

GENERAL APTITUDE

Trainer : Sujata Mohite
sujata.mohite@sunbeaminfo.com



What is **Aptitude** ?

It is **your natural ability** to learn or excel in a certain area.

For example, you could have an **aptitude** for math and logic.

Key to **success**

1. Problem Recognition
2. Speed
3. Practice

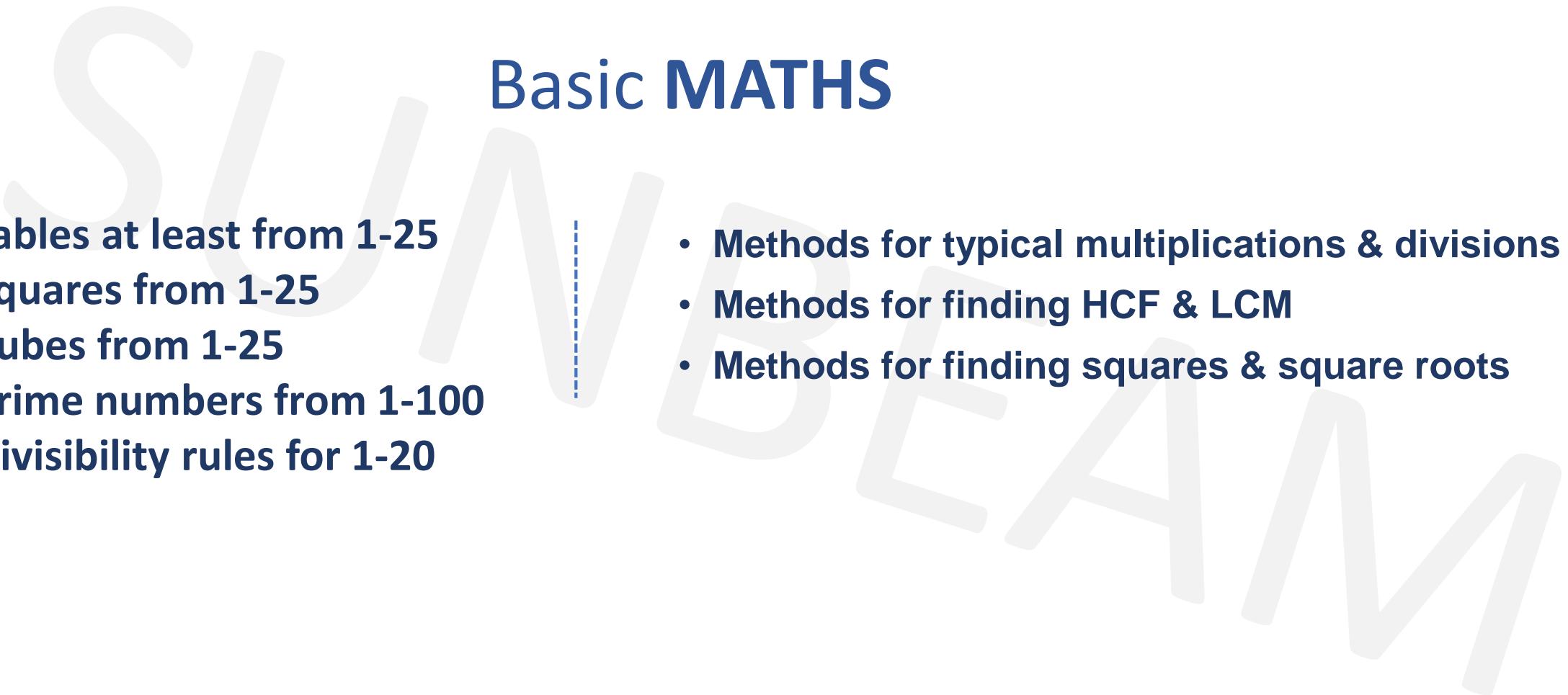


Link for English Basics

- <https://www.learngrammar.net/practice>
- <https://www.myenglishpages.com/english/exercises.php>
- https://www.englisch-hilfen.de/en/exercises_list/alle_grammar.htm
- <https://www.grammarbank.com/>
- <https://www.really-learn-english.com/english-grammar-exercises.html>
- <https://www.really-learn-english.com/english-reading-comprehension-text-and-exercises.html>
- <https://www.thefreshreads.com/unseen-passage-for-class-10/>
- Practice Synonyms and Antonyms regularly.
- Read Idioms and Phrases.
- Book - Word Power Made Easy by Norman Lewis
- Book - English Grammar by Wren and Martin



Basic MATHS

- Tables at least from 1-25
 - Squares from 1-25
 - Cubes from 1-25
 - Prime numbers from 1-100
 - Divisibility rules for 1-20
- 
- Methods for typical multiplications & divisions
 - Methods for finding HCF & LCM
 - Methods for finding squares & square roots

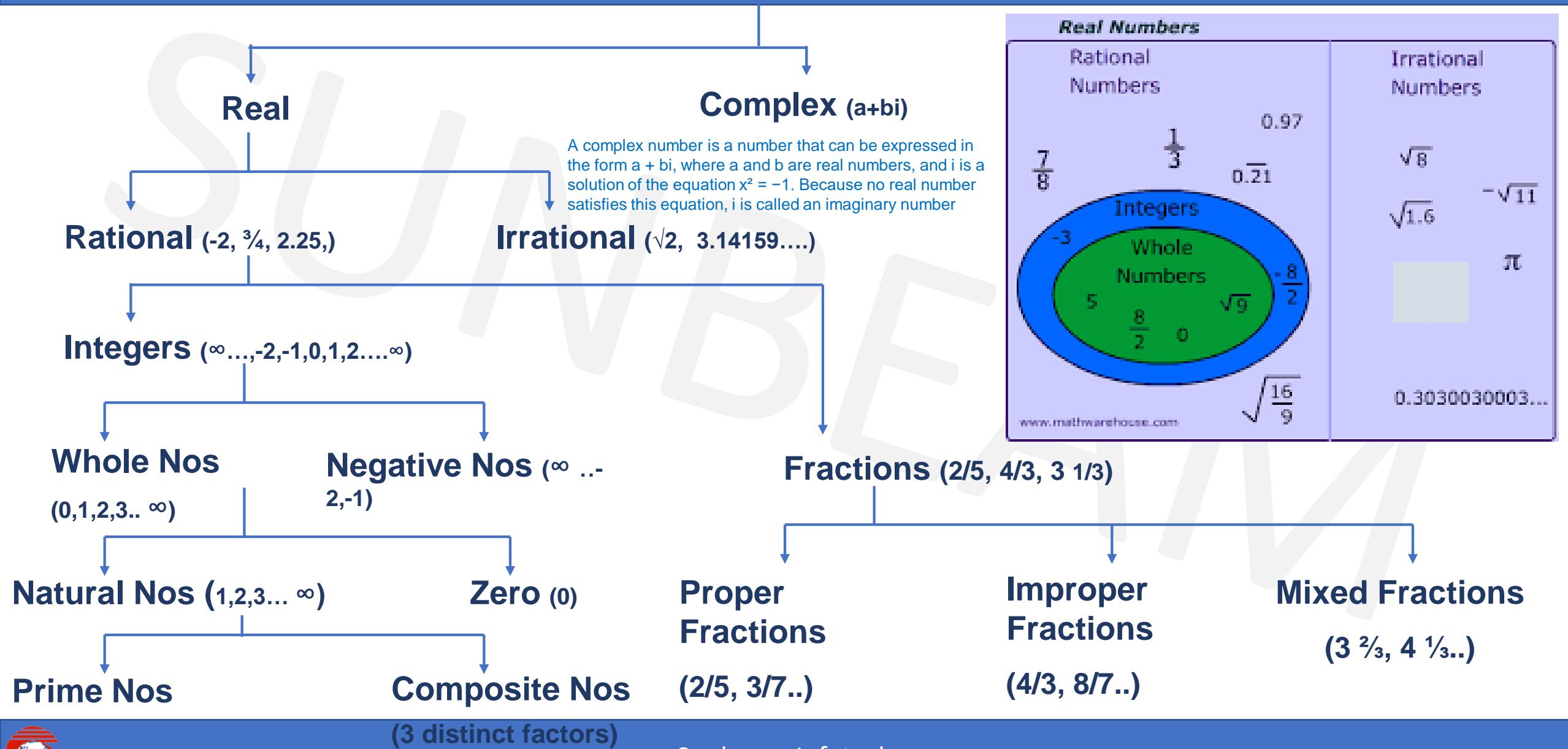


Topic Wise Test Plan

TEST NAME	TOPICS
APTI 1	Numbers + LCM + HCF + Ages + Averages
APTI 2	Percentages + Allegations & Mixtures + Profit & Loss
APTI 3	Time & Work + Pipes & Cisterns + Chain Rule
APTI 4	Time & Distance + Trains + Boats + Interest
APTI 5	Clock + Calendar + Probability + Permutation Combination



Numbers



What is the Difference Between Rational Numbers and Irrational Numbers?

Rational Numbers	Irrational Numbers
Numbers that can be expressed as a ratio of two numbers (p/q form) are termed as a rational number.	Numbers that cannot be expressed as a ratio of two numbers are termed as an irrational number.
Rational Number includes numbers, which are finite or are recurring in nature.	These consist of numbers, which are non-terminating and non-repeating in nature.
If a number is terminating number or repeating decimal, then it is rational. e.g: $1/2 = 0.5$	If a number is non-terminating and non-repeating decimal, then it is irrational. e.g: $0.31545673\dots$
Example:- $1/2, 3/4, 11/2, 0.45, 10$, etc.	example:- $\text{Pi } (\pi) = 3.14159\dots$, Euler's Number $(e) = (2.71828\dots)$, and $\sqrt{3}, \sqrt{2}$.



Basic MATHEMATICAL operations

- BODMAS
- B - Bracket (), { }, []
- O - Order
- D - Division
- M - Multiplication
- A - Addition
- S - Subtraction.



BASIC FORMULAE

- 1. $(a + b)^2 = a^2 + b^2 + 2ab$
- 2. $(a - b)^2 = a^2 + b^2 - 2ab$
- 3. $(a + b)^2 - (a - b)^2 = 4ab$
- 4. $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$
- 5. $(a^2 - b^2) = (a + b)(a - b)$
- 6. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
- 7. $(a^3 + b^3) = (a + b)(a^2 - ab + b^2)$
- 8. $(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$
- 9. $(a^3 + b^3 + c^3 - 3abc) = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$
- 10. If $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$



Basic NUMBER Representation

- Place Value : Units, Tens, Hundreds,
- Value of a 2 digit no. 'ab' where both a & b are natural numbers = $10(a) + b$
- The number with reversed digits will be 'ba' & the value of the number will be = $10(b) + a$



Numbers

Q. A number consists of two digits.

Sum of the digits is 9. If 63 is subtracted from the number its digits are interchanged. Find the number.

- A. 72
- B. 90
- C. 63
- D. 81

Solution :

Let the tens digit be a & units digit be b

$$a + b = 9 \quad \dots\dots\dots(1)$$

$$10a + b - 63 = 10b + a$$

$$9a - 9b = 63 \quad \dots\dots\dots(2)$$

$$(1) \times 9$$

$$9a + 9b = 81 \quad \dots\dots\dots(3)$$

$$(2) + (3)$$

$$18a = 144 \rightarrow a = 8, b = 1$$

$$\text{Number} = 81$$

Ans: D

Sum of Natural Numbers

- **Rule 1 :** Sum of first n natural numbers = $\frac{n(n+1)}{2}$

e.g. sum of 1 to 74 = $74 \times (74+1)/2 = 2775.$

- **Rule 2 :** Sum of first n odd numbers = n^2

e.g. sum of first seven odd numbers

$$= (1+3+5+7+9+11+13) = 49 = 7^2.$$

- **Rule 3 :** Sum of first n even numbers = $n (n+1)$

e.g. sum of first 9 even numbers

$$= (2+4+6+8+10+12+14+16+18) = 90$$

$$= 9 (9+1) = 9 \times 10 = 90$$



Sum of Natural Numbers

- **Rule 4 :** Sum of squares of first n natural numbers = $\frac{n(n+1)(2n+1)}{6}$

e.g. sum of squares of first 8 natural numbers

$$= (1 + 4 + 9 + 16 + 25 + 36 + 49 + 64) = 204$$

$$= 8 (8+1)(16+1)/ 6 = 8 \times 9 \times 17 / 6 = 204$$

- **Rule 5 :** Sum of cubes of first n natural numbers = $[n(n+1)/ 2]^2$

e.g. sum of cubes of first 4 natural numbers

$$= (1 + 8 + 27 + 64) = 100$$

$$= [4 (4+1)/2]^2 = 100$$

DIVISION

- DIVISION by ZERO is NOT POSSIBLE
- If two numbers are divisible by a number then their sum & difference is also divisible by the number.
- E.g. For 63 is divisible by 9. 27 is also divisible by 9.
- So $63 + 27 = 90$ is also divisible by 9
- And $63 - 27 = 36$ is also divisible by 9



DIVISIBILITY RULES

- 2 : Unit place is even or zero(last digit should be divisible by 2)
- 3 : Sum of the digits is divisible by 3. e.g : 324
- 4 : Last 2 digits are divisible by 4 or last 2 digits are 0. e.g : 324
- 5 : Unit digit is 5 or 0
- 6 : **Divisible by co primes 2 & 3.** e.g : 324
- 8 : Number formed by last 3 digits is divisible by 8 or last 3 digits are 0.
e.g : 1088
- 9 : Sum of all digits is divisible by 9. e.g : 324
- 10: Units digit is 0.



DIVISIBILITY RULES

- **11** : Difference between sum of digits in odd & even places should either be zero or divisible by 11

e.g: 8283

e.g : 918071

- **12** : Divisible by co primes 3 & 4 e.g : 324

- **14** : Divisible by co primes 2 & 7

- **15** : Divisible by co primes 3 & 5

- **16** : No formed by last 4 digits divisible by 16/ last 4 digits 0.

- **18** : Divisible by co primes 2 & 9

- **20** : Units digit 0 & tens digit is even.



DIVISIBILITY RULES

- **7 :** The difference between the two alternate groups taking 3 digits at a time should either be zero or multiple of 7.

eg- 550500006

eg- 7370356

- **13 :** The difference between the two alternate groups taking 3 digits at a time should either be zero or multiple of 13.

eg- 200174



DIVISIBILITY RULES

- **17:** A number is divisible by 17 if you multiply the last digit by 5 and subtract that from the rest. If that result is divisible by 17, then your number is divisible by 17.
 - For example, for 986, then : $98 - (6 \times 5) = 68$.
 - Since, 68 is divisible by 17, then 986 is also divisible by 17.
 - Also, 876 is not divisible by 17 because $87 - (6 \times 5) = 57$ and 57 is not divisible by 17.
- **19:** To determine if a number is divisible by 19, take the last digit and multiply it by 2. Then add that to the rest of the number. If the result is divisible by 19, then the number is divisible by 19.
 - For example, 475 is divisible by 19 because $47 + (5 \times 2) = 57$, and 57 is divisible by 19.
 - But , 575 is not divisible by 19 because $57 + (5 \times 2) = 67$, and 67 is not divisible by 19.



PROPERTIES OF DIVISIBILITY

To find a number completely divisible by another :

A) Greatest ‘n’ digit number exactly divisible by a Number :

Method : By subtracting the remainder

e.g a) Greatest 3 digit number divisible by 13

Greatest 3 digit number = 999. $999/13$ gives remainder 11.

$999 - 11 = 988$ = Greatest 3 digit number divisible by 13

B) Least ‘n’ digit number exactly divisible by a Number :

Method : By adding the (divisor – remainder)

e.g b) Least 3 digit number divisible by 13

Least 3 digit number = 100. $100/13$ gives remainder 9

$100 + (13 - 9) = 104$ = Least 3 digit number divisible by 13



PROPERTIES OF DIVISIBILITY

Q. On dividing a number by 999, the quotient is 366 and the remainder is 103. The number is:

- A.364724
- B.365387
- C.365737
- D.366757
- E. None of these

Soln-

dividend = divisor x quotient + remainder

$$\text{Required number} = 999 \times 366 + 103$$

$$= (1000 - 1) \times 366 + 103$$

$$= 366000 - 366 + 103$$

$$= 365737$$

Ans: C



PROPERTIES OF DIVISIBILITY

Q. A number when divided by 5 leaves 3 as remainder. If the square of the same number is divided by 5, the remainder obtained is :

- A. 9
- B. 4
- C. 1
- D. 3

Soln:

number when divided by 5 leaves a remainder 3

Let the given number = $5n + 3$ ---> using dividend = divisor quotient + remainder

$$\text{Square of the number} = (5n + 3)^2$$

$$= 25n^2 + 30n + 9 \rightarrow (a + b)^2 = a^2 + 2ab + b^2$$

$$= 5 \times 5n^2 + 5 \times 6n + 5 + 4$$

$$= 5(5n^2 + 6n + 1) + 4$$

Required remainder = 4

Ans: B



PRIME NUMBERS

- A number that is divisible only by itself and 1 (e.g. 2, 3, 5, 7, 11).
- There are **25** prime numbers between 1 - 100
- *1 is neither prime nor composite number.*
- **2 is the only prime number which is even.**
- A number having more than 2 factors is a composite number
- Find prime numbers between 101 and 200??
- There are **21** prime numbers between 101 - 200



Co-Prime

- When two numbers (they may not be prime) do not have any common factor other than one between them they are called co-prime or relatively prime.
- It is obvious that two prime numbers are always co-prime. e.g : 17 and 23
- Two composite numbers can also be co-prime. e.g: 16 & 25 do not have any common factor other than one.
- Similarly 84 and 65 do not have any common factor and hence are co-prime.



Prime Number

- **Sieve of Eratosthenes** is the fastest technique to find whether given number is prime or composite number.
- Let **p** be a given number and **n** be the smallest counting number such that $n^2 \geq p$.
- Ex: check 811 is prime or not. $29^2 > 811$.
- check if 811 is divisible by any prime number below 29 (2,3,5,7,11,13,17,19,23,29).
- none of the prime numbers divides 811.
- 811 is a prime number.



Prime Number

Q. Find whether 467 is prime or not

Step 1 : Sq root of 467 → Between 21 (441) and 22 (484)

Step 2 : 467 is not divisible by 2, 3, 5, 7, 11, 13, 17, 19. Next prime is 23 which exceeds the square limit.

Therefore 467 is prime.



Prime Number(Assignment)

Q. Which of the following is a prime number?

- A. 303 B. 477 C. 113 D. None of these

Ans : C



Prime Number(Assignment)

- Q. The prime numbers dividing 143 and leaving a remainder of 3 in each case are
- A. 2 and 11
 - B. 11 and 13
 - C. 3 and 7
 - D. 5 and 7

Ans: D



Number System(Assignment)

Q. The mean of first 10 even natural numbers is ?

- A. 9
- B. 10
- C. 11
- D. 12

Ans: C



Prime Number(Assignment)

Q. The sum of first four primes is

- A. 10
- B. 11
- C. 16
- D. 17

Ans: D



Prime Number(Assignment)

Q. Which of the following is a prime number?

- A. 19
- B. 20
- C. 21
- D. 22

Ans: A



Numbers(Assignment)

Which of the following is the output of $57 \times 57 + 43 \times 43 + 2 \times 57 \times 43$?

- A. 10000
- B. 5700
- C. 4300
- D. 1000

Ans : A



Numbers(Assignment)

Q. Which of the following is the output of 6894×99 ?

- A. 685506
- B. 682506
- C. 683506
- D. 684506

Ans: B



Numbers(Assignment)

Q. What is the unit digit in $584 \times 428 \times 667 \times 213$?

- A. 2
- B. 3
- C. 4
- D. 5

Ans: A



Numbers(Assignment)

Q. The sum of reciprocals of two consecutive numbers is $15/56$. The first number is

- A. 8
- B. 7
- C. 6
- D. 15.

Ans : B



Divisibility (Assignment)

Q. What percentage of the numbers from 1 to 50 have squares ending in the digit 1?

- A. 1
- B. 10
- C. 11
- D. 20

Ans : D



Numbers(Assignment)

Q. If $64^2 - 36^2 = 20 \times A$, then A = ?

- A. 70
- B. 120
- C. 180
- D. 140
- E. None of these

Ans: D



Numbers(Assignment)

Q. On dividing a number by 19 the difference between quotient and remainder is 9. The number is?

- A. 370
- B. 371
- C. 361
- D. 352

Ans : B



Numbers(Assignment)

Q. $(112 \times 5^4) = ?$

- A. 67000
- B. 70000
- C. 76500
- D. 77200
- E. None of these

Ans: B



Numbers(Assignment)

Q. Which of the following is a prime number?

A. 143

B. 289

C. 117

D. 359

Ans : D



HCF & LCM

HCF / GCF(Highest/Greatest Common Factor)

- HCF of two or more numbers is the greatest / largest / highest/biggest number which can divide those two or more numbers exactly.

Factors of 6 : **1, 2, 3, 6**

Factors of 8 : **1, 2, 4, 8**

Common 1 & 2 Highest & Common 2

- **LCM(Least Common Multiple)**

- The LCM of two or more numbers is the smallest / lowest / least number which is exactly divisible by those two or more numbers.

Multiples of 6 : 6, 12, 18, **24**, 30, 36, 42, **48**, 54,...

Multiples of 8 : 8, 16, **24**, 32, 40, **48**, 56, 64....

Common 24, 48, Lowest & common 24



HCF (Factorization method)

- Eg. HCF for 136, 144, 168

2	136	144	168
2	68	72	84
2	34	36	42
	17	18	21
	NO FURTHER COMMON FACTOR		

So $HCF = 2 \times 2 \times 2 = 8$

Note : HCF is always \leq the smallest of given numbers

HCF (Factorization method) - (Assignment)

- HCF of 54,72,126 (factorization method)
A. 21 B. 18 C. 36 D. 54

Ans : B



HCF (Difference Method)

- Find HCF of 203,319

Keep smaller here



- (203, 319)
- (116,203)
- (87,116)
- (29,87)
- (29,58)
- (29,29)



HCF =29



HCF (Difference Method) - (Assignment)

- HCF of 161,253 (difference method)
A. 27 B. 18 C. 23 D. 17

Ans : C



HCF (Difference Method)

Q. Find HCF of 84,125

- (84,125)
- (41,84)
- (41,43)
- (2,41)
- (2,39)
- If nothing is common then HCF =1 and numbers are said to be co prime numbers.



HCF & LCM

Q. Find the greatest number which can divide 284, 698 & 1618 leaving the same remainder 8 in each case?

- A. 36
- B. 46
- C. 56
- D. 43.

Soln-

Remainder 8 → (numbers – 8) would be exactly divisible.

$$\rightarrow 284-8 = 276$$

$$\rightarrow 698-8 = 690$$

$$\rightarrow 1618-8 = 1610$$

→ Greatest number dividing above 3 = HCF(276, 690, 1610) (difference method)

$$\rightarrow \text{HCF} = 46$$

Ans: B



HCF & LCM

Q. Find the greatest number which can divide 62, 132 & 237 leaving the same remainder in each case?

- A. 35 B. 46 C. 56 D. 43.

Soln:-

If two numbers a & b are divisible by a number n then

→ Their difference (a-b) is also divisible by n.

$$\rightarrow 132 - 62 = 70$$

$$\rightarrow 237 - 132 = 105$$

$$\rightarrow 237 - 62 = 175$$

→ Greatest number dividing above 3 = HCF(70, 105, 175)

$$\rightarrow \text{HCF} = 35$$

Ans: A



HCF & LCM

Q. Find the largest number such that 43,65,108 are divisible by that number and we get the remainder as 1,2,3 respectively in each case?

- A. 21
- B. 27
- C. 42
- D. 63

Soln:

→ (numbers – remainder) would be exactly divisible.

$$\rightarrow 43 - 1 = 42$$

$$\rightarrow 65 - 2 = 63$$

$$\rightarrow 108 - 3 = 105$$

$$\text{HCF}(42,63,105)=21$$

Ans : A



HCF & LCM

Q. A teacher has 25 books, 73 pens & 97 erasers. She wants to distribute them equally to maximum number of students so that after distribution she has equal number of books, pens & erasers left. What is the maximum number of students for such a distribution?

- A. 32 B. 21 C. 12 D. 24

Soln:-

If two numbers a & b are divisible by a number n then

→ Their difference (a-b) is also divisible by n.

$$\rightarrow 73 - 25 = 48$$

$$\rightarrow 97 - 73 = 24$$

$$\rightarrow 97 - 25 = 72$$

→ Greatest number dividing above 3 = HCF(72, 48, 24)

$$\rightarrow \text{HCF} = 24$$

Ans: D



HCF & LCM(Assignment)

Q. Find the greatest number which can divide 62, 132 & 237 leaving the same remainder in each case?

- A. 35
- B. 46
- C. 56
- D. 43.

Ans : A



HCF & LCM(Assignment)

Q. Find largest number such that if 45,68 and 113 are divided by that number we get the remainder as 1,2 and 3 respectively.

- A. 21
- B. 22
- C. 26
- D. 24

Ans: B



HCF & LCM(Assignment)

Q. Find the greatest number which can divide 41, 131 & 77 leaving the same remainder in each case?

A. 28

B. 18

C. 36

D. 24

Ans : B



LCM

- Eg. LCM for 18, 28, 108, 105

2	18	28	108	105
2	9	14	54	105
3	9	7	27	105
3	3	7	9	35
3	1	7	3	35
5	1	7	1	35
7	1	7	1	7
	1	1	1	1

Till all quotients are 1

$$\text{So LCM} = 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 7 = 3780$$

Note : LCM is always \geq the greatest of given nos



LCM(Assignment)

Q. LCM for 12,24,20

A. 210

B. 180

C. 120

D. 144

Ans : C



LCM (Assignment)

Q. Find LCM of 72,125

- A. 9000
- B. 1200
- C. 1000
- D. 800

Ans : A



Rules to Remember

- Product of two given numbers is equal to the product of their HCF & LCM
$$A \times B = \text{HCF}(A,B) \times \text{LCM}(A,B)$$
- If a, b, c are three numbers that divide a number n to leave the same remainder r, the smallest value of 'n' is
$$n = (\text{LCM of } a, b, c) + r \quad \text{e.g } 3,4,5 \text{ & rem } 1$$



Q. Find LCM of 147 & 231

Soln:-

- As we know,
- **HCF X LCM = product**
- Find HCF by difference method
- Put in the formula,
- $21 \times \text{LCM} = (147 \times 231)$
- 1617



Q. Find LCM of 84 and 125

Soln:-

- As they are co-prime numbers the product is the LCM because HCF =1 (for co-primes)
- $HCF \times LCM = \text{product}$
- $1 \times LCM = 84 \times 125$
- $LCM = 10500$



LCM

Q. Find the least number which when divided by 12,15,24 leaves a remainder of 5 in each case

- Soln:
- Find $\text{LCM}(12,15,24) = ?$

If a, b, c are three numbers that divide a number n to leave the same remainder r, the smallest value of 'n' is

$$n = (\text{LCM of } a, b, c) + r \quad \text{e.g } 3,4,5 \text{ & rem } 1$$

- LCM = 120
- In an LCM problem, if remainder is common then,

Result = LCM + common remainder

$$= 120+5 = 125$$



Q. Find the smallest number which when divided by 20,36,45 leaves a remainder 15,31 and 40 respectively.

- Soln:
- Find LCM(20,36,45)
- In LCM problem , if difference is common(constant) then,
- **Result = LCM – Common difference**

$$\begin{array}{ccccccc} \bullet & 20 & 36 & 45 & & & \\ \bullet & 15 & 31 & 40 & \left. \right\} & 5 & \\ \bullet & \text{Result} = 180 - 5 & & & & & \\ & & = 175 & & & & \end{array}$$



Q. Four numbers are in the ratio of 10 : 12 : 15 : 18. If their HCF is 3, then find their LCM.

A. 420

B. 540

C. 620

D. 680

Ans : B



Q. Find the least number which when divided by 5,6,7 and 8 leaves a remainder of 3 but when divided by 9 leaves no remainder.

A. 1677

B. 2523

C. 3363

D. 1683

Ans: D



HCF/LCM with Decimal point

- Find HCF of 1.08, 0.36 and 0.9

• Soln:

1. Convert each of the decimals into like decimals.

1.08, 0.36 and 0.90

2. Write each number without decimal point.

$$\text{HCF}(108,36,90) = 18$$

3. Put decimal point after the numbers which are in like decimals.

Here it is after 2 numbers(digits)

$$\text{HCF } (\underline{1.08}, \underline{0.36} \text{ and } \underline{0.90}) = \underline{0.18}$$



HCF(Assignment)

Q. In a school of 437 boys & 342 girls it was decided to divide the girls & boys into separate classes. However it was required that each class consist of the same number of students. What would be the number of classrooms required?

- A. 41 classrooms B. 14 classrooms C. 17 classrooms D. 26 classrooms

Ans : A

Same Class Size = HCF (Boys, Girls)

$$\rightarrow \text{HCF } (437, 342) = 19$$

$$\rightarrow \text{Boys Classes} = 437/19 = 23$$

$$\rightarrow \text{Girls Classes} = 342/19 = 18$$

$$\rightarrow \text{Total Classes} = 23 + 18 = 41$$



LCM(Assignment)

Q. Find the least number which when divided by 12,15,40 leaves a remainder of 5 in each case

- A. 120 B. 125 C. 130 D. 140

Ans : B



LCM(Assignment)

Q. If the product of two numbers is 324 and their HCF is 3, then their LCM will be = ?
A. 972 B. 327 C. 321 D. 108

Ans: D



LCM(Assignment)

Q. Three numbers are in the ratio of 3 : 4 : 5 and their L.C.M. is 2400. Their H.C.F. is:

- A. 40
- B. 80
- C. 120
- D. 200

Ans: A



LCM(Assignment)

Q. Find the least number which when divided by 16,18,20 and 25 leaves a remainder of 4 but when divided by 7 leaves no remainder.

- A. 17004
- B. 18000
- C. 18002
- D. 18004

Ans: D



HCF & LCM(Assignment)

Q. The HCF of two numbers is 8. Which one of the following can never be their LCM ?

- A. 24
- B. 48
- C. 56
- D. 60

Ans: D

If HCF = 8 then LCM should have a factor of 8

Going by options 60 does not have a factor 8. So never be their LCM.



HCF & LCM(Assignment)

Q. The LCM of three different numbers is 120. Which of the following cannot be their HCF?

- A. 8
- B. 12
- C. 24
- D. 35

Ans: D



HCF & LCM(Assignment)

Q. HCF of 204,1190,1445

- A. 17
- B. 18
- C. 19
- D. 21

Ans: A



HCF & LCM(Assignment)

Q. LCM of 22,54,108,135 and 198 is -

- A. 330
- B. 1980
- C. 5940
- D. 11880

Ans: C



HCF & LCM(Assignment)

Q. Find HCF of 36 and 84

- A. 4
- B. 6
- C. 12
- D. 18

Ans: C



Numbers(Assignment)

Q. The number nearest to 43582 divisible by each of 25, 50 and 75 is ?

- A. 43500
- B. 43550
- C. 43600
- D. 43650

Ans: D



Numbers(Assignment)

Q. What is the smallest 5 digits number which is divisible by 12, 15, and 18?

- A. 10010 B. 10015 C. 10020 D. 10080

Ans: D



Rules to Remember

- Fractions :

LCM = LCM of Numerators / HCF of Denominators

HCF = HCF of Numerators / LCM of Denominators

LCM of $\frac{25}{12}$ & $\frac{35}{18}$

LCM = $175/6$

HCF of $\frac{25}{12}$ & $\frac{35}{18}$

HCF = $5/36$



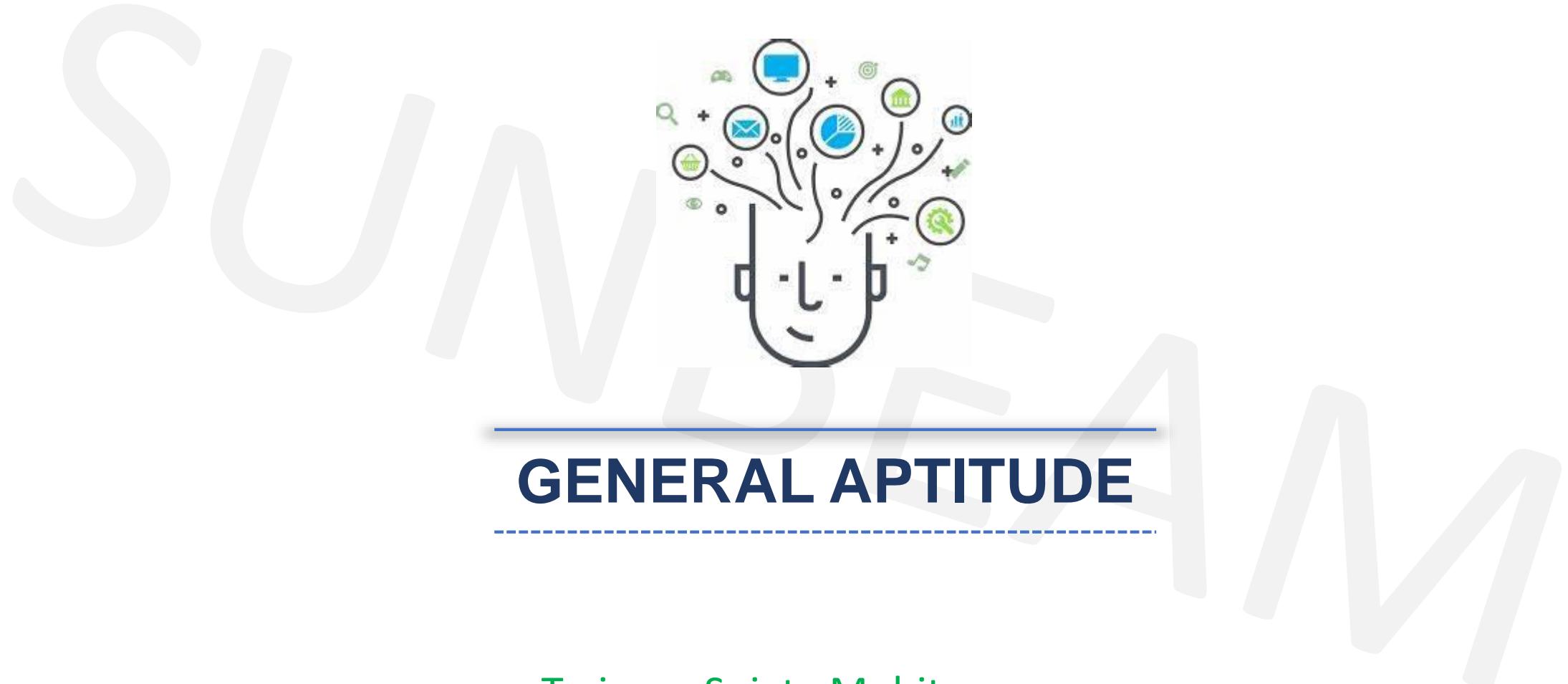
HCF & LCM Fractions(Assignment)

- Find HCF & LCM of $5/9$ and $25/36$
- Ans : HCF = $5/36$ and LCM = $25/9$

SUNBEAM







GENERAL APTITUDE

Trainer : Sujata Mohite
sujata.mohite@sunbeaminfo.com



Properties of Square Numbers

- A square can't end with odd number of zeroes. The number of 0's of perfect square is always even and the non-zero part should also be a perfect square.

- A square can't end with 2, 3, 7 or 8.

1	2	3	4	5
6	7	8	9	0

- Square of **odd** no. is **odd** & **even** no. is **even**

- Whenever last digit of square is 6, then second last digit is always odd.
- Whenever last digit of square is 5, then second last digit is always 2.
- Whenever last digit of square is 1,4,9, then second last digit is always even.



Squares

Q. A man plants his orchard with 15876 trees & arranges them so that there are as many rows as there are trees in each row. How many rows does the orchard have?

- A. 124 B. 134 C. 126 D. 136

- Soln:-

- No of trees = No. of rows x no of trees/row

- $15876 = n \times n$

- $n = \sqrt{15876}$

- $n = \sqrt{9 \times 1764}$

- $= \sqrt{9 \times 9 \times 196}$

- $= ?$

- $= 9 \times 14$

- $= 126$

- **Ans C**



Squares(Assignment)

Q. Find a positive number x , such that the difference between the square of this number and 21 is the same as the product of 4 times the number?

- A. 9
- B. 27
- C. 7
- D. 13

Ans : C



Progression

- Arithmetic Progression :
- If quantities increase or decrease by a common difference then they are said to be in AP e.g. 3, 5, 7, 9, 11,
- If a is first term, d is the common difference, l is the last term then
- General form : $a, a+d, a+2d, a+3d, \dots, a+(n-1)d$
- n^{th} term $T_n = a + (n-1)d$, $n = 1, 2, \dots$
- Sum of first n terms $S_n = \frac{n}{2} [2a + (n-1)d]$
$$S_n = \frac{n}{2} (a + l)$$



Progression



Progression

Q. The sum of all two digit numbers divisible by 3 is

- A. 550 B. 1550 C. 1665 D. 1680

Soln

Two digit numbers divisible by 3 are :

12, 15, 18, 21, , 96, 99.

