code ?
(a) 5697 (b) 5967 (c) 4697
(d) 5687 (e) None of these

8. In a certain coded BAKE is written as 3792 and BIT is written as 368. How is BITE written in the code ?
(a)3682 (b) 3768 (c) 3782
(d) 3672 (e) None of these

9. In a certain code language BREAK written is 51642 and KITE is written as 2796. How will RIB be written in that code language ?
(a) 175 (b) 176 (c) 185
(d) 135 (e) None of these

10. In a certain code 'ROBUST' is written .as '593127' and 'BONE' is written as '3864' . How is 'SORE' written in that code ?
(a) 2937 (b) 2594 (c) 2954
(d) 3954 (e) None of these

11. In a certain code 'BUILD' is written as′5$31@′and 'LIKES' is written as ''13© ∗ 8′ . How is 'SKID' written in that code
(a) 8© ∗ @ (b) 8@3© (c) 8©3@
(d) 83©@ (e) None of these

12. In a certain code 'BUILT' is written as ′5#32@′ and 'TRIBE' is written as ′@935©′. How is 'RULE' written in that code ?
(a) 9#2© (b) 95#© (c) @#3©
(d) @2#© (e) None of these

13. If in a certain code "RANGE" is coded as 12345 and "RANDOM" is coded as 123678. Then the code for the word "MANGO" would be:
(a) 82357 (b) 89343 (c) 84629
(d) 82347 (e) None of these

LANGUAGE CODING

Directions (1-5): Study the given information carefully to answer the given questions.
In a certain code language,
'committee to analysis exams' is written as 'esfr re pt',
'analysis gathering in evening' is written as 'chba mo fr',
'gathering to nominate persons' is written as 're dv chgi' and
'nominate chairman in analysis' is written as 'mo gifryu'.

Q1. What is the code for 'evening' in the given code language?
(a) mo
(b) yu
(c) ch
(d) Other than those given as options
(e) ba

Q2. In the given code language, what does the code 'pt' stand for?
(a) nominate
(b) Either 'exams' or 'committee'
(c) evening
(d) analysis
(e) Either 'for' or 'persons'

Q3. What may be the code for 'analysis call' in the given code language?
(a) dv iq
(b) iqgi
(c) iqfr
(d) gies
(e) fr dv

Q4. What is the code for 'to' in the given code language?
(a) mo
(b) fr
(c) gi
(d) dv
(e) re

Q5. If 'nominate new persons' is coded as 'dv wzgi' in the given code language, then what is the code for 'new chairman gathering'?
(a) wzches
(b) chwzyu
(c) yu mo wz
(d) freswz
(e) chyufr

Directions (6-10): Study the following information carefully and answer the given questions:
In a certain code language 'milk is very tasty' is written as 'ta la jasa', 'tea is black' is written as 'ha jaka' and 'sweet milk and tea' is written as 'ha pa sara'.

Q6. What is the code for 'milk'?
(a) ja
(b) la
(c) sa
(d) pa
(e) None of these

Q7. 'black tea' can be coded as
(a) ha ja
(b) ka ha
(c) pa ha
(d) Can't be determined
(e) None of these

Q8. Which of the following is coded as 'ta'?
(a) very
(b) sweet
(c) Either tasty or very
(d) black
(e) None of these

Q9. Which of the following is the code for 'black'?
(a) ra
(b) pa
(c) Either sa or ka

(d) ka
(e) None of these

Q10. 'ja' is the code for
(a) milk
(b) and
(c) is
(d) tasty
(e) None of these

Directions (11-14): Study the information and answer the following questions:
In a certain code language
'economy search not money' is written as 'ka la ho ga',
'demand and sound economy' is written as 'mo ta pa ka',
'money more only part' is written as 'zi la ne ki' and
'demand more sound economy' is written as 'zimoka ta'.

Q11. What is the code for 'and' in the given code language?
(a) mo
(b) ta
(c) pa
(d) ka
(e) None of these

Q12. What is the code for 'sound' in the given code language?
(a) Only ta
(b) Only mo
(c) Either pa or mo
(d) Only pa
(e) Either mo or ta

Q13. What may be the possible code for 'part only more' in the given code language?
(a) ne kizi
(b) mo zi ne
(c) ki ne mo
(d) mo ziki
(e) xi ka ta

Q14. What may be the possible code for 'more money' in the given code language?
(a) la ne
(b) ga la
(c) zika
(d) ziki
(e) la zi

Ratio and Proportion

A Ratio is comparison of two quantities by division.
A Proportion is a statement that two ratio or equivalent.
A Proportion is considered to be true if the ratios on the both side are equivalent.
If a: b = c: d, we write a: b :: c : d and we say that a, b, c, d are in proportion.

a : b :: c : d => (b x c) = (a x d)

Fourth Proportional:
If a : b = c : d, then d is called the fourth proportional to a, b, c.
Third Proportional:
a : b = c : d, then c is called the third proportion to a and b.
Mean Proportional:
Mean proportional between a and b is ab.
Properties of Proportion: If a/b = c/d then,

b/a= d/c
a/c = b/d
a × d=b × c

CLASSWORK PROBLEMS

1. Seats for Maths, Physics and Biology are inthe ratio of 5 : 7 : 8 respectively. There is aproposal to increase these seats by 40%, 50%and 75% respectively. What will be the respective ratio of increased seats ?
(1) 2 : 3 : 4
(2) 6 : 7 : 8
(3) 6 : 8 : 9
(4) Cannot be determined

2.Samira , Mahira and Kiara rented a set Of DVDs at a rent of Rs. 578. If they used it for8 hours, 12 hours and 14 hours respectively,what is Kiara‟s share of rent to be paid ?
(1) Rs. 238
(2) Rs. 204
(3) Rs. 192
(4) Rs. 215

3. A sum of money is to be divided among four persons in the ratio of 2 : 3 : 4 : 5. Out ofthe four, one person gets Rs. 200 more than theother and Rs. 100 less than another. What is thesum ?
(1) Rs. 2800
(2) Rs. 1400
(3) Rs. 4200
(4) Cannot be determined

4. (Type Q No 1) In a college the number of students studyingArts, Commerce and Science arein the ratio of 3 : 5 : 8 respectively. If the number of students studying Arts, Commerce andScience is increased by 20%, 40% and 25%respectively, what will be the new ratio ofstudents in Arts, Commerce and Sciencerespectively ?
(1) 18 : 35 : 50
(2) 3 : 10 : 10
(3) 4 : 8 : 5
(4) 32 : 35 : 25

5. 20 boys and 25 girls form a group of socialworkers. During their membership drive,the same number of boys and girls joined thegroup (e.g. if 7 boys joined, 7 girls joined). Howmany members does the group have now, if theratio of boys to girls is 7 : 8 ?
(1) 75
(2) 65
(3) 70
(4) 60

6. A sum of money is divided among A, B, Cand D in the ratio of 3 : 4 :9 : 10 respectively. Ifthe share of C is Rs. 2,580 more than the shareof B, then what is the total amount of money A and D have ?
(1) Rs. 5,676
(2) Rs. 6,192
(3) Rs. 6,708
(4) Rs. 7,224

7. Production of company A is 120% of theproduction of company B and 80% of theproduction of company C. What is the ratiobetween the productions of companies A, B andC respectively ?
(1) 6 : 5 : 9
(2) 6 : 5 : 4
(3) 12 : 10 : 15
(4) 10 : 12 : 15

8. Number of students in Arts and Sciencefaculties in an institute are in the ratio of 5 : 8respectively. If 150 more students join Artfaculty while 80 more students join

Sciencefaculty, the respective ratio becomes 3 : 4.Originally what was the total number ofstudents in both faculties together ?
(1) 1200
(2) 1400
(3) 1150
(4) None of these

9. 75% of a number is equal to 5/8 th of anothernumber. What is the ratio between the firstnumber and the second number respectively ?
(1) 5 : 4
(2) 6 : 5
(3) 4 : 5
(4) 5 : 6

10. In a test, a candidate secured 336 marksout of maximum marks „x". If the maximummarks „x" were converted into 400 marks, hewould have secured 192 marks. What were themaximum marks of the test ?
(1) 700
(2) 750
(3) 500
(4) 650

11. Which of the following represents ab = 64?
(1) 8 : a = 8 : b
(2) a : 16 = b : 4
(3) a : 8 = b : 8
(4) 32 : a = b : 2

12.(Q No 1 Type)The ratio of the number of studentsstudying in schools A, B and C is 5 : 8 : 4respectively. If the number of students studyingin each of the schools is increased by 20%, 25%and 30% respectively, what will be the newrespective ratio of the students in schools A, Band C ?
(1) 13 : 25 : 15
(2) 20 : 25 : 13
(3) 15 : 25 : 13
(4) Cannot be determined

13. When 30% of one number is subtractedfrom another number, the second numberreduces to its own four-fifth. What is the ratiobetween the first and the second numbersrespectively ?
(1) 4 : 7
(2) 3 : 2
(3) 2 : 5
(4) None of these

14. The largest and the second largest anglesof a triangle are in the ratio of 3 : 2respectively. The smallest angle is 20% of thesum of the largest and the second largestangles. What is the sum of the smallest and thesecond largest angles ?
(1) 80°
(2) 60°
(3) 100%
(4) 90°

15. The ratio between the angles of aquadrilateral is 7 : 2 : 5 : 6 respectively. Whatis the sum of double the smallest angle and halfthe largest angle of the quadrilateral ?
(1) 162°
(2) 198°
(3) 99°
(4) 135°

16. The angles of a quadrilateral are in theratio of 2 : 4 : 7 : 5. The smallest angle of thequadrilateral is equal to the smallest angle of atriangle. One of the angles of the triangle istwice the smallest angle of the triangle. What isthe second largest angle of the triangle ?
(1) 80°
(2) 60°
(3) 120°
(4) Cannot be determined

17. The ratio between the angles of aquadrilateral is 3 : 4 : 6 : 7. Half the secondlargest angle of the quadrilateral is equal to thesmaller angle of a parallelogram. What is thevalue of adjacent angle of the parallelogram ?
(1) 136°
(2) 126°
(3) 94°
(4) 96°

18. The ratio between the three angles of aquadrilateral is 1 : 4 : 5 respectively. The valueof the fourth angle of the quadrilateral is 60°.What is the difference between the value of thelargest and the smallest angles of

thequadrilateral ?
(1) 120°
(2) 90°
(3) 110°
(4) 100°

19. Mr. Pandit owned 950 gold coins all ofwhich he distributed amongst his threedaughters Lalita, Amita and Neeta. Lalita gave25 gold coins to her husband, Amita donated 15gold coins and Neeta made jewellery out of 30gold coins. The new respective ratio of the coinsleft with them was 20 : 73 : 83. How many goldcoins did Amita receive from Mr. Pandit ?
(1) 380
(2) 415
(3) 400
(4) 350

20. The largest and the second largest anglesof a triangle are in the ratio of 13 : 12respectively. The smallest angle is 20% of thesum of the largest and the second largest angles. What is the sum of the smallest and thesecond largest angles ?
(1) 120°
(2) 108°
(3) 100°
(4) 102°

21. Twenty five percent of Pranab‟s annualsalary is equal to eighty percent of Surya‟sannual salary. Surya‟s monthly salary is fortypercent of Dheeru‟s monthly salary. If Dhreeu‟sannual salary is Rs 6 lacs, what is Pranab‟smonthly salary ? (At some places annual incomeand in some place monthly income are given)
(1) Rs 7.68 lacs
(2) Rs 56,000
(3) Rs 8.4 lacs
(4) Rs 64,000

22. The ratio between the three angles of aquadrilateral is 1 : 6 : 2 respectively. The valueof the fourth angle of the quadrilateral is 45°.What is the difference between the value of thelargest and the smallest angles of thequadrilateral ?
(1) 165°
(2) 140°
(3) 175°
(4) 150°