This is an A.P. with $a = 12$, $d = 3$, $l=99$

Let n be the number of terms.

$$\text{Last term} = a + (n-1)d$$

$$99 = 12 + (n-1) \times 3$$

$$3n = 90, n = 30$$

$$\begin{aligned}\text{Sum} &= n/2 (a + l) = 30/2 \times (12+99) \\ &= 1665\end{aligned}$$

Ans: C



Progression

Q. Find the sum of all natural numbers between 10 and 200 which are divisible by 7

A. 2835

B. 2865

C. 2678

D. 2646

Soln:

Two digit numbers divisible by 7 are :

14, 21, 28, 35, , 196.

This is an A.P. with $a = 14$, $d = 7$, $l=196$

Last term = $a + (n-1)d$

$$196= 14 + (n-1)\times 7$$

$$196-14 = (n-1)\times 7$$

$$n-1 = 26$$

$$n=27$$

$$\text{Sum} = n/2 (a + l)$$

$$= 27/2 \times (14+196)$$

$$= 27 \times 210 /2$$

$$= 27 \times 105$$

$$= 2835$$

OR

$$n = \frac{\text{LastTerm} - \text{FirstTerm}}{d} + 1$$

Ans: A



Progression(Assignment)

Q. Find the sum of the series 3,8,13,18,,93

- A. 912
- B. 925
- C. 998
- D. 936

Ans : A



Progression

- Geometric Progression :

- If quantities increase or decrease by a constant factor then they are said to be in GP e.g. 4, 8, 16, 32,
- If a is first term, r is the common ratio, then
- General form : $a, ar, ar^2, ar^3, \dots, ar^{n-1}$
- n^{th} term $T_n = ar^{(n-1)}$
- Sum of first n terms $S_n = \frac{a(r^n - 1)}{(r - 1)}$



Geometric Progression of n terms :

- To prove that the sum of first n terms of the Geometric Progression whose first term 'a' and common ratio 'r' is given by-
- $S = a + ar + ar^2 + ar^3 + ar^4 + \dots + ar^{n-1}$ ----- 1
- Multiply both sides of this equation by r
- $Sr = ar + ar^2 + ar^3 + ar^4 + \dots + ar^{n-1} + ar^n$ ----- 2
- - - - - - - - - - - -
- Eq 2 - Eq 1
- $Sr - S = ar^n - a$
- $S(r - 1) = a(r^n - 1)$
- $S = \frac{a(r^n - 1)}{(r - 1)}$



Geometric Progression

Q. Find the 10th term of the series: 4, 16, 64, 256, 1024,

- A. 4^{10} B. 4^8 C. 4^9 D. 1022480

Soln:

The given series is in geometric progression

Where $a = 4$, $r = 4$

$$\begin{aligned} \text{So } T_{10} &= a \times r^{(10-1)} \\ &= 4 \times 4^{(10-1)} \\ &= 4^{10} \end{aligned}$$

Ans: A



Progression

- What is the difference between arithmetic progression and geometric progression?
- A sequence is a set of numbers, called terms, arranged in some particular order. An arithmetic sequence is a sequence with the difference between two consecutive terms constant. The difference is called the common difference. A geometric sequence is a sequence with the ratio between two consecutive terms constant.



Averages

- **Simple Average :**

- An average of a set of values is the sum of values divided by the total number of values.
- Average of 'n' values = (Sum of the 'n' values)/n
- This is also called as Arithmetic Mean.
- Average (A) = Sum (S)/ Number(n)
- $S = A \times n$

- **Weighted Average :**

- When all values whose average we want to find do not have uniform occurrences we calculate the weighted average.
- If values $y_1, y_2, y_3\dots$ occur $w_1, w_2, w_3\dots$ times then
- Weighted Avg =
$$\frac{w_1y_1+w_2y_2+w_3y_3+\dots}{w_1+w_2+w_3+\dots}$$



Averages

Q. In a class of 50 students, 24 secured 60 in Physics, 16 secured 70 marks and the rest secured 80. What is the average score for Physics in the class?

- A. 64.8 B. 65.4 C. 67.2 D. 66.7

Soln :-

Students 24 16 10.

Marks 60 70 80

$$\text{Average} = \frac{24 \times 60 + 16 \times 70 + 10 \times 80}{24 + 16 + 10}$$

$$= 3360/50$$

$$= 67.2$$

Ans : C



Averages

- Only For Consecutive Numbers -
- Whenever, we have consecutive numbers or consecutive odd numbers or consecutive even numbers, then always remember the middle number is the Average.
- Examples-
- A. 5,6,**7**,8,9 → Avg =7
- B. 5,6|7,8 → Avg =6.5
- C. 1,3,**5**,7,9 → Avg =5
- D. 21,23,**25**,27 → Avg =24



Averages

Q. The average age of a class of 22 students is 21 years. The average increased by 1 when the teacher's age also included. What is the age of the teacher?

A. 48

B. 45

C. 43

D. 44

Ans: D



Averages

Q. The average age of a class of 22 students is 21 years. The average increased by 1 when the teacher's age also included. What is the age of the teacher?

Solution 1:-

- Before teacher , total age of students = 22×21
- After teacher is added,

Total age of all students + Age of the teacher = 23×22

- Age of the teacher = $23 \times 22 - 22 \times 21$
= $22(23 - 21)$
= 22×2
= 44 years



Averages

- The average age of a class of 22 students is 21 years. The average increased by 1 when the teacher's age also included. What is the age of the teacher?

- Solution 2:-**

- New value = old avg \pm $(n \pm 1)(\text{diff})$

- Where, n = total no. of students

- $$\begin{aligned}\text{New value} &= 21 + (22+1)(1) \\ &= 21 + 23 \\ &= 44 \text{ years}\end{aligned}$$

+ if member added
- If member removed

difference = | Old avg – new avg |

Averages

Q. There are 50 students in a class. Their average weight is 45 kg. When one student leaves the class the average weight reduces by 100 g. What is the weight of the student who left the class ?

A. 45 kg.

B. 47.9 kg.

C. 49.9 kg.

D. 50.1 kg.

Soln:

$$\text{New value} = \text{old avg} + (n \pm 1)(\text{diff})$$

$$= 45 + (50 - 1)(0.1)$$

$$= 45 + 49(0.1)$$

$$= 45 + 4.9$$

$$= 49.9 \text{ kg}$$

(as we convert 100g into kg = $\frac{100}{1000} = 0.1 \text{ kg}$)

Ans: C



Averages

Q. There are 50 students in a class. Their average weight is 45 kg. When one student leaves the class the average weight reduces by 100 g. What is the weight of the student who left the class ?

- A. 45 kg.
- B. 47.9 kg.
- C. 49.9 kg.
- D. 50.1 kg.

Soln:

Total weight of 50 students = (45×50) kg = 2250 kg

Average weight of 49 students = $45\text{kg} - 100\text{g} = 44.9\text{ kg}$

So, total weight of 49 students = $(44.9 \times 49)\text{kg} = 2200.1\text{kg}$

Weight of the students who left the class = $2250 - 2200.1 = 49.9\text{ kg}$

Ans: C



Averages

Q. The average age of 16 men increases by 3 years when a person 27 years old is replaced by another. How old is the new person?

- A. 75 B. 30 C. 48 D. 64

Soln:-

Number of men = 16

Let average age be a

→ Total age of 16 men = $16a$ (Old total)

New average = $a+3$

→ New total age of 16 men = $16(a+3) = 16a + 48$

New Total – Old Total = 48

→ Age of new man = $27 + 48 = 75$

Ans : A



Averages

Q. The average age of 16 men increases by 3 years when a person 27 years old is replaced by another. How old is the new person?

- A. 75 B. 30 C. 48 D. 64

Soln:-

- Average of 16 men increases by 3 years means,
- total age increases by $16 \times 3 = 48$
- If the age of new person same as replaced person then there would have been no change in average.
- But average age of 16 men increased by 3 years
- So, total age of the person replacing another person = $27 + 48 = 75$ years

Ans : A



Averages

Q. The average age of 8 men is decreased by 2 years when two of them, whose ages are 22 and 28, are replaced by two new men.. What is the average age of two men?

- A. 34years B. 30years C. 15years D. 17years

Soln:

- Average of 8 men reduce by 2 years means total age reduces by 16 if two men leave.
- So, the total age of the new men replacing the old men = $22+28-16=34$
- \Rightarrow Average = $34/2 = 17$ years.

OR

- Total age decreased= $(8 * 2)$ years = 16 years.
- Sum of ages of two new men = $(22 + 28 - 16)$ years = 34 years
- Average age of two new men = $(34/2)$ years = 17 years.
- **Ans: D**



Averages

Q. The average age of students is 7 years and average age of 10 teachers is 50 years. If average age of group of all teachers and students is 8 years. Find the number of students?

- A. 420 B. 250

- C. 300 D. 270

Soln:

We know, Total = avg x n

	S	T
No.	z	10
Avg	7	50

(student + teacher) x avg

$$(z + 10) \times 8$$

$$8z + 80 = 7z + 500$$

$$Z = 420 \text{ students}$$

$$= (\text{student}) \times \text{avg} + (\text{teacher}) \times \text{avg}$$

$$= (z) \times 7 + (10) \times 50$$

Ans :A



Averages(Assignment)

Q. Find average of all the numbers between 6 and 34 which are divisible by 5.

- A. 18
- B. 20
- C. 34
- D. 3

Ans: B



Averages(Assignment)

Q. The average weight of 16 boys in a class is 50.25 kg and that of the remaining 8 boys is 45.15 kg. Find the average weights of all the boys in the class.

- A. 47.55 kg B. 48 kg C. 48.55 kg D. 49.25 kg

Ans: C

$$\begin{aligned}\text{Average} &= \frac{50.25 \times 16 + 45.15 \times 8}{16+8} \\ &= \frac{(804+361.2)}{24} \\ &= \frac{1165.2}{24} \\ &= 48.55\end{aligned}$$



Averages(Assignment)

Q. The average age of a class of 39 students is 15 years. If the age of the teacher be included, then the average increases by 3 months. Find the age of the teacher.

- A. 20 years
- B. 25 years
- C. 30 years
- D. 27 years

Ans : B



Averages(Assignment)

Q. The average marks of a class of 87 students is 56. When a new student was added and average becomes 56.5. Find marks of new student.

- A. 56
- B. 44
- C. 100
- D. 90

Ans: C



Averages(Assignment)

Q. Find the average of first 97 natural numbers.

- A. 47
- B. 37
- C. 48
- D. 49
- E. 49.5

Ans: D



Averages(Assignment)

Q. The average age of a class of 30 students is 9years. When teacher's age is also added, the average becomes 10. What is the age of the teacher?

- A. 41 years
- B. 40 years
- C. 39 years
- D. 42 years

Ans: B



Averages(Assignment)

Q. The average of 50 numbers is 30. If two numbers, 35 and 40 are discarded, then the average of the remaining numbers is nearly:

- A. 28.32
- B. 29.68
- C. 28.78
- D. 29.27

Ans: B



Averages(Assignment)

Q. The average age 8 men is increased by 2 years when two of them whose ages are 21 years and 23 years are replaced by two new men . The average age of the two new men is?

- A. 22 years
- B. 24 years
- C. 28 years
- D. 30 years

Ans: D



Averages(Assignment)

Q. The average weight of the students of a class is 60 kg. If eight new students of average weight 64 kg join the class, the average weight of the entire class becomes 62 kg. How many students were there in the class initially ?

- A. 8 students
- B. 16 students
- C. 10 students
- D. 12 students

Ans: A



Averages(Assignment)

Q. The average of ten numbers is 8. If the average of first nine numbers is 7. Find the 10th number?

- A. 17
- B. 16
- C. 15
- D. 12

Ans: A



Averages(Assignment)

Q. The average marks obtained by 150 students is 30. If the average marks of passed candidates was 40 and that of failed candidates was 20. Find the number of candidates who passed the exam?

- A. 25
- B. 85
- C. 75

- D. 45

Ans: C



Averages(Assignment)

Q. The average expenditure of a man for the first five months is Rs. 3600 and for next seven months is Rs. 3900, if he saves Rs.8700 during the year, his average income per month is ?

- A. Rs.4500
- B. Rs.8500
- C. Rs.7500
- D. Rs.5400

Ans: A



Averages(Assignment)

Q. The average of first five multiples of 3 is:

A. 9

B. 10

C. 8

D. 11

Ans: A



Averages(Assignment)

Q. Find the average of first 100 positive numbers

A. 49.5

B. 50.5

C. 51

D. 100

Ans: B



Averages(Assignment)

Q. The average expenditure of a man for the first five months of a year is Rs. 5000 and for next seven months is Rs. 5400, if he saves Rs.2300 during the year, his average income per month is ?

- A. Rs.5425
- B. Rs.5446
- C. Rs.5500
- D. Rs.5600

Ans: A



Ages

Ram is at present some age(x) . Age 15 years ago or future age, then



'n' times of Ram's age means ,
 $= n \times \text{age}$

Ages

Q. Karan's age after 15 years will be 5 times his age 5 years back. What is the present age of Karan?

- A. 12 years
- B. 10 years
- C. 20 years
- D. 25 years

Soln:

Present age = x

As given,

Future age = $x + 15$

Old age = $x - 5$ 5 times is that n times

$$\text{So , } x + 15 = 5(x - 5)$$

$$x + 15 = 5x - 25$$

$$x = 10 \text{ years} (\text{Karan's present age})$$

Ans: B



Ages

Q. Present age of Sam & Ana are in the ratio 5:4 respectively. Three years hence ,their ratio will become 11:9 respectively. What is Ana's present age?

- A. 6 years
- B. 24 years
- C. 28years
- D. 32years

Soln:

Present age –

$$S \rightarrow 5x, A \rightarrow 4x$$

3 years hence means (+) as its future ratio given and so its fraction

$$\frac{5x+3}{4x+3} = \frac{11}{9}$$

$$45x+27 = 44x + 33$$

$$x = 6 \text{ years}$$

For A,

$$4x = 4 \times 6 = 24 \text{ years}$$

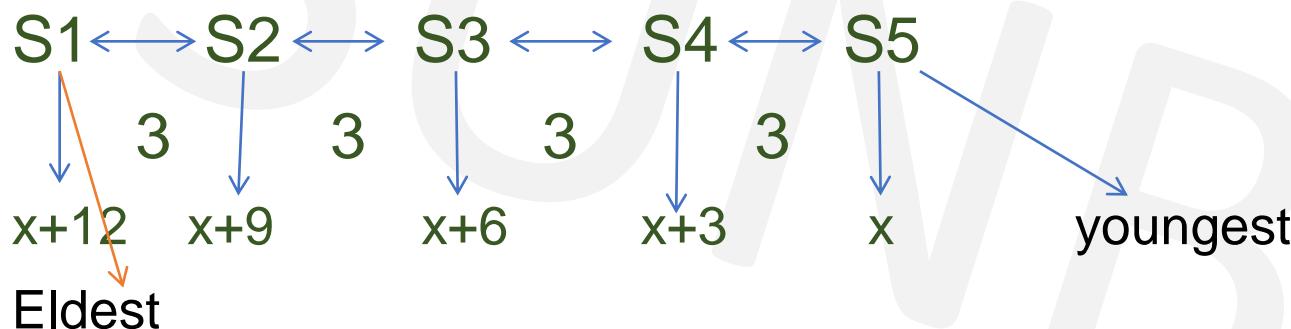
Ans: B



Ages

Q. Consider 5 siblings born apart by 3 years each. If the sum of the ages of all children is 50 years. What is the age of youngest child?

Soln :



Given,

Sum of ages = 50 years

$$x+12+x+9+x+6+x+3+x = 50$$

$$5x + 30 = 50$$

$x = 4$ years (age of youngest child)

Ages

Q. A mother said to her daughter “ I was as old as you are at the time of your birth”. If the mother’s age is 38 years now. What was the daughter’s age 5 years back?

- A. 14years B. 19years C. 38years D. None of these

Soln:

	M	D
Present	38	x
At birth time	$38-x$	0

“ I was as old as you are at the time of your birth” shows

$$M = D$$

$$38-x = x$$

$$38 = 2x$$

$x = 19$ years(present age of daughter)

5years back, $19-5 = 14$ years

Mother’s age at time of birth = $38 - x$

$$= 38 - 19$$

$$= 19 \text{ years}$$

Ans: A



Ages

Q. A man was asked to state his age in years. His reply was, "Take my age 3 years hence, multiply it by 3 and then subtract 3 times my age 3 years ago and you will know how old I am". What is the age of the man ?

- A. 18 years
- B. 20 years
- C. 24 years
- D. 32 years

Soln:

Let the present age of the man be x years

$$3(x+3)-3(x-3)=x$$

$$(3x+9)-(3x-9)=x$$

$$x=18$$

Ans: A



Ages

Q. Ten years ago, a man was seven times as old as his son. Two years hence, twice his age will be equal to five times the age of his son. What is the present age of the son ?

- A. 12 years
- B. 13 years
- C. 14 years
- D. 15 years

Ans: C



Ages(Assignment)

Q. A is 2 years old than B who is twice as old as C. The total ages of A,B,C be 27. How old is B?

- A. 5 years B. 12 years C. 10 years D. None of these

• **Soln:**

• So, we need to first find x here

$$A = 2 + B$$

$$B = 2C$$

$$C = x$$

• So B becomes, $B = 2x$

• So A becomes,

$$A = 2 + B$$

$$A = 2 + 2x$$

• **Ans: C**

Given, the total age = $A + B + C = 27$

Substitute the values here for A,B,C

$$2 + 2x + 2x + x = 27$$

$$5x = 25$$

$$x = 5 \text{ years}$$

$$\text{Age of } B = 2x = 2 \times 5 = 10 \text{ years}$$



Ages(Assignment)

Q.A man who is 40 years old has three sons, ages 6, 3 and 1. In how many years will the combined age of his three sons equal 80% of his age?

- A.5 B. 10 C. 15 D. 20

Soln:

- Let the condition occur after y years.
- After y years
- Man's age = $(40+y)$
- Son's ages $(6+y), (3+y), (1+y)$
- Sum of sons' ages = $(10+3y)$
- $(10+3y) = 80/100(40+y)$
- $5(10+3y) = 4(40+y)$
- $50 + 15y = 160 + 4y$
- $11y = 110$
- $y = 10$

Ans : B



Ages(Assignment)

Q. The ratio of Present age of A and B is 6:7. A is 7 years younger than C. C's age after 8 years will be 51 years. Then what is the difference between the present ages of A and B?

- A. 3 Years
- B. 4 Years
- C. 5 Years
- D. 6 Years
- E. Cannot be determined

Ans : D



Ages(Assignment)

Q. The average age of A, B, C, D and E is 40 years. The average age of A and B is 35 years and the average of C and D is 42 years. Age of E is :

- A. 48 years
- B. 46 years
- C. 42 years
- D. 45 years

Ans: B



Ages(Assignment)

Q. 10 years ago, age of father was thrice the age of his son. Ten years hence, father's age will be twice that of his son. The ratio of their present ages is:

- A. 5:2
- B. 7:3
- C. 9:2
- D. 13:4

Ans : B



Ages(Assignment)

Q. The average age of A, B and C is 28 years, if average age of B and C is 29 years.
What is the age of A in years?

- A. 24 years
- B. 26 years
- C. 28 years
- D. 30 years

Ans: B



Ages(Assignment)

Q. Sachin is younger than Rahul by 7 years. If their ages are in the respective ratio of 7 : 9, how old is Sachin?

- A. 16 years
- B. 18 years
- C. 28 years
- D. 24.5 years
- E. None of these

Ans: D



Ages(Assignment)

Q. At present, the ratio between the ages of Arun and Deepak is 4 : 3. After 6 years, Arun's age will be 26 years. What is the age of Deepak at present ?

- A. 12 years
- B. 15 years
- C. 19.5 years
- D. 21 years
- E. None of these

Ans: B



Ages(Assignment)

Q. The present ages of three persons in proportions 4 : 7 : 9. Eight years ago, the sum of their ages was 56. Find their present ages (in years).

- A. 8, 20, 28 years
- B. 16, 28, 36 years
- C. 20, 35, 45 years
- D. None of these

Ans: B



Ages(Assignment)

Q. The sum of the ages of two brothers 21 years hence will be twice the sum of their ages today. If the difference in their ages is 12 years, how old is the younger brother?

- A. 27 years
- B. 21 years
- C. 17 years
- D. 15 years

Ans : D

Soln-

Present age of elder brother = x

Present age of younger brother = y

After 21 years , elder brother = $x+21$ and younger brother = $y+21$

As per given condition,

$$x+21 + y+21 = 2(x + y) \quad \text{----- (1)}$$

$$x - y = 12 \quad \text{-----(2)}$$

Solving 1 and 2 , we get ,

$$x = 27 \text{ years} \quad \text{and} \quad y = 15 \text{ years}$$



Ratio & Proportion

- **Ratio** : Ratio is a comparison of two numbers (quantities) by division.
 - The ratio of a to b is written as
 - **a : b = a/b = a ÷ b.**
- * Ratio is defined only for two values of same units
ratio between 20 kg & 50 kg is 2:5



Ratio & Proportion

- Some Useful Results
- If $a:b = c:d$ or $a/b = c/d$

1. $a \times d = b \times c$

2. $b/a = d/c$ (Invertendo)

3. $a/c = b/d$ (Alternando)

4. $a+b/b = c+d/d$ (By Componendo)

5. $a-b/b = c-d/d$ (By Dividendo)

6. $(a+b)/(a-b) = (c+d)/(c-d)$ (By Componendo & Dividendo)



Ratio & Proportion

- **Proportion** : A proportion is an expression that states that two ratios are equal.

i.e. $a : b = c : d$ e.g $2 : 3 = 4 : 6$ or $2 : 3 :: 4 : 6$

a, b, c & d are called the 1st, 2nd, 3rd & 4th proportionals.

1st & 4th proportionals are called extreme terms &

2nd & 3rd proportionals are called mean terms.

Product of means = Product of extremes. $bc = ad$

- **Continued Proportion**

Three quantities are said to be in continued proportion if

$$a : b = b : c \text{ or } a/b = b/c$$

If $a : b :: b : c$ then $b^2 = ac$ (b is the mean proportion of a & c)

$$a : b = b : c = c : d \text{ or } a/b = b/c = c/d$$



Ratio & Proportion

Q. If $A : B = 2 : 3$, $B : C = 4 : 5$ and $C : D = 5 : 9$ then $A : D$ is equal to:

- A. 11 : 17 B. 8 : 27 C. 5 : 9 D. 2 : 9

Soln:

$$\frac{A}{D} = \frac{A}{B} \times \frac{B}{C} \times \frac{C}{D}$$

$$\frac{A}{D} = \frac{2}{3} \times \frac{4}{5} \times \frac{5}{9}$$

$$\frac{A}{D} = \frac{8}{27}$$

Ans : B



Ratio & Proportion(Assignment)

Q. What is the value of $A+B / A-B$, if $A/B = 7$

- A. $4/3$
- B. $2/3$
- C. $2/6$
- D. $7/8$

Ans : A

$$A/B = 7/1$$

$$A+B/A-B = 7+1/7-1 = 8/6 = 4/3$$



Ratio & Proportion

If $X : Y = 3 : 4$ and $Y : Z = 8 : 9$ then $X : Z$ is

A. 3 : 4

B. 5 : 4

C. 2 : 3

D. 8 : 9

Soln:

$$X : Y = 3 : 4$$

$$Y : Z = 8 : 9 \quad (\text{Inverted N})$$

$$\begin{aligned} Y : Z &= 8 : 9 \\ &= 3 \times 8 : 8 \times 4 : 4 \times 9 \\ &= 24 : 32 : 36 \\ &= 6 : 8 : 9 \end{aligned}$$

Now, $X : Z$

$$6 : 9$$

$$2 : 3$$

Ans: C

$$\frac{X}{Z} = \frac{X}{Y} \times \frac{Y}{Z}$$

$$\frac{X}{Z} = \frac{3}{4} \times \frac{8}{9}$$

$$\frac{X}{Z} = \frac{2}{3}$$



Ratio & Proportion(Assignment)

If $A : B = 2 : 3$ and $B : C = 4 : 5$ then $A : B : C$ is

A. $2 : 3 : 5$

B. $5 : 4 : 6$

C. $8 : 12 : 15$

D. $6 : 4 : 5$

Ans : C

- $\frac{A}{B} = \frac{2}{3}$
- $\frac{B}{C} = \frac{4}{5}$

$$\begin{array}{l} A : B : C \\ 2 : 3 \quad \downarrow \quad \downarrow \\ \downarrow \quad 4 : 5 \end{array}$$

- $A : B : C = 2 \times 4 : 3 \times 4 : 3 \times 5$
 $= 8 : 12 : 15$



Ratio & Proportion

Q. A sum of Rs. 1240 is distributed among A, B and C such that the ratio of amount received by A and B is 6 : 5 and that of B and C is 10 : 9 respectively. Find the share of C ?

A.Rs. 480

B.Rs. 360

C.Rs. 400

D.Rs. 630

• Soln:

• Given, $A : B = 6 : 5$, $B : C = 10 : 9$

• $A : B : C$

• $6 : 5$

$10 : 9$

$60 : 50 : 45$

$12 : 10 : 9$

Ans : B

$$A : B : C = 12 : 10 : 9$$

$$12x + 10x + 9x = 1240$$

$$x = 40$$

$$C's \text{ share} = 9 \times 40 = \text{Rs. } 360$$



Ratio & Proportion

If $A : B = 2 : 3$, $B : C = 4 : 5$ and $C : D = 6 : 7$. Find A:B:C:D

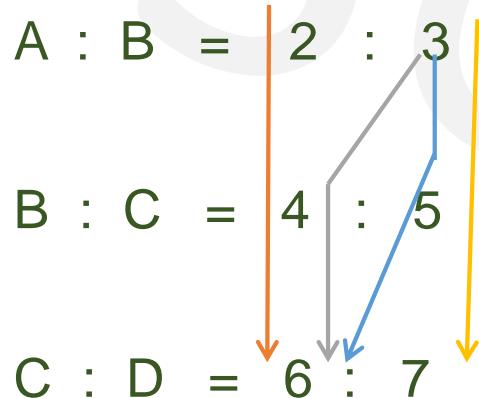
A. $2 : 3 : 4 : 5$

B. $2 : 12 : 30 : 7$

C. $16 : 24 : 30 : 35$

D. $4 : 5 : 6 : 7$

Soln:

$$\begin{array}{l} A : B = 2 : 3 \\ B : C = 4 : 5 \\ C : D = 6 : 7 \end{array}$$


$$\begin{array}{cccc} A & : & B & : & C & : & D \\ = ABC & : BBC & : BCC & : BCD \\ = 2 \times 4 \times 6 & : 3 \times 4 \times 6 & : 3 \times 5 \times 6 & : 3 \times 5 \times 7 \\ = 48 & : 72 & : 90 & : 105 \\ = 16 & : 24 & : 30 & : 35 \end{array}$$

Ans: C

Ratio & Proportion

Dividing a given number in the given Ratio :

Let A be the given number. Let the given ratio be a:b:c

This means A is divided into three parts such that

$$\text{First Part} = A \times a/(a+b+c)$$

$$\text{Second Part} = A \times b/(a+b+c)$$

$$\text{Third Part} = A \times c/(a+b+c)$$

And **First Part + Second Part + Third Part = A**

Any Part = Total Amount x (Its related ratio term / Sum of Ratio Terms)



Ratio & Proportion

Q. Find B's share in Rs 6,300 if A:B = 2:3, B:C = 4:5, C:D = 3:7

A.Rs 1080

B. Rs 1800

C. Rs 810

D. Rs 1200

Soln:

$$\begin{matrix} A/B \\ 2/3 \end{matrix}$$

$$\begin{matrix} B/C \\ 4/5 \end{matrix}$$

$$\begin{matrix} C/D \\ 3/7 \end{matrix}$$

$$A : B = 2 : 3$$

$$B : C = 4 : 5$$

$$C : D = 3 : 7$$

$$\begin{matrix} A : B : C : D \\ 8 : 12 : 15 : 35 \end{matrix}$$

$$\text{So B's share} = 6300 \times \frac{12}{70} = 1080$$

Ans : A



Ratio & Proportion

Q. A bag contains total 1200 coins of 25 ps, 50 ps and 1 Re coins. If the number of coins are in the ratio 6:5:4 find the total amount in the bag.

- A. Rs 200 B. Rs 120 C. Rs 320 D. Rs 640

Soln:

$$\begin{array}{ccc} \underline{25 \text{ ps}} & \underline{50 \text{ ps}} & \underline{1 \text{ Re}} \\ 6 & 5 & 4 \\ 6x + 5x + 4x = 1200 \end{array}$$

$$15x = 1200 \rightarrow x = 80$$

$$6x = 480 \text{ coins} \times \frac{1}{4} = \text{Rs } 120$$

$$5x = 400 \text{ coins} \times \frac{1}{2} = \text{Rs } 200$$

$$4x = 320 \text{ coins} \times 1 = \text{Rs } 320$$

$$\text{Total} = \text{Rs } 640$$

Ans : D



Ratio & Proportion

Q. Divide Rs. 18200 amongst 3 persons such that A gets $\frac{5}{9}$ th of what B & C together get & B gets $\frac{6}{7}$ th of what A & C together get. What does C get?

A. Rs. 6500

B. Rs. 3300 C. Rs. 8400

D. Rs. 1400

Soln:

$$A : (B+C)$$

$$5 : 9$$

$$A+B+C = 5x+9x = 14x$$

$$14x = 18200 \rightarrow x = 1300 \rightarrow A = 5x = 6500$$

$$B : (C+A)$$

$$6 : 7$$

$$A+B+C = 6y + 7y = 13y$$

$$13y = 18200 \rightarrow y = 1400 \rightarrow B = 6y = 8400$$

$$C = 18200 - 8400 - 6500 = 3300$$

Ans : B



Ratio & Proportion

Q. Which of the following is a ratio between a number and the number obtained by adding one-fifth of that number to it?

- A. 4:5
- B. 5:4
- C. 5:6
- D. 6:5

Ans: C



Ratio & Proportion(Assignment)

Q. If A:B =2:3, B:C= 4:5 and C:D =6:7 Find A:D is equal to:

- A. 16 : 35 B. 8 : 25 C. 4 : 15 D. 2 : 10

Ans : A



Ratio & Proportion(Assignment)

Q. The difference between two positive numbers is 10 and the ratio between them is 5 : 3. Find the product of the two numbers.

- A.375 B.175 C.275 D.125 E.250

Ans : A



Ratio & Proportion(Assignment)

Q. Two numbers are in ratio 4 : 5 and their LCM is 180. The smaller number is

- A.9
- B.15
- C.36
- D.45

Ans : C



Ratio & Proportion(Assignment)

Q. The average income of all employees is Rs. 20000. The average salary of male employees is Rs. 22000. The average salary of female employees is Rs. 15000. What is the ratio of male employees to female employees?

- A. 2 : 5
- B. 3 : 4
- C. 5 : 2
- D. 3 : 5

Ans: C



Ratio & Proportion(Assignment)

Q. The sum of 3 numbers is 98. If ratio between first and second numbers be 2 : 3 and between second and third be 5 : 8, then the second number is?

- A. 30
- B. 40
- C. 50
- D. 60

Ans: A



Ratio & Proportion(Assignment)

Two numbers are in ratio 7 : 11. If 7 is added to each of the numbers, the ratio becomes 2 : 3. The smaller number is?

- A. 39
- B. 49
- C. 66
- D. 77

Ans: B

Let the numbers be $7x$ and $11x$.

$$(7x+7)/(11x+7)=2/3$$

$$22x+14=21x+21$$

$$x=7$$

$$\text{Smaller number} = 7x = 7 \times 7 = 49$$



Ratio & Proportion(Assignment)

Q. What must be added to each of the numbers 7, 11 and 19, so that the resulting numbers may be in continued proportion?

- A. -3
- B. -4
- C. 3
- D. 4

Ans: A



Ratio & Proportion(Assignment)

Q. The incomes of A & B are in the ratio 3:2. Their respective expenditures are in the ratio 5:3. If each of them saves Rs. 2000, what is the income of B?

- A. Rs 12,000
- B. Rs 8,000
- C. Rs 16,000
- D. Rs 6,000

Ans : B



Ratio & Proportion(Assignment)

Q. When a particular number is subtracted from each of 7, 9, 11 and 15, the resulting numbers are in proportion. The number to be subtracted is -

- A. 1
- B. 2
- C. 3
- D. 5

Ans: C

Sol:

- Let the required number be x
- $\frac{7-x}{9-x} = \frac{11-x}{15-x}$
- $(7 - x)(15 - x) = (11 - x)(9 - x)$
- $105 - 22x + x^2 = 99 - 20x + x^2$
- $2x = 6$
- $x = 3$



Mixtures & Alligation

- **Alligation** : It is the rule which enables us to find the ratio in which two or more ingredients at given prices must be mixed to produce a mixture of a desired price.(mixing / linking)
 - **Mean Price** : The cost price of a unit quantity of mixture is called the mean price.
 - **Dearer** : The more expensive ingredient
-
- Note :
Always maintain the order in which problem is given else answer gets changed



Mixtures & Alligation

Type 1 oranges at Rs.60 per kg and Type 2 oranges at Rs.120 per kg and when mixed cost is Rs.75 per kg. Find the ratio in which Type 1 and Type 2 oranges are mixed.

Soln:

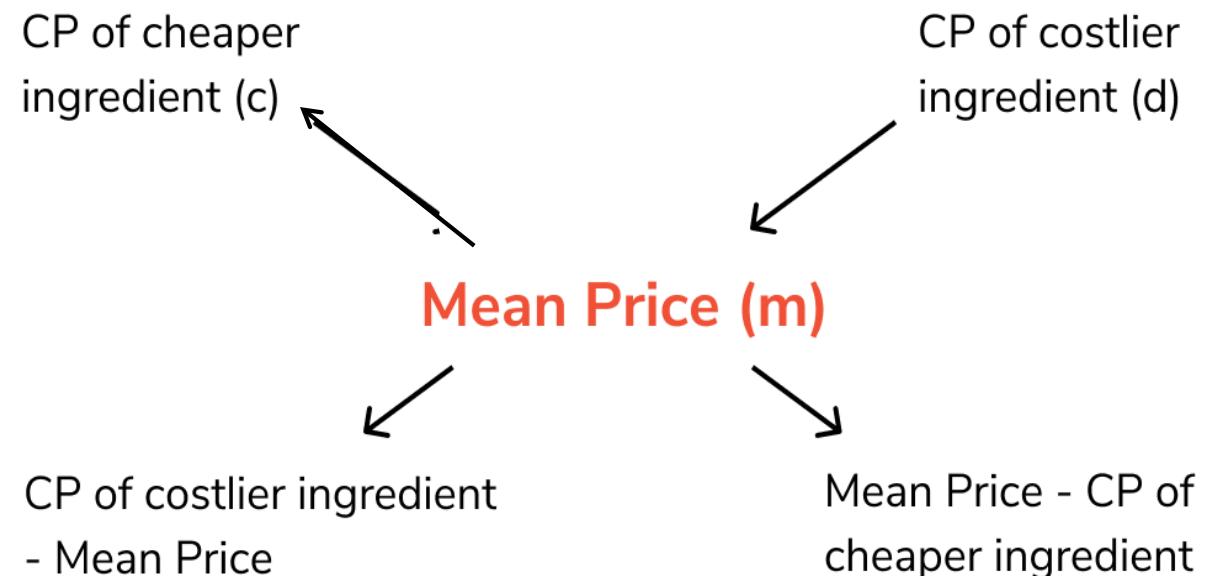
Type 1
60

Type 2
120

$$x = d - m$$

$$y = m - c$$

$$\frac{x}{y} = \frac{d-m}{m-c} = \frac{120-75}{75-60} = \frac{45}{15} = \frac{3}{1} = 3:1$$



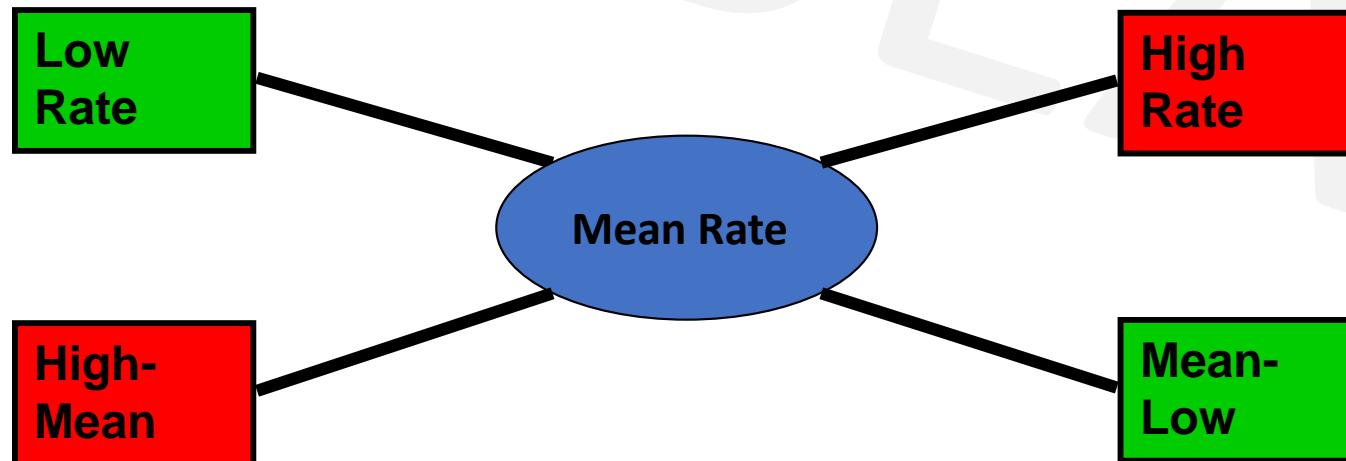
$$\frac{\text{Quantity of cheaper ingredient}}{\text{Quantity of costlier ingredient}} = \frac{d - m}{m - c}$$

Mixtures & Alligation

$$\frac{\text{Quantity of Lower}}{\text{Quantity of Higher}} = \frac{(\text{C.P. of Higher}) - (\text{Mean Price})}{(\text{Mean Price}) - (\text{C.P. of Lower})}$$

$$\frac{Q_L}{Q_H} = \frac{C_{Ph} - C_{Pm}}{C_{Pm} - C_{Pl}}$$

$$(\text{Qty Low}) : (\text{Qty High}) = (C_{Ph}-C_{Pm}) : (C_{Pm}-C_{Pl})$$



Mixtures & Alligation

Q. CP of rice A is Rs. 15/kg and CP of rice B is Rs.20/kg. If both A and B are mixed in the ratio 2:3. Then find the price per kg of the mixed rice.

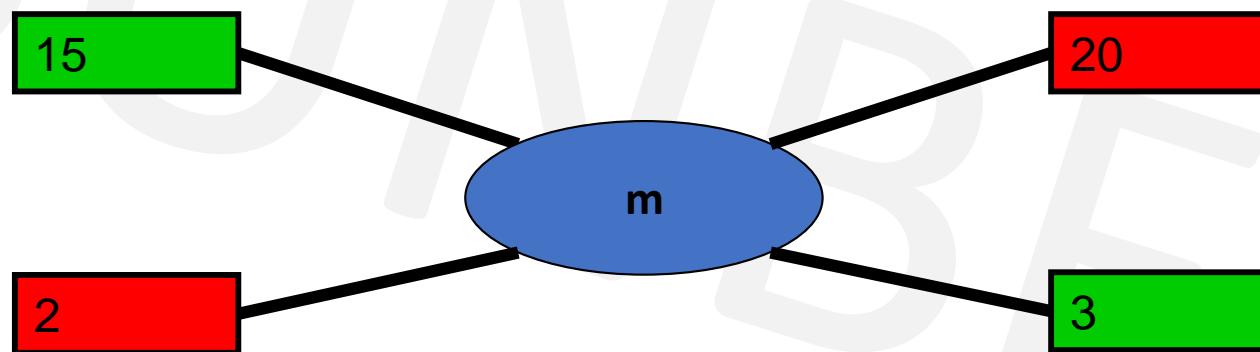
A. Rs. 28

B. Rs. 17

C. Rs. 18

D. Rs. 48

Soln:



$$\frac{x}{y} = \frac{d-m}{m-c}$$

$$\frac{2}{3} = \frac{20-m}{m-15}$$

$$m = \frac{90}{5} = \text{Rs. } 18$$

Ans: C

Mixtures & Alligation

Q. In what ratio must a grocer mix two varieties of dal worth Rs. 60/kg & Rs. 65/kg, so that selling the mixture at 68.20/kg, he may gain 10%.

Soln:

- Mean price is always CP
- Steps-
- 1. $m=?$
- 2. $m = \text{cost price(CP)}$
- 3. $SP = \text{given}$
- 4. find $x/y=?$

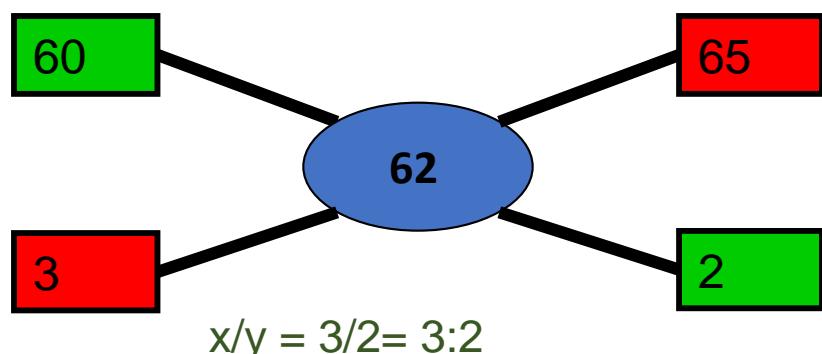


Mixtures & Alligation

In what ratio must a grocer mix two varieties of dal worth Rs. 60/kg & Rs. 65/kg, so that selling the mixture at 68.20/kg, he may gain 10%.

- A. 3:2 B. 2:3 C. 3:4 D. 4:3

- SP of 1 kg of mixture = Rs. 68.20
- Gain = 10%
- In case of profit, $SP = \frac{C.P. \times (100 + \%gain)}{100}$
- CP of 1kg of mixture = $Rs \left(\frac{\frac{100}{100+10}}{11} \times 68.2 \right)$
 $= \frac{682}{11}$
- Mean price = Rs. 62
- By the rule of alligation, we have :
- C.P. of 1kg dal of 1st kind C.P. of 1kg dal of 2nd kind



Ans: A

Mixtures & Alligation

Q. A person blends two varieties of tea, one cost Rs. 160/kg and other cost Rs. 200/kg in the ratio 5 : 4. He sells the blended variety at Rs.192/kg. Find the profit %.

A. 6%

B. 8%

C. 7%

D. 9%

Soln :

$$\frac{x}{y} = \frac{d-m}{m-c}$$

$$\frac{5}{4} = \frac{200-m}{m-160}$$

$$5m - 800 = 800 - 4m$$

$$9m = 1600$$

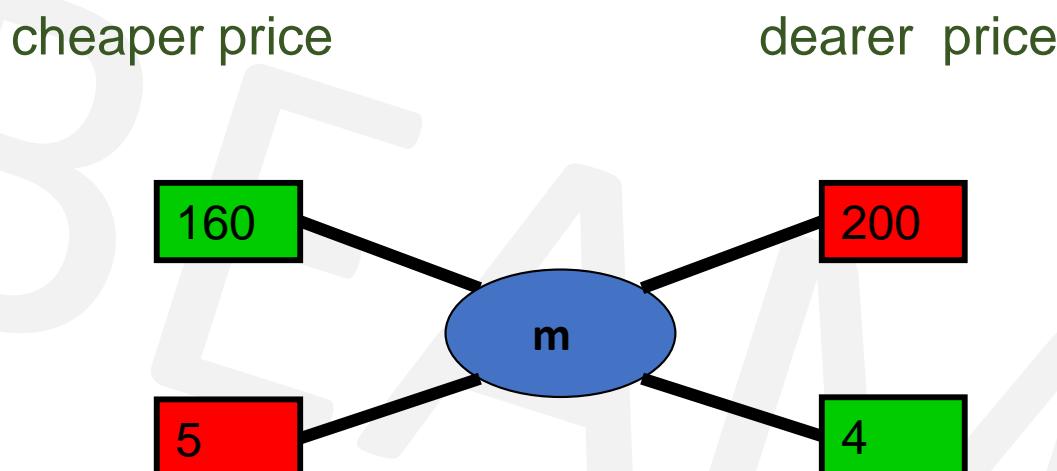
$$m = \frac{1600}{9}$$

SP=Rs.192(given) , CP =mean price

$$\text{Profit\%} = \frac{\text{SP}-\text{CP}}{\text{CP}} \times 100$$

$$= \frac{\frac{192 - \frac{1600}{9}}{\frac{1600}{9}}}{\frac{1600}{9}} = \frac{1728 - 1600}{1600} = \frac{128}{16} = 8\%$$

Ans: B



Mixtures & Alligation

Q. Two jars A and B contain milk and water in the ratio 7:5 and 17:7 respectively. In what ratio mixtures from two vessels should be mixed to get a new mixture containing milk and water in the ratio 5:3?

A. 2:1

B. 1:2

C. 2:3

D. 3:4

Soln:

For these type of questions consider 1 ingredient out of the two ingredients and represent as fraction of one.

A

m:w

7:5

B

m:w

17:7

C

m:w

5:3

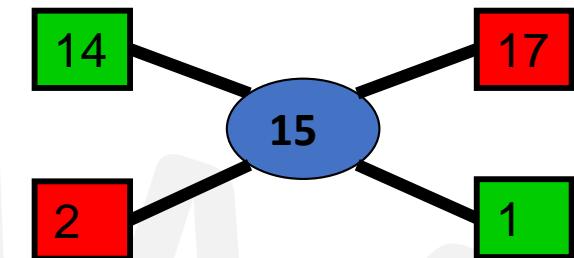
To make calculations easier, convert all denominator into common one
So, find LCM(12,24,8) = 24

$$A: \frac{7}{12} \times \frac{2}{2} = \frac{14}{24}$$

$$B: \frac{17}{24}$$

C

$$\frac{5}{8} \times \frac{3}{3} = \frac{15}{24}$$



We consider milk here, so fraction of milk,

$$A: \frac{7}{7+5} = \frac{7}{12}$$

$$B: \frac{17}{17+7} = \frac{17}{24}$$

$$C: \frac{5}{5+3} = \frac{5}{8}$$

forget denominators,
By rule of Alligation,

Ans: A

Mixtures & Alligation

Q. 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 mixtures are mixed to obtain a new mixture in vessel C containing spirit and water in the ratio 8:5?

- A. 4:3
- B. 3:4
- C. 5:6
- D. 7:9

Ans: D



Mixtures & Alligation(Assignment)

Q. What quantity of sugar costing Rs 21.20 per kg must be mixed with 144 kg of sugar priced at Rs 26.20 per kg so that 10% may be gained by selling mix at Rs 25.30/kg ?

- A. 256 kg
- B. 265 kg
- C. 244 kg
- D. 144 kg

Ans: A



Mixtures & Alligation(Assignment)

Q. Find the ratio in which the contains of 2 jars A & B containing spirit & water in the ratio 1:3 & 3:2 respectively must be mixed so that resulting mixture contains 45% spirit?

- A. 2:3
- B. 3:5
- C. 3:2
- D. 3:4

Ans D



Mixtures & Alligation(Assignment)

Q. Two solutions have milk : water ratio of 2:3 and 4:5. In what ratio must they be mixed such that the resultant solution has milk : water ratio of 3:4?

- A. 8:3
- B. 3:8
- C. 5:9
- D. 9:5

Ans : C



Mixtures & Alligation(Assignment)

Q. In what ratio rice at Rs. 9.30/kg be mixed with rice at Rs. 10.80/kg. So that the mixture be worth Rs. 10/kg.

- A. 6:5
- B. 8:7
- C. 3:7
- D. 6:1

Ans : B



Mixtures & Alligation(Assignment)

Q. 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. 2 : 5
- B. 3 : 5
- C. 5 : 3
- D. 5 : 2

Ans : A



Mixtures & Alligation(Assignment)

Q. In what ratio must a mixture of 30% alcohol strength be mixed with that of 50% alcohol strength so as to get a mixture of 45% alcohol strength?

- A. 1 : 2
- B. 1 : 3
- C. 2 : 1
- D. 3 : 1

Ans : B



Mixtures & Alligation(Assignment)

Q. A mixture of 70 litres of alcohol and water contains 10% of water. How much water must be added to the above mixture to make the water 12.5% of the resulting mixture?

- A. 1 litre B. 1.5 litres C. 2 litres D. 2.5 litres

Ans: C

- Water=10% of 70 lit=7 lit,
- alcohol=90% of 70 lit=63 lit.
- Let, x lit water must be added.
$$\frac{(7+x)}{63} = \frac{12.5\%}{87.5\%}$$
- $7 + x = 787.5 / 87.5$
 $7 + x = 9$
- $x=2$ litres



Mixtures & Alligation(Assignment)

Q. In what ratio should two qualities of coffee powder having the rates of ₹47 per kg and ₹32 per kg be mixed in order to get a mixture that would have a rate of ₹37 per kg?

- A. 1 : 2
- B. 4 : 1
- C. 1 : 3
- D. 3 : 1
- E. 1 : 4

Ans: A



Mixtures & Alligation(Assignment)

Q. How many kilograms of tea worth Rs. 3.60 per kg. must be mixed with 8 kg. of tea worth Rs. 4.20 per kg. so that by selling the mixture at Rs. 4.40 per kg. There may be a profit of 10%.

- A) 4 kg
- B) 3 kg.
- C) 6 kg.
- D) 8 kg.

Ans: A



Mixtures & Alligation(Assignment)

Q. The ratio of milk to water in 20 litres of a mixture is 3 :1. The Milk (in litres) to be added to the mixture so as to have milk and water in the ratio 4 : 1 is ?

- A. 7 litres
- B. 4 litres
- C. 5 litres
- D. 6 litres

Ans: C



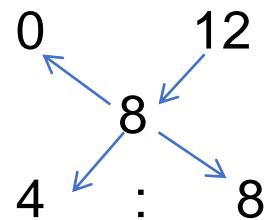
Mixtures & Alligation(Assignment)

Q. In what ratio must water be mixed with milk costing Rs. 12 per litre to obtain a mixture worth of Rs. 8 per litre?

- A. 1 : 2 B. 2 : 1 C. 2 : 3 D. 3 : 2

Ans: A

By the rule of alligation :



Ratio of water to milk

$$= 4 : 8$$

$$= 1 : 2$$







GENERAL APTITUDE

Trainer : Sujata Mohite
sujata.mohite@sunbeaminfo.com



Mixtures & Alligation

Q. How many kg of sugar costing Rs. 9 per kg must be mixed with 27kg of sugar costing Rs. 7 per kg, so that there maybe a gain of 10% by selling the mix at 9.24 per kg ?

A. 62kg

B. 63kg

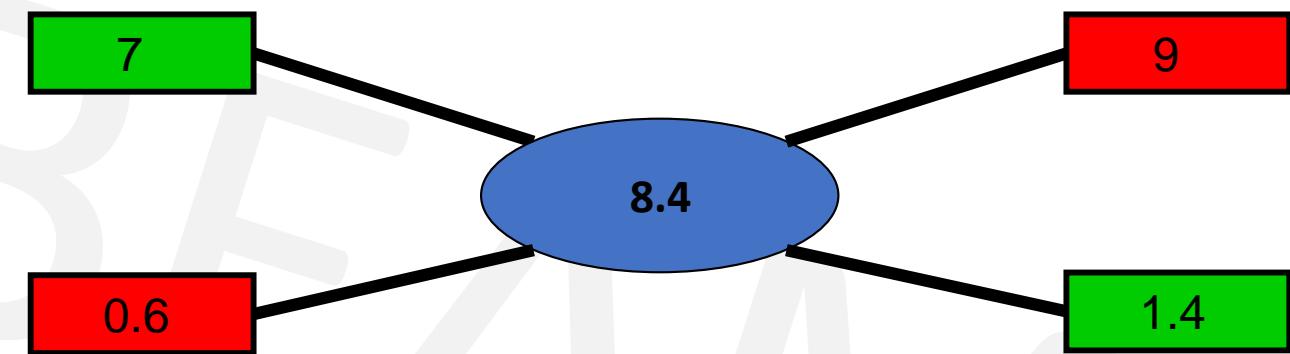
C. 53kg

D. 59kg

Soln:

$$SP = \frac{C.P. \times (100 + \% \text{gain})}{100}$$

$$CP (\text{Mean}) = 9.24 \times 100/110 = 8.4$$



- Qty of Low : Qty of High = $0.6/1.4 = 6/14 = 3/7$
- $27 / Q_H = 3/7$
- $Q_H = 27 \times 7/3 = 63 \text{ kg}$

Ans: B

Mixtures & Alligation

- Final concentration = Initial $(1 - \frac{R}{\text{Initial}})n$
- where,
- Final concentration is the amount of concentration remaining after the process
- n is the number of times the process is done and
- R is the replaced quantity.
- Initial is the initial concentration



Mixtures & Alligation

Q. A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

- A. 26.34 litres B. 27.36 litres C. 28 litres D. 29.16 litres

Ans: D

• The volume of milk remaining after the three processes is,

$$\begin{aligned} \bullet V &= N \left(1 - \frac{R}{N}\right)^n \quad \text{where,} \\ &= 40 \left(1 - \frac{4}{40}\right)^3 \\ &= 40 \left(1 - \frac{1}{10}\right)^3 \\ &= 40(0.729) \\ &= 29.16 \end{aligned}$$

N is the original amount of milk,
n is the number of processes and
R is the replaced quantity.



Mixtures & Alligation(Assignment)

Q. A container contains 100 L of milk. From this container 10 L of milk was taken out and replaced by water. This process was further repeated three times. How much milk does the container have now?

- A. 72.9 litres
- B. 65.61 litres
- C. 34.39 litres
- D. 81 litres

Ans: B

Final concentration = Initial concentration $(1 - \text{Replaced}/\text{Initial})n$



Mixtures & Alligation(Assignment)

Q. The ratio of milk to water in 80 litres of a mixture is 7 : 3. The water (in litres) to be added to it to make the ratio 2 : 1 is ?

A. 4 litres

B. 5 litres

C. 6 litres

D. 8 litres

Soln:

Mixture = 80 litres

Milk : Water

$$7 : 3 = 7+3 = 10 \text{ (total parts of mixture)}$$

$$\text{Quantity of Milk} = \frac{7}{10} \times 80 = 56 \text{ litres}$$

$$\text{Quantity of Water} = \frac{3}{10} \times 80 = 24 \text{ litres}$$

Let quantity of water added be 'x' litres

$$\frac{56}{24+x} = \frac{2}{1}$$

$$56 = 48 + 2x$$

$x = 4$ litres of water is to be added.

Let, Milk = $7x$ and Water = $3x$

$$7x + 3x = 80 \text{ litres}$$

$$10x = 80$$

$$x = 8 \text{ litres}$$

OR

$$\text{Milk} = 7x = 7 \times 8 = 56 \text{ litres}$$

$$\text{Water} = 3x = 3 \times 8 = 24 \text{ litres}$$

$$\frac{56}{24+x} = \frac{2}{1}$$

$$56 = 48 + 2x$$

$x = 4$ litres of water is to be added.

Ans : A



Mixtures & Alligation(Assignment)

Q. What quantity of sugar costing Rs 21.20 per kg must be mixed with 144 kg of sugar priced at Rs 26.20 per kg so that 10% may be gained by selling mix at Rs 25.30/kg ?

- A. 256 kg
- B. 265 kg
- C. 244 kg
- D. 144 kg

Ans: A



Mixtures & Alligation(Assignment)

Q. Find the ratio in which the contains of 2 jars A & B containing spirit & water in the ratio 1:3 & 3:2 respectively must be mixed so that resulting mixture contains 45% spirit?

- A. 2:3
- B. 3:5
- C. 3:2
- D. 3:4

Ans D



Mixtures & Alligation(Assignment)

Q. Two solutions have milk : water ratio of 2:3 and 4:5. In what ratio must they be mixed such that the resultant solution has milk : water ratio of 3:4?

- A. 8:3
- B. 3:8
- C. 5:9
- D. 9:5

Ans : C



Mixtures & Alligation(Assignment)

Q. In what ratio rice at Rs. 9.30/kg be mixed with rice at Rs. 10.80/kg. So that the mixture be worth Rs. 10/kg.

- A. 6:5
- B. 8:7
- C. 3:7
- D. 6:1

Ans : B



Mixtures & Alligation(Assignment)

Q. 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. 2 : 5
- B. 3 : 5
- C. 5 : 3
- D. 5 : 2

Ans : A



Mixtures & Alligation(Assignment)

Q. In what ratio must a mixture of 30% alcohol strength be mixed with that of 50% alcohol strength so as to get a mixture of 45% alcohol strength?

- A. 1 : 2
- B. 1 : 3
- C. 2 : 1
- D. 3 : 1

Ans : B



Mixtures & Alligation(Assignment)

Q. A mixture of 70 litres of alcohol and water contains 10% of water. How much water must be added to the above mixture to make the water 12.5% of the resulting mixture?

- A. 1 litre B. 1.5 litres C. 2 litres D. 2.5 litres

Ans: C

- Water=10% of 70 lit=7 lit,
- alcohol=90% of 70 lit=63 lit.
- Let, x lit water must be added.
$$\frac{(7+x)}{63} = \frac{12.5\%}{87.5\%}$$
- $7 + x = 787.5 / 87.5$
 $7 + x = 9$
- $x=2$ litres



Mixtures & Alligation(Assignment)

Q. In what ratio should two qualities of coffee powder having the rates of ₹47 per kg and ₹32 per kg be mixed in order to get a mixture that would have a rate of ₹37 per kg?

- A. 1 : 2
- B. 4 : 1
- C. 1 : 3
- D. 3 : 1
- E. 1 : 4

Ans: A



Mixtures & Alligation(Assignment)

Q. How many kilograms of tea worth Rs. 3.60 per kg. must be mixed with 8 kg. of tea worth Rs. 4.20 per kg. so that by selling the mixture at Rs. 4.40 per kg. There may be a profit of 10%.

- A) 4 kg
- B) 3 kg.
- C) 6 kg.
- D) 8 kg.

Ans: A



Mixtures & Alligation(Assignment)

Q. The ratio of milk to water in 20 litres of a mixture is 3 :1. The Milk (in litres) to be added to the mixture so as to have milk and water in the ratio 4 : 1 is ?

- A. 7 litres
- B. 4 litres
- C. 5 litres
- D. 6 litres

Ans: C



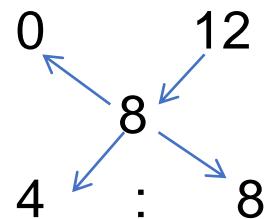
Mixtures & Alligation(Assignment)

Q. In what ratio must water be mixed with milk costing Rs. 12 per litre to obtain a mixture worth of Rs. 8 per litre?

- A. 1 : 2
- B. 2 : 1
- C. 2 : 3
- D. 3 : 2

Ans: A

By the rule of alligation :



Ratio of water to milk

$$= 4 : 8$$

$$= 1 : 2$$



Percentage

- Percentage is a fraction whose denominator is 100(per 100)

Fract ion	% $\div 100$	Fracti on	%	Fracti on	%	Fracti on	%	Fracti on	%
$x100$				$1/1$	100%	$1/6$	16.66 %	$1/11$	9.09 %
$3/4$	75%	$5/4$	125%	$1/2$	50%	$1/7$	14.28 %	$1/12$	8.33 %
$4/5$	80%	$3/2$	150%	$1/3$	33.33 %	$1/8$	12.5 %	$1/13$	7.69 %
$2/3$	66.66 %	$1/16$	6.25%	$1/4$	25%	$1/9$	11.11 %	$1/14$	7.14 %
$5/6$	83.33 %			$1/5$	20%	$1/10$	10%	$1/15$	6.66 %
$6/5$	120%								



Percentage

Q. x is 83.33% of y. So y is _____% of x

Solution:

$$x = 83.33y$$

$$x = \frac{5}{6} y$$

$$\text{So, } y = \frac{6}{5} x$$

$$y = 120\% \text{ (from chart)}$$

Fraction x100	%	Fraction	%
3/4	75%	5/4	125%
4/5	80%	3/2	150%
2/3	66.66 %	1/16	6.25%
5/6	83.33 %		
6/5	120%		



Percentage

Q. x is 80% of y. So y is ____% of x

Solution:

$$x = 80y$$

$$x = \frac{4}{5} y$$

$$\text{So, } y = \frac{5}{4} x$$

$$y = 125\%$$



Percentage

Q. A number x is increased by 20% then the number is decreased by 20%. Find the net % change.

- Soln :
- If a number is increased / decreased by $x\%$ then there is always a loss of $-(x/10)^2$
- Net % Change = $-(20/10)^2 = -(400/100) = - 4\%$ (loss)
- **OR**
- Let the number be 100
- $100 \uparrow$ by 20% = 120
- So $20\% \downarrow$ of 120 = 96
- | | | |
|-----|-----|----|
| 100 | 120 | 96 |
|-----|-----|----|

 $-4\% = \text{net change}$

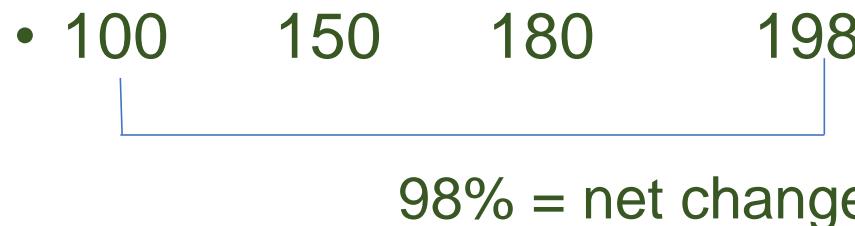


Percentage

Q. A number x is increased by 50% then the number is increased by 20% and again by 10%. Find the net % change

Soln:

- Let the number be 100
- $100 \uparrow \text{ by } 50\% = 150$
- Again, $150 \uparrow \text{ by } 20\% = 30$, So $150 + 30 = 180$
- $10\% \uparrow \text{ of } 180 = 18$, So, $180 + 18 = 198$



Percentage

- **Two Step change of Percentage**

In first step if number is changed by $a\%$ and the result is again changed by $b\%$ the net percentage change of original number is given by

$$\text{Net \% Change in Number} = a + b + ab/100 \text{ (+ve or -ve)}$$



Percentage

Q. If a number is increased by 12 % & then decreased by 18% then the net % change in number is

Soln:

Net % Change in Number = $a + b + ab/100$ (+ve or -ve)

$$\begin{aligned}\% \text{ Change} &= 12 - 18 + (12 \times -18)/100 \\&= -6 - 2.16 \\&= -8.16\%\end{aligned}$$



Percentage

- **Percentage Change & effect on Product**

If $A \times B = \text{Product}$

If A is changed by $a\%$ & also B is changed by $b\%$ then

Net % Change in Product = $a + b + ab/100$ (+ve or -ve)



Percentage

Q. Find % Change of area of rectangle if length increases by 30% & breadth decreases by 12%

Soln :

Net % Change in Product = $a + b + ab/100$ (+ve or -ve)

$$\begin{aligned}\% \text{ Change of Area} &= +30 - 12 + (30 \times -12)/100 \\ &= 18 - 3.6 = + 14.4\%\end{aligned}$$



Percentage

- Expenditure = Price x Consumption
- $P \propto \frac{1}{\text{Consumption}}$
- So, for expenditure to remain constant, when one quantity increases the other quantity should decrease proportionally.
- **Eg:** If the price of a commodity is decreased by 20% and its consumption is increased by 20%, what will be the increase or decrease in expenditure on the commodity?
- Soln:

Net % Change = $a + b + ab/100$ (+ve or -ve)

$$\begin{aligned}\% \text{ Change} &= -20 + 20 + (-20 \times 20)/100 \\ &= 0 - 4 = -4\%\end{aligned}$$

OR

100 ==> 20%↓(Decrease in Price) ==> 80 ==> 20%↑(Increase in Consumption) ==> 96.
| Thus, there is a decrement of 4%



Percentage

Q. Two numbers are respectively 40% and 60% more than a third number. The ratio of the two numbers is:

- A. 7:8 B. 3 : 5 C. 4 : 5 D. 6 : 7

Soln:-

- Let the third number be 100
- First number = 40% more than 100 = $100 + 40\% \text{ of } 100 = 100 + 40 = 140$
- Second number = 60% more than 100 = $100 + 60\% \text{ of } 100 = 100 + 60 = 160$
- Ratio = $\frac{\text{first number}}{\text{second number}} = \frac{140}{160} = \frac{7}{8} = 7 : 8$

Ans: A



Percentage using x

Q. Two numbers are respectively 40% and 60% more than a third number. The ratio of the two numbers is:

- A. 7:8 B. 3 : 5 C. 4 : 5

- D. 6 : 7

Soln:-

- Let the third number be x .
- First number = 40% more than x = $x + 40\% \text{ of } x = x + \frac{40}{100}x = \frac{100x+40x}{100} = \frac{140x}{100}$
- Second number = 60% more than x = $x + 60\% \text{ of } x = x + \frac{60}{100}x = \frac{100x+60x}{100} = \frac{160x}{100}$
- Ratio = $\frac{\text{first number}}{\text{second number}} = \frac{\frac{7x}{5}}{\frac{8x}{5}} = \frac{7}{8} = 7 : 8$

Ans: A



Percentage(Assignment)

Q. If the price of sugar increases by 25%, by what percent will a housewife have to reduce her consumption to leave total expenditure on sugar unchanged?

- A. 25%
- B. 35%
- C. 20%
- D. 15%

Ans: C



Percentage(Assignment)

Q. If the radius of a circle is decreased by 50%, find the percentage decrease in its area.

- A. 55% B. 65% C. 75% D. 85%

• **Soln:**

• Area of a circle = πr^2 where r is the radius
=> Area is directly proportional to r^2

• Assume the old radius is = $r_1=100$

• $A_1 = \pi \times 100^2 = 10000\pi$

Assume the new radius is = $r_2=50$

$$A_2 = \pi \times 50^2 = 2500\pi$$

$$\text{Decrease in area} = 10000\pi - 2500\pi = 7500\pi$$

$$\text{Percentage decrease in area} = \frac{\text{difference}}{\text{old}} \times 100 = \frac{7500\pi}{10000\pi} \times 100 = 75\%$$

• **Ans : C**



Percentage(Assignment)

Q. 1.14 expressed as a per cent of 1.9 is:

- A. 6%
- B. 10%
- C. 60%
- D. 90%

Ans: C



Percentage(Assignment)

Q. A number x is increased by 20% then the number is increased by 10% and again by 50%. Find the net % change.

- A. 77%
- B. 75%
- C. 88%
- D. 98%
- E. 99%

Ans : D



Percentage(Assignment)

Q. If the altitude of a triangle increases by 5% and the base of the triangle increases by 7%, by what percent will the area of the triangle increase?

- A. 12.25%
- B. 12.35%
- C. 6.00%
- D. 5.25%

Ans B



Percentage(Assignment)

Q. The length and breadth of a room are increased by 25% and 40% respectively. While the height is decreased by 20%.Find % change.

- A. 16%
- B. 40%
- C. 60%
- D. 30%

Ans B



Percentage(Assignment)

Q. If the length of a rectangle is increased by 37.5% and its breadth is decreased by 20%, find the change in its area.

- A. 15% increase B. 13% decrease C. 10% increase D. 10% decrease

Ans: C



Percentage(Assignment)

Q. The ratio 5 : 4 expressed as a percent equals :

- A. 125%
- B. 80%
- C. 40%
- D. 12.5%

Ans: A

$$\text{Required \%} = \frac{5}{4} \times 100 = 125\%$$



Percentage(Assignment)

Q. $12\% \text{ of } 5000 = ?$

A. 600

B. 620

C. 680

D. 720

Ans: A



Percentage(Assignment)

Q. 280% of 3940 = ?

- A. 10132
- B. 11032
- C. 11230
- D. 11320

Ans: B



Percentage(Assignment)

Q. $15\% \text{ of } 578 + 22.5\% \text{ of } 644 = ?$

- A. 231.4
- B. 231.6
- C. 231.8
- D. 233.6

Ans: B



Profit & Loss

- **Basics**

Profit (Gain) = (S.P – C.P)

Loss = (C.P – S.P)

% gain = (Gain / C.P) x 100

% loss = (Loss / C.P) x 100

- **Multipliers to find S.P**

In Case of Profit : S.P. = C.P. x **(100 + %gain)/100**

In Case of Loss : S.P. = C.P. x **(100 - %loss)/100**

i.e For sale at 25% profit S.P. = 125 % of C.P.

For sale at 25% loss S.P. = 75% of C.P.



Profit & Loss

Q. A man bought certain no of oranges at the rate of 5 for Rs 4 and sold them at the rate of 4 for Rs 5. Find his overall profit/loss percentage?

A. 25.5% Pr

B. 36.5% Pr

C. 56.2% Pr

D. 64.5% Pr

Soln

Cost Price

Oranges →

5 →

20 →

SP>CP, so profit

$$P\% = (SP - CP)/CP \times 100$$

$$= (25-16)/16 \times 100$$

$$= 225/4 = 56.20\%$$

Ans: C

Selling Price

Oranges →

4 →

20 →

Rs

5 →

25

Cost Price

Oranges →

5 →

1 →

Rs

4 →

$\frac{4}{5}$

Selling Price

Oranges →

4 →

1 →

Rs

5 →

$\frac{5}{4}$

SP>CP, so profit

$$P\% = (SP - CP)/CP \times 100$$

$$= \frac{\left(\frac{5}{4} - \frac{4}{5}\right)}{\frac{4}{5}} \times 100 = \frac{\left(\frac{9}{20}\right)}{\frac{4}{5}} \times 100$$

$$= 225/4 = 56.20\%$$



Profit & Loss

Q. A man bought banana at the rate of 8 for Rs 34 and sold them at the rate of 12 for Rs 57
How many banana should be sold to earn a net profit of Rs. 45?

- A. 90 B. 100 C. 135 D. 150

Soln:-

- Cost Price
- banana → Rs
- 8 → 34
- 1 → $\frac{34}{8} = \frac{17}{4}$
- Selling Price
- banana → Rs
- 12 → 57
- 1 → $\frac{57}{12} = \frac{19}{4}$
- SP>CP, so profit
- Profit = (SP - CP)
- $= \frac{19}{4} - \frac{17}{4} = \frac{1}{2}$

No. of banana to make a profit of Rs.45

$$= \frac{\text{Profit total}}{\text{Pofit one}} = \frac{45}{1/2} = 90 \text{ banana}$$

Ans: A



Profit & Loss

Q. A shopkeeper purchases 11 sword for Rs.10 and sells them at the rate of 10 sword for Rs. 11. He earns a profit % of?

- A. 11%
- B. 15%
- C. 20%
- D. 21%

Ans: D



Profit & Loss

Q. If selling price is doubled, the profit triples. Find the profit %.

- A. $66\frac{2}{3}\%$ B. 100% C. $105\frac{1}{3}\%$ D. 120%

Soln:

Let, CP = C , SP=S

As they ask profit % , we know profit = SP – CP

As per given,

$$3(S-C) = 2S-C$$

$$3S - 3C = 2S-C$$

$$S = 2C$$

$$\text{But, Profit} = S - C = 2C - C = C$$

$$\text{Profit \%} = \frac{\text{profit}}{\text{CP}} \times 100 = \frac{C}{C} \times 100 = 100\%$$

Ans : B



Profit & Loss

Q. A shopkeeper sells his goods at 20% profit and to make an extra profit he gives only 800 gm per kg. Find his profit %

- A. 25% Pr B. 33.33% Pr C. 50% Pr D. 25% Ls

Soln

CP	SP	Profit
100	120	20
80	120	40
% Profit	= $40/80 \times 100$	
	= $1/2 \times 100$	
	= 50%	

Ans: C



Profit & Loss

Q. If the cost price of 6 pencils is equal to the selling price of 5 pencils, then the gain per cent is

- A. 10%
- B. 20%
- C. 15%
- D. 25%

Soln:

Let the cost price of one pencil be Rs.1.

CP of 5 pencils =Rs. 5

CP of 6 pencils =Rs. 6

as, SP of 5 pencils = CP of 6 pencils

SP of 5 pencils = Rs.6

if, SP >CP so it's a profit

profit = SP - CP

$$= 6 - 5$$

$$= 1$$

Profit % = profit/cp x 100

$$= 1/5 \times 100$$

$$= 20\%$$

Ans: B



Alligation

Q. A person blends two varieties of tea , one cost Rs. 160/kg and other cost Rs. 200/kg in the ratio 5 : 4. He sells the blended variety at Rs.192/kg. Find the profit %.

Soln :

$$\frac{x}{y} = \frac{d-m}{m-c}$$

$$\frac{5}{4} = \frac{200-m}{m-160}$$

$$4(200-m) = 5(m-160)$$

$$800 - 4m = 5m - 800$$

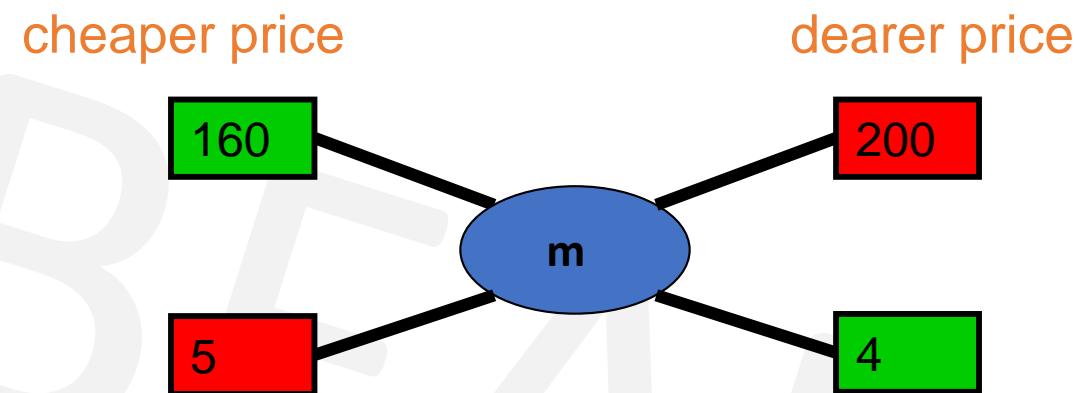
$$9m = 1600$$

$$m = \frac{1600}{9}$$

SP=Rs.192(given) , CP =mean price

$$\text{Profit\%} = \frac{\text{SP}-\text{CP}}{\text{CP}} \times 100$$

$$= \frac{\frac{192 - \frac{1600}{9}}{\frac{1600}{9}}}{\frac{1600}{9}} = \frac{1728 - 1600}{1600} = \frac{128}{16} = 8\%$$



Combination

Q. A merchant has 1000 kg of sugar, part of which he sells at 8% profit and rest at 18% profit. he gains 14% on the whole. What is the quantity sold at 18% profit ?