23. The ratio between the angles of aquadrilateral is 3 : 4 : 6 : 5. Two-third of thelargest angle of the quadrilateral is equal to thesmaller angle of a parallelogram. What is thevalue of adjacent angle of the parallelogram ?
(1) 120°
(2) 110°
(3) 100°
(4) 130°

24. Rohit has some 50 paisa coins, some 2rupee coins, some 1 rupee coins and some 5rupee coins. The value of all the coins is Rs 50.Number of 2 rupee coins is 5 more than that ofthe 5 rupee coins. 50 paisa coins are double innumber than 1 rupee coins Value of 50 paisacoins and 1 rupee coins is Rs 26. How many 2rupee coins does he have ?
(1) 4
(2) 2
(3) 7
(4) Cannot be determined

25. The ratio between the adjacent angles of aparallelogram is 2 : 3 respectively. Half thesmaller angle of the parallelogram is equal tothe smallest angle of a quadrilateral. Largestangle of quadrilateral is four times its smallestangle. What is the sum of largest angle ofquadrilateral and the smaller angle ofparallelogram.
(1) 252°
(2) 226°
(3) 144°
(4) None of these

26. One of the angles of a triangle is two-thirdof sum of adjacent angles of parallelogram.Remaining angles of the triangle are in ratio 5 :7 respectively. What is the value of secondlargest angle of the triangle ?
(1) 25°
(2) 40°
(3) 35°
(4) Cannot be determined

27. The largest and the smallest angles of atriangle are in the ratio of 3 : 1 respectively.The second largest angle of the triangle is equalto 44°. What is the value of 150 per cent of thelargest angle of the triangle ?
(1) 149
(2) 129
(3) 153
(4) 173

28. One of the angles of a quadrilateral isthrice the smaller angle of a parallelogram. Therespective ratio between the adjacent angles ofthe parallelogram is 4 : 5. Remaining threeangles of the quadrilateral are in ratio 4 : 11 : 9respectively. What is the sum of the largest andthe smallest angles of the quadrilateral ?
(1) 255°
(2) 260°
(3) 265°
(4) 270°

29. Smallest angle of a triangle is equal totwo-third of the smallest angle of aquadrilateral.The ratio between the angles of thequadrilateral is 3 : 4 : 5 : 6. Largest angle ofthe triangle is twice its smallest angle. What isthe sum of second largest angle of the triangleand largest angle of the quadrilateral ?
(1) 160°
(2) 180°
(3) 190°
(4) 170°

30. The largest and the second largest anglesof a triangle are in the ratio of 4 : 3respectively. The smallest angle is half thelargest angle. What is the difference between thesmallest and the largest angles of the triangle?
(1) 30°
(2) 60°
(3) 40°
(4) 20°

31. The ratio between the three angles of aquadrilateral is 13 : 9 : 5 respectively. Thevalue of the fourth angle of the quadrilateral is36°. What is the difference between the largestand the second smallest angles of thequadrilateral ?
(1) 104°
(2) 108°
(3) 72°
(4) 96°

32. The ratio between the adjacent angles of aparallelogram is 7 : 8 respectively. Also theratio between the angles of quadrilateral is 5 : 6: 7 : 12. What is the sum of the smaller angle ofparallelogram and second largest angle of thequadrilateral ?
(1) 168°
(2) 228°
(3) 156°
(4) 224°

33. The ages of Sulekha and Arunima are inthe ratio of 9 : 8 respectively. After 5 years theratio of their ages will be 10 : 9. What is thedifference in years between their ages.
(1) 4 years
(2) 5 years
(3) 6 years
(4) 7 years

34. The ages of Sonal and Nitya are in theratio of 9 : 5 respectively. After 8 years the ratioof their ages will be 13 : 9. What is thedifference in years between their ages ?
(1) 4 years
(2) 12 years
(3) 6 years
(4) 8 years

35. The ratio of the ages of a father and son is17 : 7 respectively. 6 years ago the ratio oftheir ages was 3 : 1 respectively. What is thefather‟s present age ?
(1) 64
(2) 51
(3) 48
(4) Cannot be detremined

36. Ratio of Rani‟s and Komal‟s age is 3 : 5respectively. Ratio of Komal‟s and Pooja‟s ageis 2 : 3 respectively. If Rani is two-fifth ofPooja‟s age, what is Rani‟s age ?
(1) 10 years
(2) 15 years
(3) 24 years

(4) Cannot be determined

37. Present ages of Amit and his father are inthe ratio of 2 : 5 respectively. Four years hencethe ratio of their ages becomes 5 : 11respectively. What was father‟s age five yearsago ?
(1) 40 years
(2) 45 years
(3) 30 years
(4) 35 years

38. Four years ago Shyam‟s age was 3/4 timesthat of Ram. Four years hence, Shyam‟s age willbe times that of Ram. What is the present ageof Shyam ?
(1) 15 years
(2) 20 years
(3) 16 years
(4) 24 years

39. The ratio of the ages of Tina and Rakesh is9 : 10 respectively. Ten years ago the ratioof their ages was 4 : 5 respectively. What is thepresent age of Rakesh ?
(1) 25 years
(2) 20 years
(3) 30 years
(4) 24 years

40. The present ages of Vishal and Shekharare in the ratio of 14 : 17 respectively. Six yearsfrom now, thier ages will be in the ratio of 17 :20 respectively. What is Shekhar‟s present age ?
(1) 17 years
(2) 51 years
(3) 34 years
(4) 28 years

ASSIGNMENT PROBLEMS

1. The ratio between the ages of a father anda son at present is 5 : 2 respectively. Four yearshence the ratio between the ages of the son andhis mother will be 1 : 2 respectively. What is theratio between the present ages of the father andthe mother respectively?
(1) 3 : 4
(2) 5 : 4
(3) 4 : 3
(4) Cannot be determined

2. Radha's present age is three years lessthan twice her age 12 years ago. Also therespective ratio between Raj‟s present age andRadha‟s present age is 4 : 9. What will be Raj'sage after 5 years ?
(1) 12 years
(2) 7 years
(3) 21 years
(4) None of these

3. The ratio of the present ages of Meena andFiona is 16 : 13 respectively. Four yearsago the respective ratio of their ages was 14 :11. What will be Fiona‟s age four years fromnow?
(1) 28 years
(2) 32 years
(3) 26 years
(4) None of these

4. The respective ratio of the present ages ofSwati and Trupti is 4 : 5. Six years hencethe respective ratio of their ages will be 6 : 7.What is the difference between their ages ?
(1) 2 years
(2) 3 years
(3) 4 years
(4) Cannot be determined

5. The respective ratio between the presentages of Ram and Rakesh is 6 : 11. Fouryears ago the ratio of their ages was 1 : 2respectively. What will be Rakesh‟s age afterfive years ?
(1) 45 years
(2) 29 years
(3) 49 years
(4) Cannot be determined

6. The respective ratio between the presentages of son, mother, father and grandfatheris 2 : 7 : 8 : 12. The average age of son andmother is 27 years. What will be mother‟s ageafter 7 years ?
(1) 40 years
(2) 41 years
(3) 48 years
(4) 49 years

7. The respective ratio between the

presentages of Ram, Rohan and Raj is 3 : 4 : 5. Ifthe average of their present ages is 28 yearsthen what would be the sum of the ages of Ramand Rohan together after 5 years ?
(1) 45 years
(2) 55 years
(3) 52 years
(4) 59 years

8. The respective ratio between present ageof Manoj and Wasim is 3 : 11. Wasim is 12years younger than Rehana. Rehana‟s age after7 years will be 85 years. What is the present ageof Manoj‟s father who is 25 years older thanManoj ?
(1) 43 years
(2) 67 years
(3) 45 years
(4) 69 years

9. The respective ratio between the presentage of Aarti and Savita is 5 : x. Aarti is 9 yearsyounger than Jahnavi. Jahnavi‟s age after 9years will be 33 years. The difference betweenSavita‟s and Aarti‟s age is same as the present age of Jahnavi. What will come in place of x?
(1) 21
(2) 37
(3) 17
(4) None of these

10. An amount of money is to be dividedamong P, Q and R in in the ratio of 3 : 5 : 7respectively. If the amount received by R is Rs4,000 more than the amount received by Q,what will be the be total amount received by Pand Q together ?
(1) Rs. 8,000
(2) Rs. 12,000
(3) As. 16,000
(4) Cannot be determined

11. The ratio of 8 books to 20 books is
(a) 2 : 5
(b) 5 : 2
(c) 4 : 5
(d) 5 : 4

12. The ratio of the number of sides of a square to the number of edges of a cube is
(a) 1 : 2
(b) 3 : 2
(c) 4 : 1
(d) 1 : 3

13. A picture is 60cm wide and 1.8m long. The ratio of its width to its perimeter in lowest form is
(a) 1 : 2
(b) 1 : 3
(c) 1 : 4
(d) 1 : 8

14. Neelam's annual income is Rs. 288000. Her annual savings amount to Rs. 36000. Theratio of her savings to her expenditure is
(a) 1 : 8
(b) 1 : 7
(c) 1 : 6
(d) 1 : 5

15. Mathematics textbook for Class VI has 320 pages. The chapter 'symmetry' runs from page 261 to page 272. The ratio of the number of pages of this chapter to the total number of pages of the book is
(a) 11 : 320
(b) 3 : 40
(c) 3 : 80
(d) 272 : 320

16. In a box, the ratio of red marbles to blue marbles is 7:4. Which of the following could be the total number of marbles in the box?
(a) 18
(b) 19
(c) 21
(d) 22

17. On a shelf, books with green cover and that with brown cover are in the ratio 2:3. If there are 18 books with green cover, then the number of books with brown cover is
(a) 12
(b) 24
(c) 27
(d) 36

18. The greatest ratio among the ratios 2 : 3, 5 : 8, 75 : 121 and 40 : 25
is
(a) 2 : 3
(b) 5 : 8
(c) 75 : 121
(d) 40 : 25

19. There are 'b' boys and 'g' girls in a class. The ratio of the number of
boys to the total number of students in the class is:
(a)b/b+g
(b)g/g+b
(c)b/g
(d)b+g/b

20. If a bus travels 160 km in 4 hours and a train travels 320km in
5 hours at uniform speeds, then the ratio of the distances travelled
by them in one hour is
(a) 1 : 2
(b) 4 : 5
(c) 5 : 8
(d) 8 : 5

Mixtures and Allegation:

Mixtures are generally two types.
i) Simple mixture:- When two different ingredients are mixed together
ii) Compound mixture:- when two or more simple mixture are mixed together to form another mixture, it is known as a compound mixture.
Allegation: Allegation means linking; it is the rule that enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of desired price.
Mean Price: The cost of a unit quantity of the mixture is called the mean price.
Rule of Allegation:
If two ingredients are mixed then,
Quantity of cheaper/Quantity of costlier = Cost of costlier – Mean price/ Mean price – Cost of cheaper
Suppose a container contains x of liquid from which y units are taken out and replaced by water.
• After n operations, the quantity of pure liquid = $x(1-y/x)^n$

CLASSWORK PROBLEMS

1. In what ratio must rice at Rs 9.30 per Kg be mixed with rice at Rs 10.80 per Kg so that the mixture be worth Rs 10 per Kg?
(a) 6:5
(b) 8:7
(c) 3:7
(d) 6:1

2. How much water must be added to 60 litres of milk at 1.5 litres for Rs. 20 So as to have a mixture worth Rs.$10\frac{2}{3}$ a litre?(litres)
(a) 10
(b) 12
(c) 15
(d) 18