- A. 300 kg
- B. 700 kg
- C. 600 kg
- D. 400 kg

Ans : C



Profit & Loss(Assignment)

If gain is half of SP, the gain percentage is ____?

- A. 50%
- B. 33.33%
- C. 25%
- D. 100%

Soln:

we know profit = SP – CP

As per given,

$$\frac{1}{2}SP = SP - CP$$

$$CP = SP - \frac{1}{2}SP$$

$$SP = 2CP$$

$$\text{But, Profit} = SP - CP = 2CP - CP = CP$$

$$\text{Profit \%} = \frac{\text{profit}}{CP} \times 100 = \frac{CP}{CP} \times 100 = 100\%$$

Ans : D



Profit & Loss(Assignment)

Q. A bookseller sells 84 books at the cost of 72 books. Find his profit or loss%

- A. 14.28%
- B. 28.24%
- C. 20.4%
- D. 12.86%

Ans : A



Profit & Loss(Assignment)

Q. By selling 100 pencils, a shopkeeper gains the selling price of 20 pencils. His gain per cent is

- A) 25
- B) 20
- C) 15
- D) 12

Ans: A

$SP - CP = \text{gain}$ here gain = SP of 20 pencils

S.P. of 100 pencils – C.P. of 100 pencils = S.P. of 20 pencils

S.P. of 80 pencils = C.P. of 100 pencils

Let C.P. of 1 pencil = Rs. 1

S.P. of 80 pencils = Rs. 100

C.P. of 80 pencils = Rs. 80

$$\text{Profit \%} = \frac{100-80}{80} \times 100 = 25\%$$



Profit & Loss(Assignment)

Q. A man bought a horse & carriage together for Rs 15600 & sold them together, the horse at 36% profit & the carriage at 15% loss. If selling price of both is equal. Find the cost of the carriage?

A.Rs.6000

B. Rs.7600

C. Rs.3600

D. Rs.9600

• **Soln**

• Let CP of horse be H & Carriage be C $\rightarrow H+C= 15600$

• SP of both is equal

• So, comparing the CPs

$$\frac{136H}{100} = \frac{85C}{100}$$

$$H = \frac{5C}{8}$$

$$5C/8 + C = 15600$$

$$13C/8 = 15600$$

$$C = 1200 \times 8$$

$$C = 9600$$

Ans: D



Profit & Loss(Assignment)

Q. A vendor bought 6 oranges for Re 10 and sold them at 4 for Re 6. Find his loss or gain percent.

- A. 8% gain
- B. 10% gain
- C. 8% loss
- D. 10% loss

Ans: D



Profit & Loss(Assignment)

Q. A shopkeeper sells his goods at 10% loss but uses a weight of 750gms instead of 1kg. Find profit %

- A. 20% Pr
- B. 14.28% Pr
- C. 30% Pr
- D. 25% Ls

Ans: A



Profit & Loss(Assignment)

Q. A fruit seller buys oranges at 4 for Rs. 3 and sells them at 3 for Rs. 4. Find its profit percent.

- A. 43.75% Pr B. 77.7% Pr C. 75% Pr D. 65.7% Ls

Ans: B



Profit & Loss(Assignment)

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

- A. Rs. 1090
- B. Rs. 1160
- C. Rs. 1190
- D. Rs. 1202

Ans: C



Profit & Loss(Assignment)

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

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

Ans: A



Interest

If P = Principal, R = Rate of interest, N = Time in years, I = Interest, A = Amount

Then **A = P + I**

Simple Interest

$$\text{S.I.} = (P \times R \times N) / 100$$

Basic principal remains constant.

S.I. is good example of AP(Arithmetic Progression)

Compound Interest

$$A = P (1 + R/100)^T$$

$$\text{C.I.} = A - P$$

T = periods of compounding,

R = rate for compounding period

Basic principal keeps on increasing as we get interest on interest.

C.I. is good example of GP(Geometric Progression)



Interest

Q. A shopkeeper with an OD facility at 18% with a bank borrowed Rs. 15000 on Jan 8, 2011 and returned the money on June 3, 2011 so as to clear the debt. The amount that he paid was -

- A. Rs. 16080 B. Rs. 16280 C. Rs. 16400 D. None of these

Soln:

- $P = 15000, r = 18\%, T = 23(\text{jan}) + 28(\text{feb-nonleap}) + 31(\text{march}) + 30(\text{April}) + 31(\text{may}) + 3(\text{june}) = 146 \text{ days}$
- $146/365 \text{ days} = 2/5 \text{ years.}$
- $SI = 15000 \times 18 \times 2/5 \times 1/100 = 30 \times 18 \times 2 = 1080$

$$\text{Amount} = P + SI$$

$$= 15000 + 1080$$

$$= \text{Rs. } 16080$$

Ans: A



Interest

Q. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:

- A. Rs. 650
- B. Rs. 690
- C. Rs. 698
- D. Rs. 700

Soln:-

amount after 4 years = amount after 3 years + simple interest in one year

S.I. in one year = Rs. $(854 - 815)$ = Rs. 39.

S.I. for 3 years = Rs. (39×3) = Rs. 117.

Principal = amount - interest

$$\begin{aligned}\text{Principal} &= 815 - 117 \\ &= \text{Rs. } 698.\end{aligned}$$

Ans: C



Interest

Q. A farmer borrowed Rs.3600 at 15% simple interest per annum. At the end of 4 years, he cleared this account by paying Rs.4000 and a donkey. The cost of the donkey is -

- A. Rs. 1000
- B. Rs. 1200
- C. Rs. 1550
- D. Rs. 1760

Soln:

$$\text{SI for 4 years} = \text{Rs.}(3600 \times 0.15 \times 4) = \text{Rs.}2160$$

$$\text{Amount after 4 years} = \text{Rs. } (3600 + 2160) = \text{Rs. } 5760$$

$$\text{Cost of donkey} = \text{Rs. } (5760 - 4000) = \text{Rs. } 1760$$

Ans: D



Interest

Q. P =Rs. 2000, R =10%, N =2yrs , Find A and CI

Soln:

$$\begin{aligned}A &= 2000\left(1 + \frac{10}{100}\right)^2 \\&= 2000\left(\frac{110}{100}\right)^2 \\&= 2000\left(\frac{121}{100}\right) \\&= \text{Rs. 2420}\end{aligned}$$

$$CI = 2420 - 2000 = \text{Rs. 420}$$

$$2000 \rightarrow 10\% = 200$$

$$10\% \quad 10\%$$

$$2000 \longrightarrow 2200 \longrightarrow 2420$$

$$CI = 2420 - 2000 = 420$$



Interest

Q. 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. Rs. 1550

B. Rs. 1650

C. Rs. 1750

D. Rs. 2000

Soln:

$$A = P(1+R/100)^N = 4000 \left(1 + \frac{10}{100}\right)^2 = 4000 \times \left(\frac{11}{10}\right)^2 = 4000 \times \frac{11}{10} \times \frac{11}{10} = \text{Rs. } 4840$$

OR

$$\begin{array}{ccccc} 4000 & \xrightarrow{10\%} & 4400 & \xrightarrow{10\%} & 4840 \\ & \text{1st yr} & & \text{2nd yr} & \end{array}$$

$$CI = A - P$$

$$CI = 4840 - 4000 = \text{Rs. } 840$$

Ans: C

$$SI = \frac{1}{2} CI$$

$$\frac{PNR}{100} = \frac{1}{2} \times 840$$

$$\frac{P \times 3 \times 8}{100} = 420$$

$$\begin{aligned} P(\text{sum}) &= \frac{420 \times 100}{3 \times 8} \\ &= \text{Rs. } 1750 \end{aligned}$$



Interest

Q. P =Rs. 4000, R =20% per annum, N =6months.Find CI computed quarterly for given period.

Soln:

N =6months(2 quarterly)

rate(R) = 20 % per annum = 5 % quarterly

After every 3 months CI will be calculated.

by 5% = 200

by 5% = 210

4000

4200

4410

$$I = 4410 - 4000$$

$$= \text{Rs. } 410$$



Interest

Q. Difference between Compound interest & simple interest on a sum placed at 8% p.a. compounded annually for 2 years is Rs 128. Find the Principal

- A. 20000
- B. 24000
- C. 26000
- D. 15000

• Soln:

- Let the principal be P = Rs. 100.
- time N = 2 years, rate of interest R = 8% per annum
- simple interest = $PNR/100 = \frac{100 \times 8 \times 2}{100} = \text{Rs. } 16$

• CI (for 2 years)

• 8% 8%

• $100 \rightarrow 108 \rightarrow 116.64$

• $\begin{array}{ccccccc} P & \xrightarrow{\hspace{1cm}} & SI & \xrightarrow{\hspace{1cm}} & CI & \xrightarrow{\hspace{1cm}} & \text{Diff} \\ 100 & & 16 & & 16.64 & & 0.64 \end{array}$

• $0.64 \rightarrow 100$

• $128 \rightarrow ?$

• $\frac{12800}{0.64} = \text{Rs. } 20000$



Interest

Q. Difference between Compound interest & simple interest on a sum placed at 8% p.a. compounded annually for 2 years is Rs 128. Find the principal

- A. 20000
- B. 24000
- C. 26000
- D. 15000

• **Soln:**

- Let the principal be P = Rs. 100.
- time N = 2 years, rate of interest R = 8% per annum
- simple interest = $PNR/100 = \frac{100 * 8 * 2}{100} = \text{Rs. } 16$
- compound amount = $P(1+R/100)^N$
- $= 100 * (1 + \frac{8}{100})^2 = 100 * (\frac{108}{100})^2 = 100 * (\frac{11664}{10000}) = \frac{11664}{100} = 116.64$
- compound interest = compound amount – principal
- $C.I = A - P$
 $= 116.64 - 100 = \text{Rs. } 16.64$
- the difference between the compound interest and simple interest = $16.64 - 16.00 = \text{Rs. } 0.64$
- $0.64 \rightarrow 100$
- $128 \rightarrow ?$
- $= \frac{128 * 100}{0.64} = 20000$
- Thus, the principal is Rs. 20000.



Ans : A

Interest

- If the difference between compound and simple interest is of **two years** than,
Difference = $P(R)^2/(100)^2$
Where P = principal amount, R = rate of interest
- If the difference between compound and simple interest is of **three years** than,
Difference = $3 \times P(R)^2/(100)^2 + P (R/100)^3$.
Here also, P = principal amount, R = rate of interest



Partnership

Q.A started business with Rs. 45,000 and B joined afterwards with 30,000. If the profit at the end of a year was divided in the ratio 2 : 1 respectively, then B would have joined A for business after.

- A. 1 month B. 2 months C. 3 months D. 4 months

Soln:

- Capital of A = Rs. 45,000 Capital of B = Rs. 30,000
- Ratio of P₁:P₂=2:1
- using formula,
- $\frac{C_1 T_1}{C_2 T_2} = \frac{P_1}{P_2}$
- In this type , the time period is 12 months i.e. one year
- $\frac{45000 \times 12}{30000 \times T_2} = \frac{2}{1}$
- T₂=9
- B would join business after (12 - 9) = 3 months
- **Ans: C**



Partnership

Q. If $4(A's\ capital) = 6(B's\ capital) = 10(C's\ capital)$, then out of a profit of Rs. 4650, C will receive _____

- A) Rs.700
- B) Rs.800
- C) Rs.900
- D) Rs.1000

Soln:

$$4A = 6B = 10C$$

$$A = 10/4C = 5/2C \quad \text{and} \quad B = 10/6C = 5/3C$$

$$A + B + C = 4650$$

$$5/2C + 5/3C + C = 4650$$

$$C = 900$$

Share of C or C will receive Rs.900

Ans: C



Partnership

Q. A, B & C enter into a partnership with total of Rs 8,200. A's capital is Rs 1000 more than B's & Rs 2000 less than C's. What is B's share of annual profit of Rs 2,460?

A. Rs 1320

B. Rs 720

C. Rs 420

D. Rs 520

Ans: C



Interest(Assignment)

Q. A sum of money placed at compound interest doubles in 7 years. In how many years the principal becomes-

- a. 4 times of itself
- b. 8 times of itself

Soln:

Let initial value be 100



- a. In 14yrs
- b. In 21 yrs

OR

100----->200 in 7 years

200----->400 in again 7 years then,

400----->800 in 7 years again, thus
the time becomes= $7+7+7= 21$ years.



Interest(Assignment)

Q. A started a business by investing Rs. 32000. After 2 months B joined him with some investments. At the end of the year the total profit was divided in the ratio 8:5. How much capital was invested by B?

- A. Rs. 30,000 B. Rs. 28000 C. Rs. 24000 D.Rs. 19000

- Soln:
- using formula,
- $\frac{C_1 T_1}{C_2 T_2} = \frac{P_1}{P_2}$
- $\frac{32000 \times 12}{C_2 \times 10} = \frac{8}{5}$
- $C_2 = \text{Rs. } 24000$

Ans: C



Interest(Assignment)

Q. When annual compounding is done, a sum amounts to Rs 5000 in 6 years and 7200 in 8 years.
What is the int rate?

- A. 10% B. 15% C. 20% D. 25%

Soln

Let P be the principal & R the int rate

$$\rightarrow 5000 = P(1+R/100)^6 \dots\dots (1)$$

$$\rightarrow 7200 = P(1+R/100)^8 \dots\dots (2)$$

$$\rightarrow 36/25 = (1+R/100)^2$$

→ Taking square roots of both sides

$$\rightarrow 1+R/100 = 6/5$$

$$\rightarrow R/100 = 1/5$$

$$\rightarrow R = 20\%$$

Ans: C



Interest(Assignment)

Q. A sum fetched a total simple interest of Rs.7056 at the rate of 8 percent per year in 7 years. What is the sum?

- A. Rs 12600
- B) Rs 15120
- C) Rs 10080
- D) Rs 7560

Ans : A



Interest(Assignment)

Q. Find the compound interest on Rs. 15,625 for 9 months at 16% per annum compounded quarterly.

- A. Rs. 1851
- B. Rs. 1941
- C. Rs. 1951
- D. Rs. 1961

Ans: C



Interest(Assignment)

Q. What is the difference between the simple interest on a principal of Rs. 500 being calculated at 5% per annum for 3 years and 4% per annum for 4 years?

- A.Rs. 5 B.Rs. 10 C.Rs. 20 D.Rs. 40 E. None of these

$$SI_1 = P N_1 R_1 / 100$$

$$= \frac{500 \times 3 \times 5}{100} = \text{Rs. } 75$$

$$SI_2 = P N_2 R_2 / 100$$

$$= \frac{500 \times 4 \times 4}{100} = \text{Rs. } 80$$

$$\text{Difference} = 80 - 75 = \text{Rs. } 5$$

OR

$$500 == 15\% \uparrow \Rightarrow 575 \text{ (1}^{\text{st}} \text{ case)}$$

$$500 == 16\% \uparrow \Rightarrow 580 \text{ (2}^{\text{nd}} \text{ case)}$$

$$\text{difference} = 580 - 575 = \text{Rs. } 5$$

Ans : A



Interest(Assignment)

Q. A sum of money placed at compound interest doubles itself in 4 years. In how many years will it amount to 8 times?

- A. 9 years
- B. 8 years
- C. 27 years
- D. 12 years

Ans: D



Interest(Assignment)

Q. Difference between Compound interest & simple interest on a sum placed at 20% per annum compounded annually for 2 years is Rs. 72. Find the sum.

- A. Rs. 2400
- B.Rs. 8400
- C. Rs.1800
- D.Rs. 900

Ans : C



Interest(Assignment)

Q. What is the simple interest on a sum of Rs. 700 if the rate of interest for the first 3 years is 8% per annum and for the last 2 years is 7.5% per annum?

- A.Rs. 269.5 B.Rs. 283 C.Rs. 273 D.Rs. 280 E. None of these

Ans: C



Interest(Assignment)

Q. Rs.2100 is lent at compound interest of 5% per annum for 2 years. Find the amount after two years.

- A.Rs. 2300
- B.Rs. 2315.25
- C.Rs. 2310
- D.Rs. 2320
- E. None of these

• **Soln:**

$$\begin{aligned} \bullet & A = P (1+ R/100)^T \\ \bullet & A = 2100(1+5/100)^2 \\ \bullet & A=2100\times[105/100]2 \\ \bullet & A=\frac{2100 \times 11025}{10000} \end{aligned}$$

$$\bullet \text{ Amount, } A=\text{Rs.}2315.25$$

• **Ans : B**



Interest(Assignment)

Q. A man borrowed total Rs 2500 at Simple interest from two money lenders. He paid interest at 12% p.a. to one and 14% p.a. to the other. The total interest paid for the year was Rs.326. How much did he borrow at 14%?

- A. Rs 1000 B. Rs 1200 C. Rs 1300 D. Rs 1500

Soln:

Let, x = Principal at 12%

&

$2500-x$ = Principal at 14%

$$SI \text{ at Rs.}x = \frac{x \times 1 \times 12}{100} = \frac{12x}{100} = \frac{3x}{25}$$

$$SI \text{ at Rs.}2500 - x = \frac{2500 - x \times 1 \times 14}{100} = \frac{(2500 - x) \times 7}{50} = \frac{17500x - 7x}{50}$$

$$SI \text{ at }x + SI \text{ at }2500 - x = 326$$

Substitute and solving the equation gives $x =$ Rs. 1200

We need Principal at $2500 - x = 2500 - 1200 =$ Rs. 1300

Ans: C



Interest(Assignment)

Q.A certain sum of money amounts to Rs. 704 in two years and Rs 800 in 5 years. Find the Principal.

- A. Rs. 640 B. Rs. 600 C. Rs. 550 D. Rs.450
- **Ans: A**



Interest(Assignment)

Q. A started a business by investing Rs. 32000. After 4 months B joined him with some investments. At the end of the year the total profit was divided in the ratio 6:5. How much capital was invested by B?

- A. Rs. 30,000
- B. Rs. 28000
- C. Rs. 40000
- D. Rs. 19000

Ans: C



Interest(Assignment)

Q. Three persons started a placement business with a capital of Rs. 3000. B invests Rs. 600 less than A and C invests Rs. 300 less than B. What is B's share in a profit of Rs. 886 ?

- A. Rs. 443
- B. Rs. 354.40
- C. Rs. 265.80
- D. Rs. 177.20

Ans: C



Interest(Assignment)

Q. What should be the simple interest obtained on an amount of Rs 5,760 at the rate of 6% p.a. after 3 years?

- A. Rs 1036.80
- B. Rs 1666.80
- C. Rs 1336.80
- D. Rs 1063.80
- E. None of these

Ans : A



Interest(Assignment)

Q. Anand and Deepak started a business investing Rs.22,500 and Rs.35,000 respectively. Out of a total profit of Rs. 13,800. Deepak's share is

- A. Rs 9600
- B. Rs 8500
- C. Rs 8450
- D. Rs 8400

Ans: D

Ratio of their shares-

$$= 22500 : 35000$$

$$= 9 : 14$$

$$\text{Deepak's share} = \text{Rs.}(13800 \times 14/23)$$

$$= \text{Rs. } 8400$$



Interest(Assignment)

Q. A started a business with Rs. 21,000 and is joined afterwards by B with Rs. 36,000. After how many months did B join if the profits at the end of the year are divided equally?

- A. 4 B. 5 C. 6

- D. 7

Ans: B

- Capital of A = Rs. 21000
- Ratio of P1:P2=1:1
- **using formula,**
- $\frac{C_1 T_1}{C_2 T_2} = \frac{P_1}{P_2}$
- In this type , the time period is 12 months i.e. one year
- $\frac{21000 \times 12}{36000 \times T_2} = \frac{1}{1}$
- $T_2 = 7$
- B would join business after $(12 - 7) = 5$ months



Interest(Assignment)

Q. A,B,C subscribes Rs. 50000 for a business. A subscribes Rs. 4000 more than B and B Rs. 5000 more than C. Out of a total profit of Rs. 35000, A receives :

- A. Rs. 8400
- B. Rs. 11900
- C. Rs. 13600
- D. Rs. 14700

Ans: D



Interest(Assignment)

Q. The simple interest on Rs.1820 from March 9, 2012 to May 21, 2012 at 7.5% rate will be

- A. Rs. 22.50
- B. Rs. 27.30
- C. Rs. 28.80
- D. Rs. 29

Ans: B







GENERAL APTITUDE

Trainer : Sujata Mohite
sujata.mohite@sunbeaminfo.com



Time & Work

- Work (Effort) = Manpower \times time.
- If A can do a piece of work in x days then work done by A in one day is equal to $1/x$ of the entire work.
- If A is twice as good a workman as B then A will take half the time taken by B to do a same piece of work.
- If number of people to do a certain work is increased (or decreased) the time taken to do the same work will decrease (or increase)
- Total work = LCM
- Efficiency = $(\text{Total work}) / (\text{Total time})$
- OR
- Total work = Efficiency \times Total time



Time & Work

Q. A, B & C can complete a certain work in 10, 12 & 15 days respectively. If all of them work together in how many days will the work get completed?



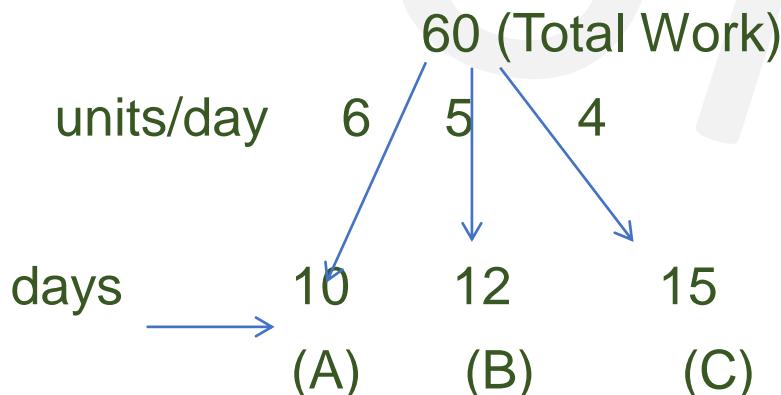
Time & Work

Q. A, B & C can complete a certain work in 10, 12 & 15 days respectively. If all of them work together in how many days will the work get completed?

Soln:

We know, Total work = Days x units/day

$$\text{LCM}(10,12,15) = 60$$



In one day, $A+B+C = 6+5+4 = 15$ units

So to complete TW = 60 units, days = ?

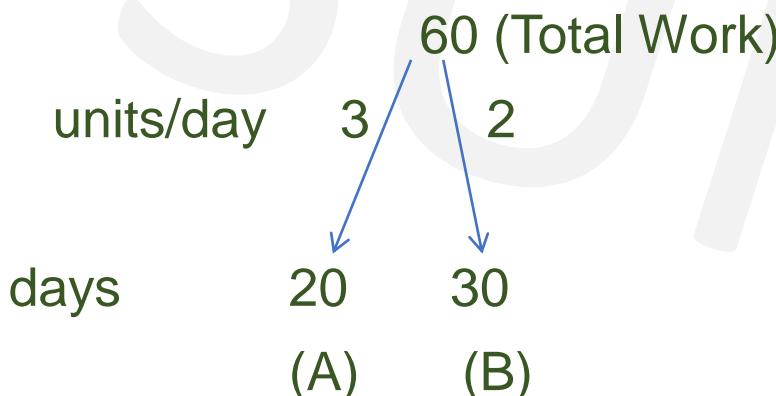
$$\text{days} = \frac{60}{15} = 4. \text{ So 4 days are needed to complete the work.}$$

Time & Work

Q. Two persons A & B can complete a work in 20 & 30 days respectively. If both of them start together but A stops after 10 days then how many days will the work last?

- A. 7 days B. 8 days C. 15 days D. 10 days

Soln: LCM(20,30) = 60



A after 10 days, $3 \times 10 = 30$ units & B after 10 days = $2 \times 10 = 20$ units

Total units = 60 , Remaining units = total – A + B(after 10 days)

$$= 60 - 50 = 10 \text{ units}$$

Days needed to do 10 units work = $\frac{10}{2} = 5$ days

So Total Duration = $10 + 5 = 15$ days

Ans: C



Time & Work

Q. Two persons A & B can complete a work in 20 days , B & C can complete it in 24 days & C and A can complete it in 40 days. Find in how many days will B complete the work alone?

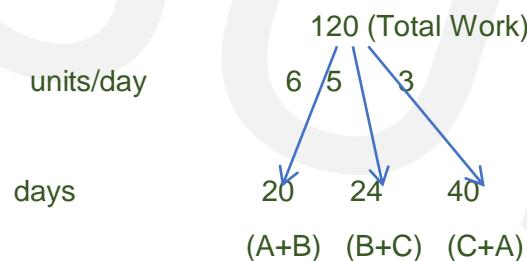
A.30 days

B. 40 days

C. 50 days

D. 60 days

• Soln: $\text{LCM}(20,24,40) = 120$



No of workers

$$2 \times (A+B+C) = 6+5+3 = 14 \quad \text{i.e. } 2(A+B+C)'s \text{ 1 day work}$$

$$A + B+C = 14/2 = 7$$

$$B = 7 - (A+C)$$

$$B \text{ alone} = 7 - 3 = 4 \text{ units/day}$$

$$\text{To find days needed by B} = \frac{\text{Total work}}{\text{units/day}} = \frac{120}{4} = 30 \text{ days}$$

So , 30 days are needed by B to complete the work alone.

Ans :A



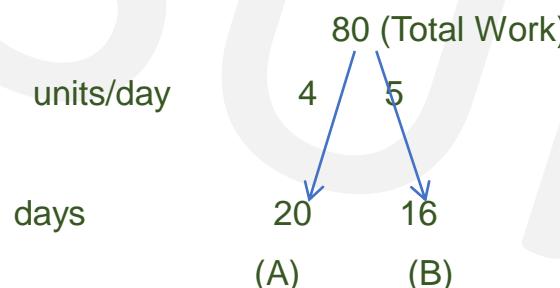
Time & Work

Q. A & B can do a piece of work in 20 & 16 days respectively. If they work on alternate days each starting with A in how many days was the work completed?

- A. 19 days B. 18 days

- C. 16 days D. 30 days

• Soln: $\text{LCM}(20,16) = 80$



- Day 1, A = 4 units
- Day2, day 1 work added
- $B = 5 + 4 = 9 \text{ units}$
- 9 units \rightarrow 2 days
- 80 units \rightarrow ?
- Days $= \frac{80 \times 2}{9} = \frac{160}{9} = 17.7777 = 17.78 \text{ days}$
- **Ans B**

Time & Work

- Efficiency = capacity to do work
- Efficiency and time are inversely proportional
- Efficiency $\propto \frac{1}{T}$
- Efficiency and work are directly proportional
- Efficiency $\propto W$



Time & Work

Q. A is twice as efficient as B and completes a certain work in 12 days less than B. In how many days will both of them complete the same work?

- A. 6 days B. 8 days C. 7 days D. 3 days

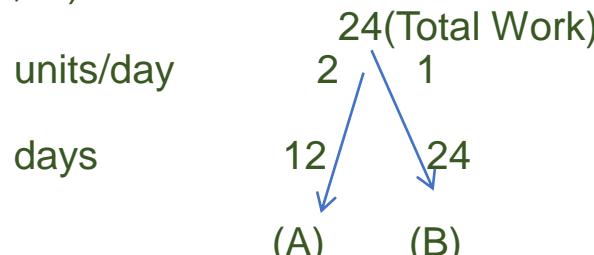
Soln:

$$\begin{array}{rcl} A & & B \\ 2x & - & x \\ \hline x & = & 12 \end{array}$$

As, Efficiency $\propto \frac{1}{T}$

$$A = 12 \text{ days and } B = 2x = 2 \times 12 = 24 \text{ days}$$

- LCM(12, 24) = 24



$$A + B = 2 + 1 = 3 \text{ units/day}$$

$$\text{Days} = \frac{\text{TW}}{\text{units/day}} = \frac{24}{3} = 8 \text{ days}$$

Ans B

or

Days ratio is inversely proportional to efficiency ratio.

Eff (Ratio)
Days (Ratio)
Days

$$\begin{array}{rcl} \frac{A}{2} & & \frac{B}{1} \\ 1 & & 2 \\ x-12 & & x \end{array}$$
$$\begin{aligned} \rightarrow 2(x-12) &= x \\ \rightarrow x &= 24 \text{ days} \\ \rightarrow x - 12 &= 12 \\ \rightarrow 24 - 12 &= 12 \text{ days} \end{aligned}$$



Time & Work

Q. A, B & C can complete a work in 10, 12 & 15 days respectively. All three together completed the work & they are paid Rs 6000. Find the share of C

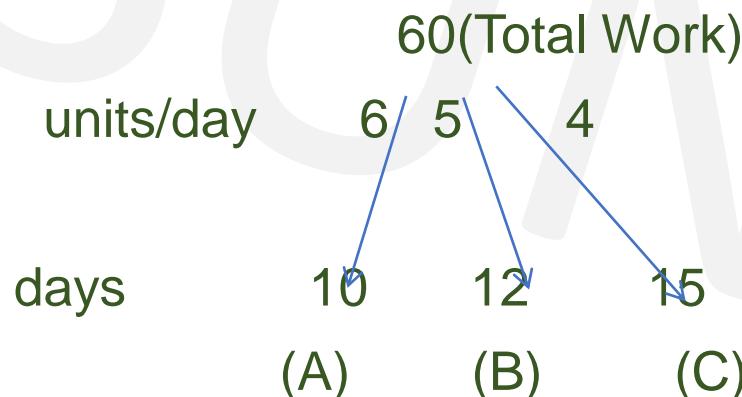
A. 3000

B. 2400

C. 2000

D. 1600

• Soln: $LCM(10,12,15) = 60$



Together,

$$(A+B+C) = 6+5+4 = 15 \text{ units/day}$$

Total paid amount to $(A+B+C) = 6000$

$$C = \frac{4}{15} \times 6000$$

$$= \text{Rs. } 1600$$

Ans: D



Time & Work(Assignment)

Q. Two persons A & B can complete a work in 24 & 30 days respectively. If both of them start together .After how many days should B stop working so that A completes the remaining work in 6 days?

A.7 days

B. 8 days

C. 9 days

D. 10 days

Ans D



Time & Work(Assignment)

Q. Two persons A & B can complete a work in 20 days , B & C can complete it in 30 days while C & A can complete it in 24 days. Find in how many days will B complete the work alone?

A.36 days

B. 48 days

C. 56 days

D. 64 days

Ans B



Time & Work(Assignment)

Q. A is thrice as good a workman as B and can finish a piece of work in 60 days less than B. Find the time to complete the work if both of them work together

- A. 20 days B. 22.5 days C. 24.5 days D. 22 days

Ans: B



Time & Work(Assignment)

Q. 2 workers A & B can finish a job in 8 days and 12 days respectively ,after the completion of work they were paid Rs.200. Find share of B.

- A. Rs. 120
- B. Rs. 80
- C. Rs. 40
- D. Rs. 60

Ans: B



Work & Time(Assignment)

Q. A, B & C can do a piece of work in 12, 20, & 30 days respectively. If A is assisted everyday alternately by B & C in how many days was the work completed?

- A. 6 days
- B. 8 days
- C. 7 days
- D. 3 days

Ans: B



Work & Time(Assignment)

Q. A can do a piece of work in 10 days, B in 12 days and C in 15 days. They all start work together, but A leaves 2 days later and B leaves 3 days before completion of the work. In how many days was the work completed?

- A. 7 days
- B. 5 days
- C. 8 days
- D. 10 days

Ans: A



Work & Time(Assignment)

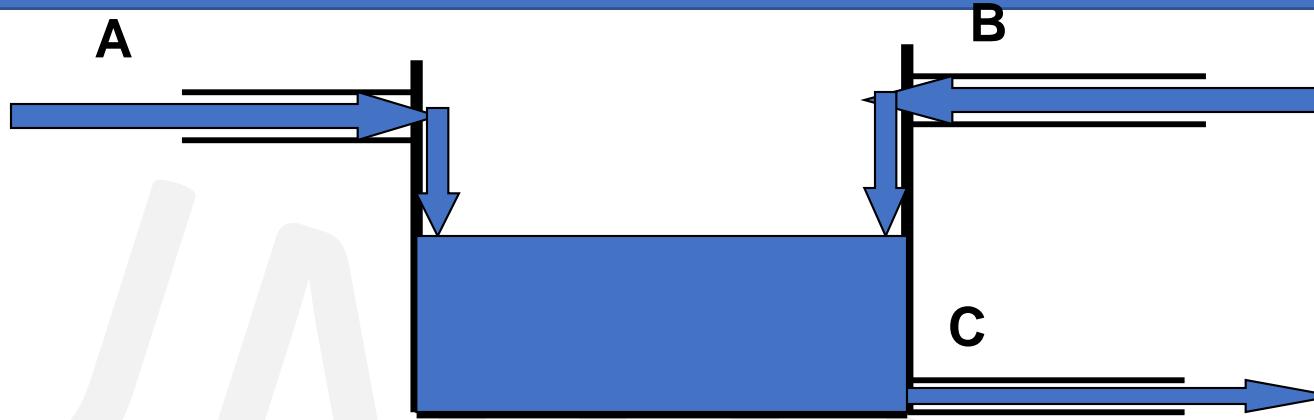
Q. Apurva can do a job in 12 days. She and Amit completed the work together and were paid Rs.54 and Rs.81 respectively. How many days are needed to complete the job together?

- A. 4.8 days
- B. 4.2 days
- C. 4 days
- D. 3.6 days

Ans: A



Pipes & Cisterns



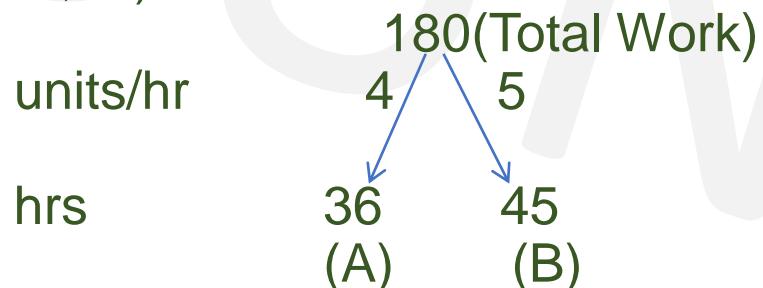
- A cistern may have inlet pipe or outlet pipe.
- Conventionally filling a tank is treated as positive work and emptying a tank as negative work.
- Net work done = (Sum of work done by inlets) – (sum of work done by outlets)

Pipes & Cisterns

Q. Two pipes A and B can fill a tank in 36 hours and 45 hours. If both pipes are opened simultaneously. How much time will it take to fill the tank?

Soln:

- $\text{LCM}(36,45) = 180$



As both are opened , together , $A+B = 4+5 = 9$ units/hr

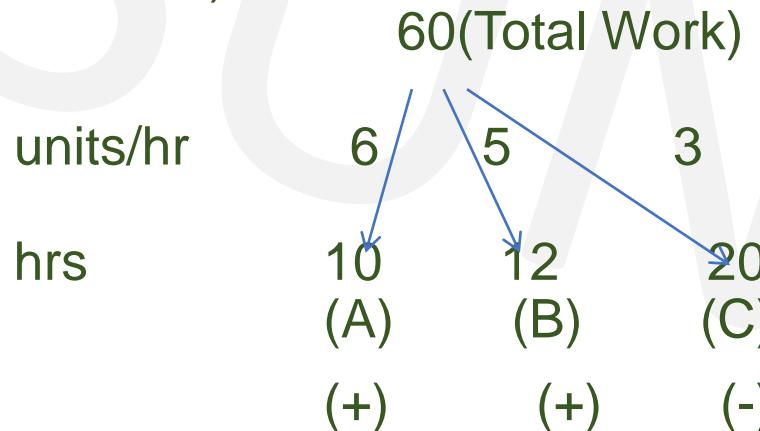
For tank to fill = $\frac{180}{9} = 20$ hours.

Pipes & Cisterns

Q. Two pipes can fill the reservoir in 10 hours and 12 hours respectively. While third pipe empties full tank in 20 hours. If all the three pipes operate simultaneously , how much time will the tank be filled?

Soln:

- LCM(10,12,20) = 60



$$A+B = 6 + 5 = 11$$

As, C empties the tank so, $11 - 3 = 8$ units/hr

Quantity filled in 1 hour if all the pipes are opened together

$$\text{Time to fill} = \frac{\text{TW}}{\text{units/hr}} = \frac{60}{8} = 15/2 \text{ hrs}$$

Pipes & Cisterns

Q. Two pipes A and B can fill a tank in 24 minutes and 32 minutes respectively. If both the pipes are opened simultaneously, after how much time should B be closed so that the tank is full in 18 minutes

A . 2 min

B. 4 min

C. 6 min

D.8 min

Soln:

$$\text{LCM}(24,32) = 96$$

units/hr

hrs

96(Total Work)

4

3

24

32

$$\text{WD} = \text{time} \times \text{units/hr}$$

$$\text{Work done by A alone} = 18 \times 4 = 72 \text{ units}$$

$$\text{Remaining work} = \text{Total units} - \text{work done by A} = 96 - 72 = 24 \text{ units}$$

$$\text{B should be closed after } = \frac{24}{3} = 8 \text{ mins.}$$

Ans : D



Pipes & Cisterns

Q. 12 buckets of water fill a tank when the capacity of each bucket is 13.5 litres. How many buckets will be needed to fill the same tank, if the capacity of each bucket is 9 litres?

- A. 8 B. 15 C. 16

- D. 18

Ans: D

$$\begin{aligned}\text{Capacity of the tank} &= (12 \times 13.5) \text{ litre} \\ &= 162 \text{ litres}\end{aligned}$$

$$\text{Capacity of each bucket} = 9 \text{ litres}$$

$$\begin{aligned}\text{Number of buckets needed} &= 162 / 9 \\ &= 18 \text{ buckets}\end{aligned}$$



Pipes & Cisterns

Q. Bucket P has thrice the capacity as bucket Q. It takes 60 turns for bucket P to fill the empty tank. How many turns it will take for both P and Q, having each turn together to fill the tank?

- A. 30
- B. 40
- C. 45
- D. 90

Soln-

$$P = 3Q$$

60 turns of P = capacity of tank

$$60P = \text{capacity of tank}$$

$$60(3Q) = \text{capacity of tank}$$

$$180Q = \text{capacity of tank}$$

P+Q work together.

$$\begin{aligned}\text{Amount of water poured together} &= P + Q \\ &= 3Q + Q = 4Q\end{aligned}$$

$$\text{Number of turns} = 180Q/4Q = 45 \text{ turns}$$

Ans: C



Pipes & Cisterns(Assignment)

Q. There are 3 pipes attached to a tank A, B & C. A alone can fill the tank in 60 min, B can fill the tank in 45 min & C can empty the full tank in 30 min. If all three pipes are opened together in how much time will the tank be full?

A. 5 hrs

B. 4 hrs

C. 3 hrs

D. 2 hrs

Ans: C



Pipes & Cisterns(Assignment)

Q. A pump can fill a tank with water in 2 hours. Because of a leak, it took 2 1/3 hours to fill the tank. The leak can drain all the water of the tank in:

- A. 4 1/3 hours B. 7 hours C. 8 hours D. 14 hours

• **Soln :**

• Work done = $\frac{XY}{Y-X}$ where, X = number of hrs to fill tank , Y = number of hrs to fill tank with leakage

$$2 \frac{1}{3} = \frac{7}{3}$$

$$\text{Work done} = \frac{\frac{2}{3} \times \frac{7}{3}}{\frac{7}{3} - 2} = \frac{\frac{14}{9}}{\frac{1}{3}} = 14$$

• Leak will empty the tank in 14 hours

• **Ans: D**



Pipes & Cisterns(Assignment)

Q. Two pipes A and B can fill a cistern in $37\frac{1}{2}$ minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if B is turned off after:

A. 5 mins

B. 9 mins

C. 10 mins

D. 15 mins

Ans : B



Pipes and Cisterns(Assignment)

Q. Two pipes A & B can fill the cistern in 20 min & 25 min respectively. Both are opened together but at the end of 5 min B is turned off. How much total time will the cistern take to fill up?

- A. 5 min
- B. 10 min
- C. 12 min
- D. 16 min

Ans: D



Pipes and Cisterns(Assignment)

Q. Two pipes A and B can fill a tank in 36 minutes and 45 minutes respectively. Another pipe C can empty the tank in 30 minutes. First A and B are opened. After 7 minutes, C is also opened. The tank is filled up in

- A. 39 minutes
- B. 46 minutes
- C. 40 minutes
- D. 45 minutes

Ans: B



Pipes and Cisterns(Assignment)

Q. Two pipes A and B can fill a tank in 15 minutes and 20 minutes respectively. Both the pipes are opened together but after 4 minutes, pipe A is turned off. What is the total time required to fill the tank?

- A. 10 min. 20 sec.
- B. 11 min. 45 sec.
- C. 12 min. 30 sec.
- D. 14 min. 40 sec.

Ans: D



Chain Rule

- In earlier problems the rate of doing work of each person or pipe varied.
- In chain rule problems all entities are of the same efficiency or work capacity.
- The entities may be men, women, tractors, engines, pumps, horses, lawn mowers etc.
- Work Done = No. of Men x Days x Hrs/day
- $W = M \times D \times H$
- $W_1 = M_1 \times D_1 \times H_1$, $W_2 = M_2 \times D_2 \times H_2$
- $$\frac{W_1}{W_2} = \frac{M_1 \times D_1 \times H_1}{M_2 \times D_2 \times H_2}$$



Chain Rule

Q. 18 men working for 5 hours per day can complete a job in 8 days. How many men working for 8 hours a day for 6 days will be required?

A. 24

B. 15

C. 16

D. 17

Men x Days x Hrs/day

Case 1

$$18 \times 8 \times 5$$

Case 2

$$M \times 6 \times 8$$

$$M \times 6 \times 8$$

$$M$$

Ans B

= Work Done

$$= 720 \text{ man-hrs}$$

$$= 720 \text{ man-hrs}$$

$$= 18 \times 8 \times 5$$

$$= 15$$



Chain Rule

Q. 20 men or 40 women working for 9 hours a day can finish a work in 80 days. In how many days will 10 men & 10 women working together for 12 hours a day finish the work?

- A. 60 days B. 70 days C. 80 days D. 90 days

Men x Days x Hrs/day = Work Done

Also 20 Men = 40 Women \rightarrow 1M = 2 W (convert to one unit i.e. women or children)

20 men ---- 40 women

1men ----- ? (2women)

Case 1

$$40W \times 80 \times 9 = \text{work}$$

Case 2

$$(20W + 10W) \times D \times 12 = \text{work}$$

$$30W \times D \times 12 = 40W \times 80 \times 9$$

$$D = 80 \text{ days}$$

Ans C



Chain Rule

Q. 8 men or 12 women or 16 children working for 8 hours a day can finish a work in 52 days. In how many days will 1 man & 1 woman & 1 child working together for 8 hours a day finish the work?

- A. 180 days
- B. 192 days
- C. 216 days
- D. 164 days

• Men x Days x Hrs/day = Work Done

• Also 8 Men = 16 children $\rightarrow 1M = 2 C$

• And 12 Women = 16 children $\rightarrow 1W = \frac{4}{3} C$

• Case 1

• $16C \times 52 \times 8$ = work

• Case 2

• $(2C + \frac{4}{3}C + C) \times D \times 8$ = work

• $(2C + \frac{4}{3}C + C) \times D \times 8 = 16C \times 52 \times 8$

• $\frac{13}{3}C \times D \times 8 = 16C \times 52 \times 8$

• D = 192 days

Ans: B



Chain Rule

Q. 12 men and 16 boys can do a piece of work in 5 days. 13 men and 24 boys can do it in 4 days. The ratio of the daily work done by a man and a boy is –

A. 2 : 1

B. 3 : 1

C. 3 : 2

D. 5 : 4

Soln:

$$W = M \times D$$

$$W = (12m + 16b) \times 5$$

$$= 60m + 80b$$

and

$$W = M \times D$$

$$W = (13m + 24b) \times 4$$

$$= 52m + 96b$$

As , work done is same, equating both sides ,we get,

$$60m + 80b = 52m + 96b$$

$$60m - 52m = 96b - 80b$$

$$8m = 16b$$

$$m = 2b \quad m : b = 2 : 1$$

Ans: A



Chain Rule(Assignment)

Q. 12 men & 18 women working together for 9 hours a day finish the work in 150 days.
30 men & 15 women working together for 10 hours a day finish the work in 81 days. In
how many days will 12 men & 12 women working together for 12 hours a day finish
the work?

- A. 115 days B. 120 days C. 130 days D. 135 days

Ans: D



Chain Rule(Assignment)

Q. 24 workers working 8 hours a day can construct a wall in 5 days. In how many days can 45 workers working 4 hours a day construct 3 such walls?

- A. 18 days
- B. 16 days
- C. 4 days
- D. 7 days

Ans : B



Chain Rule(Assignment)

Q. 24 workers working 5 hours a day can construct a bungalow in 8 days. In how many days can 40 workers working 8 hours a day construct 2 such bungalows?

- A. 3 days
- B. 6 days
- C. 4 days
- D. 8 days

Ans : B



Chain Rule(Assignment)

Q. 32 painters working 5 hours a day can paint a building in 10 days. In how many days can 40 workers working 6 hours a day paint 3 such buildings?

- A. 10 days
- B. 16 days
- C. 20 days
- D. 28 days

Ans : C



Chain Rule(Assignment)

Q. 8 men or 12 women can construct a wall in 33 days . In how many days can 10men and 21 women construct the wall.

- A. 10 days
- B. 11 days
- C. 22 days
- D. 15 days

Ans : B



Chain Rule

Q. 36 men working for 12 hours a day can build a wall 45 mt long, 52 mt high & 63 mt broad in 91 days. In how many days will 80 men working for 9 hours a day build a wall 50 mt long, 72 mt high & 30 mt broad ?

- A. 24 days B. 35 days C. 40 days D. 47 days

$$\text{Men} \times \text{Days} \times \text{Hrs/day} = \text{Work Done (Volume of Wall)}$$

Case 1

$$36 \times 91 \times 12$$

$$= 45 \times 52 \times 63$$

Case 2

$$80 \times D \times 9$$

$$36 \times 91 \times 12$$

$$= \frac{50 \times 72 \times 30}{45 \times 52 \times 63}$$

$$D$$

$$=$$

$$40 \text{ days}$$

Ans C



Chain Rule(Assignment)

Q. 12 men or 18 women can construct a wall in 33 days . In how many days can 20men and 24 women construct the wall.

- A. 10 days
- B. 11 days
- C. 22 days
- D. 15 days

Ans : B



Chain Rule(Assignment)

Q. 12 men can do a piece of work in 24 days. How many days are needed to complete the work, if 8 men do this work ?

- A. 28 days
- B. 36 days
- C. 48 days
- D. 52 days

Ans: B



Probability

- How likely an event is supposed to happen.
- $\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$
- AND → multiply(x) e.g:- 1 green and 1 blue ball in a box
- OR → Add (+) e.g:- 1 red or 1 blue ball in a box
- 1 bag has 3 balls, what is the probability of you picking up 2 balls?

$$\bullet 3C_2 = \frac{3 \times 2}{1 \times 2} = 3$$

Total no. of balls
the bag contains

Out of which how many balls
We need to choose
(tells number of times 3 has to be reduced)

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}}$$



Points to Remember

- The **probability** of an event will not be less than 0.
- This is because 0 is impossible (sure that something will not happen).
- The **probability** of an event will not be **more than 1**. This is because 1 is certain that something will happen.
- The probability of an event is **a number** describing the chance that the event will happen.
- An event that is certain to happen has a probability of 1.
- An event that cannot possibly happen has a probability of 0.
- If there is a chance that an event will happen, then its probability is between 0 & 1.



Probability

- **Atleast** – min to max
- Eg:- 2 bags out of 3

↓
min ↓
 max

So various probabilities to be done is 2 and 3

- **Atmost** - max to min
- Eg:- 1 bag has 3 balls out of which probability to pick up 2 balls

↓
atmost 2 → max 2 , 1 , 0 (min)

Probability

Q. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

- A. 10/21 B. 11/21 C. 2/7 D. 5/7

• Soln-

- Total balls = $2+3+2 = 7$ balls in the bag
- None = blue (neglect whichever color is written after none)
- Draw = 2 balls
- Probability = $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{2R \text{ or } (1R \text{ and } 1G) \text{ or } 2G}{7C_2} = \frac{2C_2 + (2C_1 \times 31) + 3C_2}{7C_2} = \frac{10}{21}$

Ans : A



Probability

Q. In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

- A. 1/3 B. 3/4 C. 7/19 D. 8/21 E. 9/21

Soln:

- Total balls = $8+7+6 = 21$ balls in the box
- Neither red nor green means only blue
- Draw = 1 ball
- Probability = $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{1 \text{ blue out of total } 7}{21C_1} = \frac{7C_1}{21C_1} = \frac{7}{21} = \frac{1}{3}$

Ans: A



Probability

Q. What is the probability of getting a sum 5 from two throws of a dice?

- A. 1/9
- B. 1/8
- C. 1/7
- D. 1/6

Soln-

Dice =6 faces = 6 possibilities

So in two throws of dice, total possibilities = **6 x 6= 36**

Sum =5, so favourable outcomes are - { (1,4), (4,1) , (2,3) , (3,2) }

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{4}{36} = \frac{1}{9}$$

Ans : A



Probability

Q. Three unbiased coins are tossed. What is the probability of getting utmost two heads?

- A. $\frac{3}{4}$ B. $\frac{1}{4}$ C. $\frac{3}{8}$ D. $\frac{7}{8}$

• Soln-

- Total possibilities = {TTT, TTH, THT, HTT, THH, HTH, HHT, HHH}
- Event of getting utmost 2 heads = max 2H or 1H or 0H
- Possibility of getting 2 H = {TTT, TTH, THT, HTT, THH, HTH, HHT}
- Probability =
$$\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{7}{8}$$

Ans: D



Probability

Q. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected, is:

- A. 21/46 B. 25/117 C. 1/50 D. 3/25

Soln:

- Total students = $15 + 10 = 25$ students in a class
- Draw = 3 students

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{10C_1 \times 15C_2}{25C_3} = \frac{21}{46}$$

Ans : A



Probability

- A Standard deck of playing cards consist of 52 cards, among them there are 4 subgroups/suits –
- The four suits with their names , symbols and color –

1. The suit of Hearts



→ 13 cards

26 red cards

2. The suit of Diamonds



→ 13 cards

3. The suit of Clubs



→ 13 cards

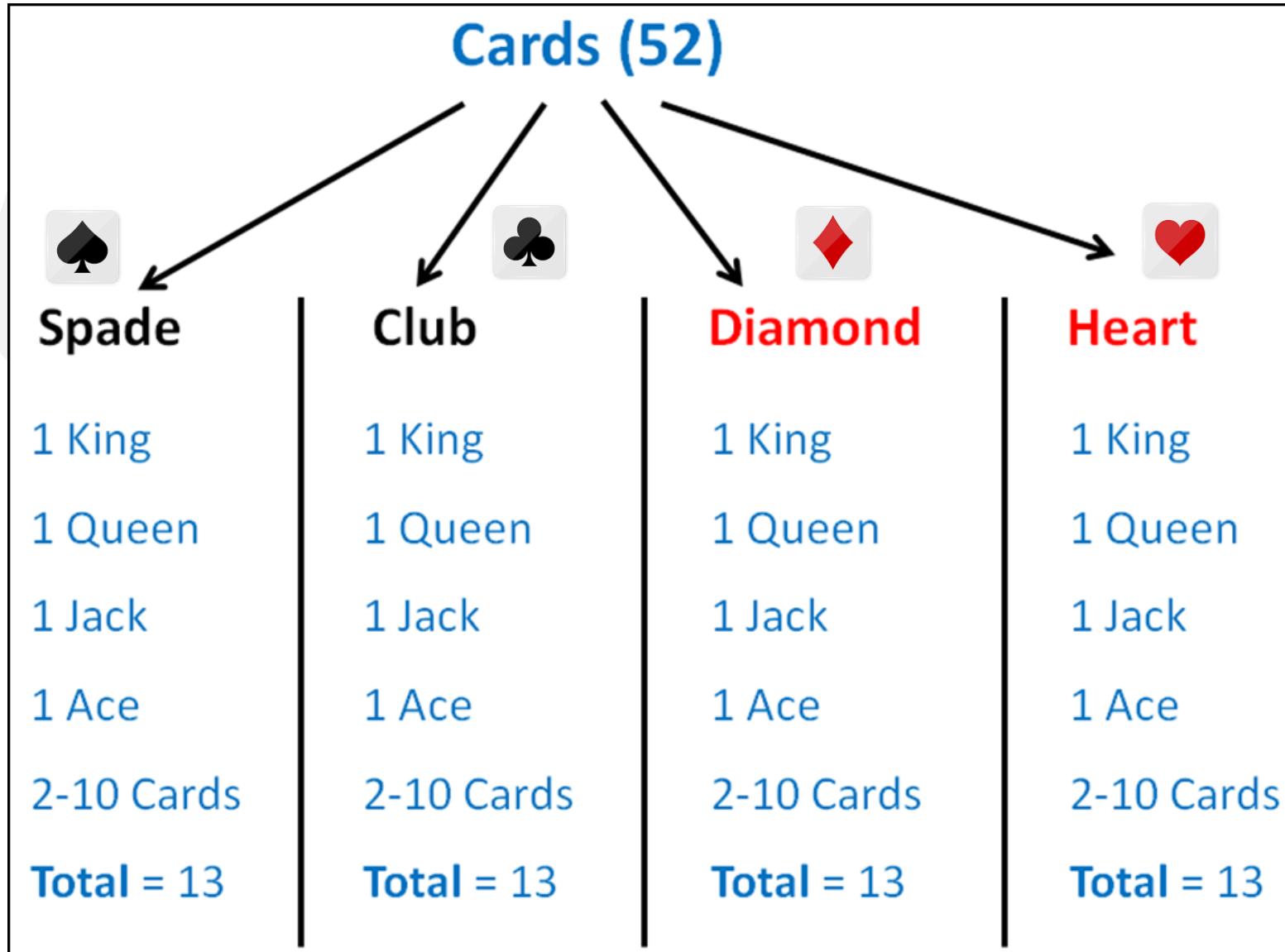
26 black cards

4. The suit of Spades



→ 13 cards

Probability

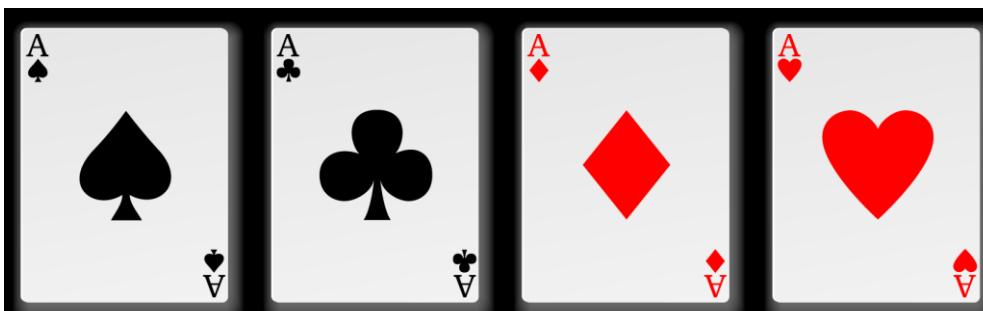


Probability

- King, Queen and Jack (or Knaves) are **face cards**. So, there are **12 face cards** in the deck of 52 playing cards.
- **Jokers** are not normally considered to be **face cards**



- **Aces**
- There are 4 Aces in every deck, 1 of every suit.



Probability

Q. From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?

- A. 1/15 B. 25/57 C. 35/256 D. 1/221

• Soln-

• Total cards in a pack = 52

• Total kings in a pack = 4

• Drawn = 2

• Probability = $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{4C_2}{52C_2} = \frac{1}{221}$

Ans : D



Probability

Q. Two dice are rolled. Find the probability of getting a sum of 8 or 11 on both the dices.

A. 5/36

B. 9/36

C. 7/36

D. 11/36

Ans: C

- Favorable outcomes for sum of 8 or 11 on both the dices are-
- (2,6),(3,5),(4,4),(5,3),(6,2),(5,6),(6,5)
- Number of favorable outcomes = 7
- Probability = $\frac{7}{36}$



Probability(Assignment)

A man tossed two dice. What is the probability that the total score is a prime number?

- A. 5/12
- B. 5/14
- C. 5/20
- D. 5/24

• Soln-

- Dice = 6 faces = 6 possibilities
- 2 Dice = $6 \times 6 = 36$ possibilities
- Sum = prime number
- So favourable outcomes are - { (1,1), (1,2) , (1,4), (1,6) , (2,1) , (2,3) , (2,5) , (3,2) , (3,4) , (4,1) , (4,3) , (5,2) , (5,6) , (6,5) , (6,1) }
- Probability = $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{15}{36} = \frac{5}{12}$

Ans : A



Probability(Assignment)

Q. A brother and sister appear for an interview against two vacant posts in an office. The probability of the brother's selection is $\frac{1}{5}$ and that of the sister's selection is $\frac{1}{3}$. What is the probability that one of them is selected?

- A. $\frac{1}{5}$ B. $\frac{2}{5}$ C. $\frac{1}{3}$ D) $\frac{2}{3}$

Soln: -

(brother is selected and sister is not selected) OR (brother is not selected and sister is selected)

$$\begin{aligned}\text{Probability} &= \frac{1}{5} \times \frac{2}{3} + \frac{4}{5} \times \frac{1}{3} \\ &= \frac{6}{15}\end{aligned}$$

$$= \frac{2}{5}$$

Ans: B

$$\begin{aligned}\text{sister not selected} &= 1 - \text{prob. of sister selected} \\ &= 1 - \frac{1}{3} \\ &= \frac{2}{3}\end{aligned}$$

$$\begin{aligned}\text{brother not selected} &= 1 - \text{prob. of brother selected} \\ &= 1 - \frac{1}{5} \\ &= \frac{4}{5}\end{aligned}$$



Probability(Assignment)

Q. Probability of occurrence of event A is 0.5 and that of event B is 0.2. the probability of occurrence of both A and B is 0.1. what is the probability that none of A and B occur?

- A. 0.4 B. 0.5 C. 0.2 D. 0.1

Soln:

probability of sure event = 1

- Given $P(A) = 0.5$ and $P(B) = 0.2$
- $$\begin{aligned} P(A \text{ or } B) &= P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ &= 0.5 + 0.2 - 0.1 = 0.6 \end{aligned}$$
- And $P(\text{neither } A \text{ nor } B) = P(A' \cap B') = 1 - P(A \cup B) = 1 - 0.6 = 0.4.$

Ans: A

- Note: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- This is also known as the addition theorem of probability.



Probability(Assignment)

Q. A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red, is?

- A. 1/22
- B. 3/22
- C. 2/91
- D. 2/77

Ans : C



Probability(Assignment)

Q. What is the probability of getting a sum 9 from two throws of a dice?

- A. 1/6
- B. 1/8
- C. 1/9
- D. 1/12

Ans : C



Probability(Assignment)

Q. A bag contains 6 black and 8 white balls. One ball is drawn at random. What is the probability that the ball drawn is white?

- A. $\frac{3}{4}$
- B. $\frac{4}{7}$
- C. $\frac{1}{8}$
- D. $\frac{3}{7}$

Ans : B



Probability(Assignment)

Q. A bag contains 6 blue balls, 3 white balls and 4 green balls. If two balls are drawn at random what is the possibility that they are not of the same color?

- A. 6/13 B. 7/13 C. 9/13 D. 10/13

• **Ans: C**



Probability(Assignment)

Q. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

- A. 1/13
- B. 1/4
- C. 3/13
- D. 9/52

Ans: C



Probability(Assignment)

Q. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is not a face card (Jack, Queen and King only)?

- A. 5/13
- B. 10/13
- C. 1/13
- D. 1/26

Ans: B



Probability(Assignment)

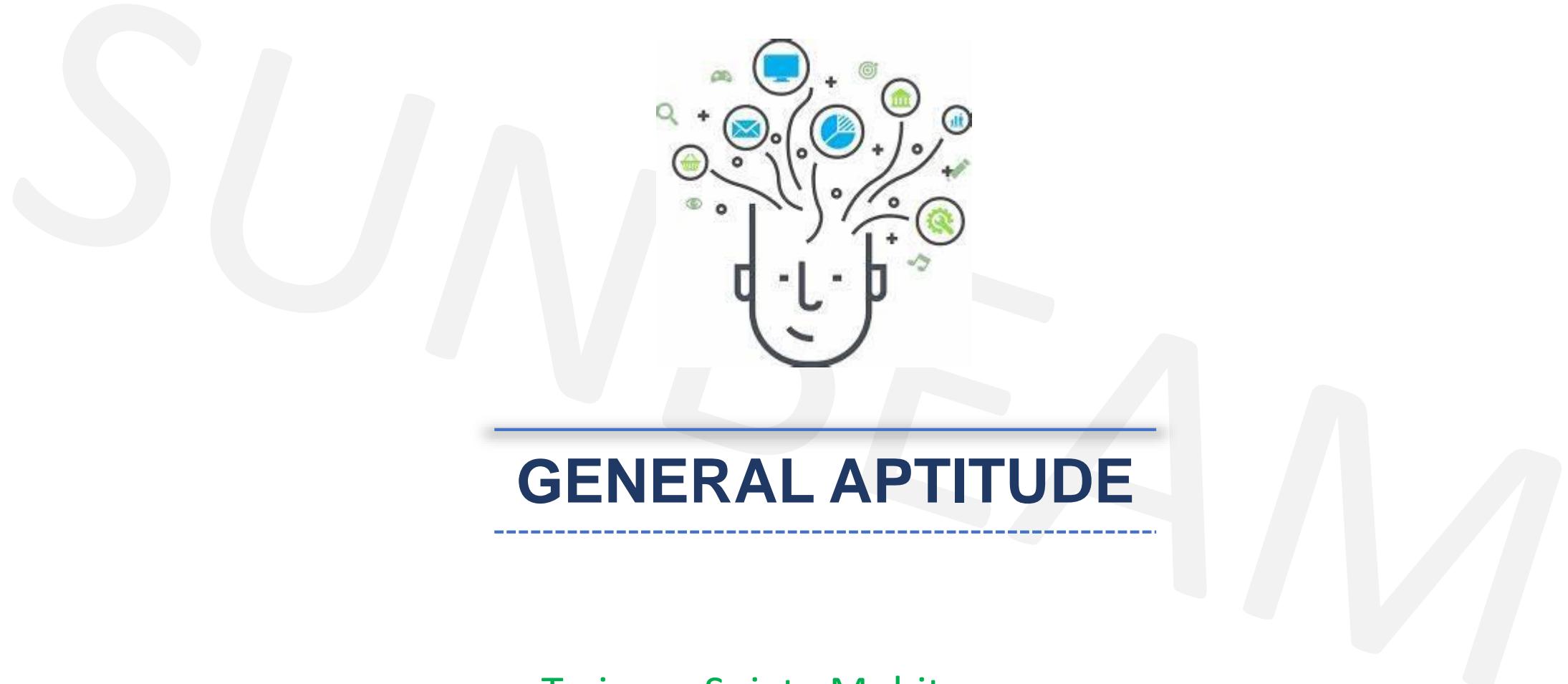
Q. A basket contains 6 apples ,4 pears and 3 oranges. If two fruits are picked up at random, what is the probability that both are pears?

- A. 4/13
- B. 1/13
- C. 2/13
- D. 3/26

Ans: B







GENERAL APTITUDE

Trainer : Sujata Mohite
sujata.mohite@sunbeaminfo.com



Time & Distance

- **Speed = Distance / Time**
- **Distance = Speed x Time**
- Ram travels from A to B traveling distance of 10 km in 4 hrs. His speed is
- **$10/4 = 2.5 \text{ km/hr}$**
- Ram moves from Pune to Satara at the same speed taking 1 day & 10 hrs. The distance between Pune & Satara is
- **$(24+10) \times 2.5 = 34 \times 2.5 = 85 \text{ km}$**
- Ram now wants to reach back to Pune in 17 hours So he should travel back at a speed of
- **$85/17 = 5 \text{ km/hr}$**



Time & Distance

- If the same distance is traveled at different speeds S_1 & S_2 then average speed is given by-

$$S_a = \frac{(2 \times S_1 \times S_2)}{(S_1 + S_2)}$$

- If the same distance is traveled at different speeds S_1 , S_2 & S_3 then average speed is given by-

$$S_a = \frac{(3 \times S_1 \times S_2 \times S_3)}{(S_1 S_2 + S_2 S_3 + S_1 S_3)}$$

- Imp : Convert every term to same units
- $1 \text{ Km/hr} = \frac{5}{18} \text{ m/s}$ & $1 \text{ m/s} = \frac{18}{5} \text{ km/hr}$
- If a bowler has a run up of 100 m & he runs at a speed of 36 km/hr the time he takes to complete his runup is
- $36 \times \frac{5}{18} \text{ m/s} = 10 \text{ m/s}$
- $100 \text{ m} \div 10 \text{ m/s} = 10 \text{ s}$



Time & Distance

If different distance D_1, D_2 & D_3 travelled is at different speeds S_1, S_2 & S_3 then average speed is given by-

$$S_a = \frac{(D_1 + D_2 + D_3)}{\left(\frac{D_1}{S_1} + \frac{D_2}{S_2} + \frac{D_3}{S_3}\right)}$$

- Q. A man covers 10kms at a speed of 5 km/hr, 30kms at a speed of 7 km/hr abd 20kms at a speed of 15 km/hr. Find out the average speed.

$$\bullet \quad S_a = \frac{(10+ 30 + 20)}{\left(\frac{10}{5} + \frac{30}{7} + \frac{20}{15}\right)} = 7.77 \text{ km/hr}$$

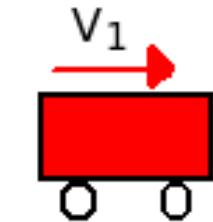


Time & Distance

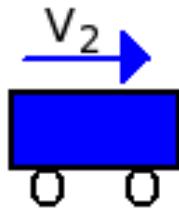
- Speed & distance are directly proportional.
- $S \propto D$
- Distance & Time are directly proportional.
- $D \propto T$
- Speed & time are inversely proportional.
- $S \propto 1/T$
- Relative speed is defined as the speed of a moving object with respect to another. When two objects are moving in the same direction, relative speed is calculated as their difference and if objects are moving in opposite direction then calculate as their sum.
- **Relative speed = X-Y (same direction)**
- **Relative speed = X+Y (opposite direction)**



Relative Speed-

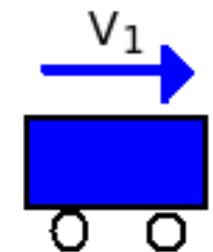


Objects Moving in Same direction



Relative Speed = $v_1 - v_2$

Relative Speed = $v_2 - v_1$



Objects Moving in Opposite Direction

Relative Speed = $v_1 + v_2$

Time & Distance

Q. A certain distance is covered by a car at a certain speed. If a motorcycle covers half the distance in double time, the ratio of the speed of the motorcycle to the car is

- A. 4:1 B. 1:2 C. 1:4 D. 2:3

Soln:

- Let Car cover distance d in time $t \rightarrow S_c = d \div t$
- Motorcycle covers dist $d/2$ in time $2t \rightarrow S_m = d/2 \div 2t$
- $\rightarrow S_m = d/4t$
- $\rightarrow S_m : S_c = d/4t : d/t = 1:4$
- **Ans : C**



Time & Distance

Q. A car traveled 20% of the time at 30 km/hr, 50% of the time at 40 km/hr and rest of the journey at 50 km/hr. What is the average speed of the car over the whole journey?

- A. 40 km/hr B. 35 km/hr C. 41 km/hr

- D. 45 km/hr

Soln:

Avg Speed

= total dist / total time

Assume Journey

= T hr

Total Distance

= $(0.2T \times 30 + 0.5T \times 40 + 0.3T \times 50)$

= $6T + 20T + 15T$

= $41T$

Average Speed

= $41T/T = 41$ kmph

Ans: C

$$\begin{aligned} Sa &= \frac{(D_1 + D_2 + D_3)}{\left(\frac{D_1}{S_1} + \frac{D_2}{S_2} + \frac{D_3}{S_3}\right)} \\ &= \frac{(20 \times 30 + 50 \times 40 + 30 \times 50)}{\left(\frac{20 \times 30}{30} + \frac{50 \times 40}{40} + \frac{30 \times 50}{50}\right)} \\ &= \frac{4100}{100} = 41 \text{ km/hr} \end{aligned}$$



Time & Distance

Q. At 7:30 am two trains start from their respective stations A & B in opposite direction, 930 km apart at speeds of 60 km/hr & 90 km/hr respectively. At what time do they meet?

- A. 12:30 pm B. 1:30 pm C. 1:42 pm D. 1:50 am

Soln:

- Time = Distance/ Speed
- Time = $930 \text{ km} / (60+90)\text{km/hr}$ (relative Speed adds up)
- Time = 6.20 hours = 6 hrs 12 min
- Time of meeting 1:42 pm

Ans: C



Time & Distance

Q. Walking at a speed of $\frac{4}{5}$ of the original speed a person reaches office 8 min late (8 mins more than normal time). Find the time required usually.

- A. 24 min B. 30 min C. 32 min D. 44 min

Soln:

	<u>Original</u>	<u>New</u>
Speed	S	$4S/5$
Time	T	$T+8$

Speed x Time = Distance is constant

$$\rightarrow ST = 4S/5 \times (T+8)$$

$$\rightarrow T = 4/5 \times (T+8)$$

$$\rightarrow 5T/4 = T+8$$

$$\rightarrow \frac{5T}{4} - T = 8$$

$$\rightarrow \text{Normal Time } T = 32 \text{ mins}$$

Ans: C



Time & Distance

Q. A boy rides his bicycle 10km at an average speed of 12km/hr and again travels 12km at an average speed of 10km/hr. His average speed for the entire trip is approximately

- A. 10.4km/hr
- B. 10.8 km/hr
- C. 11 km/hr
- D. 12.2km/hr

Soln:

$$S_a = \frac{(D_1 + D_2)}{\left(\frac{D_1}{S_1} + \frac{D_2}{S_2}\right)}$$

Ans: B



Time & Distance(Assignment)

Q. A boy starts from his house for college at a fixed time. If he walks at the rate of 5 kmph he is late by 7 mins. If he walks at 6 kmph he is 5 min early. Find College to home distance.

- A. 5 km B. 6 km C. 7 km D. 6.5 km

	<u>Original</u>	<u>Case1</u>	<u>Case2</u>
Speed	s	5	6
Time	t	t+7	t-5

Speed x Time = Distance is constant

$$\rightarrow st = 5 \times (t+7)/60 = 6 \times (t-5)/60$$

$$\rightarrow 5t + 35 = 6t - 30$$

$$\rightarrow t = 65 \text{ mins}$$

$$\rightarrow \text{Using Case 1 Distance} = 5 \times (65+7)/60 = 6 \text{ km}$$

Ans B



Time & Distance(Assignment)

Q. One day a person travels to office at $\frac{5}{6}$ of his usual speed. He takes t minutes more than normal time. What is his normal time?

- A. $2t$ B. $3t$ C. $4t$ D. $5t$

Soln:

	<u>Original</u>	<u>New</u>
Speed	S	$\frac{5S}{6}$
Time	T	$T+t$

Speed \times Time = Distance is constant

$$\rightarrow ST = \frac{5S}{6} \times (T+t)$$

$$\rightarrow T = \frac{5}{6} \times (T+t)$$

$$\rightarrow 6T = 5(T+t)$$

$$\rightarrow T = t \rightarrow \text{Normal Time } T = 5t$$

Ans: D



Time & Distance(Assignment)

Q. A boy goes to school from home at a speed of 10km/hr and return back at 30km/hr.
Find his average speed.

- A. 15 km/hr
- B. 14.5 km/hr
- C. 10 km/hr
- D. 20 km/hr

Ans: A



Time & Distance(Assignment)

Q. A person travels equal distance with speeds of 3 km/hr, 4 km/hr and 5 km/hr and taken a total time of 47 minutes. The total distance (in km) is :

- A. 2 km
- B. 3 km
- C. 4 km
- D. 5 km

Ans: B

If the same distance is traveled at different speeds S_1, S_2 & S_3 then average speed is given by-

$$S_a = \frac{(3 \times S_1 \times S_2 \times S_3)}{(S_1 S_2 + S_2 S_3 + S_1 S_3)} = \frac{(3 \times 3 \times 4 \times 5)}{(3 \times 4 + 4 \times 5 + 3 \times 5)} = \frac{20 \times 9}{47}$$

Total Dist = Speed x time

$$\begin{aligned} &= \frac{20 \times 9}{47} \times \frac{47}{60} \\ &= 3 \text{ km/hr} \end{aligned}$$



Time & Distance(Assignment)

Q. A man covers half of his journey at 6 km/h and the remaining half at 3 km/h. His average speed is-

- A. 9 km/hr B. 4.5 km/hr C. 4 km/hr D. 3 km/hr

Soln:

- Average speed = $\frac{2xy}{x+y} = \frac{2 \times 6 \times 3}{6+3} = \frac{36}{9} = 4 \text{ km/hr}$

Ans: C



Time & Distance(Assignment)

Q. On a journey, across Delhi, a Taxi averages 30 kmph for 60% of the distance, 20 kmph for 20% of it and 10kmph for the remainder. The average speed for the whole journey is :

- A. 20km/hr
- B. 22.5 km/hr
- C. 24.625km/hr
- D. 25km/hr

Ans: A



Time & Distance(Assignment)

Q. A distance is covered by a cyclist at a certain speed. If a jogger covers half of the distance in double the time, the ratio of the speed of the jogger to that of the cyclist is :

A. 1 : 4

B. 4 : 1

C. 1 : 2

D. 2 : 1

Ans: A



Time & Distance(Assignment)

Q. Walking at a speed of 20% more than the original a person requires 6 min less than normal time. Find the time required usually

- A. 24 min
- B. 30 min
- C. 36 min
- D. 44 min

• Ans C



Time & Distance(Assignment)

Q. Walking at a speed of 12 km/hr a person reaches 10 min late. But if he walks at 20 km/hr he reaches 14 min early. Find the distance.