3. In what ratio must wheat at Rs.3.20 per kg be mixed with wheat at Rs.2.90 per kg so that the mixture be worth Rs.3.08 per kg?
(a) 3:4
(b) 4:3
(c) 3:2
(d) 2:3

4. In what proportion must rice at Rs. 3.10 per kg be mixed with rice at Rs. 3.60 per kg so that the mixture be worth Rs. 3.25 per kg?
(a) 5:3
(b) 3:7
(c) 3:5
(d) 7:3

5. In what ratio must tea at Rs. 62 per Kg be mixed with tea at Rs. 72 per Kg so that the mixture must be worth Rs. 64.50 per Kg?
(a) 2:3
(b) 3:2
(c) 3:1
(d) 1:3

6.The ratio, in which tea costing Rs. 192 per kg is to be mixed with tea costing Rs. 150 per kg so that the mixed tea when sold for Rs. 194.40 per kg, gives a profit of 20%.
(a) 3:5
(b) 2:5
(c) 3:7
(d) 1:2

7. In a zoo, there are Rabbits and Pigeons. If heads are counted, there are 200 and if legs are counted, there are 580. How many pigeons are there?
(a) 90
(b) 100
(c) 110
(d) 120

8. Weights of two friends Ram and Sham are in the ratio 4:5. If Ram's weight is increased by 10% and total weight of Ram and Shyam become 82.8 kg, with an increases of 15%, by what percent did the weight of Shyam has to be increased?
(a) 19%
(b) 23%
(c) 29%
(d) 17%

9. In a 729 litres mixture of milk and water, the ratio of milk to water is 7:2. To get a new mixture containing milk and water in the ratio 7:3, the amount of water to be added is:
(a) 51 ltr

(b) 61 ltr
(c) 71 ltr
(d) 81 ltr

10. Three types of wheat of Rs. 1.27, Rs. 1.29 and Rs. 1.32 per kg are mixed together to be sold at Rs. 1.30 per kg. In what ratio should this wheat be mixed?
(a) 1:1:2
(b) 1:2:3
(c) 2:1:3
(d) 2:2:3

11. The milk and water in two vessels A and B are in the ratio 4:3 and 2:3 respectively. In what ratio the liquids in both the vessels be mixed to obtain a new mixture in vessel c consisting half milk and half water?
(a) 2:3
(b) 8:3
(c) 4:3
(d) 7:5

12 .Two vessels A and B contain spirit and water mixed in the ratio 5:2 and 7:6 respectively. Find the ratio in which these mixture be mixed to obtain a new mixture in vessel c containing spirit and water in the ratio 8:5?
(a) 2:9
(b) 1:7
(c) 3:8
(d) 7:9

13. How many kilograms of sugar costing Rs. 9 per kg must be mixed with 27kg of sugar costing Rs.7 per kg so that there may be gain of 10% by selling the mixture at Rs.9.24 per kg?(Kg)
(a) 63
(b) 60
(c) 50
(d) 77

14. One quantity of wheat at Rs 9.30 per Kg is mixed with another quality at a certain rate in the ratio 8:7. If the mixture so formed be worth Rs 10 per Kg, what is the rate per Kg of the second quality of wheat?(Rs)
(a) 12.47
(b) 10.80
(c) 15.17
(d) 47.66

15. A can contains a mixture of two liquids A and B in the ratio 7:5 when 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7:9. How many litres of liquid A was contained by the can initially?(litres)
(a) 28
(b) 21
(c) 36
(d) 45

16. 8 litres are drawn from a cask filled with wine and is then filled with water. This operation is performed three more times. The ratio of the quantity of wine now left in cask to that of the total solution is 16:81.How much wine did the cask hold originally?
(a) 24
(b) 44
(c) 45
(d) 49

17. A man travelled a distance of 90Km in 9 hours partly on foot at 8 kmph and partly on bicycle at 17 kmph. Find the distance travelled on foot.(Km)
(a) 46
(b) 56
(c) 62
(d) 52

18. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. What part of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?
(a) 6/7
(b) 2/7
(c) 7/11
(d) 1/5

19. Teas worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1 : 1 : 2 . If the mixture is worth Rs 153 per Kg , the price of the third variety per Kg will be?(Rs)
(a) 175.50
(b) 147.50
(c) 258.50
(d) 785.50

20. A 20 litre mixture of milk and water contains milk and water in the ratio 3 : 2. 10 litres of the mixture is removed and replaced with pure milk and the operation is repeated once more. At the end of the two removals and replacement, what is the ratio of milk and water in the resultant mixture?
(a) 3:17
(b) 5:3
(c) 17:3
(d) 9:1

21.How many kgs of Basmati rice costing Rs.42/kg should a shopkeeper mix with 25 kgs of ordinary rice costing Rs.24 per kg so that he makes a profit of 25% on selling the mixture at Rs.40/kg?(Kg)
(a) 16
(b) 12.5
(c) 20
(d) 200

22.In what ratio must a person mix three kinds of wheat costing him Rs 1.20,Rs 1.44 and Rs 1.74 per Kg so that the mixture may be worth Rs 1.41 per Kg?
(a) 11:77:7
(b) 25:45:8
(c) 27:23:6
(d) 11:45:7

23.How many litres of water should be added to a 30 litre mixture of milk and water containing milk and water in the ratio of 7 : 3 such that the resultant mixture has 40% w-ater in it?(ltr)
(a) 5
(b) 10
(c) 7
(d) None

24. A sample of x litres from a container having a 60 litre mixture of milk and water containing milk and water in the ratio of 2 : 3 is replaced with pure milk so that the container will have milk and water in equal proportions. What is the value of x?(ltr)
(a) 6
(b) 10
(c) 30
(d) None

25.From a cask of milk containing 30 litres, 6 litres are drawn out and the cask is filled up with water. If the same process is repeated a second, then a third time, what will be the number of litres of milk left in the cask?(litres)
(a) 12
(b) 14.38
(c) 15.36
(d) 5.12

26.How many litres of a 12 litre mixture containing milk and water in the ratio of 2 : 3 be replaced with pure milk so that the resultant mixture contains milk and water in equal proportion?(litres)
(a) 1.5
(b) 2
(c) 4
(d) 1

27.A merchant mixes three varieties of rice costing Rs.20/kg, Rs.24/kg and Rs.30/kg and sells the mixture at a profit of 20% at Rs.30/kg. How many kgs of the second variety will be in the mixture if 2 kgs of the third variety is there in the mixture?(Kg)
(a) 6
(b) 1
(c) 5
(d) 3

28.In what ratio must a person mix three kinds of tea costing Rs.60/kg, Rs.75/kg and Rs.100 /kg so that the resultant mixture when sold at Rs.96/kg yields a profit of 20%?
(a) 1:2:4
(b) 1:4:2
(c) 3:7:6
(d) None

29. A zookeeper counted the heads of the animals in a zoo and found it to be 80. When he counted the legs of the animals he found it to be 260.If the zoo had either pigeons or horses, how many horses were there in the zoo?
(a) 60
(b) 40
(c) 50
(d) 30

30. A milk vendor has 2 cans of milk .The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the container so as to get 12 litres of milk such that the ratio of water to milk is 3:5?(litres)
(a) 6
(b) 8
(c) 7
(d) 1

31. A container contains 80 Litre milk. From this container 8 Litre milk was taken out and replaced with water. This process was further repeated two times. How much milk is now contained in the container?
(a) 58.32 L
(b) 57.32 L
(c) 59.32 L
(d) 56.32 L

32. A trader sold two articles in Rs 800. On one he gained 33(1/3)% and on another he gained 20%. In this whole transaction he gained 25%. Find the cost price of the second article (the one sold at 20% gain)
(a) Rs 240
(b) Rs 400
(c) Rs 300
(d) Rs 500

33. A mixture of certain quantity of milk with 20 Litre of water is sold at 80 paise per litre. If pure milk be worth Rs 1.20 per litre. How much milk is present in the mixture?
(a) 20 L
(b) 25 L
(c) 30 L
(d) 40 L

34. In an alloy, zinc and copper are in the ratio 1:3. In the second alloy the same elements are in the ratio 2:3. If what proportion should the two alloys be mixed so as to form a new alloy in which zinc and copper are in the ratio 1:2.
(a) 5:4
(b) 4:5
(c) 5:6
(d) 6:5

35. 400 grams of sugar solution has 40% sugar in it. How much sugar should be added to make it 50% in the solution?
(a) 60 gm
(b) 70 gm
(c) 80 gm
(d) 90 gm

36. A dishonest milkman professes to sell his milk at cost price, but he mixes it with water and thereby gains 33(1/3)%. The percentage of water in the mixture is?
(a) 20%
(b) 33 (1/3) %
(c) 25%
(d) 30%

37. A person has a chemical of Rs 15 per litre. In what ratio should water be mixed in that chemical so that after selling the mixture at Rs 12/litre he may get a profit of 20%.
(a) 1:2
(b) 2:1
(c) 1:3
(d) 3:1

38. If 2 kg of metal, of which 1/3 is zinc and the rest is copper be mixed with 3 kg of metal of which ¼ is zinc and the rest is copper, What is the ratio of zinc to copper in the mixture?
(a) 2:3
(b) 3:2
(c) 43:17
(d) 17:43

39. A man has 90 pens. He sells some of these at a profit of 15% and the rest at 9% profit. On the whole transaction he gets a profit of 11%. How many pens did he sell at 9% profit?
(a) 60
(b) 50
(c) 40
(d) 70

40. A butler stole wine from a butt of sherry which contained 35% spirit and he replaced what he had stolen by wine containing only 20% spirit. The butt was then 25% strong only. How much of the butt did he steal?
(a) 1/3
(b) 2/3

(c) 3/4
(d) 1/4

ASSIGNMENT PROBLEMS

1.The ratio of A & B in a mixture is 8:1 . 15ltr of mixture is taken out and same amount of B is added, now ratio become 4:3. Find the initial amount of A in the mixture (approx)?
(a) 24
(b) 37
(c) 34
(d) 40

2. A shopkeeper sells his milk at cost price but he add some water and earn 16(2/3)% profit. Find the ratio of milk and water?
(a) 6:1
(b) 1:6
(c) 5:1
(d) 1:5

3. There is 70ltr milk in a container. From this 7ltr of milk is taken out and added some quantity of water. This process is repeated two more times. Find the remaining milk in container?
(a) 45ltr
(b) 48.03ltr
(c) 50ltr
(d) 51.03ltr

4. A man has to distribute Rs65 in a class of 50 students. He gives 1.5 rupee to boys and 1 rupee to girls each. Find how many girls are there in the class?
(a) 30
(b) 20
(c) 15
(d) 25

5. In an alloy the ratio of copper and aluminum is 4:5 and in other alloy the ratio of copper and aluminum is 6:7. In what ratio these alloy should be taken to make ratio of copper and aluminum is 5:6?
(a) 5 : 11
(b) 11 : 5
(c) 13 : 9
(d) 9 : 13

6. In a bag there are three types of coins, 1rupee, 50 paisa and 25paisa in the ratio of 5:10:24. There total value is Rs208. The total number of coins is?
(a) 507
(b) 208
(c) 961
(d) 744

7. 400gm of sugar solution has 30% sugar in it. How much sugar should be added to make it 50% in the solution (in gm)?
(a) 120
(b) 60
(c) 100
(d) 160

8. A mixture of certain quantity of milk with 15ltr of water is sold at 80paisa/ltr. If pure milk be worth Rs1.10 per ltr. How much milk is there in the mixture?
(a) 50 ltr
(b) 40 ltr
(c) 60 ltr
(d) 70 ltr

9. A merchant borrowed Rs3500 from two money lenders. For one loan he paid 14% p.a and for other 18% p.a. the interest paid for one year was Rs525. How much did he borrow at 18%p.a?
(a) Rs875
(b) Rs625
(c) Rs750
(d) Rs1000