- A. 9 km
- B. 12 km
- C. 14 km
- D. 15 km

Ans: B



Time & Distance(Assignment)

Q. Two cars started simultaneously travelling toward each other from town A and town B 480km apart. It took first car travelling from town A to town B and car covered the distance in 8hrs and car from town B to town A covers distance in 12hrs. Find distance from town A when they meet?

- A. 288km B. 250km C. 380km D. 240km

Ans: A

- Speed of first car = Distance/ time = $480 / 8 = 60\text{km/hr}$
- Speed of second car = Distance/ time = $480 / 12 = 40\text{km/hr}$
- The cars will meet in = $480 / (60+40) = 4.8 \text{ hrs}$ (relative Speed adds up as travelling in opposite directions)
- Dist from A where they will meet = speed of car from A x time
 $= 60 \times 4.8 = 288\text{km}$



Time & Distance(Assignment)

Q. A car travels 1/3 of the distance on a straight road with a velocity of 10 km/h, next one-third with a velocity of 20 km/h and the last one-third with a velocity of 60 km/h. Then the average velocity of the car (in km/h) during the whole journey is-

- A. 18km/hr
- B. 24km/hr
- C. 30km/hr
- D. 20km/hr

Ans: A

$$\text{Time} = \frac{\text{Dist}}{\text{Speed}}$$

$$\begin{aligned}\text{Total Time} &= \frac{1/3D}{10} + \frac{1/3D}{20} + \frac{1/3D}{60} \\&= \frac{D}{30} + \frac{D}{60} + \frac{D}{180} \\&= \frac{6D + 3D + 1D}{180} \\&= \frac{10D}{180} \text{ hrs}\end{aligned}$$

$$\begin{aligned}\text{Avg velocity} &= \frac{\text{Dist}}{\text{time}} \\&= \frac{D}{\frac{10D}{180}} \\&= \frac{180D}{10D} \\&= 18 \text{ km/hr}\end{aligned}$$



Time & Distance(Assignment)

Q. A man riding his bicycle covers 150 metres in 25 seconds. What is his speed in km per hour ?

- A. 25 km/hr
- B. 21.6 km/hr
- C. 23 km/hr
- D. 20 km/hr

Ans: B



Time & Distance(Assignment)

Q. A motorist travelled the distance between two towns, which is 65 km, in 2 hours and 10 minutes. Find his speed in meter per minute.

- A. 200 meters/min
- B. 500 meters/min
- C. 600 meters/min
- D. 700 meters/min

Ans: B



Trains

- **Trains**
- Let S_1 = speed of train, S_2 = Speed of Object
 L_1 = length of the train, L_2 = Length of the object.
 t = time taken by train to completely pass the object

Case A : Stationary object without considerable length

$$L_1 = S_1 \times t$$



Trains

Q. A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train ?

- A. 120 metres
- B. 180 metres
- C. 324 metres
- D. 150 metres

Ans : D

Case A : Stationary object without considerable length

$$\begin{aligned} L_1 &= S_1 \times t \\ &= 60 \times 5 / 18 \times 9 \\ &= 150 \text{m} \end{aligned}$$



Trains

- **Trains**
- Let S_1 = speed of train, S_2 = Speed of Object
 L_1 = length of the train, L_2 = Length of the object.
 t = time taken by train to completely pass the object

Case B : Stationary object with considerable length

$$L_1 + L_2 = S_1 \times t$$



Time & Distance

Q. A train of length 600 m crosses a man standing on a platform in 45 sec & the same train crosses the complete platform in 2 min. What is the length of the platform?

- A. 500 m B. 700 m C. 900 m D. 1000 m

• Soln:

• Case A : $L_1 = S_1 \times t$ (Train passing the man)

$$\begin{aligned} \frac{600}{S_1} &= S_1 \times 45 \\ S_1 &= 600/45 \\ &= 40/3 \end{aligned}$$

• Case B : $L_1 + L_2 = S_1 \times t$ (Train passing the platform)

$$600 + L_2 = 40/3 \times 120$$

$$L_2 = 1600 - 600$$

$$L_2 = 1000 \text{ m}$$

• Ans D



Trains

- **Trains**
- Let S_1 = speed of train, S_2 = Speed of Object
 L_1 = length of the train, L_2 = Length of the object.
 t = time taken by train to completely pass the object

Case C : Moving object without considerable length

$$L_1 = (S_1 \pm S_2) \times t$$



Time & Distance

Q. A train of length 600 mt crossed a man going in the same direction at 12 km/hr in 45 sec while the same train crossed another man coming from the opposite direction on a bike in 20 sec. Find the speed of the bike.

- A. 24 km/hr B. 36 km/hr C. 40 km/hr D. 48 km/hr

Soln:

$$12 \text{ km/hr} = 12 \times 5/18 = 10/3 \text{ m/s}$$

Case A : $L_1 = (S_t - S_m) \times t$ (Train passing man)

$$600 = (S_t - 10/3) \times 45$$

$$S_t = 50/3 \text{ m/s}$$

Case B : $L_1 = (S_t + S_b) \times t$ (Train passing the bike)

$$600 = (50/3 + S_b) \times 20$$

$$S_b = 40/3 \text{ m/s} \times 18/5 = 48 \text{ km/hr}$$

Ans: D



Trains

- **Trains**
- Let S_1 = speed of train, S_2 = Speed of Object
 L_1 = length of the train, L_2 = Length of the object.
 t = time taken by train to completely pass the object

Case D : Moving Object with considerable length

$$L_1 + L_2 = (S_1 \pm S_2) \times t$$



Time & Distance

Q. Two trains of same length cross an electric pole in 12 sec & 20 sec respectively.
Find in how much time do they cross each other while traveling in same direction?

A. 45 sec

B. 50 sec

C. 60 sec

D. 75 sec

Soln:

Case A : $L_1 = S_1 \times t$ (Trains passing the pole)

$$L_1 = S_1 \times 12 \rightarrow S_1 = L_1/12$$

$$L_1 = S_2 \times 20 \rightarrow S_2 = L_1/20$$

Case B : $L_1 + L_2 = (S_1 \pm S_2) \times t$ (Train passing other train)

$$2L_1 = (L_1/12 - L_1/20) \times t$$

$$2 = (1/12 - 1/20) \times t$$

$$2 = 1/30 \times t \rightarrow t = 60 \text{ sec.}$$

Ans: C



Time & Distance(Assignment)

Q. Two trains of lengths 200 mt & 400 mt cross each other completely in 15 sec & 1.25 min respectively while going in opposite & same direction. Find the speed of the slower train.

A. 24 m/s

B. 16 m/s

C. 40 m/s

D. 8 m/s

Soln:

Case A : $L_1 + L_2 = (S_1 + S_2) \times t$ (Trains passing opp direction)

$$200 + 400 = (S_1 + S_2) \times 15$$

$$S_1 + S_2 = 40 \text{ m/s} \dots\dots(1)$$

Case B : $L_1 + L_2 = (S_1 - S_2) \times t$ (Trains passing same direction)

$$200 + 400 = (S_1 - S_2) \times 75$$

$$S_1 - S_2 = 8 \text{ m/s} \dots\dots(2)$$

$$2S_1 = 48 \rightarrow S_1 = 24, S_2 = 16$$

Ans: B



Time & Distance(Assignment)

Q. Person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?

- A. 3.6
- B. 7.2
- C. 8.4
- D. 10

Ans: B



Time & Distance(Assignment)

Q. An aeroplane covers a certain distance at a speed of 240 kmph in 5 hours. To cover the same distance in $1 \frac{2}{3}$ hours, it must travel at a speed of:

- A. 300 kmph
- B. 360 kmph
- C. 600 kmph
- D. 720 kmph

Ans: D



Time & Distance(Assignment)

Q. The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 km in 4 hours, then the speed of the first train is:

- A. 70 km/hr
- B. 75 km/hr
- C. 84 km/hr
- D. 87.5 km/hr

Ans: D



Time & Distance(Assignment)

Q. A man on tour travels first 160 km at 64 km/hr and the next 160 km at 80 km/hr. The average speed for the first 320 km of the tour is:

- A. 35.55 km/hr
- B. 36 km/hr
- C. 71.11 km/hr
- D. 71 km/hr

Ans: C



Trains(Assignment)

Q. A train 125 m long passes a man, running at 5 km/hr in the same direction in which the train is going, in 10 seconds. The speed of the train is:

- A. 45 km/hr
- B. 50 km/hr
- C. 54 km/hr
- D. 55 km/hr

Ans: B



Time & Distance(Assignment)

Q. Two trains run on parallel tracks in the same direction with speeds of 42 km/hr & 60 km/hr. A person sitting in the faster train crossed the slower train completely in 1.2 min. Find the length of the slower train.

- A. 240 m B. 360 m C. 420 m D. 480 m

Ans: B

Note – Man in the train has same speed as train but no length

Using case 3 from trains → Moving object without length

$$L_1 = (S_1 - S_2) \times t$$



Time & Distance

• **Boats & Streams**

- If Speed of boat in still water = $x \text{ kmph}$
- Speed of the stream = $y \text{ kmph}$ then
 - Speed of the boat downstream $S_d = (x+y) \text{ kmph}$
 - Speed of the boat upstream $S_u = (x-y) \text{ kmph}$
- Speed of Boat in still water $X = \frac{1}{2} (S_d + S_u)$
- Speed of the stream $Y = \frac{1}{2} (S_d - S_u)$



Boats & Streams

Q. A boat goes 16 km upstream & returns back to original place in 6 hrs. If the speed of water is 2 kmph. Find the speed of boat in still water.

A. 3 kmph

B. 4 kmph

C. 6 kmph

D. 8 kmph

Soln

Let speed of boat = x , Speed of water $y = 2$

Case A : $S_u = x - 2$

Case B : $S_d = x + 2$

Total time $= T_u + T_d$

$$6 = \frac{16}{(x-2)} + \frac{16}{(x+2)}$$

$$6(x-2)(x+2) = 16(x+2) + 16(x-2)$$

$$6x^2 - 24 = 16(2x)$$

$$6x^2 - 32x - 24 = 0$$

$$3x^2 - 16x - 12 = 0 \rightarrow 3x^2 - 18x + 2x - 12 = 0 \rightarrow (3x+2)(x-6) = 0$$

$$\rightarrow x = 6 \text{ kmph}$$

Ans: C



Boats & Streams

Q. A man notices that it takes him thrice the time to row up than to row down the same distance. Find the speed of the boat in still water if the speed of water is 5 kmph?

A. 8 kmph

B. 8.5 kmph

C. 10 kmph

D. 10.5 kmph

Soln

$$T_d : T_u = 1 : 3 \rightarrow S_d : S_u = 3 : 1$$

Let speed of boat = x , Speed of water = 5

$$\rightarrow S_d = x+5, S_u = x-5$$

$$\rightarrow S_d/S_u = (x+5)/(x-5)$$

$$\rightarrow 3/1 = (x+5)/(x-5)$$

$$\rightarrow 3(x-5) = x+5$$

$$\rightarrow 3x-15 = x+5 \rightarrow 2x = 20 \rightarrow x = 10 \text{ kmph.}$$

Ans: C



Boats & Streams(Assignment)

Q. A person covers 200 m in 15 sec while going upstream & 5 km in 3 min while going downstream. Find the speed of boat in still water.

- A. 44 m/s
- B. 74 m/s
- C. 74 km/hr
- D. 80 km/hr

Ans: C



Boats & Streams(Assignment)

Q. A man rows at the rate of 12 kmph in still water. It takes him 4 hr 16 min to row to a place 24 km away & back. What is the speed of water?

- A. 3 kmph
- B. 2.5 kmph
- C. 2 Kmph
- D. 1.5 kmph

Ans : A



Boats & Streams(Assignment)

Q. A man notices that it takes him 5 times the time to row up than to row down the same distance. Find the speed of the boat in still water if the speed of water is 20 kmph?

A. 22 kmph

B. 25 kmph

C. 27 Kmph

D. 30 kmph

Ans: D



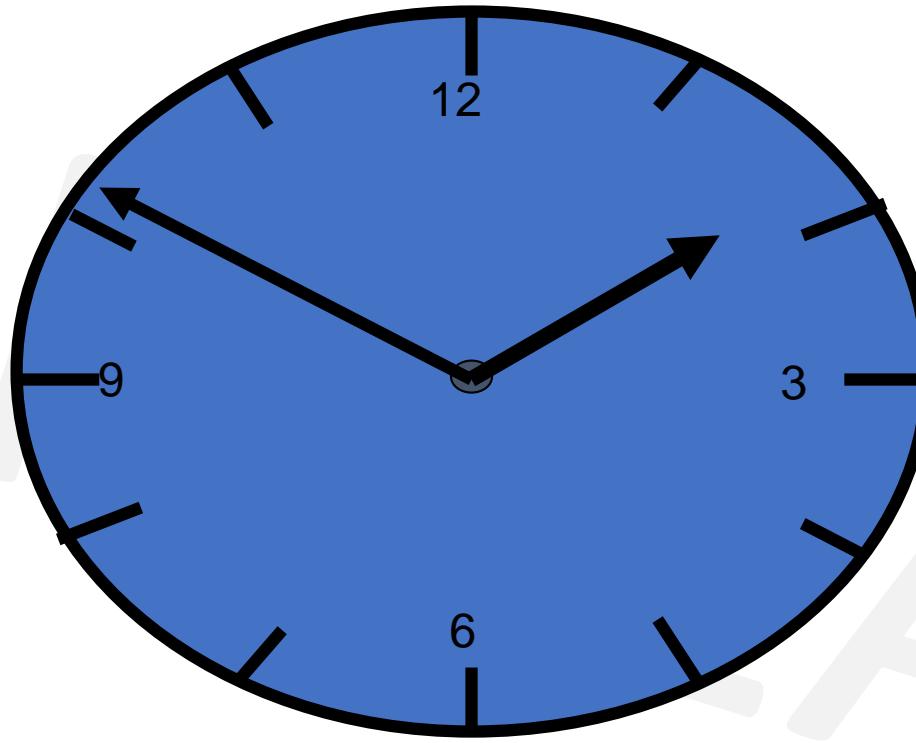
Clocks

SL



M

Clocks



- → 360°
- → 60 minute spaces of 6° each
- → 12 Hours space of 30° each

Clocks

- The Face or dial of a watch is a circle whose circumference is divided into 60 equal parts, called ***minute spaces***.
- A clock has two hands, the smaller one is called ***the hour hand or short hand***
- while the larger one is called the ***minute hand or long hand..***
- i) In 60 minutes, the minute hand gains 55 minutes on the hour hand.
- ii) In every hour, both the hands coincide once.
- iii) The hands are in the same straight line when they are coincident or opposite to each other.
- iv) When the two hands are at right angles, they are 15 minute spaces apart.
- v) When the hand's are in opposite directions, they are 30 minute spaces apart.
- vi) Angle traced by hour hand in 12 hrs = 360° .
- vii) Angle traced by minute hand in 60 min. = 360° .



Clocks

- $12 \text{ hr} \times 30^\circ = 360^\circ$
- At night 12, day starts , both hands are at same place.
- Every hour they coincide once **but between 11-12 it coincides at 12**, so its 11 times only.
- The two hands coincide -
 - 11 times in 12 hours
 - 22 times in 24 hours
- The two hand are in opposite direction –
 - 11 times in 12 hours
 - 22 times in 24 hours
 - **Between 5-7 it happens only once at 6 o'clock.**
- The two hand make right angles –
 - 22 times in 12 hours
 - 44 times in 24 hours



Clocks

- The hands of a clock coincide 11 times in every 12 hours (Since between 11 and 1, they coincide only once, i.e., at 12 o'clock).

AM	PM
12:00	12:00
1:05	1:05
2:11	2:11
3:16	3:16
4:22	4:22
5:27	5:27
6:33	6:33
7:38	7:38
8:44	8:44
9:49	9:49
10:55	10:55

The hands overlap about every 65 minutes, not every 60 minutes.

∴ The hands coincide 22 times in a day.



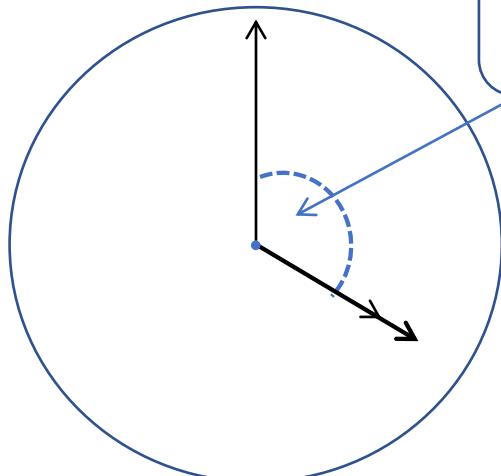
Clocks

Q. At what time between 4 and 5 o'clock will the hands of a watch be together/coincide?

- A. $10 \frac{9}{11}$ min past 4 B. $21 \frac{10}{11}$ min past 4 C. $11 \frac{10}{11}$ min past 4 D. $21 \frac{9}{11}$ min past 4

Soln:

- **Ans: D**
- Draw diagram of clock here



Distance travelled by minute hand is 20min-spaces.
So D = 20

$$\begin{aligned} T &= \frac{D}{S} \\ &= \frac{20}{11/12} \\ &= \frac{20 \times 12}{11} \\ &= \frac{240}{11} \\ &= 21 \frac{9}{11} \text{ mins. past 4} \end{aligned}$$

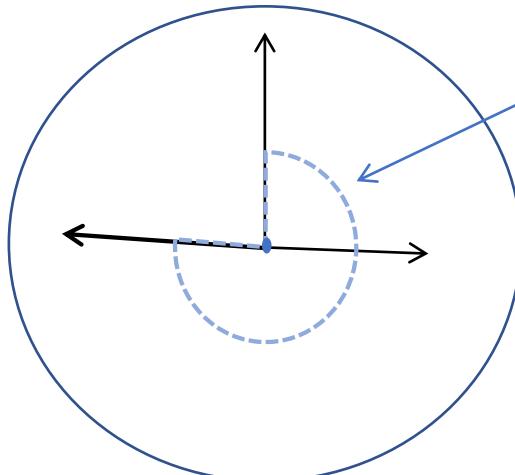
Clocks

Q. At what time between 3 & 4 o'clock will the hands of the clock be in the opposite direction.

- A. $40 \frac{9}{11}$ min past 3
- B. $30 \frac{10}{11}$ min past 3
- C. $49 \frac{1}{11}$ min past 3
- D. $41 \frac{9}{11}$ min past 3

Ans : C

- Draw diagram of clock here



Distance travelled by minute hand is 45min-spaces.
So D = 45

$$\begin{aligned}T &= D/S \\&= \frac{45}{11/12} \\&= \frac{45 \times 12}{11} \\&= \frac{540}{11} \\&= 49 \frac{1}{11} \text{ mins. past 3}\end{aligned}$$

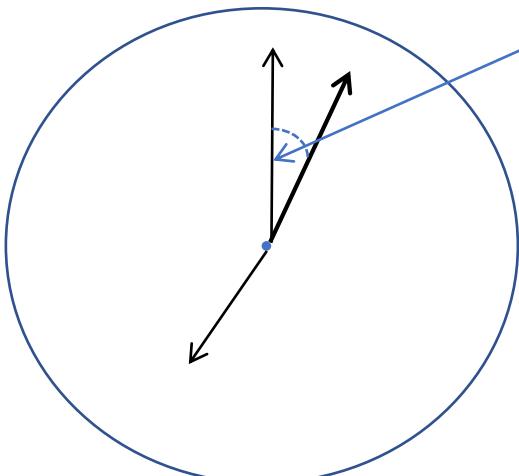
Clocks

Q. At what time between 7 and 8 o'clock will the hands of a clock be in the same straight line but, not together? ← means in opposite direction

- A. 5 min. past 7 B. $5 \frac{2}{11}$ min. past 7 C. $5 \frac{3}{11}$ min. past 7 D. $5 \frac{5}{11}$ min. past 7

Soln:

- Ans: D
- Draw diagram of clock here



Distance travelled by minute hand is 5min-spaces.
So D = 5

$$\begin{aligned} T &= D/S \\ &= \frac{5}{11/12} \\ &= \frac{5 \times 12}{11} \\ &= \frac{60}{11} \\ &= 5 \frac{5}{11} \text{ mins. past 7} \end{aligned}$$

Clocks

Q. What is the angle between the hands of a clock at 7:23 am?

- A. 90° B. 85.5° C. 83.5° D. 81.5°

Soln:

$$\text{Angle } \theta = 30H - \frac{11}{2} M$$

$$= 30 \times 7 - \frac{11}{2} \times 23$$

$$= 210 - 253/2$$

$$= 210 - 126.5$$

$$= 83.5^\circ$$

Ans : C



Clocks

Find the reflex angle between 2 hands of a clock at 10:25

- A. 187.5° B. 192.5° C. 197.5° D. 207.5°

Soln:

$$\begin{aligned}\theta &= |30H - 11/2 M| \quad \text{OR } |30H - 5.5 M| \\ &= 30 \times 10 - 11/2 \times 25 \\ &= 300 - 275/2 \\ &= 300 - 137.5 \\ &= 162.5^\circ\end{aligned}$$

But reflex angle is greater than 180° and less than 360°

$$360 - 162.5 = 197.5^\circ$$

• **Ans: C**



Clocks

Q. Find non reflex angle between 2 hands of a clock at 10:10

Soln:

$$\begin{aligned}\theta &= |30H - 11/2 M| \quad \text{OR } |30H - 5.5 M| \\ &= 30 \times 10 - 11/2 \times 10 \\ &= 300 - 55 \\ &= 245^\circ \quad \text{----> its a reflex angle } > 180^\circ\end{aligned}$$

But reflex angle is greater than 180° and less than 360°

$$360 - 245 = 115^\circ \quad \text{----> non reflex angle}$$

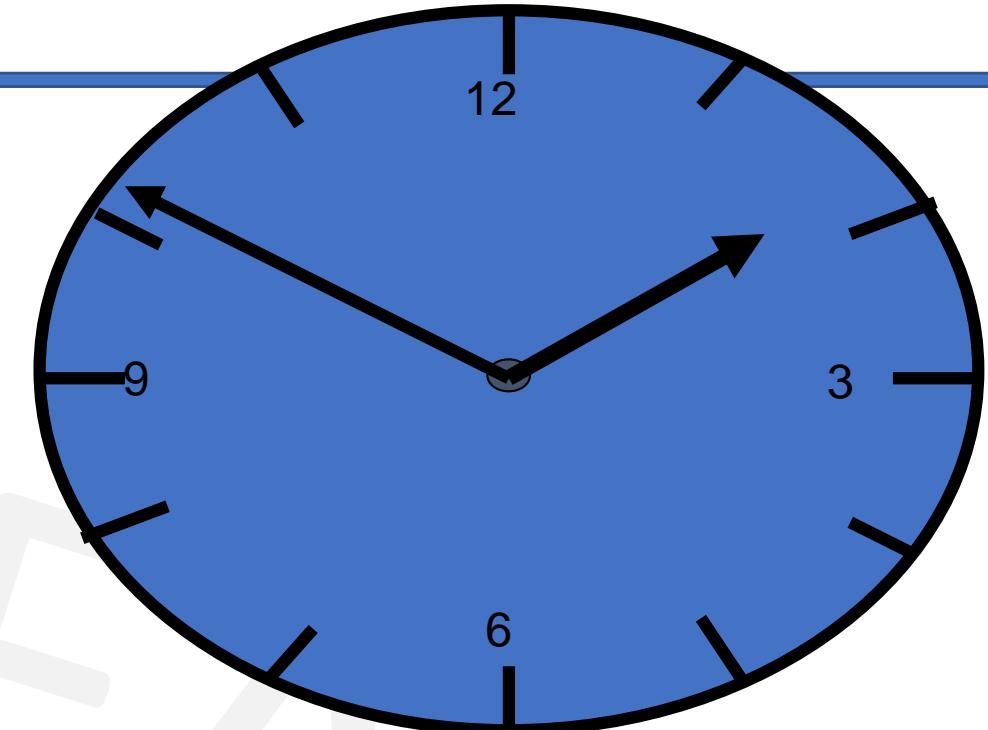


Clocks

Please remember ,

In a clock that runs correctly,

hands overlap every $720/11$ mins. = $65\frac{5}{11}$ mins



Clocks - Method1(Assignment)

- The minute hands of a clock meet at intervals of 70 mins. How much does the clock gain or lose in one day?
- A. $90 \frac{10}{77}$ min B. $93 \frac{39}{77}$ min C. $93 \frac{35}{143}$ min D. None of these
- **Soln:**
 - In a clock that runs correctly, hands overlap every $720/11$ mins.
 - In this clock hands are together after every 70 mins.
 - So gain/loss in 70 mins = $720/11 - 70$ mins = $(720-770)/11 = -50/11$
 - 70 min $\rightarrow 50/11$ min loss
 - 24×60 min $\rightarrow x$
 - So loss in one day = $(\frac{50}{11} \times 24 \times 60) / 70 = 93 \frac{39}{77}$ min
- **Ans: B**



Clocks – Method2(Assignment)

Q. The minute hands of a clock meet at intervals of 70 mins. How much does the clock gain or lose in one day?

- A. $90 \frac{10}{77}$ min B. $93 \frac{39}{77}$ min C. $93 \frac{35}{143}$ min D. None of these

• Soln:

- The minute hand of a clock overtakes the hour hand at intervals of M minutes of correct time.
- The clock gains or loses in a day by $= (720/11 - M)(60 \times 24/M)$ minutes.

• Here M = 70.

• The clock gains or losses in a day by-

• Gain/loss $= (720/11 - M)(60 \times 24/M)$

$$= (720/11 - 70)(60 \times 24/70)$$

$$= \left(\frac{720 - 770}{11} \right) \left(\frac{6 \times 24}{7} \right)$$

$$= \left(\frac{-50}{11} \right) \left(\frac{144}{7} \right) = \frac{-7200}{77}$$

$$= 93 \frac{39}{77} \text{ min}$$



Clock(Assignment)

Q. A clock is set at 4am. It loses 16 minutes in 24 hours. What will be the correct time when the clock indicates 9pm on the 4th day?

- A. 8pm B. 7pm C. 10pm D. 11pm
- **Ans C**
- Time from 4am on a day to 9pm on the 4th day = 89 hours
- 23 hrs 44 minutes of this clock = 24 hours of the correct clock as this clock loses 16 minutes in 24 hours.
- $23 \frac{44}{60} = 23 \frac{11}{15} = \frac{356}{15}$ hrs
- Now, $\frac{356}{15}$ hrs of this clock = 24 hours of correct clock
- 89 hours of this clock = ?
- $\frac{24 \times 11}{356} * 89 = 90$ hours of the correct clock, i.e. the correct clock gains one hour over the incorrect clock.
- The correct time on the fourth day will be 10pm.
- **OR**
- time from first day 4am to 4th day 9pm = 89 hours
- 16mins loss - in 24hrs
- ? - in 89hrs
- so loss = 59.33mins == 1hr
- as loss is of 1hr ,so correct clock will indicate 10pm when this clock will show 9pm



Clocks(Assignment)

Q. An accurate clock shows 8 o'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

- A. 144° B. 150° C. 168° D. 180°

- Soln:
- In one hour ----- the hour hand rotates 30°
- In 6 hours ----- the hour hand rotates 180°
- OR
- Number of hours from 8am till 2pm= 6hrs
The rotation of an hour hand in one hour= 30°
Total degree of rotation= 360°

Therefore, the Angle traced by the hour hand in 6 hours is= $(360/12) \times 6 = 180^\circ$

• **Ans: D**



Clocks(Assignment)

Q. What is the angle between the hands of a clock at 7:20 ?

- A. 100°
- B. $192\frac{1}{2}^\circ$
- C. 195°
- D. $197\frac{1}{2}^\circ$

Ans : A

What is the angle between the hands of a clock at 2:30 ?

- A. 144°
- B. 150°
- C. 105°
- D. 180°

Ans : C

What is the angle between the hands of a clock at 3:30 ?

- A. 144°
- B. 150°
- C. 105°
- D. 75°

Ans : D



Clocks(Assignment)

Q. The minute hand of a clock overtakes the hour hand at intervals of 65 mins of correct time. How much does the clock gain or lose in one day?

- A. $10 \frac{10}{143}$ min B. $10 \frac{21}{143}$ min C. $10 \frac{100}{143}$ min D. None of these

Ans: A



Clocks(Assignment)

Q. A clock is so placed that at 12 noon its minute hand points towards North-east. In which direction does its hour hand point at 1:30 p.m ?

A. West

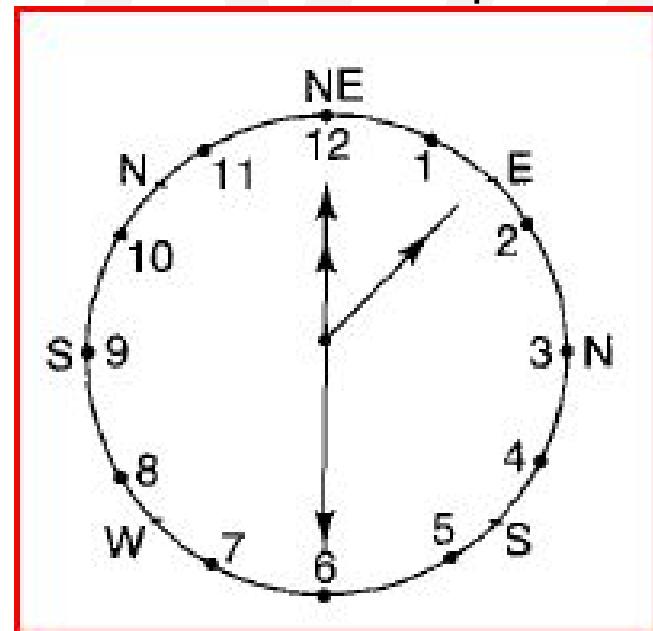
B. East

C. North

D. South

Ans: B

Diagram is shown as per the conditions in the question. Clearly at 1.30 p.m hour hand shall point - East.

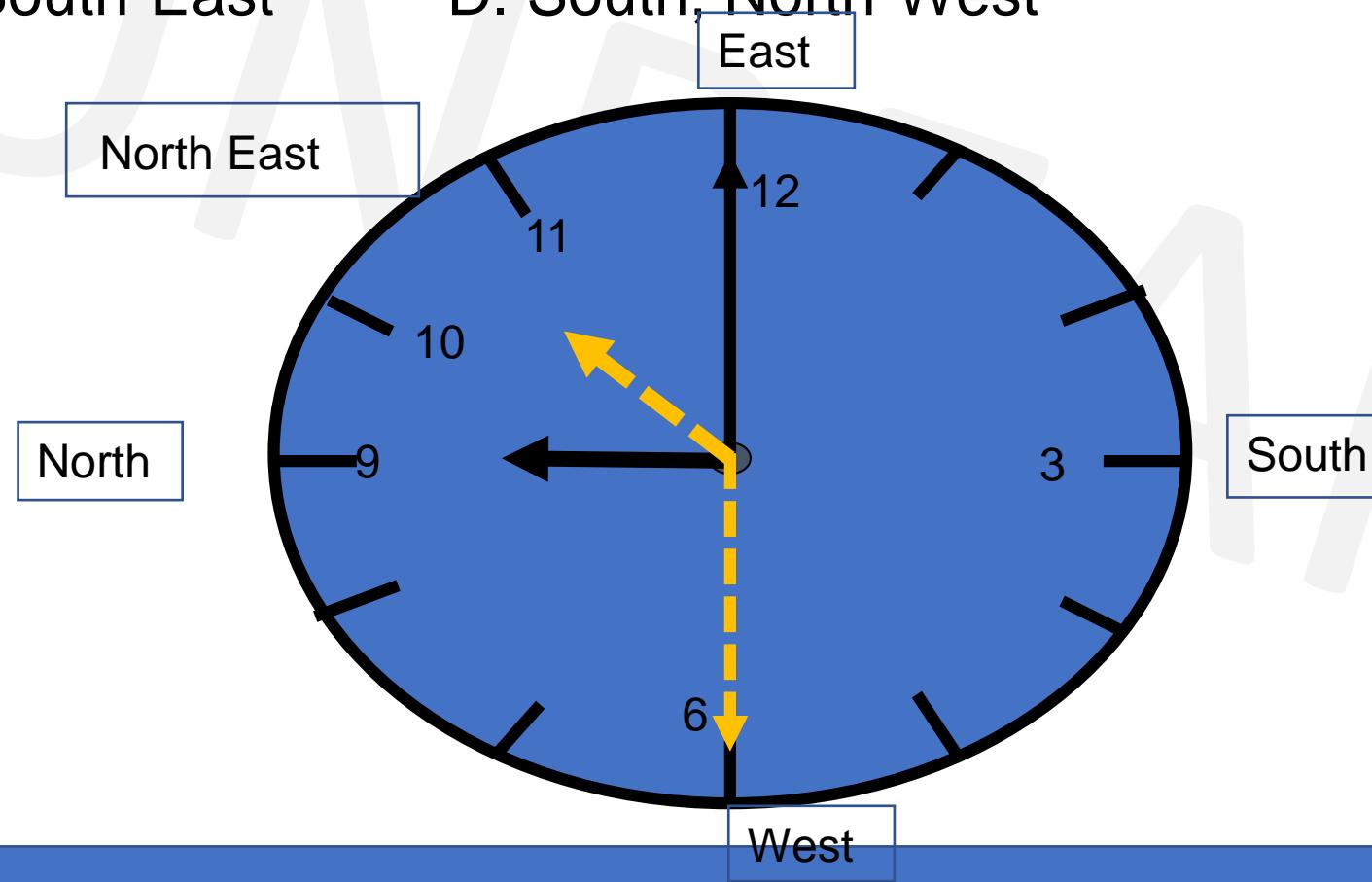


Clock(Assignment)

Q. Time piece kept in home is such that hour hand points to North at 9am..In which direction minute hand and hour hand point respectively at 10:30am?

- A. West, North-East
- B. East, North-West
- C. North, South-East
- D. South, North-West

Ans: A



Clock(Assignment)

Q. How many rotations will the hour hand of a clock complete in 72 hours?

- A. 3
- B. 6
- C. 9
- D. 12

Ans: B







GENERAL APTITUDE

Trainer : Sujata Mohite
sujata.mohite@sunbeaminfo.com



Calendar

- In Non Leap year –
 - 365 days
 - $1 \text{ year} = 52 \text{ weeks} + 1 \text{ odd day(extra day)}$
 - 28th February
- In Leap year –
 - 366 days
 - $1 \text{ year} = 52 \text{ weeks} + 2 \text{ odd days}$
 - 29th February
- A **century leap year** is a **year** that is exactly divisible by 400
 - **years** 1600 and 2000 were **century leap years**; (400,800,1200,1600,2000 – century leap years till date)
 - **years** 1700, 1800, and 1900 were not **century leap years**.
- To find the day of a week on a given date we use the concept of “**odd days**”.
- 01/01/0001 A.D(Anno Domini) was a Monday and 1st day of week so 1st January 0001 was a Monday.



Calendar

- In a century,
 - 24 leap year
 - 76 non leap years

100 years

Leap year non leap year

$$24 \times 2 + 76 \times 1 = \frac{48}{7} + \frac{76}{7}$$

remainder

$$6 + 6 = 12 \div 7 = 5 \leftarrow \text{remainder}$$

5 extra(odd) days in a century (100 years)

100 years = 5 odd days ← remainder

200 years = $10 \div 7 = 3$ odd days

300 years = $15 \div 7 = 1$ odd days

400 years = 0 odd days (as century leap year)



Calendar

Years	No. of odd
Ordinary year	1
Leap year	2
100 years	5
200 years	3
300 years	1
400 years	0

BEAM



Calendar

Day of week	No. of odd
Sunday	0
Monday	1
Tuesday	2
Wednesday	3
Thursday	4
Friday	5
Saturday	6

BEAM



Calendar

Month		Remainder
January	$31 \div 7$	3
February	$28 \div 7$ or $29 \div 7$	0(non leap) or 1(leap)
March	$31 \div 7$	3
April	$30 \div 7$	2
May	$31 \div 7$	3
June	$30 \div 7$	2
July	$31 \div 7$	3
August	$31 \div 7$	3
September	$30 \div 7$	2
October	$31 \div 7$	3
November	$30 \div 7$	2
December	$31 \div 7$	3



Calendar

Q. What was the day of the week on 15th August, 1947?

Soln:

Completed till 1946

$$\begin{array}{ccc} 1946 & & \\ \downarrow & \downarrow & \\ \frac{1900}{400} = 300 & \frac{46}{4} = 11 \text{(quotient)} & \\ 1 \text{ odd day} & 46 + 11 = 57 & \frac{57}{7} = 1 \text{(remainder)} \end{array}$$

In 1946, odd days are,

$$\begin{array}{cccccc} 1900 & & 46 & & & \\ & 1 & + & 1 & = & 2 \text{ odd days} \end{array}$$

1946 month

$$\text{Total odd days} = 2 + 2 + 1 = 5 \text{ odd days}$$

As per table for days of a week , 5 \longleftrightarrow Friday

As month is August, go till July as per table,

$$\begin{array}{ccccccccc} J & F & M & A & M & J & J \\ 3 + 0 + 3 + 2 + 3 + 2 + 3 = 16 \end{array}$$

$$\text{Now, } \frac{16}{7} = 2 \text{ (remainder)}$$

$$\begin{array}{c} \text{For date,} \\ \frac{15}{7} = 1 \text{ (remainder)} \end{array}$$



Calendar

For Months -

J	F	M	A	M	J	J	A	S	O	N	D
0	3	3	6	1	4	6	2	5	0	3	5

For years -

1600 – 1699	6
1700 – 1799	4
1800 – 1899	2
1900 – 1999	0
2000 – 2099	6



Calendar

Q. What was the day of the week on 26th January, 1947?

Soln:

1. Last 2 digits of the year → 47
 2. Divide by 4 ($47 \div 4$) = 11 (quotient)
 3. Take the date → 26
 4. Take the no. of month → 0 (from table)
 5. Take the no. of year → 0 (from table)
-
- 84 (add)
6. Divide by 7 → $\frac{84}{7} = 0$ (remainder)

Check table for day of the week

0 \longleftrightarrow Sunday



Calendar

Q. What was the day of the week on 29th February, 2012?

Soln:

1. Last 2 digits of the year → 12
2. Divide by 4 ($12 \div 4$) = 03(quotient)
3. Take the date → 29
4. Take the no. of month → 03 (from table)
5. Take the no. of year → $\underline{06}$ (from table)
53 (add)
6. Divide by 7 → $\frac{53}{7} = 4$ (remainder)

subtract 1 from remainder

In this case for all dates of **January & February** in a leap year , $4 - 1 = 3$

Check table for day of the week

3 \longleftrightarrow Wednesday



Calendar

Q. Today is Monday. Which day will be on 61st day?

Soln:

1 week = 7 days. Taking the multiple of 7

56 - Monday

or

63 - Monday

57 – Tuesday

62 - Sunday

58 – Wednesday

61 - Saturday

59 – Thursday

60 – Friday

61 - Saturday

$56 + 5 = 61$ days

(add 5 days)

or

$63 - 61 = 2$ days

(subtract 2 days)



Calendar

Q. What dates of May 2002 did Monday fall on?

Soln:

Lets take date = 1st May 2002

1. Last 2 digits of the year → 02
2. Divide by 4 ($02 \div 4$) = 00(quotient)
3. Take the date → 01
4. Take the no. of month → 01 (from table)
5. Take the no. of year → 06 (from table)
—————
10 (add)
6. Divide by 7 → $\frac{10}{7} = 3$ (remainder)

Check table for day of the week

3 \longleftrightarrow Wednesday

1st May 2002 falls on Wednesday

1	2	3	4	5	6
W	Th	F	Sa	Su	M

↑
first Monday

Now add 7 to it to find remaining Mondays

Dates on which Monday falls are -

6 , 13 , 20, 27



Calendar

Q. If we have preserved the calendar of 2017. Find the next immediate year in which we can reuse.

A. 2027 B. 2023

C. 2025 D. 2029

Soln:

$x/4$ (x = given year)

$$\frac{2017}{4} = 1 \text{ (remainder)}$$

For any year divide by 4, the possibility of remainder is 0,1,2,3

If remainder = 0 $\rightarrow x + 28$

If remainder = 1 $\rightarrow x + 6$

If remainder = 2/3 $\rightarrow x + 11$

$$\text{So, } \frac{2017}{4} = 1 \text{ (remainder)}$$

$$2017 + 6 = 2023$$

Ans: B



Calendar

Q. Which of the following days can never be the last day of a century?

- A. Sunday B. Monday C. Tuesday D. Wednesday

• **Soln:**

- The last day of century can be only
- 1 odd day(Monday)
- 3 odd days (Wednesday)
- 5 odd days (Friday)
- 7 or 0 odd days (Sunday)
- So, century can never end in **Tuesday , Thursday or Saturday.**

• **Ans: C**



Calendar

- Q. The day on 5th April of a year will be the same day on 5th of which month of the same year?
- A. 5th July B. 5th August C. 5th June D. 5th October

• **Ans A**

- April & July for all years have the same calendar. So, a day on any date of April will be the same day on the corresponding date in July.
- The same day will fall on 5th July of the same year.



Calendar(Assignment)

Q. What was the day of the week on your birthdate?

Q. 13th October 2019 is a Sunday. Find the day on 13th October 1989?

- A. Sunday
- B. Monday
- C. Friday
- D. Wednesday

Ans: C

Q. 1st March 2006 falls on a Wednesday .What day does 1st March 2010 fall on?

- A. Tuesday
- B. Monday
- C. Friday
- D. Wednesday

Ans: B

Q. Today is Monday. Which day will be after 64 days?

- A. Tuesday
- B. Monday
- C. Friday
- D. Wednesday

Ans: A

Q. Today is Monday. After 30 days it will be?

- A. Tuesday
- B. Monday
- C. Friday
- D. Wednesday

B. Ans: D



Calendar(Assignment)

Q. 15th August 1947 was a Friday. Find the day on 15th August 1977?

- Soln:

$$\begin{array}{r} 1977 \\ - 1947 \\ \hline 30 \text{ years} \end{array}$$

Leap years between 1947 to 1977

1948	1964
1952	1968
1956	1972
1960	1976

} 8 years

$$30 + 8 = 38$$

total years leap

$$\frac{38}{7} = 3 \text{ (remainder)}$$

As 15th August 1947 was a Friday ,

So, Friday + 3 days = **Monday**



Calendar(Assignment)

Q. 4th January 2016 falls on Monday. What day of the week does 4th January 2017 lies?

- A. Wednesday
- B. Thursday
- C. Tuesday
- D. Monday

Soln:

Normal year = 1 odd day

Leap year = 2 odd days

$$\begin{array}{r} \text{Jan 4, 2016} \rightarrow \text{Monday} \\ + \quad 2 \quad (\text{as leap year}) \\ \hline \end{array}$$

Jan 4, 2017 → Wednesday

Ans: A



Calendar(Assignment)

Q. Wednesday falls on 5th of a month .So which day will fall 5 days after 22nd of the same month?

A. Tuesday

B. Friday

C. Thursday

D. Wednesday

Ans: B

5th = Wednesday

+7

12th = Wednesday

+7

19th = Wednesday

+5

22nd = Saturday

27th = Thursday

5 days after 22nd will be **Friday**



Calendar(Assignment)

Q. On what dates of April, 2001 did Wednesday fall?

- A. 1st, 8th, 15th, 22nd, 29th
- B. 2nd, 9th, 16th, 23rd, 30th
- C. 3rd, 10th, 17th, 24th
- D. 4th, 11th, 18th, 25th

Ans: D



Calendar(Assignment)

Q. What is the day on 22 April 2222?

- A. Monday
- B. Tuesday
- C. Saturday
- D. Sunday

Ans: A



Calendar(Assignment)

Which of the following is not a leap year?

- A. 700
- B. 800
- C. 1200
- D. 2000

Ans: A

The century divisible by 400 is a leap year.

The year 700 is not a leap year.



Calendar(Assignment)

It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

- A. Sunday
- B. Saturday
- C. Friday
- D. Wednesday

Ans: C

On 31st December, 2005 it was Saturday.

Number of odd days from the year 2006 to the year 2009 = $(1 + 1 + 2 + 1) = 5$ days.

On 31st December 2009, it was Thursday.

on 1st Jan, 2010 it is Friday.



Calendar(Assignment)

Q. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?

- A. Monday
- B. Tuesday
- C. Wednesday
- D. Sunday

Ans: B



Permutation & Combination

- What is permutation?
- It is the number of ways a group of things can be arranged.

E.g: Consider 3 letters A,B,C . In how many ways they can be arranged?

- A B C
 - A C B
 - B A C
 - B C A
 - C A B
 - C B A
- 6 ways to arrange these 3 letters
- For 3 letter / 4 letter words its possible but for more number of letters we need a formula-
 - $nPr = \frac{n!}{(n-r)!}$



Permutation & Combination

Q. Consider 4 letters A,B,C,D and arrange them in 3 spaces

- - - 3 spaces

No . Of letters = 4

No of spaces = 3

$$nPr = 4P_3 = \frac{4!}{(4-3)!} = \frac{4!}{1!} = 4! = 4 \times 3 \times 2 \times 1 = 24 \text{ ways it can be arranged}$$

Q. Arrange 7 letters A,B,C,D,E,F,G in 4 spaces

- - - - 4 spaces

$$nPr = 7P_4 = \frac{7!}{(7-4)!} = \frac{7!}{3!} = \frac{5040}{6} = 840$$



Permutation & Combination - Remember

$$0! = 1$$

$$1! = 1$$

$$2! = 2 \times 1 = 2$$

$$3! = 3 \times 2 \times 1 = 6$$

$$4! = 4 \times 3 \times 2 \times 1 = 24$$

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

$$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

$$7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$$



Difference between permutation and combination

Combination (order does not matter)

"My fruit salad is a combination of apples, grapes and bananas" We don't care what order the fruits are in, they could also be "bananas, grapes and apples" or "grapes, apples and bananas", its the same fruit salad.



Permutation (When the order does matter)

"The combination to the safe is 472". Now we **do** care about the order. "724" won't work, nor will "247". It has to be exactly **4-7-2**.



Difference between permutation and combination

What is permutation?

Permutation: The various ways of arranging a given number of things by taking some or all at a time are all called as permutations.

Permutation includes word formation, number formation, circular permutation, etc. **In permutation, objects are to be arranged in particular order.** It is denoted by ${}^n P_r$, or $P(n, r)$.

Example: Arrange the given 3 numbers 1, 2, 3 by taking two at a time.

Now these numbers can be arranged in 6 different ways: (12, 21, 13, 31, 23, 32).

Here,

12 and 21, 13 and 31 or 23 and 32 do not mean the same, because here order of numbers is important.



Difference between permutation and combination

- **What is combination?**

Combination: Each of different groups or selections formed by taking some or all number of objects is called a combination.

Combination is used in different cases which include team/group/committee.

In combination, objects are selected randomly and here order of objects doesn't matter. It is denoted by ${}^n C_r$ or $C(n, r)$ or ${}^n C_r = {}^n C_{(n-r)}$.

Example: If we have to select two girls out of 3 girls X, Y, Z, then find the number of combinations possible.

Now only two girls are to be selected and arranged. Hence, this is possible in 3 different ways: **(XY, YZ, XZ).**

Here,

You cannot make a combination as XY and YX, because these combinations mean the same.



Permutation & Combination

Q. In how many ways can the letters of the word 'LEADER' be arranged?

- A. 72 B. 144 C. 360 D. 720 E. None of these

Soln:

The word LEADER has 6 letters. So it can be arranged in $6!$ ways.

Out of these 6 letters , 2 letters are repeated (letter E repeated twice)

So we write it as -

$$\frac{6!}{2!}$$

6! ways to arrange letters in the word LEADER

2! In the denominator as letter E is repeated twice

$$\begin{aligned} &= \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} \\ &= 360 \text{ ways} \end{aligned}$$

Ans : C



Permutation & Combination

Q. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?

- A. 360 B. 480 C. 720 D. 5040 E. None of these

Soln:

L E A D I N G —————→ vowels in this word are E,A,I

Remaining letters(consonants) are - L D N G

now we can arrange the vowels together in the remaining spaces as

_ L _ D _ N _ G _ in 5! ways and vowels be rearranged in those spaces in 3! ways

$$5! \times 3! = 720 \text{ ways}$$

Ans : C



Permutation & Combination

Q. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

- A. 810 B. 1440 C. 2880 D. 50400 E. 5760

Soln:

C O R P O R A T I O N ----- vowels in this word are O,O,A,I,O

Remaining letters(consonants) are - C R P R T N

now we can arrange the vowels together in the remaining spaces as

_C_R_P_R_T_N_ in 7! ways and vowels be rearranged in those spaces in 5! Ways

But the repeated letters are 2R in consonants and 3O in vowels

$$\frac{7!}{2!} \times \frac{5!}{3!} = 50400 \text{ ways}$$

Ans : D



Permutation & Combination

Q. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

- A. 210 B. 1050 C. 25200 D. 21400 E. None of these

Soln:

we need to form a 5letter word with 3consonants & 2vowels = C C C V V

Ways to select, (3 consonants out of 7) AND (2 vowels out of 4)

$$= 7C_3 \times 4C_2 \times 5!$$

each group has 5 letters and they can be arranged in 5! ways

$$= \frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{4 \times 3}{2 \times 1} \times 5!$$

$$= 35 \times 6 \times 120$$

$$= 25200 \text{ ways}$$

Ans : C



Permutation & Combination

Q. In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions?

- A. 32
- B. 48
- C. 36
- D. 60
- E. 120

Ans: C



Permutation & Combination

Q. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?

- A. 564 B. 645 C. 735 D. 756 E. None of these

Soln:

We may have (3 men and 2 women) or (4 men and 1 woman) or (5 men only).

Required number of ways= $(7C3 \times 6C2) + (7C4 \times 6C1) + (7C5)$

$$= \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6 \times 5}{2 \times 1} \right) + (7C3 \times 6C1) + (7C2) \rightarrow [\text{using } {}^nC_r = {}^nC_{(n-r)}]$$

$$= 525 + \left(\frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6}{1} \right) + \left(\frac{7 \times 6}{2 \times 1} \right)$$

$$= 525 + 210 + 21$$

$$= 756$$

Ans: D



Permutation & Combination(Assignment)

Q. 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. 194 C. 205 D. 209 E. None of these

Soln:

(1 boy and 3 girls) or (2 boys and 2 girls) or (3 boys and 1 girl) or (4 boys).

$$= (6C1 \times 4C3) + (6C2 \times 4C2) + (6C3 \times 4C1) + (6C4)$$

$$= (6C1 \times 4C1) + (6C2 \times 4C2) + (6C3 \times 4C1) + (6C2) \rightarrow \text{using } {}^nC_r = {}^nC_{(n-r)} (\text{to reduce calculation})$$

$$= (6 \times 4) + \left(\frac{6 \times 5}{2 \times 1} \times \frac{4 \times 3}{2 \times 1} \right) + \left(\frac{6 \times 5 \times 4}{3 \times 2 \times 1} \times 4 \right) + \frac{6 \times 5}{2 \times 1}$$

$$= (24 + 90 + 80 + 15)$$

$$= 209$$

Ans: D



Permutation & Combination(Assignment)

Q. How many 4-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?

- A. 40
- B. 400
- C. 5040
- D. 2520

Ans: C



Permutation & Combination(Assignment)

Q. In how many different ways can the letters of the word 'MATHEMATICS' be arranged so that the vowels always come together?

- A. 10080
- B. 4989600
- C. 120960
- D. None of these

Ans: C



Permutation & Combination(Assignment)

Q. In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

- A. 120
- B. 720
- C. 4320
- D. 2160
- E. None of these

Ans: B



Permutation & Combination(Assignment)

Q. How many Permutations of the letters of the word APPLE are there?

- A.600
- B.120
- C.240
- D.60

Ans: D



Permutation & Combination(Assignment)

Q. How many different words can be formed using all the letters of the word ALLAHABAD?

- A. 7560
- B. 7890
- C. 7650
- D. None of these

Ans: A



Permutation & Combination(Assignment)

Q. Find the value of ${}^{50}P_2$

- A. 4500
- B. 3260
- C. 2450
- D. 1470

Ans : C



Permutation & Combination(Assignment)

Q. How many words can be formed by using letters of the word ‘DELHI’?

- a. 50
- b. 72
- c. 85
- d. 120

Ans : D



Permutation & Combination(Assignment)

Q. Find the number of ways the letters of the word 'RUBBER' can be arranged?

- A. 450
- B. 362
- C. 250
- D. 180

Ans: D



Permutation & Combination(Assignment)

Q. Out of 5 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

- A. 60
- B. 200
- C. 5230
- D. 7200

Ans : D



Permutation & Combination(Assignment)

Q. In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

- A. 63
- B. 90
- C. 126
- D. 45
- E. 135

Ans: A



IMPORTANT FORMULAE

- **I.** 1.Area of a rectangle=(length x breadth)
- Therefore length = (area/breadth) and breadth=(area/length)
- 2.Perimeter of a rectangle = $2 \times (\text{length} + \text{breadth})$

- **II.** Area of a square = $(\text{side})^2 = \frac{1}{2}(\text{diagonal})^2$
- **III** Area of four walls of a room = $2 * (\text{length} + \text{breadth}) * (\text{height})$

- **IV** 1.Area of the triangle= $\frac{1}{2}(\text{base} * \text{height})$
- 2. Area of a triangle = $(s * (s-a)(s-b)(s-c))^{(1/2)}$, where a,b,c are the sides of a triangle & $s = \frac{1}{2}(a+b+c)$
- 3.Area of the equilateral triangle = $((3^{1/2})/4) * (\text{side})^2$



IMPORTANT FORMULAE

- **V.** 1. Area of the parallelogram = (base * height)
2. Area of the rhombus = $\frac{1}{2}$ (product of the diagonals)
3. Area of the trapezium = $\frac{1}{2}$ (size of parallel sides)*distance between them.

- **VI** 1. Area of a circle = πr^2 , where r is the radius
2. Circumference of a circle = $2\pi R$.
3. Length of an arc = $2\pi R\theta/(360)$ where θ is the central angle
4. Area of a sector = $(1/2) (\text{arc} \times R) = \pi R^2 \theta/360$.

- **VII.** 1. Area of a semi-circle = $(\pi)R^2$.
2. Circumference of a semi-circle = $(\pi)R$.
where, **pi** = 3.142



VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **I. CUBOID**

- Let length = l, breadth = b and height = h units. Then,
- 1. Volume = $(l \times b \times h)$ cubic.units.
- 2. Surface area= $2(lb + bh + lh)$ sq.units.
- 3. Diagonal.= $\sqrt{l^2 + b^2+h^2}$ units

- **II. CUBE**

- Let each edge of a cube be of length a. Then,
- 1. Volume = a^3 cubic units.
- 2. Surface area= $6a^2$ sq. units.
- 3. Diagonal = $\sqrt{3} a$ units.

- **III. CYLINDER**

- Let radius of base = r and Height (or length) = h. Then,
- 1. Volume = $(\pi r^2 h)$ cubic units.
- 2. Curved surface area = $(2\pi rh)$. units.
- 3. Total surface area = $2 \pi r (h+r)$ sq. units



VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **IV. CONE**

- Let radius of base = r and Height = h . Then,
- **1. Slant height, $l = \sqrt{h^2+r^2}$**
- **2. Volume = $(1/3) \pi r^2 h$ cubic units.**
- **3. Curved surface area = $(\pi r l)$ sq. units.**
- **4. Total surface area = $(\pi r l + \pi r^2)$ sq. units.**

- **V. SPHERE**

- Let the radius of the sphere be r . Then,
- **1. Volume = $(4/3) \pi r^3$ cubic units.**
- **2. Surface area = $(4 \pi r^2)$ sq. units.**

- **VI. HEMISPHERE**

- Let the radius of a hemisphere be r . Then,
- **1. Volume = $(2/3) \pi r^3$ cubic units.**
- **2. Curved surface area = $(2 \pi r^2)$ sq. units.**
- **3. Total surface area = $(3 \pi r^2)$ units.**



Surds and Indices

O Rules of Indices: -

i. $a^n * a^m = a^{m+n}$

ii. $\frac{a^m}{a^n} = a^{m-n}$

iii. $(a^n)^m = a^{mn}$

iv. $(ab)^n = a^n * b^n$

v. $(\frac{a}{b})^n = \frac{a^n}{b^n}$

vi. $a^0 = 1$ (where $a \neq 0$)

vii. $a^{-n} = \frac{1}{a^n}$

O Rules of Surds: -

i. $\sqrt[n]{a} = a^{\frac{1}{n}}$

ii. $\sqrt[n]{ab} = a^{\frac{1}{n}} * b^{\frac{1}{n}}$

iii. $\sqrt[n]{\frac{a}{b}} = \frac{a^{\frac{1}{n}}}{b^{\frac{1}{n}}}$

iv. $(\sqrt[n]{a})^n = a$

v. $(\sqrt[n]{a})^m = a^{\frac{m}{n}}$



Races

Races

- A contest of speed in running, riding, driving, sailing or rowing is called a race.
- If in a race Ram is at starting point & Shyam starts from 20 mts ahead, then it is said that Ram has given Shyam a start of 20 mts or Ram gives Shyam 20 mts.
- This means that if they start from same point Ram would beat Shyam by 20 mts.



Races

Q. In a 100 mt race A gives B a start of 25 mt & still wins by 9 sec. Find the speed of A if speed of B is 6 kmph.

A. 8 kmph

B. 9 kmph

C. 10 kmph

D. 12 kmph

Soln



$$S_b = 6 \text{ kmph} = 6 \times 5/18 = 5/3 \text{ m/s}$$

$$T_b = D_b/S_b = 75/(5/3) = 45 \text{ sec}$$

$$T_a = T_b - 9 = 36 \text{ sec}$$

$$\begin{aligned} S_a &= D_a/T_a \\ &= 100/36 \text{ m/s} \\ &= 100/36 \times 18/5 \\ &= 10 \text{ kmph} \end{aligned}$$

Ans C



Races(Assignment)

Q. In a 100 m race, A can beat B by 25 m and B can beat C by 4 m. In the same race, A can beat C by:

- A. 21 m B. 26 m C. 28 m D. 29 m

• Soln:-

$$A : B = 100 : 75$$

$$B : C = 100 : 96$$

$$A:C = \left(\frac{A}{B} \times \frac{B}{C} \right) = \left(\frac{100}{75} \times \frac{100}{96} \right) = 100:72$$

A beats C by $(100 - 72) = 28$ m.

Ans: C



Circular Motion

- Use of both relative speed & LCM
- Let S_a, S_b = speeds of two persons.

S_r = Their relative speed

Distance traveled in 1 round = circumference

Case A : Both running in Same direction

Both meet again first time when \rightarrow **Time = dist/ S_r = Circumference/ $S_a - S_b$**

Case B : Both running in opposite directions(**DistA+ DistB =Circumference**)

Both meet first time when \rightarrow **Time = Circumference/ $S_a + S_b$**

Case C : Both running in same/opposite directions

Both meet again at starting point at LCM of their Lap times.



Circular Motion(Races)

Q. Two friends P & Q start from same point at the same time on a circular track 336 meters long in opposite directions at 6 m/s & 8 m/s respectively. After how much time will they meet again at the starting point for the first time?

- A. 56 sec B. 112 sec C. 168 sec D. 214 sec

Ans : C

Step1 – find the time taken by each member /player to complete 1 round

Step2 – Calculate LCM(Lap time)

$$\text{LapTm}(P) = \frac{\text{Circumference}}{\text{Sp}} = \frac{336}{6} = 56 \text{ sec}$$

$$\text{LapTm}(Q) = \frac{\text{Circumference}}{\text{SQ}} = \frac{336}{8} = 42 \text{ sec}$$

$$\text{LCM}(42,56) = 168 \text{ sec}$$



Circular Motion(Assignment)

Q. A, B & C start together running along a circular track of 500 m at 8 km/hr, 5 km/hr & 3 km/hr respectively. After how much time will all three meet again at the starting point for the first time?

- A. 20 min
- B. 24 min
- C. 30 min
- D. 36 min

Ans: C







GENERAL APTITUDE

Trainer : Sujata Mohite
sujata.mohite@sunbeaminfo.com



SUNDEAM

REASONING



Analogy

Q. Planet : Orbit :: Projectile : ?

- A. Track
- B. Path
- C. Milky Way
- D. Trajectory

Ans D

Q. Pigeon : Peace :: White Flag : ?

- A. Friendship
- B. Victory
- C. Surrender
- D. War

Ans C. (negotiations)



Analogy

Q. Complete analogous pair

Elephant : Howdah :: Horse:?

A. Lounge

B. Hoof

C. Saddle

D. Hump

Ans : C



Analogy

Complete analogous pair

sphere :circle :: cuboid : ?

- A. Square
- B. Parallelogram
- C. Rhombus
- D. Rectangle
- E. Pentagon

Ans: D



Analogy

Q. $5 : 35 :: ?$

- A. 7 : 77 B. 9 : 45 C. 11 : 55 D. 3 : 24

Ans : A

Q. $9 : 8 :: 16 : ?$

- A. 27 B. 17 C. 14 D. 18

Ans: A



Analogy

Complete analogous pair

$$17 : 272 :: ? : 650$$

- A. 40
- B. 24
- C. 26
- D. 28
- E. 25

Ans: C



Analogy(Assignment)

Q. $25 : 37 :: 49 : ?$

- A. 41
- B. 56
- C. 60
- D. 65

Ans : D



Analogy(Assignment)

Q1. $8 : 256 :: ?$

A. 7 : 343

B. 9 : 243

C. 10 : 500

D. 5 : 75

Ans C

Q2. $8 : 28 :: 27 : ?$

A. 8

B. 28

C. 64

D. 65

Ans D

Q3. $3 : 11 :: 7 : ?$

A. 22

B. 29

C. 18

D. 51

Ans D



Analogy(Assignment)

Q1. Newspaper : Press :: Cloth : ?

- A. Tailor
- B. Textile
- C. Factory
- D. Mill

Ans D

Q2. Train : Track ::

- A. Idea : Brain
- B. Bullet : Barrel
- C. Water : Boat
- D. Fame : Television

Ans B

Q3. Fear : Threat :: Anger : ?

- A. Compulsion
- B. Panic
- C. Provocation
- D. Force

Ans C



Odd One out

Q. Find the odd one out:

- A. 263 B. 111 C. 551 D. 383

Ans : D



Odd One out

Q. Find the odd one out -

- A. Newspaper-Editor B. Film – Director
- C. Car – Driver D. Book - Author

Ans : C



Find the Odd one out

Choose or find odd out

- A. Food : Hunger
- B. Water : Thirst
- C. Air : Suffocation
- D. Talent : Education
- E. Leg : Lame

Ans: D



Find the Odd one out

Q. Choose or find odd word:

Beans, Gourd, Brinjal, Cucumber, Potato

- A. Beans
- B. Gourd
- C. Brinjal
- D. Cucumber
- E. Potato

Ans: E



Find the Odd one out

Choose or find odd out

- A. Chair
- B. sheep
- C. bench

- D. table

Ans: B



Odd One out(Assignment)

Q1. Find the odd one out –

- A. Sprinkle - Pour B. Happiness - Merriment C. Mist – Fog D. Sad – Unhappy

Ans : D

Q2. A. Petrol

B. Taxi

C. Cart

D. Driver

Ans : C

Q3. A. Court

B. Radium

C. King

D. Palace

Ans: B

Q4. A. Donkey

B. Camel

C. Cow

D. Mule

Ans: C



Odd One out(Assignment)

Q1. Find the odd one out –

- A. Paint
- B. touch
- C. color
- D. whitewash

Ans : B

Q2. A. ball

- B. catch
- C. take
- D. hold

Ans : A

Q3. A. garment

- B. cotton
- C. sugar
- D. shirt

Ans: C

Q4. A. canteen

- B. stage
- C. dancer
- D. makeup

Ans: A

Q5. A. blackboard

- B. Duster
- C. chalk
- D. computer

Ans: D



Odd One out(Assignment)

- Q1. A. Curd B. Butter C. Oil D. Cheese

Ans C

- Q2. A. POCG B. KLIZ C. BUDX D. FMQV

Ans D

- Q3. A. 751 B. 734 C. 981 D. 862

Ans A

- Q4. A. 12 B. 25 C. 37 D. 64

Ans C

- Q5. A. Arrow B. Axe C. Dagger D. Sword E. Knife

Ans : A



Coding Decoding(A-Z)

Q. In a certain code, COMPATIBLE is written as BQNPDDKAHS. How is STABILISED written in that code?

- A. TUBCJCDRHK
- B. JCBUTEDTHM
- C. JCBUTCDRHK
- D. JCBUTEFTJM
- E. None of these

Ans: C

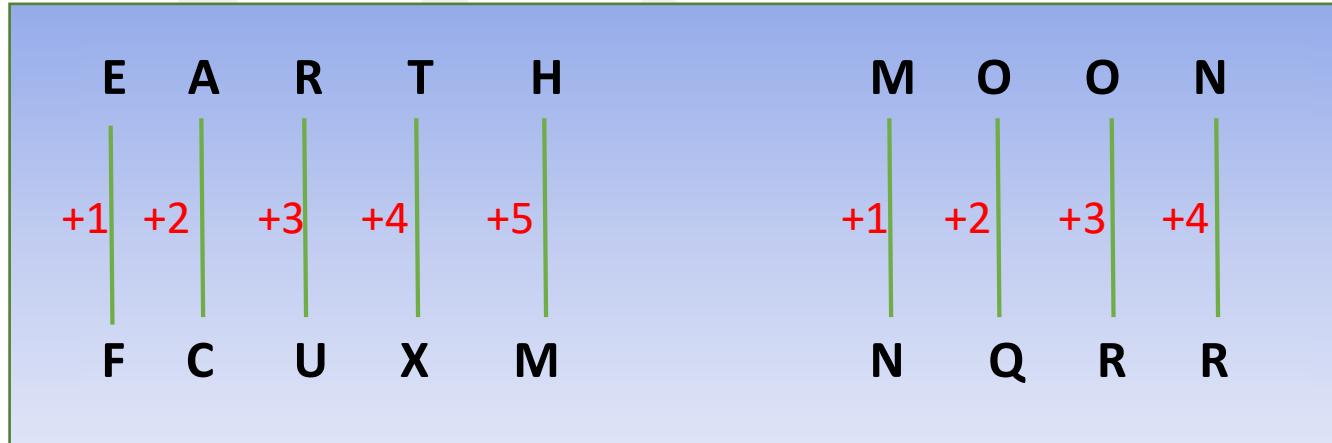
(The letters in the first half and second half of the word are written in the reverse order and in the group of letters so obtained, each letter in the first half is moved one step forward while that in the second half is moved one step backward.

STABILISED => STABI/LISED => IBATS/DESIL => JCBUT/CDRHK)



Coding Decoding(A-Z)

Q. If EARTH is written as FCUXM in a certain code. How is MOON written in that code?



Q. If DELHI is written as EDMGJ in a certain code. How is NEPAL written in that code?

- A. ODQZM
- B. FENHK
- C. OFQBM
- D. EFMIJ

Ans: A

Coding Decoding(A-Z)(Assignment)

Q. In a coded language “SHOWER” is coded as “RHWOES”. What is the code for “FATHER”?

- A. RHAEFT
- B. RAHTEF
- C. RTHAEF
- D. THAREF

Ans : B



Coding Decoding(A-Z)(Assignment)

Q. If “PATHOLOGY” is coded as “HTAPOYGOL”, then what is the code for “PROGRAMME”?

- A. GORPREMMA B. GOREPRMMA
- C. GORREPMMA D. ROGEPRMMA

• **Ans : A**



Coding Decoding(Assignment)

Q1. BANK : CBOL :: GROVE : _____

- A. SPOMP
- B. HSPWF
- C. EVORG
- D. PSWFH

Ans : B

Q2. LARGE : NCTIG :: QUIET : _____

- A. SWKGV
- B. GKVWS
- C. RPQMN
- D. TEIUG

Ans : A



Coding Decoding(Assignment)

Q. RATES : ENGRF :: DWELT : _____

- A. PRSTA B. RYJYM C. QJRYG D. RJMKN

Ans: C



Coding Decoding(Assignment)

Q. In a certain language, CHENNAI is coded as DGFMOZJ. How is MUMBAI coded in the same language ?

- A. NTNABH
- B. LVLCZJ
- C. LTLCBH
- D. NVNCBJ

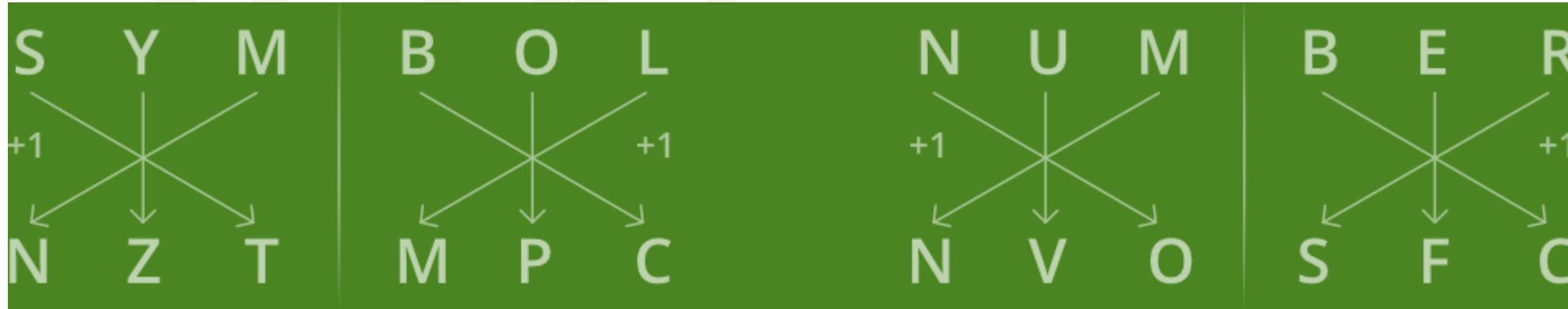
Ans: A



Coding Decoding(Assignment)

- If SYMBOL is written as NZT MPC is a certain code. How is NUMBER written in that code?

Ans: NVOSFC



Coding Decoding(Assignment)

Q1: If in a certain language, MADRAS is coded as NBESBT, how is BOMBAY coded in that code?

- A. CPNCBX
- B. CPNCBZ
- C. CPOCBZ
- D. CQOCBZ
- E. None of these

Ans: B

Q2: In a certain code, TRIPPLE is written as SQHOOKD. How is DISPOSE written in that code?

- A. CHRONRD
- B. DSOESPI
- C. ESJTPTF
- D. ESOPSID
- E. None of these

Ans: A

Q3: If in a code language. COULD is written as BNTKC and MARGIN is written as LZQFHM, how will MOULDING be written in that code?

- A. CHMFINTK
- B. LNKTCHMF
- C. LNTKCHMF
- D. NITKHCMF
- E. None of these

Ans: C



Coding Decoding(Assignment)

Q4: In a certain code, MONKEY is written as XDJMNL. How is TIGER written in that code?

- A. QDFHS
- B. SDFHS
- C. SHFDQ
- D. UJHFS
- E. None of these

Ans: A

Q5: If FRAGRANCE is written as SBHSBODFG, how can IMPOSING be written?

- A. NQPTJHOJ
- B. NQPTJOHI
- C. NQTPJOHJ
- D. NQPTJOHJ
- E. None of these

Ans: D



Coding Decoding(Assignment)

In a certain code, POETRY is written as QONDQSX and OVER is written as PNUDQ.
How is MORE written in that code language?

- A. LNNQD
- B. NNNQD
- C. NLNQD
- D. NLPQD
- E. None of these

Ans: C

(The first letter of the word is replaced by a set of two letters - one following it and the other preceding it - in the code. The remaining letters of the word are each moved one step backward)



Series-Numerical

- **Series** : In case of a series there may not be a particular formula but the terms have definite relationship which has to be recognized.
- **Difference or Sum Type Series**

1, 4, 10, 19, 31, ?

Difference between 2 terms increases in multiples of 3

- **Cumulative Series**

1, 3, 4, 7, 11, 18....

Each term is the addition of the previous terms.

- **Power Series**

0, 6, 24, 60, 120,

Here each term is defined as $n^3 - n$

- **Alternate Series**

1, 5, 9, 10, 25, 15, 49,....

Consists of two series of alternate terms having relationship.



Puzzle Test(Coding-Decoding)

Q. If pen is called table, table is called fan, fan is called chair and chair is called roof, on which of the following will a person sit ?

- A. Fan
- B. Chair
- C. Roof
- D. Table
- E. Pen

Ans: C



Coding-Decoding

If ‘football’ is called ‘cricket’, ‘cricket’ is called ‘basketball’, ‘basketball’ Is called ‘badminton’, ‘badminton’ is called ‘volleyball’, ‘volleyball’ is called ‘hockey’ and ‘hockey’ is called ‘golf, which of the following games is not played using a ball ?

- A. Volleyball
- B. Basketball
- C. Hockey
- D. Cricket
- E. None of these

Ans: A



Puzzle Test(Assignment)

Ans: B



Puzzle Test(Assignment)

- If pen is called butter, butter is called soap, soap is called ink, ink is called honey.
Which of the following is used for washing clothes?

A. Honey B. Butter C. Red D. Ink

Ans: D

- If air is called green, green is called blue, blue is called sky, sky is called yellow, then what is the colour of clear sky?

A. Yellow B. Pink C. Sky D. Water

Ans: C



Puzzle Test(Assignment)

- If train is called bus, bus is called tractor, tractor is called car, car is called scooter.
Which is used to plough a field?

A. Train B. Bus C. Tractor D. Car

Ans: D

- If room is called bed, bed is called window, window is called flower and flower is called cooler. On what would a man sleep?

A. Window B. Bed C. Flower D. Cooler

Ans: A



Puzzle Test(Assignment)

- If book is called watch, watch is called bag, bag is called bottle and bottle is called window. Which is used to carry the books?

A. Bottle B. Bag C. Book D. Watch

Ans: A

- If fork is called glass, glass is called tray, tray is called bucket, then what is used to drink water?

A. Fork B. Glass C. Tray D. Bucket

Ans: C

- Q. If 'paper' is called 'wood', 'wood' is called 'straw', 'straw' is called 'grass', 'grass' is called 'rubber' and 'rubber' is called 'cloth', what is furniture made up of -

A. grass B. straw C. wood D. paper

Ans: B



Linear Arrangement

Five friends are sitting on a bench.

Sunil is sitting next to Sunita & Sanjay is next to Bindu.