10. How many kg of salt at 42 paisa per kg must a man mix with 25kg of salt at 24 paisa per kg, so that he may on selling the mixture at 40 paisa per kg, gain 25% on the outlay?
(a) 15kg
(b) 20kg
(c) 25kg
(d) 30kg

11. After selling an article a man gains 25%. Also he uses a false weight of 10%. Find the total profit earn by him?
(a) 37.5%
(b) 35%
(c) 37(8/9)%
(d) 38(8/9)%

12. A man wants to gain 20% after selling milk at cost price. So in what ratio he has to add water to earn this profit?
(a) 5:1
(b) 1:4
(c) 1:5
(d) 4:1

13. A shopkeeper has two types of article. The CP of 1st article is 20Rs/kg and other article is X Rs/kg. He has quantity of 1st article is 10kg and other article is 20 kg. He sold the mixture of these article at Rs 39/kg with a profit of 30%. Find the value of X?
(a) 70Rs/kg
(b) 35Rs/kg
(c) 60Rs/kg
(d) 30Rs/kg

14. A sugar solution of 60kg has 20% sugar in it. How much sugar must be added in this to make it half of the solution?
(a) 18kg
(b) 96kg
(c) 24kg
(d) 36kg

15. A man has 80 pens. He sells some of these at 15% profit and the rest at 10%loss. Overall he gets a profit of 10%. Find how many pens were sold at 15% profit ?
(a) 16
(b) 64
(c) 40
(d) 72

16. How much tea at Rs4 a kg should be added to 15kg of tea at Rs10 a kg so that the mixture be worth Rs6.50 a kg?
(a) 15
(b) 35
(c) 25
(d) 21

17. There are two types of jar. In the 1st jar the ratio of copper and aluminium is 1:2 and in the 2nd Jar is 1: 4. In what ratio these two jar should be mix to make 3rd jar In which the ratio of copper &aluminium become 1:3?
(a) 3:5
(b) 5:3
(c) 2:5
(d) 5:2

18. A butler stole wine from a butt of sherry which contained 50% spirit and he replaced it with wine which contains 20% spirit. Now the strength of butt remain only 30%. How much of the butt did he steal?
(a) 1/3
(b) 1/2
(c) 2/3
(d) ¼

19. There are 65 students in a class. 39 rupees were distributed among them so that each boy gets 80 paisa and each girl gets 30 paisa. Find the number of girls in the class?
(a) 39
(b) 26
(c) 40
(d) 30

20. A container has 40 l of milk. From this, 4 l of milk is taken out and replaced with water. Now 4 l of mixture is taken out and replaced with water again. Find how much quantity of milk is remaining in the container?
(a) 32.4 l
(b) 32 l
(c) 31.4 l
(d) 31 l

PERMUTATION AND COMBINATION

Principal Of Multiplication:
AND suggests the use of Multiplication and shows that more than one operation has to be performed at a time. It also gives the idea that there should be one starting point and one endpoint.
Multiplication
If an event can occur in m different ways, and following which another event can occur in n different ways, then the total number of occurrence of the events in the given order is m * n
Principal Of Addition:
OR suggests the use of Addition and shows that exactly one operation has to be performed at a time out of the given set of all the possibleoperations.

PERMUTATION
A permutation is an arrangement in a definite order of a number of objects taken some or all at a time.
LinearArrangement
Number of permutations of n distinct objects among r different places, where repetition is not allowed, is$P(n,r)$

$$^{n}P_{r} = \frac{n!}{(n-r)!}$$

Number of permutations of n distinct objects among r different places, where repetition is allowed, isn^r
Number of permutations of n objects in which p objects are alike of one kind, q are alike of second, r are alike of third and so on and remaining are of different kind, and where repetition is not allowed,is
= n!/p! q! r!...
(where, p+q+r...<= n)
Numberofpermutationsofnobjects,whenalloft hemare identical = n!/n!
CircularArrangement
Number of ways to arrange n distinct objects on n places around a circle = (n –1)!
Number of arrangements of n beads for forming anecklace = (n-1)!/2
(In case of the necklace or garland, anticlockwise and clockwise arrangements are same)
Numberofselectionofkconsecutivethingsoutof n things in a circle
=n, when k <n
= 1, when k =n

Polygon Arrangement
Number of ways to arrange n distinct objects along the sides of a r sided regular polygon with every side having n/r objects =n!/r
If the polygon is not regular, then the number of arrangements will be just n!
If n people are to be arranged around a rectangular table, such that there are equal number of people on each side of the table, then total number of arrangements will ben!/2

Dearrangement
Number of arrangements of n distinct things in a row, such that none of them occupies its original place is
$= n! [1/0! – 1/1! +1/2!–1/3!+....+ (-1)^n/n!]$
Dearr.(2) = 1, Dearr.(3) = 2, Dearr.(4) = 9, Dearr.(5) = 44

Miscellaneous
Number of ways 4 different letters can be posted in7 different letter boxes $=4^7$
Number of ways n identical things canbe arranged among r different places = r^n $(0 < r <= n)$
e.g. Number of ways 4 identical rings can be worn in 5 fingers of a hand = 5^4
Numberofwaysndifferentthingscanbearrange d among r different places
= (n + r – 1)!/(r – 1)!
e.g. Number of ways 4 different rings can be worn in 5 fingers of a hand = 5 .6 .7. 8
Sum of all 'r' digit numbers formed by using each of the given 'n' non-zero distinct digits exactly once (no repetition) = (Sum of all the digits) (1111… r times) $^{n}P_{r-1}$
Sum of all 'r' digit numbers formed by using each of the given 'n' non-zero distinct digits (withrepetition) = (Sum of all the digits) (1111… r times) n^{r-1}

COMBINATION

A combination is a selection, in no definite order, of a number of objects taken some or all at a time.

Number of combinations of n distinct objects taken r at a time, where repetition is not allowed, is $C(n,r)$

$$^{n}C_r = \frac{n!}{(n-r)!\,r!} \quad (0 < r < n)$$

Number of combinations of n distinct objects among r different places, where repetition is allowed, is $^{n+r-1}C_r$

Number of combinations or distributions of nidentical objects among r different places is $^{n+r-1}C_{r-1}$

Also the whole number solutions of equation, $(x + y + z + \ldots$ (r variables) $= n) = {}^{n+r-1}C_{r-1}$

Number of combinations or distributions of n identical objects among r different places such that each place gets atleast 1 is $^{n-1}C_{r-1}$

Also the natural number solutions ofequation, $(x + y + z + \ldots$ (r variables) $= n) = {}^{n-1}C_{r-1}$

Number of selections out of n distinctobjects

= (Select None) + (Select One) + (Select Two)

$= {}^{n}C_0 + {}^{n}C_1 + {}^{n}C_2 + \ldots + {}^{n}C_n = 2^n$

Number of ways in which a selection can be made by taking some or all out of p + q + r +… things where p are alike of one kind, q alike of second, r alike of third and so on is $(p+1)(q+1)(r+1)\ldots - 1$

Number of zero or more selections out of n sameobjects

$= 1 + 1 + 1 + \ldots + 1 = n + 1$

Number of one or more selections out of n sameobjects

$= 1 + 1 + 1 + \ldots + 1 = n$

Number of lines in a plane formed by n points (where no three points are collinear) $= {}^{n}C_2$

Number of diagonals in a regular polygon = $^{n}C_2 - n$

Number of triangles formed in a plane using n points (where no three points are collinear) $= {}^{n}C_3$

Formulae related to Combination

a) $nC0 = 1 = nCn$

b) $nC1 = n = nCn\text{-}1$

c) $nCn\text{-}r = nCr$

d) $nCa = nCb \Rightarrow a + b = n$

e) $nCr + nCr\text{-}1 = n+1Cr$

f) $nC0 + nC1 + nC2 + \ldots + nCn\text{-}1 + nCn = 2^n$

g) $nC0 + nC2 + nC4 + \ldots = nC1 + nC3 + nC5 + \ldots = 2^{n-1}$

GROUPING & DISTRIBUTION

Number of ways in which n distinct objects can be distributed equally among r people

$= n!/[(n/r)!]^r$

Number of ways in which n things can be divided into groups of p, q, r… things

$= n!/\ p!\ q!\ r!\ldots \quad (n = p + q + r\ldots)$

Number of ways in which n distinct objects can be distributed equally among r groups

$= n!/\ [(n/r)!]^r$(if groups are distinct)

$= n!/\ r!\ [(n/r)!]^r$(if groups are not distinct)

GRID

Number of Squares in a square grid of n ×n side $= 1^2 + 2^2 + 3^2 + 4^2 + \ldots + n^2$

Number of Rectangles (including Squares) in a square grid of n ×n side

$= 1^3 + 2^3 + 3^3 + 4^3 + \ldots + n^3$

Number of Squares in a grid having m rows and n columns

$= m \times n + (m\text{-}1) \times (n\text{-}1) + (m\text{-}2) \times (n\text{-}2) + \ldots$

(until one of them gets zero)

Number of Rectangles (including Squares) in a grid having m rows and n columns

$= (1 + 2 + \ldots + m) \times (1 + 2 + \ldots + n)$

CLASSWORK PROBLEMS

1.How many 3 digit number can be formed with the digits 5, 6, 2, 3, 7 and 9 which are divisible by 5 and none of its digit is repeated?

a) 12

b) 16

c) 20

d) 24

2.How many 3 digit numbers are divisible by 4?

A) 256

B) 225

C) 198
D) 252

3.How many 4 digit words can be made from the digits 7, 8, 5, 0, and 4 without repetition?
A) 70
B) 96
C) 84
D) 48

4.Find the no of 3 digit numbers such that atleast one of the digit is 6 (with repetitions) ?
A.252
B.345
C.648
D.560

5.How many numbers can be formed with the digits 1, 7, 2, 5 without repetition ?
A.89
B.56
C.64
D.72

6.How many 3 digit number can be formed by 0, 2, 5, 3, 7 which is divisible by 5 and none of the digit is repeated.
a) 24
b) 36
c) 48
d) 60

8.How many 3 digits numbers have exactly one digit 2 in the number?
A) 225
B) 240
C) 120
D) 160

3.There are 4 bananas, 7 apples and 6 mangoes in a fruit basket. In how many ways can a
person make a selection of fruits from the basket.
a) 269
b) 280
c) 279
d) 256

9.Q(9 –10) There are 6 players in a cricket which is to be sent to Australian tour. The total number of members is 12.
If 2 particular member is always included
a) 210
b) 270
c) 310
d) 420

If 3 particular player is always excluded
a) 76
b) 82
c) 84
d) 88

11.In a group of 6 boys and 5 girls, 5 students have to be selected. In how many ways it can be done so that at least 2 boys are included
a) 1524
b) 1526
c) 1540
d) 1560

12.There are 8 men and 7 women. In how many ways a group of 5 people can be made such that the particular woman is always to be included?
A) 860
B) 1262
C) 1001
D) 1768

13.There are 6 men and 7 women. In how many ways a committee of 4 members can be made such that a particular man is always to be excluded?
A) 280
B) 420
C) 220
D) 495

14.4 matches are to be played in a chess tournament. In how many ways can result be decided?
a) 27
b) 9
c) 81
d) 243

15.In how many ways a group of 4 men and 3 women be made out of a total of 8 men and 5 women?
A) 720
B) 140

C) 120
D) 360

16.In how many ways 8 students can be given 3 prizes such that no student receives more than 1 prize?
A) 348
B) 284
C) 224
D) 336

17.In how many ways can 3 prizes be given away to 12 students when each student is eligible for all the
prizes ?
A.1234
B.1728
C.5314
D.1331

18.Total no of ways in which 30 sweets can be distributed among 6 persons ?
A.35 C 5
B.36 C 5
C.36 C 6
D.35!/5!

19.A bag contains 4 red balls and 5 black balls. In how many ways can i make a selection so as to take atleast 1 red ball and 1 black ball ?
A.564
B.345
C.465
D.240

20.In how many ways can 7 girls and 4 boys stand in a row so that no 2 boys are together ?
A.8467200
B.9062700
C.7407000
D.8407200

21.There are 3 boxes and 6 balls. In how many ways these balls can be distributed if all the balls and all the boxes are different?
A.243
B.512
C.729
D.416

22.In how many ways can 4 books be selected out of 10 books on different subjects ?
A.210
B.320
C.716
D.5040

23.In how many 8 prizes can be given to 3 boys, if all boys are equally eligible of getting the prize.
a) 512
b) 343
c) 256
d) 526

24.In party there is a total of 120 handshakes. If all the persons shakes hand with every other person. Then find the number of person present in the party.
a) 15
b) 16
c) 17
d) 18

25.There are 8 boys and 12 girls in a class. 5 students have to be chosen for an educational trip. Find the number of ways in which this can be done if 2 particular girls are always included
a) 812
b) 816
c) 818
d) 820

26.In how many different ways can the letter of the word ELEPHANT be arranged so that vowels always occur together?
a) 2060
b) 2160
c) 2260
d) 2360

27.In how many ways all the letters of the word 'MINIMUM' be arranged such that all vowels are together?
A) 60
B) 30
C) 90
D) 70

28.In how many different ways the letters of the world INSIDE be arranged in such a way that all vowels always come together
a) 64
b) 72
c) 84
d) 96

29.In how many ways 4 Indians, 5 Africans and 7 Japanese be seated in a row so that all person of same nationality sits together
a) 4! 5! 7! 3!
b) 4! 5! 7! 5!
c) 4! 6! 7! 3!
d) can't be determined

30.How many words of 4 letters with or without meaning be made from the letters of the word 'NUMBER', when repetition of letters is not allowed?
A) 480
B) 360
C) 240
D) 360

31.In how many ways the letters of the word 'ALLIGATION' be arranged taking all the letters?
A) 120280
B) 453600
C) 360340
D) 3628800

32.In how many ways the letters of the word PERMUTATION be arranged ?
A.10!/2!
B.10!
C.11!
D.11!/2!

33.In how many ways can 5 boys and 4 girls can be seated in a row so that they are in alternate position.
a) 2780
b) 2880
c) 2800
d) 2980

34.In a G - 20 meeting there were total 20 people representing their own country. All the representative sat around a circular table. Find the number of ways in which we can arrange them around a circular table so that there is exactly one person between two representatives namely Manmohan and Musharraf.
a) 2 x (17!)
b) 2 x (18!)
c)(3!) x (18!)
d)(17!)

35.In how many ways can 7 beads be strung into necklace ?
A.2520
B.5040
C.720
D.360

36.In how many ways 5 African and 5 Indian can be seated along a circular table, so that they occupy alternate position.
a) 5! 5!
b) 4! 5!
c) 5! 4!
d) 4! 4!

37.There is meeting of 20 delegates is to be held in a hotel. In how many ways these delegates can be seated along a round table, if three particular delegates always seat together.
a) 17! 3!
b) 18! 3!
c) 17! 4!
d) can't be determined

38.There are 7 non-collinear points. How many triangles can be drawn by joining these points?
a) 10
b) 30
c) 35
d) 60

39.There are 15 points in a plane out of which 6 are collinear. Find the number of lines that can be formed from 15 points.
a) 105
b) 90
c) 91
d) 95

40.A box contains 27 marbles some are blue and others are green. If a marble is drawn at

random from the box, the probability that it is blue is 1/3. Then how many number of green marbles in the box?
A. 10
B. 15
C. 14
D. 18

ASSIGNMENT PROBLEMS

1.In a group of 6 boys and 8 girls, 5 students have to be selected. In how many ways it can be done so that at least 2 boys are included
a) 1524
b) 1526
c) 1540
d) 1560

2. How many 6 digit telephone numbers can be formed if each number starts with 35 and no digit appears more than once?
(a) 720
(a)360
(c) 1420
(d)1680

3. An event manager has ten patterns of chairs and eight patterns of tables. In how many ways can he make a pair of table and chair?
(a)100
(b) 80
(c) 110
(d) 64

4. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?
(a) 47200
(b)48000
(c) 42000
(d)50400

5. How many 3 digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9 which are divisible by 5 and none of the digits is repeated?
(a) 20
(b) 16
(c) 8
(d) 24

6. 4. How many numbers are there between 100 and 1000 such that at least one of their digits is 6?
(a) 648
(b) 258
(c) 654
(d) 252

7. How many numbers not exceeding 10000 can be made using the digits 2,4,5,6,8 if repetition of digits is allowed?
(a) 9999
(b) 820
(c) 780
(d) 740

8. 25 buses are running between two places P and Q. In how many ways can a person go from P to Q and return by a different bus?
(a) 50
(b)600
(c) 576
(d) 625

9. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?
(a) 159
(b) 209
(c) 201
(d) 212

10. There are 6 periods in each working day of a school. In how many ways can one organize 5 subjects such that each subject is allowed at least one period?
(a) 3200
(b)3600
(c)2400
(d) None of these

11. What is the sum of all 4 digit numbers formed using the digits 2, 3,4 and 5 without repetition?
(a) 93324
(b)92314
(c)93024
(d)91242

12. In a birthday party, every person shakes hand with every other person. If there was a

total of 28 handshakes in the party, how many persons were present in the party?
(a)9
(b) 8
(c) 7
(d) 6

13. In how many different ways can 5 girls and 5 boys form a circle such that the boys and the girls alternate?
(a) 2880
(b)1400
(c)1200
(d) 3212

14. Find out the number of ways in which 6 rings of different types can be worn in 3 fingers?
(a) 120
(b) 216
(c)125
(d)729

15. If there are 9 horizontal lines and 9 vertical lines in a chess board, how many rectangles can be formed in the chess board?
(a) 920
(b) 1024
(c) 64
(d) 1296

16. How many five digit positive integers that are divisible by 3 can be formed using the digits 0, 1, 2, 3, 4 and 5, without any of the digits getting repeating
(a) 15
(b) 96
(c) 216
(d) 120

17. If the letters of the word CHASM are rearranged to form 5 letter words such that none of the word repeat and the results arranged in ascending order as in a dictionary what is the rank of the word CHASM?
(a) 24
(b) 31
(c) 32
(d) 30

18. How many four letter distinct initials can be formed using the alphabets of English language such that the last of the four words is always a consonant?
(a) (26^3)*(21)
(b) 26*25*24*21
(c)25*24*23*21
(d) None of these.

19. There are 12 yes or no questions. How many ways can these be answered?
(a) 1024
(b) 2048
(c) 4096
(d) 144

20. A person writes letters to six friends and addresses the corresponding envelopes. In how many ways can the letters be placed in the envelopes so that at least two of them are in wrong envelopes?
(a) 119
(b) 120
(c) 720
(d) 719

PROBABILITY

Probability or chance is a common term used in day-to-day life. For example, we generally say, 'it may rain today'. This statement has a certain uncertainty.

Probability is quantitative measure of the chance of occurrence of a particular event.

If all the possible outcomes of an experiment are known but the exact output cannot be predicted in advance, that experiment is called a random experiment.

Examples

Tossing of a fair coin

When we toss a coin, the outcome will be either Head (H) or Tail (T)

Throwing an unbiased die

Die is a small cube used in games. It has six faces and each of the six faces shows a different number of dots from 1 to 6. Plural of die is dice.

When a die is thrown or rolled, the outcome is the number that appears on its upper face and it is a random integer from one to six, each value being equally likely.

Drawing a card from a pack of shuffled cards

A pack or deck of playing cards has 52 cards which are divided into four categories as given below

Spades (♠)

Clubs (♣)

Hearts (♥)

Diamonds (♦)

Each of the above mentioned categories has 13 cards, 9 cards numbered from 2 to 10, an Ace, a King, a Queen and a jack

Hearts and Diamonds are red faced cards whereas Spades and Clubs are black faced cards.

Kings, Queens and Jacks are called face cards

Taking a ball randomly from a bag containing balls of different colours

Sample Space

Sample Space is the set of all possible outcomes of an experiment. It is denoted by S.

Examples

When a coin is tossed, S = {H, T} where H = Head and T = Tail

When a dice is thrown, S = {1, 2 , 3, 4, 5, 6}

When two coins are tossed, S = {HH, HT, TH, TT} where H = Head and T = Tail

Events are said to be equally likely if there is no preference for a particular event over the other.

Examples

When a coin is tossed, Head (H) or Tail is equally likely to occur.

When a dice is thrown, all the six faces (1, 2, 3, 4, 5, 6) are equally likely to occur.

Two or more than two events are said to be mutually exclusive if the occurrence of one of the events excludes the occurrence of the other

This can be better illustrated with the following examples

When a coin is tossed, we get either Head or Tail. Head and Tail cannot come simultaneously. Hence occurrence of Head and Tail are mutually exclusive events.

When a die is rolled, we get 1 or 2 or 3 or 4 or 5 or 6. All these faces cannot come simultaneously. Hence occurrences of particular faces when rolling a die are mutually exclusive events.

Note : If A and B are mutually exclusive events, $A \cap\cap B = \phi\phi$ where $\phi\phi$ represents empty set.

Consider a die is thrown and A be the event of getting 2 or 4 or 6 and B be the event of getting 4 or 5 or 6. Then

A = {2, 4, 6} and B = {4, 5, 6}

Here $A \cap B \neq \phi$. Hence A and B are not mutually exclusive events.

Events can be said to be independent if the occurrence or non-occurrence of one event does not influence the occurrence or non-occurrence of the other.

Example : When a coin is tossed twice, the event of getting Tail(T) in the first toss and the event of getting Tail(T) in the second toss are independent events. This is because the occurrence of getting Tail(T) in any toss does not influence the occurrence of getting Tail(T) in the other toss.

Exhaustive Event is the total number of all possible outcomes of an experiment.

Examples

When a coin is tossed, we get either Head or Tail. Hence there are 2 exhaustive events.

When two coins are tossed, the possible outcomes are (H, H), (H, T), (T, H), (T, T). Hence there are 4 ($=2^2$) exhaustive events.

When a dice is thrown, we get 1 or 2 or 3 or 4 or 5 or 6. Hence there are 6 exhaustive events.
Let A and B are two events with sample space S. Then
A ∪B is the event that either A or B or Both occur. (i.e., at least one of A or B occurs)
A ∩ B is the event that both A and B occur
Let E be an event and S be the sample space. Then probability of the event E can be defined as
P(E)= n(E)/n(S)

where P(E) = Probability of the event E, n(E) = number of ways in which the event can occur and n(S) = Total number of outcomes possible
P(S) = 1
0 ≤ P (E) ≤ 1
P(ϕ) = 0
Addition theorem
Let A and B be two events associated with a random experiment. Then
P(A U B) = P(A) + P(B) – P(A ∩ B)
If A and B are mutually exclusive events, then P(A U B) = P(A) + P(B) because for mutually exclusive events, P(A ∩ B) = 0
If A and B are two independents events, then P(A ∩ B) = P(A).P(B)
Let A be any event and A^- be its complementary event (i.e., A^- is the event that A does not occur). Then $P(A^-) = 1 - P(A)$
Let E be an event associated with a random experiment. Let xx outcomes are favourable to E and y outcomes are not favourable to E, then
Odds in favour of E are x:y, i.e., x/y and
Odds against E are y:x, i.e., y/x
P(E) = x/x+y
$P(E^-)$ = y/x+y

CLASSWORK PROBLEMS

1.Find the probability that in a leap year, the numbers of Mondays are 53?
a) 1/7
b) 2/7
c) 3/7
d) 4/7

2.A six-digit is to be formed from the given numbers 1, 2, 3, 4, 5 and 6. Find the probability that the number is divisible by 4.
a) 3/17
b) 4/15
c) 4/19
d) 4/17

3.Find the probability that in a random arrangement of the letter of words in the word
'PROBABILITY' the two I's come together.
a) 2/11
b) 1/11
c) 3/11
d) 4/11

4.In an examination, there are three sections namely Reasoning, Maths and English. Reasoning part contains 4 questions. There are 5 questions in maths section and 6 questions in English section.If three questions are selected randomly from the list of questions then what is the probability that all of them are from maths?
A. 7/91
B. 8/91
C. 2/91
D. 4/91

5.An apartment has 8 floors. An elevator starts with 4 passengers and stops at 8 floors of the apartment. What is the probability that all passengers travels to different floors?
a) 109/256
b) 135/256
c) 105/256
d) 95/256

6.A 4- digit number is formed by the digits 0, 1, 2, 5 and 8 without repetition. Find the probability that the number is divisible by 5.
a) 1/5
b) 2/5
c) 3/5
d) 4/5

7.A card is drawn from a pack of 52 cards. The card is drawn at random; find the probability that it is neither club nor queen?
a) 4/13
b) 5/13
c) 7/13
d) 9/13

8.From a pack of cards, if three cards are drawn at random one after the other with replacement, find the probability that one is ace, one is jack and one is queen?
a) 16/7725
b) 16/5525
c) 18/5524
d) 64/5515

9.A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both hearts. Find the Probability of the lost card being a heart?
A. 12/50
B. 8/50
C. 11/50
D. 9/50

10.In a race of 12 cars, the probability that car A will win is 1/5 and of car B is 1/6 and that of car C is 1/3. Find the probability that only one of them won the race.
a) 2/7
b) 7/10
c) 9/10
d) 3/7

11.A speak truth in 60% cases and B in 80% cases. In what percent of cases they likely to contradict each other narrating the same incident?
a) 9/25
b) 7/25
c) 11/25
d) 13/25

12.Two person A and B appear in an interview. The probability of A's selection is 1/5 and the probability of B's selection is 2/7. What is the probability that only one of them is selected?
a) 11/35
b) 12/35
c) 13/35
d) 17/35

13.A bag contains 5 red balls and 7 blue balls. Two balls are drawn at random without replacement, and then find the probability of that one is red and other is blue.
a) 33/65
b) 35/66
c) 37/66
d) 41/65

14.A bag contains 3 red balls and 8 blacks ball and another bag contains 5 red balls and 7 blacks balls, one ball is drawn at random from either of the bag, find the probability that the ball is red.
a) 93/264
b) 95/264
c) 91/264
d) 97/264

15.12 persons are seated at a circular table. Find the probability that 3 particular persons always
seated together.
a) 9/55
b) 7/55
c) 4/55
d) 3/55

16.P and Q are two friends standing in a circular arrangement with 10 more people. Find the
probability that exactly 3 persons are seated between P and Q.
a) 5/11
b) 4/11
c) 2/11
d) 3/11

17.A basket contains 5 black and 8 yellow balls. Four balls are drawn at random and not replaced.What is the probability that they are of different colours alternatively.
a) 56/429
b) 57/429
c) 61/429
d) 68/429

Direction(Q18 – Q20):
A bag contains 6 red balls and 8 green balls. Two balls are drawn at random one after one with replacement. 6.What is the probability thatBoth the balls are green
a) 13/49
b) 15/49
c) 16/49

d) 17/49

19.First one is green and second one is red
a) 16/49
b) 14/49
c) 11/49
d) 12/49

20.Both the balls are red
a) 14/49
b) 9/49
c) 11/49
d) 12/49

21.A urn contains 4 red balls, 5 green balls and 6 white balls, if one ball is drawn at random, find the probability that it is neither red nor white.
a) 1/3
b) 1/4
c) 1/5
d) 2/3

22.A bag contains 6 red balls and 7 white balls. Another bag contains 5 red balls and 3 white balls.One ball is selected from each. Find the probability that one ball is red and one is white?
a) 53/104
b) 47/104
c) 63/104
d) 51/104

23.A lottery is organised by the college ABC through which they will provide scholarship of rupees one lakhs to only one student. There are 100 fourth year students, 150 third year students, 200 second year students and 250 first year students. What is the probability that a second year student is choosen.
a) 1/7
b) 2/7
c) 3/7
d) 4/7

24.A box contains 50 balls, numbered from 1 to 50. If three balls are drawn at random with replacement. What is the probability that sum of the numbers are odd?
a) 1/2
b) 1/3
c) 2/7
d) 1/5

25.A and B are two persons sitting in a circular arrangement with 8 other persons. Find the
probability that both A and B sit together.
a) 1/9
b) 2/7
c) 2/9
d) 2/5

26.A bag contains 3 red balls and 8 blacks ball and another bag contains 5 red balls and 7 blacks balls, one ball is drawn at random from either of the bag, find the probability that the ball is red.
a) 93/264
b) 95/264
c) 91/264
d) 97/264

27.In a bag there are 4 white, 4 red and 2 green balls. Two balls are drawn at random.What is the probability that at least one ball is of red colour?
A. 4/3
B. 7/3
C. 1/3
D. 2/3

28.Sahil has two bags (A & B) that contain green and blue balls.In the Bag ‘A’ there are 6 green and 8 blue balls and in the Bag ‘B’ there are 6 green and 6 blue balls. One ball is drawn out from any of these two bags. What is the probability that the ball drawn is blue?
A. 15/28
B. 13/28
C. 17/28
D. 23/28

29.A basket contains 5 red 4 blue 3 green marbles. If three marbles picked up random, What is the probability that either all are green or all are red?
A. 1/20
B. 7/20
C. 3/20
D. 9/20

30.A basket contains 5 red 4 blue 3 green marbles. If three marbles picked up random, What is the probability that at least one is blue?
A. 41/55
B. 53/55
C. 47/55
D. 49/55

31.A basket contains 5 red 4 blue 3 green marbles. If two marbles picked up random, What is the probability that both are red?
A. 4/33
B. 5/33
C. 7/33
D. 8/33

32.A bag contains 5 red caps, 4 blue caps, 3 yellow caps and 2 green caps.If three caps are picked at random, what is the probability that two are red and one is green?
A. 22/55
B. 15/81
C. 10/91
D. 5/91

33.A bag contains 5 red caps, 4 blue caps, 3 yellow caps and 2 green caps. If four caps are picked at random, what is the probability that two are red, one is blue and one is green?
A. 22/1001
B. 80/1001
C. 21/1001
D. 55/1001

34.A bag contains 2 red caps, 4 blue caps, 3 yellow caps and 5 green caps. If three caps are picked at random, what is the probability that none is green?
A. 2/13
B. 3/13
C. 1/13
D. 5/13

35.A bag contains 5 red and 7 white balls. Four balls are drawn out one by one and not replaced. What is the probability that they are alternatively of different colours?
a) 7/99
b) 11/99
c) 14/99
d) 19/99

36.P and Q are sitting in a ring with 11 other persons. If the arrangement of 11 persons is at
random, then the probability that there are exactly 4 persons between them?
a) 1/3
b) 1/4
c) 1/5
d) 1/6

37.10 persons are seated around a round table. What is the probability that 4 particular persons are always seated together?
a) 1/21
b) 4/21
c) 8/21
d) 11/21

38.A box contains 4 red, 5 black and 6 green balls. 3 balls are drawn at random. What is the
probability that all the balls are of same colour?
a) 33/455
b) 34/455
c) 44/455
d) 47/455

39.A box contains 30 electric bulbs, out of which 8 are defective. Four bulbs are chosen at random from this box. Find the probability that at least one of them is defective?
a) 432/783
b) 574/783
c) 209/784
d) 334/784

40.A bag contains 6 red balls and 8 green balls. 2 balls are drawn at random one by one with replacement. Find the probability that both the balls are green
a) 16/49
b) 25/49
c) 12/49
d) 21/49

ASSIGNMENT PROBLEMS

1.There are three boxes each containing 3 Pink and 5 Yellow balls and also there are 2 boxes each containing 4 Pink and 2 Yellow

balls. A Yellow ball is selected at random. Find the probability that Yellow ball is from a box of the first group?
A. 42/61
B. 45/61
C. 51/61
D. 52/61

2.A fruit basket contains 10 Guavas and 20 Bananas out of which 3 Guavas and 5 Bananas are defective. If two fruits selected at random, what is the probability that either both are Bananas or both are non-defective?
A. 315/435
B. 313/435
C. 317/435
D. 316/435

3.A committee of five persons is to be chosen from a group of 10 people. The probability that a certain married couple will either serve together or not at all is?
A. 54/199
B. 52/195
C. 53/186
D. 51/126

4.Out of 14 applicants for a job, there are 6 women and 8 men. It is desired to select 2 persons for the job. The probabilty that atleast one of selected persons will be a Woman is?
A. 77/91
B. 54/91
C. 45/91
D. 40/91

5.Three Bananas and three oranges are kept in a box. If two fruits are chosen at random, Find the probability that one is Banana and another one is orange?
A. 1/5
B. 3/5
C. 4/5
D. 2/5

6.A basket contains 6 White 4 Black 2 Pink and 3 Green balls. If three balls picked up random, What is the probability that all three are White?
A. 4/91
B. 5/93
C. 7/97
D. 8/92

7.A basket contains 6 White 4 Black 2 Pink and 3 Green balls. If three balls are picked at random, what is the probability that two are Black and one is Green?
A. 22/355
B. 15/381
C. 10/393
D. 18/455

8.A basket contains 6 White 4 Black 2 Pink and 3 Green balls. If four balls are picked at random, what is the probability that atleast one is Black?
A. 69/91
B. 80/91
C. 21/91
D. 55/91

9.A basket contains 6 White 4 Black 2 Pink and 3 Green balls.If two balls are picked at random, what is the probability that either both are Pink or both are Green?
A. 2/105
B. 4/105
C. 8/137
D. 5/137

10. The probability that A can solve the problem is 2/3 and B can solve the problem is ¾.if both of them attempt the problem, then what is the probability that the problem gets solved.
(a) 1/2
(b) 17/12
(c) 1/4
(d) 11/12

11. Two dice are tossed. The probability that the total score is a prime number is:
(a) 1 / 6
(b) 5 / 12
(c) 1 / 2
(d) 7 / 9

12. A drawer contains 50 bolts and 150 nuts. Half of the bolts and half of the nuts are rusted. If one of the items is chosen at random, the probability that it is rusted or a bolt is

(a) 5/8
(b) ½
(c) 3/8
(d) 1/8

13. A card is chosen from a well shuffled pack of 52 cards. What is the probability that the card chosen is a spade number?
(a) ¼
(b) 2/13
(c)5/26
(d) 1/26

14. Two cards are drawn from a pack of cards in succession (with replacement). Find the probability that both are king.
(a)1/144
(b)1/169
(c)1/171
(d)1/2

15. The probability of a student possessing a Hi-Tech point pen is 3/5 and that of possessing a ball point pen is 2/3. Find the probability that a student can have at least one type of pen.
(a) 3/5
(b) 2/5
(c) 13/15
(d) 1/15

16. When 3 coins are tossed together what is the probability of getting exactly 2 tails?
(a) 3/8
(b) 8/9
(c) 2/3
(d) None of these

17. If A speaks the truth 80 % of the times and B speaks the truth 60 % of the times. What is the probability that both speak the truth at the same time?
(a) 0.8
(b) 0.48
(c) 0.6
(d) 0.14

18. The probability that a computer company will get a computer hardware contract is 2/3, and the probability that it will not get a software contract is 5/9. If the probability of getting at least one contract is 4/5, what is the probability that it will get both the contracts?
(a) 21 / 45
(b) 8 / 27
(c) 14 / 45
(d) 32 / 135

19. Tickets numbered from 1 to 20 are mixed up together and then a ticket is drawn at random. The probability that the ticket has a number which is a multiple of 3 or 7 is
(a) 1/5
(b) 2/5
(c) 3/5
(d) 4/5

20. A man and his wife appear in an interview for two vacancies in the same post. The probability of husband's selection is (1 / 7) and the probability of wife's selection is (1 / 5). What is the probability that only one of them is selected?
(a) 4 / 5
(b) 2 / 7
(c) 8 /15
(d) 4 / 7

BLOOD RELATIONS

1. Pointing to a photograph, a man said, "I have no brother or sister but that man's father is my father's son." Whose photograph was it ?
(a)His own
(b)His Son
(c)His Father
(d)His Grandfater

2. Pointing towards a person in a photograph, Anjali said, "He is the only son of the father of my sister's brother." How is that person is related to Anjali ?
A. Anjali Father
B. Anjali Mother
C. Anjali Brother
D. Maternal Uncle

3. Pointing to a man, a woman said, "His mother is the only daughter of my mother." How is the woman related to the man ?
A. Mother
B. Daughter
C. Sister
D. Grand Mother

4. Pointing to the photograph, Vipul said, "She is the daughter of my grandfather's only son." How is Vipul related to the girl in the photograph ?
A. Mother
B. Daughter
C. Cousin/sister
D. Grandmother

5. Looking at the portrait of a man, Harsh said, "His mother is the wife of my father's son. I have no brothers or sisters." At whose portrait was Harsh was looking ?
A. His child
B. His father
C. His grandson
D. His nephew

6. Pointing to a girl in photograph. Amar said, "Her mother's brother is the only son of my mothers's father." How the girl's mother related to Amar ?
A. Mother
B. Sister
C. Aunt
D. Grandmother

7. Pointing to a gentleman, Deepak said," His only brother is the father of my daughter's father." How is gentleman related to Deepak ?
A. Brother
B. Father
C. Grand Father
D. Uncle

8. If Kamal says, "Ravi's mother is the only daughter of my mother", how is Kamal related to Ravi ?
A. Brother
B. Father
C. Maternal Uncle
D. Cousin

9. Pointing to a photograph, a woman says, "This man's son's sister is my mother-in-law." How is the woman's husband related to the man in the photograph ?
A. Grandson
B. Son
C. Son in law
D. Cousin

10. Pointing to a man in photograph, a woman said, "His brother's father is the only son of my grandfather." How is the woman related to the man in the photograph ?
A. Mother
B. Daughter
C. Wife
D. Cousin/Sister

11. Introducing a girl, Vipin said, “her mother is the only daughter of my mother -in-law.” How is vipin related to the girl?
1)uncle 2)father. 3)brother
4)husband

12. Pointing to a lady, a man said, “The son of her only brother is the brother of my wife.” How is the lady related to the man?
1)mother-in-law 2)mother
3)grandmother
4)sister of father-in-law.

13. Pointing to a photograph Arun said, 'she is the mother of my brother's son's wife's daughter.' How is Arun related to the lady?
1) Uncle 2) Daughter-in-law. 3) Cousin 4) None

14. Pointing a photograph X said to his friend Y, "She is the only daughter of the father of my mother." How X is related to the person of photograph?
1) Daughter 2)Son.
3)Nephew 4) Cannot be decided

Directions for Qs. 15 – 17: refer to the following information for the following questions
In a family , there are 6 members, A,B,C,D,E & F. A is married to lady B. D is the only son of C, who is the brother of A. E is the sister of D. B is the daughter-in-law of F, whose husband has died.
15. How is F related to A?
1)Mother. 2)Sister
3)daughter 4)None
16. How is E related to C?
1)Sister 2)Daughter.
3)Cousin 4)Aunt
17. Who is C to B?
1)Brother-in-law 2)Brother 3)Son
4)Nephew

18. C is the brother of A; B is the daughter of A; E is the sister of C; and D is the brother of B. Who is the uncle of D?
1)A 2)B 3)C.
4)D

19. If A + B means A is the mother of B; A x B means A is the father of B; A $ B means A is the brother of B and A @ B means A is the sister of B then which of the following means P is the son of Q?
1) Q+R@P@ N 2) Q+R*P@ N 3) QxR$P@N 4) QxR$P$N.

Directions for Qs. 20 – 22: refer to the following information for the following questions
X+Y means X is the father of Y; X-Y means X is the wife of Y; XxY means X is the brother of Y; X/Y means X is the daughter of Y.
20. If a+b+c, which of the following is true?
1)a is brother of c 2)a is son of c 3)a is husband of c. 4)a is father of c

21. If a x b + c, which of the following is true?
1) a is brother of c 2) a is father of c
3) a is uncle of c. 4) a is son of c

22. If a x b/c, which of the following is true?
1)a is uncle of c 2) a is son of c.
3) a is brother of c 4) a is father of c

23. A has 3 children. B is the brother of C and C is the sister of D, E who is the wife of A is the mother of D. There is only one daughter of the husband of E. what is the relation between D and B?
1)D is brother of B. 2)D is son of B
3)D is sister of B 4)D is daughter of B

24. If D is the brother of B, how B is related to C? To answer this question which of the statements is/are necessary?
1. The son of D is the grandson of C.
2. B is the sister of D.
1) Only 1
2) Only 2
3) Either 1 or 2
4) 1 and 2 both are required.

Directions for Qs. 25 – 29: refer to the following information for the following questions
A, B, 0D, F, G, H and K are seven members of a family. They belong to three generations. There are two married couples belonging to two different generations. D is son of H and is married to K. F is granddaughter of B. G's father is grandfather of A. B's husband is father-in -law of K. H has only one son.

25. How is F related to G?
1)Son. 2)Newphew
3)Niece 4)None
26. How is H related to B?
1)Father 2)Uncle
3)Father-in-law
4)None.
27. How is K related to G?
1)Sister 2)Niece.
3)Sister-in-law 4)None

28. Which of the following is the, pair of married ladies?
1)HK 2)HD 3)KF
4)BF.

29. How many female members are there among them?
1)Two 2)Three
3)Four 4)None.

30. A party consist of grandmother, father, mother, four sons with their wives and one son and two daughters to each of the sons. How many females are there in all?
1)10 2)12 3)14.
4)16

31. On Diwali, a whole family decided to meet. The gathering consisted of one grandfather, one grandmother, two fathers, two mothers, four children, three grandchildren, one brother, two sisters, two sons, two daughters, one father-in-law, one mother-in-law, and one daughter-in-law. They were altogether seven. How many male members in the family.
1)3. 2)5 3)4
4)2

Directions for Qs. 32 – 35: refer to the following information for the following questions

In a family of 8 people, R is married to M. M is brother of K who is Z's mother. R has 3 children, 1 son & two daughters with one daughter married. B is the sister-in-law to D. A is the brother of C.

32. How is A related to Z?
1)Cousin. 2)Aunt 3)Uncle
4)None

33. How is C related to D?
1)Wife. 2)Husband 3)Sister
4)None

34.K is B's….
1)Mother 2)Brother 3)Aunt
4)Uncle

35. How is R related to Z?
1)Mother 2)Brother 3)Uncle
4)Aunt.

Directions for Qs. 36 – 40: refer to the following information for the following questions

There is a family of six people A,B,C,D,E and F. They are Chemist, Musician, Poet, Engineer, Sales Executive and Bank P.O.
a) There are two married couples in a family.
b) D the Musician is married to the lady Poet.
c) F the Sales Executive is the son of B & brother of E.
d) C the Chemist is the daughter-in-law of A.
e) The Bank P.O. is married to the Chemist.
f) E is an unmarried engineer.
g) A is the grandmother of F.

36. How is E related to F?
1)Brother 2)Sister
3)Cousin Brother 4)Either Brother or Sister.

37. Which of the following is the profession of B?
1)Poet 2)Chemist
3)Bank P.O.. 4)None

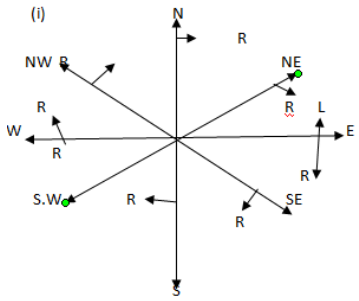
38. Which of the following is the profession of A?
1)Poet. 2)Chemist
3)Bank P.O. 4)None

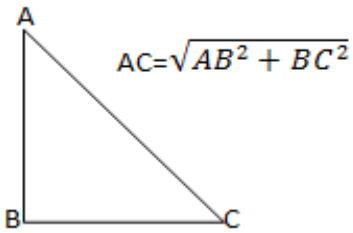
39. Which of the following is one of the couples?
1)FD 2)DB 3)EA
4)None.

40. How is D related to F?
1)Father 2)Grandfather.
3)Uncle
4)Grandmother

DIRECTION SENSE

In this topic we will discuss questions in which there are instructions regarding movement of a person or object from a starting point to the end point .These questions are set to test the common sense of directions and movements of the candidates. Movement directions may be instructed simply in left & right form, according to directions or even in angles. We will discuss all the types as the chapter follows.
See the figures below carefully



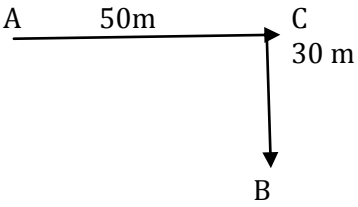


From the diagram (i) it is clear that there are 4 main directions North, East, South, West & the 4 sub- directions :- North - East, South – East, North- West, South – West . We need to know these 8 directions to answer the questions.
Angles : - As we can see ,angle between West & North is 90° . So angle between West & North – West will be its half i.e 45° .Similarly, angle between West & North- East will be 135°& it will increase by 45° in each segment .
Movement : - From diagram (i) we can see that when we turn right it is always clock-wise & left is anti – clock wise .
Diagrams (ii) represents Pythagoras theorem which we have all studied in class X . It is used to calculate the distance from the starting point to the end point .

So, if we know the directions ,angles , how to turn left or right and how to use Pythagoras theorem, we can solve any question of direction test in all the exams. Still, we have to keep certain points in mind while solving these questions, which have been categorized as below for better understanding of the topic:
Type 1: There is be difference between " in which direction is he facing now" & " in which direction is he from the starting point "

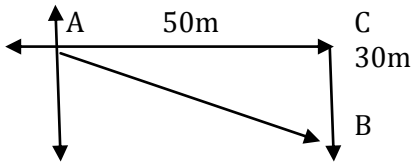
Eg: A person moves 50m towards East & then turn right & walk another 30 m to reach B . The movement of the person will be as follows:

1.



(always ensure to make diagram approximately proportional to the distances mentioned so as to get exact direction)

2.



If it is asked in which direction is he facing now, it will be South, as is clear from diagram 1.
As per figure 2,direction from the starting point will be South- East
Type 2: Total distance covered & displacement from starting point :
Taking same example as above. Total distance travelled will be 50m + 30 m = 80 m [i.e. AC + CB]
Whereas displacement from starting point will be the straight distance from Point A to

point B which can be calculated by using Pythagoras theorem.

AC= $\sqrt{AB^2 + BC^2}$

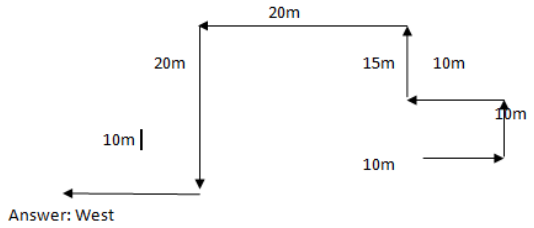
$= \sqrt{50^2 + 30^2}$

$=\sqrt{2500 + 900}$

$=\sqrt{3400}$

$=10\sqrt{34}\ m$ (usually the options in the exams will be in form of last possible roots)

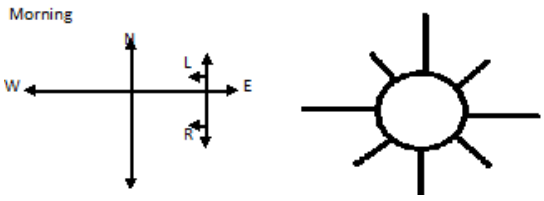
3:Multiple turns : - A man walks 10m towards East . He then takes 2 consecutive left turns covering 5, and 10 m respectively in each turn & then turns right and goes 15 m. He again take two continuous left turns covering 20-20 m each time and in the end turns right covering another 10m . In which direction is he going now ?



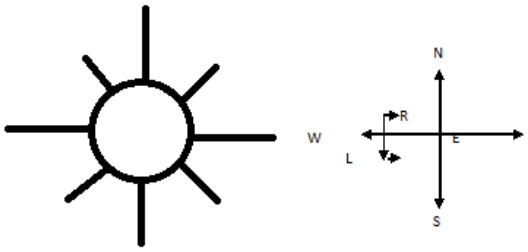
Answer: West

Type – 4 :Shadow based questions : - As we know , Sun rises in East & sets in West . The shadow is always opposite to the Sun. From the diagram below, it is clear that in the morning ,if the shadow of a person is towards his left, then he is facing North.

And if the shadow is towards right , he faces South . It is vice – versa in evening as the Sun is in the West. Similarly , if a person is facing sun in the morning, on his left will be North & South towards his right . It will be Vice – Versa in the evening.



Evening



Practice questions:

1. Rohan walked 50 m towards East, took a right turn and walked 30 m. Which direction is he now from his starting position ?
(1) South-West (2) North-East
(3) North-West (4) South-East
(5) None of these

2. 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?
(1) West (2) North (3) East
(4) South (5)Cannot be determined

3 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 ?
(1) North-West (2) North (3)South-West
(4) Cannot be determined (5)None of these

4. 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 ?
(1) West (2) East (3) North
(4) South (5) None of these

5. 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?
1) South-East 2) North 3)North-East
4) East 5) None of these.

6.. 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 ?
(1) West (2) South (3) East
(4) Date inadequate (5) None of these

7. 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 ?
(1) South (2) West (3) North
(4) South-West (5) None of these

8. 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 ?
(1) 10 m North (2) 50 m South
(3) 20 m West. (4) 10 m South
(5) None of these

9. 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 ?
(1) West (2) North-West
(3) North-East (4) Cannot be determined
(5) None of these

10. 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?
(1)50 m East (2) 10 m South-East
(3) 20✓13 m South East(4) 20 m North-East
(5) None of these

11. 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?
1) 5 km West 2) 5 km North-East
3) 7 km East 4) 7 km West
5) None of these.

12. 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?
(1) 10 km (2) 6 km (3)20 km
(4) 25 km (5) None of these

13. 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 ?
(1) North (2) South (3) East
(4) West (5) None of these

14. 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 ?
(1) South (2) East (3) West
(4) North (5) None of these

15. One morning Meena started walking towards the Sun. After walking a while she turned towards her left and again towards her left. After walking a while,. She turned left. In which direction is she facing now ?
(1) West (2) South (3) North
(4) East (5) None of these

16. Mamta starts at point T, walks straight to point U which is 4 ft away. She turns left and walks to W which is again 4 ft away. Then turns right to reach P by walking 3 ft, then turns right and walks 1 ft to Q, turns left and goes to V which is 1 feet away and in the end turns right and goes to R, 3 ft away. What is the distance between T and R?
1)4 ft 2) 5 ft 3) 7 ft 4) 8 ft

17. Raghu starts from his house in his car and travels 8 km towards the North, then 6 km towards East then 10 km towards his right, 4 km towards his left. 10 km towards North and finally 4 km towards his right. In which direction is he now with reference to the starting point ?
(1) South (2) North-East (3)South East
(4) North (5) None of these

18. A cyclist goes 30 km to North and then turning to East he goes 40 km. Again he turns to his right and goes 20 km. After this he turns to his right and goes 40 km. How far is the from his starting point ?
(1) 50 km (2) 10 km (3) 25 km
(4) 40 km (5) None of these

19.Ajay walks 10 km towards South of point 'P', turns to his right and walks 4 km. Turn to his right and walk 10 km and then he turns to his left and covers a distance of 5 km. How far is he from the point ' P' ?
(1) 1 km (2) 9 km (3) 14 km
(4) 20 km (5) None of these

20. Raju is facing North. He goes 35 metres ahead , turns left and walk 20 meters. He turns right and covers 25 metres, then turns right to cover 30 metres. In which direction is he heading ?
(1) North (2) South (3) East
(4) West (5) None of these

21. Simran is facing South, she t0urns right and walk 20 m, turn right again and walk 10 m. Then she turns left and walk 10 m and then turning right walk 20 m. In the end she again turns right and walk 60 m. In which direction is she from the starting point?
1) North 2) North-West
3) East 4) North-West
5) None of these

22.One evening, Sudhir& Atul were standing back to each other. Atul's shadow fell on exactly left of Sudhir . In which direction was Atul facing ?.
(1) North (2) South (3) East
(4) West (5) None of these

23.In the evening Harry walks in some direction then turns left and stops . His shadow is now on his right side. In which direction did he start walking ?
(1) South (2) East (3) North
(4) West (5) None of these

24. Rohit is walking towards West after going 10 m he turns left . He further walks 5 m and turns 45°R . In which direction is he going now?
(1) North-East (2) North-West
(3) South-West (4) South-East

25. A, B, C travels in different directions from a common point and cover the same distance . Now, the direction of B makes a perpendicular on the line joining the present positions of A & C . If C is to the South-West of B, then, in which direction is A from B ?
(1) N.E. (2) N-W (3) S-W
(4) S-E (5) None of these

26. Aman starts walking from his college, walks 10 km towards North, then he turns to his left and walks 10 km. From there he takes a right turn and walks 10 km. In which direction is he facing now ?
(1) South (2) North (3) East
(4) West (5) None of these

(Q:27-28). Sunil is going to a city X to attend a meeting on the way , he realises that he is going in wrong direction city X is just is the opposite direction which of the following set of turns he should now take to go in opposite direction
(1) 45°*R*, Left , Left , Right 45°*L*
(2) Left , 135°*R*, 45 °L, left Right
(3) Right, 45 °*L*, 45 ° Right, Left, Right
(4) 135 °R, 45°L , 45°R, 45 *L*°, Right
(5) None of these

28.(1) Right, Right, Left, 45 ° Left, 45 ° R
(2) Left , Right Left , Left 135 °, 45°R
(3) 45 °*L*, Right, Left, 135 °L, 45° R
(4) Right Left Right Left Right
(5) None of these

29. Medha moves towards South-East for 7 km, then moves towards North-West for 7 km and finally moves towards North-West for 7 km and finally moves a distance of 4 km

East and stands there. How far is the starting point from where she stands now ?
(1) 3 km (2) 4 km (3) 7 km
(4) 10 km (5) None of these

30. One morning , Madhu started walking with her back towards the Sun. Then she turned towards left , walked straight and then turned towards right and then turned towards left. Now in which direction is she facing ?
(1) South (2) North (3) East
(4) West (5) None of these

31. Ganesh is standing at a point. He walks 20 m towards the East and further 10 m towards the South, Then he walks 35 m towards the West; and further 5 m towards the East. What is the straight distance in metres between his starting point and the point where he reached last ?
(1) 20 m (2) 5 m (3) $10\sqrt{2}$ m
(4) 35 m (5) None of these

32. A train moves at X km/hr towards West. At the same speed wind is blowing towards North. So in which direction approximately the smoke of the train will go?
1) North – East 2) North-West
3) South 4)South–West
5) None of these

33. A train is going towards East and the wind is coming from North, both at equal speeds. In which direction will the smoke go approximately?
1) South-East 2) East 3) North-East 4) South-West 5) None of these

34. A train is coming from the South and wind is blowing from East, in which direction will smoke go, if the speeds of train and winds are equal?
1) North-West 2) South-West
3) North 4) South

35. A man goes towards East and on the way turns left and goes in semi-circle around a big rock and then turns left at right angles, in which direction is he going now?
1) East 2) West
3)North
4) South 5) None of these

36. Mahesh leaves his home and walks 40 m towards North-West, then 40m in South-West and then walks 40 m in South –East. In which direction should he move now to reach back to his home?
1) North-East 2)North-West 3) South-East 3)South –West5) None of these

37. A man is practicing yoga with his head down and legs up. His face is towards West, in which direction will his left hand be?
1)North 2) South 3)East
4)West

38. Two cars start from the opposite places of a main road, 150 km apart. First car runs for 25 km and takes a right turn and then runs 15 km. It then turns left and then runs for another 25 km and then takes the direction back to reach the main road. In the mean time, due to minor break down the other car has run only 35 km along the main road. What would be the distance between two cars at this point?
1) 65 km 2) 75 km 3) 80 km 4)85 km

39. 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?
1) 1 km 2) 2 km 3) 3 km 4) 5km

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

40. Which one is in the North-East of the person who is to the left of Kumar?
1) Dev 2) Nilesh
3) Ankur 4)Pintu

41. If a boy starting from Nilesh, met to Ankur and then to Kumar and after this he to Dev and then to Pintu and whole the time he walked in a straight line, then how much total distance did he cover?
1) 215 m 2) 155m 3) 245 m 4) 185 m

(42 – 44). Directions to Solve
Each of the following questions is based on the following information:
A # B means B is at 1 metre to the right of A.
A $ B means B is at 1 metre to the North of A.
A * B means B is at 1 metre to the left of A.
A @ B means B is at 1 metre to the south of A.
In each question first person from the left is facing North.
42. According to X @ B * P, P is in which direction with respect to X?
1)North 2) South 3)North – East
4)South – West
43. According to M # N $ T, T is in which direction with respect to M?
1) North West 2) North – East
3) South-West 4) South – East

44.According to P # R $ A * U, in which direction is U with respect to P?
1) East 2)West
3)North 4)South

45. If a boy moves from his house to his school that is 20m from his home towards south. He goes in the north direction thinking it south direction and walks for 20 m, until he realizes his mistake. How much more distance and in which direction he must walk in order to reach the actual destination?
1) 40 m in South-East 2) 20 m in South
3) 40 m in South 4) 60 m in North

Direction: Q(46-50) There are 5 friends A, B, C, D and E standing randomly. B is to the northeast of E. D is 2km to the east of E, who is 6km to the west of A. C is to the northwest of D and in the line of EB. D is 4km the south of B.
46. In which direction is C with respect to A ?
1).South west 2).South east
3)Northeast 4).Northwest
5).None of these

47. In which direction is A with respect to B ?
1)Southeast 2)Southwest
3)Northwest 4)Northeast
5)None of these

48. What is the distance between D and A ?
1)5km 2)4km 3)6km 4)3km
5)None of these

49. What is the shortest distance between B and A?
1)5√7km 2)4√2km 3)6√2km
4)3√5km 5)None of these

50. What is the shortest distance between between B and E?
1)2√7km 2)5 √2km 3)7√2km
4)2√5km 5)None of these