Bindu is not sitting with Sumit. Sumit is on the left end of the bench & Sanjay is on the second position from the right.

Sunil is on the right of Sunita & Sunita on the right side of Sumit. Sunil & Sanjay are sitting together.

Based on the above data, answer the following:

1	2	3	4	5
Sumit	Sunita	Sunil	Sanjay	Bindu

Q1. Who occupies the centre position?

- A. Sumit B. Sunil C. Sanjay D. Bindu

Ans: B

Q2 Sunil is sitting between

- A. Sunita & Bindu B. Sumit & Bindu C. Sunita & Sanjay D. Sanjay & Sumit

Ans: C

Q3. Sumit is sitting on the

- A. second place from right B. extreme left C. second place from left
D. extreme right

Ans: B

Q4. Sunita is sitting how many places away from Bindu?

- A. 1 B. 4 C. 2 D. 5

Ans: C



Linear Arrangement(Assignment)

Q. A, B, C, D, E, F & G are sitting on a wall all facing east. C is immediate to the right of D. B is at an extreme end and has E as his neighbor. G is between E and F. D is sitting third from the south end. Who are D's neighbors?

- A. C,E B. A,C

- C. C,F

- D. A,F

Ans: C



Circular Seating Arrangement

Q. A group of 8 members sit in a circle facing towards the centre. D is between A & F & D is opposite to G. E is to the right of A but E is on the left of C, C whose right hand neighbour is G. B has H to his left & F to his right.

Who is diagonally opposite to A?

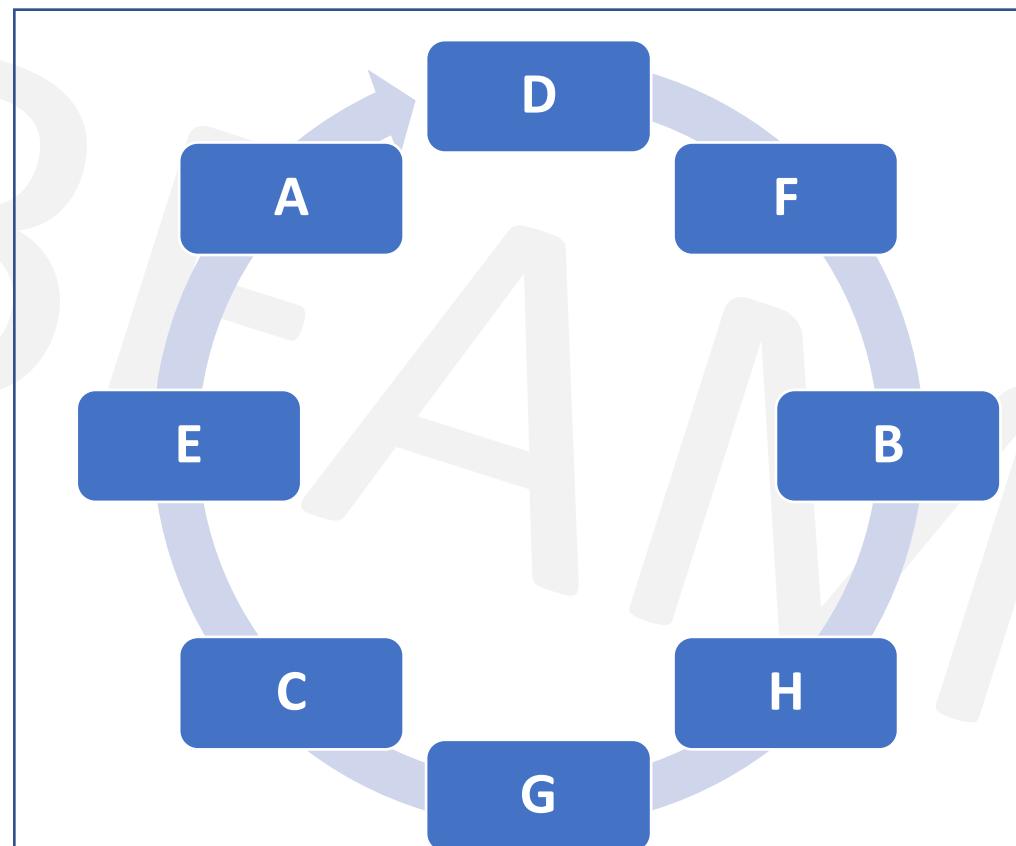
- A. B
- B. F
- C. G
- D. H

Ans: D

Who is to the right of D?

- A. B
- B. G
- C. A
- D. H

Ans: C



Circular Seating Arrangement

Q. Eight friends J,K,L,M,N,O,P and Q are sitting around a circular table playing cards. J is second to the right of P who is third to the right of K. M is second to the left of O who sits between P and J. L is not a neighbour of K or N.

1. Who is to the immediate left of K?

- A. N
- B. J
- C. Q
- D. Cannot be determined
- E. None of these

Ans: C

2. Which of the following is the correct position of N?

- A. Second to the right of K
- B. To the immediate left of K
- C. To the immediate right of M
- D. To the immediate right of K
- E. None of these

Ans: D



Circular Seating Arrangement(Assignment)

Q. Six friends are playing a card game on a round table. Subodh is to the right of Prabodh. There is one person between Sudha and Uma. Prabir is between Subodh & Uma & second to the left of Alok.

Who is to the right of Sudha?

- A. Prabodh
- B. Uma
- C. Alok
- D. Prabir

Ans : A

Who is diagonally opposite of Prabir?

- A. Prabodh
- B. Uma
- C. Sudha
- D. Prabir

Ans : C



Matrix Arrangement

Q. There are 6 friends A,B,C,D,E & F. Each one is proficient in one of the games, namely, Badminton, Volleyball, Cricket, Hockey, Tennis & Polo. Each owns a different colored car, namely, yellow, green, black, white, blue & red. D plays Polo & owns a yellow car. C does not play either Tennis or Hockey & owns neither Blue nor Yellow car. E owns a White car & plays Badminton. B does not play Tennis, he owns a Red car. A plays Cricket & owns a Black car.

Q1. Who plays Volleyball?

- A. B
- B. C
- C. F
- D. Data Inadequate

Ans : B

Q2. What is the color of F's car?

- A. Green
- B. Blue
- C. Red
- D. Either Green or Blue.

Ans : B



Matrix Arrangement(Assignment)

There are 5 people each of whom wear only one of five different brands of shirts.

Five people --- A, B, C, D & E

Five brands --- Parx, Allen Solly, Newport, Arrow & Excalibur

1] A does not wear Allen Solly or Excalibur.

2] D wears Newport or Allen Solly.

3] C wears Parx.

4] B does not wear Arrow, Newport or Excalibur.

Q1. Who wears Excalibur?

A. A

B. E

C. B

D. D

Ans: B

Q2 What does D wear?

A. Arrow B. Allen Solly C. Newport D. Excalibur

Ans: C



Coding Decoding

Q. If in a certain language "sing and play" is coded as "ra pa le", "I play football" is coded as "pa se fa" and "she can sing" is coded as "te ra ba" then what is the code for the word "and" in the code language?

- A. le
- B. se
- C. fa
- D. te

Ans : A



Coding-Decoding

In a certain code language, 'col tip mot' means 'singing is appreciable' ; 'mot baj min' means 'dancing is good' and 'tip nop baj' means 'singing and dancing' , which of the following means 'good' in that code language ?

- A. not
- B. min
- C. baj
- D. Can't be determined
- E. None of these

Ans: B



Coding Decoding(Assignment)

Q. Study the given information and select the most appropriate term for 'save more money'
'time and money' is coded as 'tis nim jes'
'manage money judiciously' is coded as 'lop xer nim'
'save more time' is coded as 'jes kib dob'
'save enough judiciously' is coded as 'xer kib hix'.

- A. nim hix kib
- B. jes nim dob
- C. kib nim dob
- D. none of these

Ans: C



Coding Decoding(Assignment)

- In a secret code,
- 762= shoes are old
- 248 = grandpa is old
- 573 = buy good shoes.
- What stands for 'are' in this code?
- A. 2 B. 4 C. 6 D. 8
- **Ans: C**

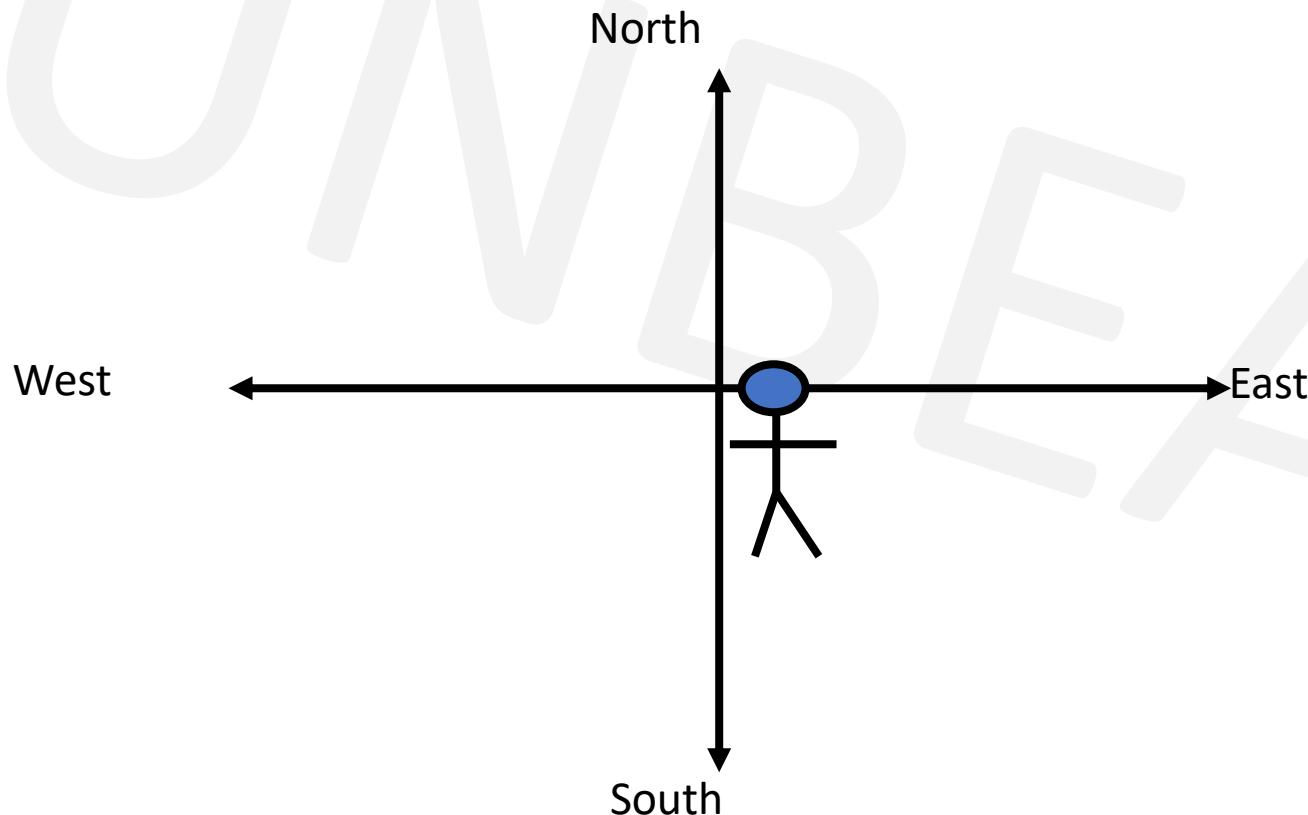


Directions

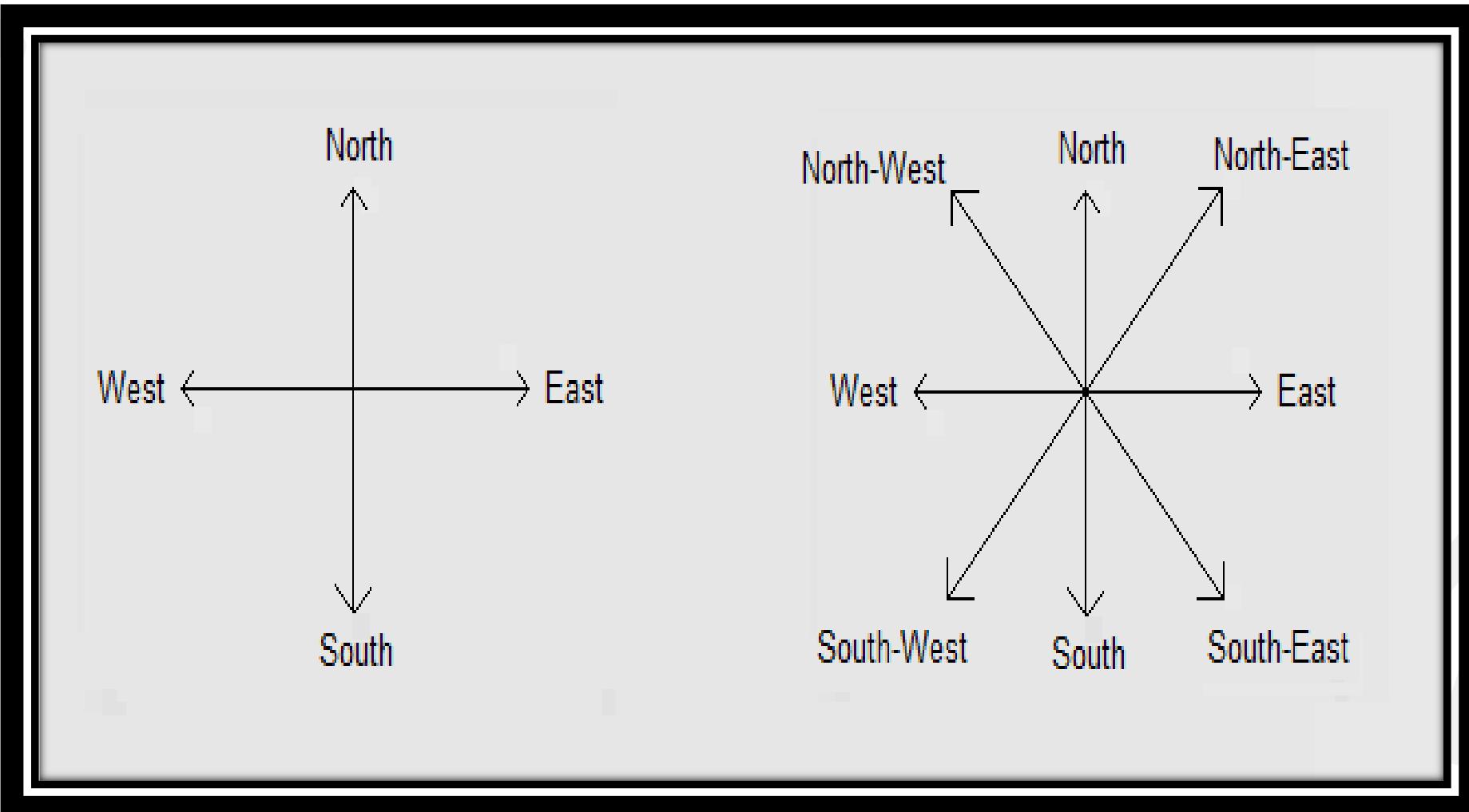
The key to solving these problems is **getting your directions right.**

It is the person's right or left not yours. The key is to think that you are walking as per the directions given in place of the man.

Visualize.



Directions



Directions

Q. A person starts from a point A and travels 3 km eastwards to B and then turns left and travels thrice that distance to reach C. He again turns left and travels five times the distance he covered between A and B and reaches his destination D. The shortest distance between the starting point and the destination is:

A. 12km

B. 15km

C. 16km

D. 18km

Ans : B

“In a right-angled triangle, the square of the hypotenuse side is equal to the sum of squares of the other two sides”, hypotenuse is the longest side, as it is opposite to the angle 90°

Hypotenuse 2 = Perpendicular 2 + Base 2

By Pythagoras Theorem –

$$\begin{aligned}\text{Min dist} &= \sqrt{(12^2 + 9^2)} \\ &= \sqrt{144 + 81} \\ &= \sqrt{225} \\ &= 15\end{aligned}$$



Directions

A and B start walking from a point, in opposite directions. A covers 3km and B covers 4km. Then turns right and walks 4km while B turns left and walks 3km. How far is each from the starting point?

- A. 5 kms
- B. 4 kms
- C. 10kms
- D. 8 kms

Ans: A

“In a right-angled triangle, the square of the hypotenuse side is equal to the sum of squares of the other two sides”, hypotenuse is the longest side, as it is opposite to the angle 90°

$$\text{Hypotenuse}^2 = \text{Perpendicular}^2 + \text{Base}^2$$

By Pythagoras Theorem –



Directions

Q. Raj walked 30 meters towards East, took a right turn and walked 40 meters. Then he took a left turn and walked 30 meters. In which direction is he now from the starting point?

- A. North - East
- B. East
- C. South - East
- D. South
- E. None of these

Ans: C



Directions(Assignment)

Q. Starting from a point x Ramu walked 25 meters towards the west he turned to his left and walked 30 meters he then turned to his left and walked 25 meters he then further turned to his right and walked 12 meters how far is Ramu from the point x and in which direction?

- A. 42 m south B. 47 m east C. 42 m north D. 27 m south

Ans : A



Directions(Assignment)

Q. I start walking towards east and after 35 metres turn right and walk another 15 metres and again turn right and walk further 15 metres and stop. What is the minimum distance I have to walk to get to my starting point?

- A. 25 metres
- B. 30 metres
- C. 35 metres
- D. 20 metres

Ans: A

“In a right-angled triangle, the square of the hypotenuse side is equal to the sum of squares of the other two sides”, hypotenuse is the longest side, as it is opposite to the angle 90°

$$\text{Hypotenuse}^2 = \text{Perpendicular}^2 + \text{Base}^2$$

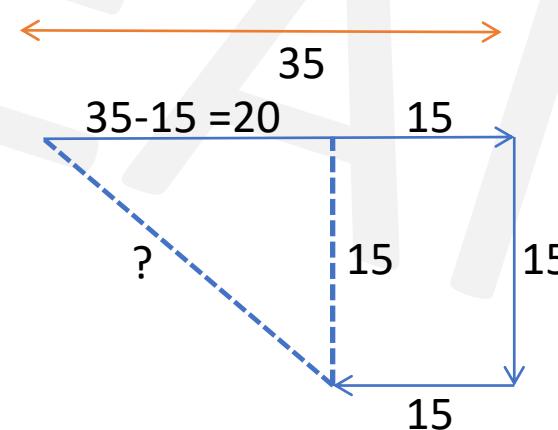
By Pythagoras Theorem –

$$\text{Min dist} = \sqrt{(20^2 + 15^2)}$$

$$= \sqrt{400 + 225}$$

$$= \sqrt{625}$$

$$= 25$$



Directions(Assignment)

Q. A walks southwards then turns right, then right again and then left and again left. In which direction is he from his starting point if he walked the same distance in before each turn?

- A. North-west
- B. South-east
- C. South-west
- D. South

Ans: C



Directions(Assignment)

Q. A walks 10m in front and 10m to the right. Then every time turning to his left, he walks 5, 15 and 15m respectively. How far is he now from his starting point and facing in which direction?

- A. 5m south
- B. 15m north
- C. 5m north
- D. 15m south

Ans : A



Directions(Assignment)

Q. I am facing East. Turning to the right I go 20 m, then turning to the left I go 20 m and turning to the right I go 20 m, then again turning to the right I go 40 m and then again I go 40 m to the right. In which direction am I from my original position?

- A. North
- B. West
- C. South
- D. East

Ans : B



Blood Relation

List of different types of relations to solve questions based on Blood Relationships.

Relationship	Terms
Father's son or mother's son	Brother
Father's daughter or mother's daughter	Sister
Mother's brother (younger or elder)	Maternal Uncle
Father's brother (younger or elder)	Uncle (Paternal)
Father's sister (younger or elder)	Aunt
Mother's sister (younger or elder)	Aunt
Son's wife	Daughter-in-law
Daughter's husband	Son-in-law
Sister's husband	Brother-in-law
Husband's brother or wife's brother	Brother-in-law
Brother's wife	Sister-in-law
Husband's sister or wife's sister	Sister-in-law
Husband's father or wife's father	Father-in-law
Husband's mother or wife's mother	Mother-in-law
Brother's son or sister's son	Nephew



Blood Relation

Type of Relationship	Terminology in Use
Mother's or Father's son	Myself/Brother
Mother's or Father's daughter	Myself/Sister
Mother's or Father's brother	Uncle
Mother's or Father's sister	Aunt
Mother's or Father's father	Grandfather
Mother's or Father's mother	Grandmother
Son's wife	Daughter-in-law
Daughter's husband	Son-in-law
Husband's or wife's sister	Sister-in-law
Husband's or wife's brother	Brother-in-law
Brother's son	Nephew
Brother's daughter	Niece
Uncle or aunt's son or daughter	Cousin
Sister's husband	Brother-in-law
Brother's wife	Sister-in-law
Grandson's or Granddaughter's daughter	Great-granddaughter



Blood Relation

Q. 'P+Q' means P is the brother of Q

'PXQ' means P is the father of Q

'P- Q' means P is the sister of Q

Which of the following represents 'S' is the niece of 'T'?

A. T x S + M - K

B. T + M x S - K

C. K - S x M + T

D. T x M + S - K

Ans : B



Blood Relation

Q. Pointing to a man in a photograph, Veena said, "His mother's only daughter is my mother." How is Veena related to that man?

- A. Nephew
- B. Sister
- C. Wife
- D. Niece

Ans: D



Blood Relation

Q. Pointing towards a girl in the picture, Seema said, "She is the mother of Neeta whose father is my son." How is Seema related to the girl in the picture?

- A. Mother-in-law
- B. Aunt
- C. Cousin
- D. None of these

Ans: A



Blood Relations(Assignment)

Q. Pointing to a boy in the photograph, Monika said, “His sister is the only daughter of my father”. How is the boy related to Monika’s father?

- A. Nephew
- B. Father
- C. Son
- D. Brother
- E. None of these

Ans: C



Blood Relations(Assignment)

Pointing to a photograph ,Nitin said " She is the grandmother of my father's sister's son". How is the woman in the photograph related to Nitin?

- A. Mother
- B. Aunt
- C. Cousin
- D. Grandmother

Ans: D



Blood Relations(Assignment)

Q. Introducing a man, a woman said, "He is the only son of my mother's mother." How is the woman related to the man ?

- A. Mother
- B. Aunt
- C. Sister
- D. Niece
- E. None of these

Ans: D

(Mother's mother---Maternal grand mother; Maternal grand mother's only son----Maternal uncle.
So, the man is woman's maternal uncle i.e., the woman is man's niece.)



Blood Relations(Assignment)

Q. A woman introduces a man as the son of the brother of her mother. How is the man related to the woman?

- A. Nephew
- B. Son
- C. Cousin
- D. Uncle
- E. Grandson

Ans: C



Blood Relations(Assignment)

Q. P and Q are sisters and R and S are brothers. P's daughter is S's sister. How is Q related to R?

- A. Aunt
- B. Niece
- C. Nephew
- D. Grandmother

Ans: A



Blood Relations(Assignment)

1. $A + B$ means A is the brother of B

2. $A \times B$ means A is the father of B

3. $A \div B$ means A is the mother of B

Which of the following would mean "G is the son of H"?

A. $H \times I \times G$

B. $H + G \times I$

C. $H \div G \div I$

D. $H \times G + I$

Ans: D



Blood Relations(Assignment)

Q. A + B means A is the son of B;

A - B means A is the wife of B;

A x B means A is the brother of B;

A ÷ B means A is the mother of B; and

A = B means A is the sister of B.

What does P = R ÷ Q mean ?

- a. P is the aunt of Q.
- b. P is the sister of Q.
- c. Q is the niece of P.
- d. Q is the daughter of P.

Ans: a



Blood Relations(Assignment)

Q. Pointing to a girl, Kirti Said, “She is the daughter of my brother’s wife”. How is the girl related to Kirti?

- A. Nephew
- B. Niece
- C. Sister-in-law
- D. Mother
- E. None of these

Ans: B



Blood Relations(Assignment)

Q. A is the son of C; C and Q are sisters; Z is the mother of Q and P is the son of Z. Which of the following statements is true?

- A. P and A are cousins
- B. P is the maternal uncle of A
- C. Q is the maternal grandfather of A
- D. C and P are sisters

Ans: B

- C and Q are sisters and A is the son of C.
- C is the mother of A and Z is the mother of Q.
Hence, Z is the maternal grandmother of A.
- P is the son of Z.
- Hence, P is the maternal uncle of A.



Blood Relations(Assignment)

Q. Sherlock said to a lady sitting in a car, "The only daughter of the brother of my wife is the sister-in-law of the brother of your sister." How the husband of the lady is related to Sherlock ?

- A. Maternal uncle B. Uncle C. Father D. Son-in-law

Ans: D

- Sherlock's son-in-law is the brother of the lady who was sitting in the car.
- Hence, the husband is also the son-in-law of Sherlock .



Blood Relations(Assignment)

AxB means 'A is the father of B'.

A÷B means 'A is the daughter of B'.

A+B means 'A is the mother of B'.

A-B means 'A is the brother of B'.

Which of the following means that R is the wife of P?

- A. PxR-Q-T
- B. P+T+R-Q
- C. P+R-Q+T
- D. PxT-Q÷R
- E. None of the above

Ans: D



Data Sufficiency

The last Sunday of March, 2006 fell on which date ?

Statements :

- I. The first Sunday of that month fell on 5th.
- II. The last day of that month was Friday.

- A. I alone is sufficient while II alone is not sufficient
- B. II alone is sufficient while I alone is not sufficient
- C. Either I or II is sufficient
- D. Neither I nor II is sufficient
- E. Both I and II are sufficient

Ans: C



Data Sufficiency

Q. How many speeches were delivered in the two days' programme ?

Statements:

- I. 18 speakers were invited to give at least one speech (maximum of two speech), out of which one-sixth of the speakers could not come.
- II. One-third of the speakers gave two speeches each.

- A. I alone is sufficient while II alone is not sufficient
- B. II alone is sufficient while I alone is not sufficient
- C. Either I or II is sufficient
- D. Neither I nor II is sufficient
- E. Both I and II are sufficient

Ans: E



Data Sufficiency(Assignment)

Q. What day is the fourteenth of a given month?

- I. The last day of the month is a Wednesday.**
- II. The third Saturday of the month was seventeenth.**
- A. I alone is sufficient while II alone is not sufficient
- B. II alone is sufficient while I alone is not sufficient
- C. Either I or II is sufficient
- D. Neither I nor II is sufficient
- E. Both I and II are sufficient

Ans : B



Data Sufficiency(Assignment)

Q. You must submit your application within 10 days from, the date of release of this advertisement." What is the exact date before which the application must be submitted?

I. The advertisement was released on 18th February.

II. It was a leap year.

- a. If the data in statement I alone are sufficient.
- b. If the data in statement II alone are sufficient.
- c. If the data either in statement I alone or in statement II alone are sufficient.
- d. If the data given in both the statements I and II together are not sufficient.
- **Answer: a**



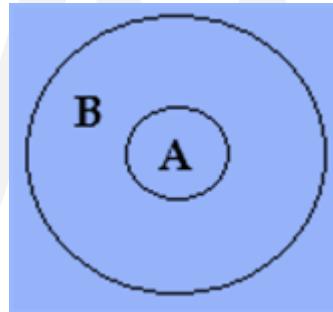
Syllogisms

- The syllogisms are just argument sentences that require deductive reasoning to arrive at some conclusions.
- **Steps to solve the Syllogism questions:-**
- Read the question thoroughly
- Start drawing the Venn diagram to make the explanation more clear and simplified.
- Follow the sequence of the question while drawing
- Analyse the conclusion from the Venn diagram
- Check for other alternative solutions at the end
- Always pay attention to words like ‘some’, ‘a few’, ‘all’, ‘atleast’, etc. These words form the base to solve the syllogism questions.
- Never assume anything while solving the syllogism questions. The only data that has to be followed while solving the question is the data mentioned in the question. No extra assumption must be made while solving questions.



Types of Syllogism

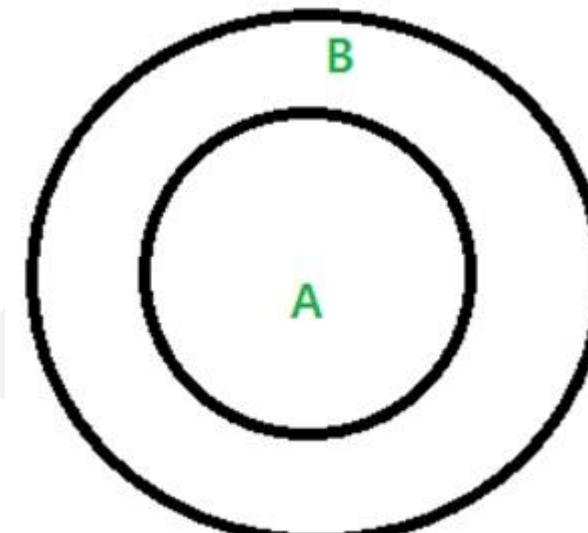
- **1. All A are B**
- A is contained in B but not necessarily vice versa.
- This means A is a subset of B, but B may not be a subset of A.



- It is visible that circle A is inside the circle B, which means that B contains the entire A, i.e. All A are B.

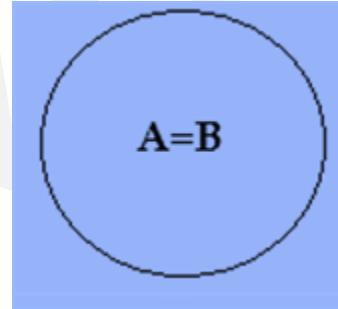
Example

- 1) All A are B
 - Conclusions -
 - Some B are A.
 - Some A are B.
-
- **Example: All cats are animals.**
 - Conclusions -
 - Some animals are cats..
 - Some cats are animals.



Types of Syllogism

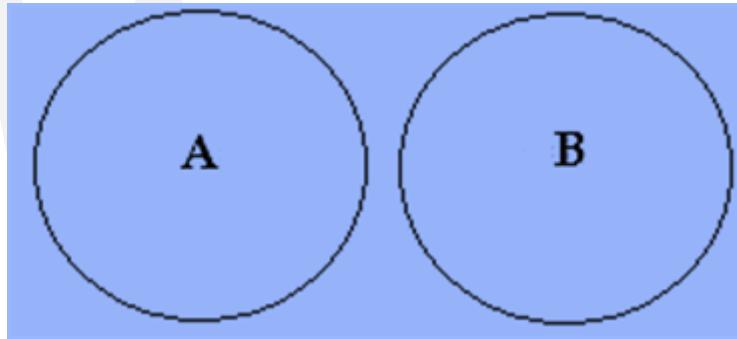
- **2. A = B**
- In this case, the conclusion is similar to the first type, i.e. “All A are B”. Here not only “All A are B”, but also “All B are A”.
- This means A is a subset of B and B is also a subset of A.



- Here A is contained in B and so is B contained in A. So, here A contains all B and again B also contains all A.

Types of Syllogism

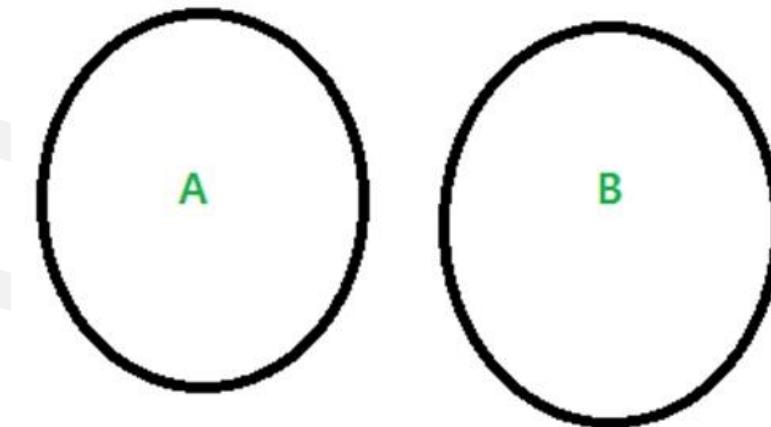
- **3. No A are B**
- B does not contain any of A and so A is not contained in B.
- This means that A and B are disjoint sets.



- Here no part of A is present inside of B and similarly, no part of B is present in A. So neither A nor B contain any part of B or A respectively.

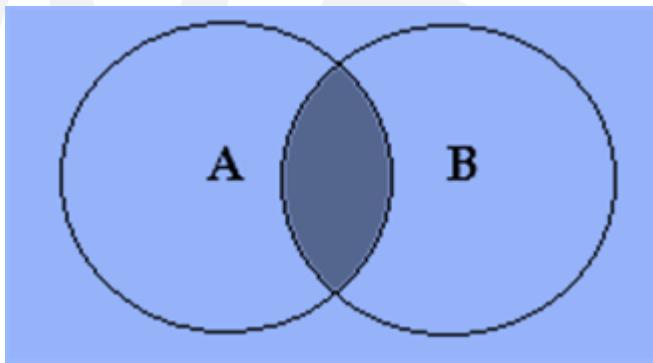
Examples

- **Example: No cats are animals.**
- Conclusions we get from the above pattern:
- No animals are cats.



Types of Syllogism

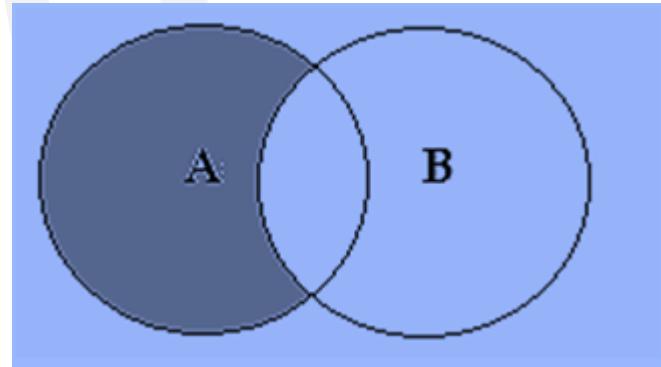
- **4. Some A are B**
- This is the case when some of A is in B that is A and B are intersecting, and thus some B are A will also be true.



- Here, the shaded portion indicates that some portion of A is contained in B while the unshaded portion is uncertain portion and does not indicate anything whether A is contained in B or not.

Types of Syllogism

- **5. Some A are not B**
- This means that some portion of A is not included in B for sure while the other part of A is uncertain whether it is included in B or not.



- Some portion of A is surely not included in B while there is no surety whether the shaded region is included in B or not.

Syllogisms

- Some rules that should be followed while solving the syllogism questions:
- Any “All” and “All” sentence will always imply an “All” conclusion.
- Any “All” and “No” sentence will always imply a “No” conclusion.
- Any ‘All’ and “Some” sentence will always imply a “No” conclusion.
- Any “Some” and “All” sentence will always imply a “Some” conclusion.
- Any “Some” and “No” sentence will always imply a “Some not’ conclusion.
- Any “Some” and “Some” sentence will always imply a “No” conclusion.



Syllogisms

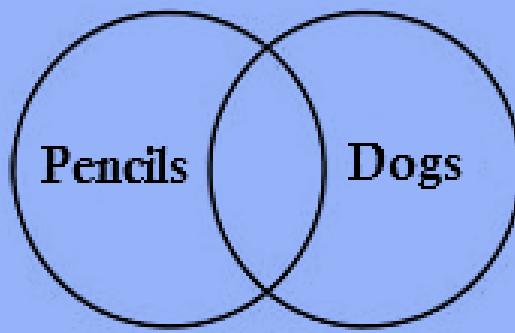
- **Statements:**
- Some pencils are dogs

- All dogs are pens
- All pens are cats

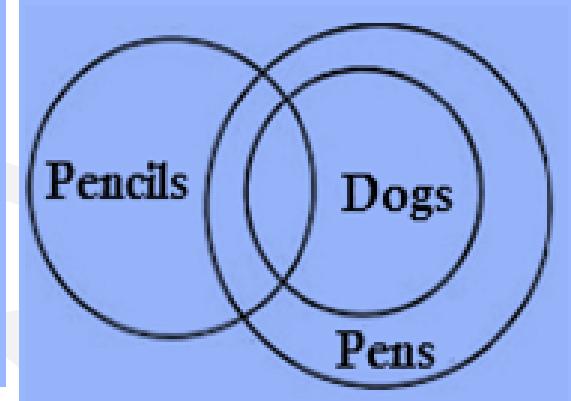
- **Conclusions:**

- All dogs are cats
- Some pens are pencils
- Some pencils are cats

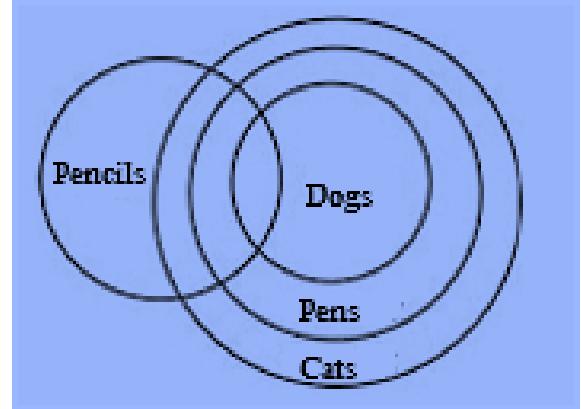
Some pencils are dogs



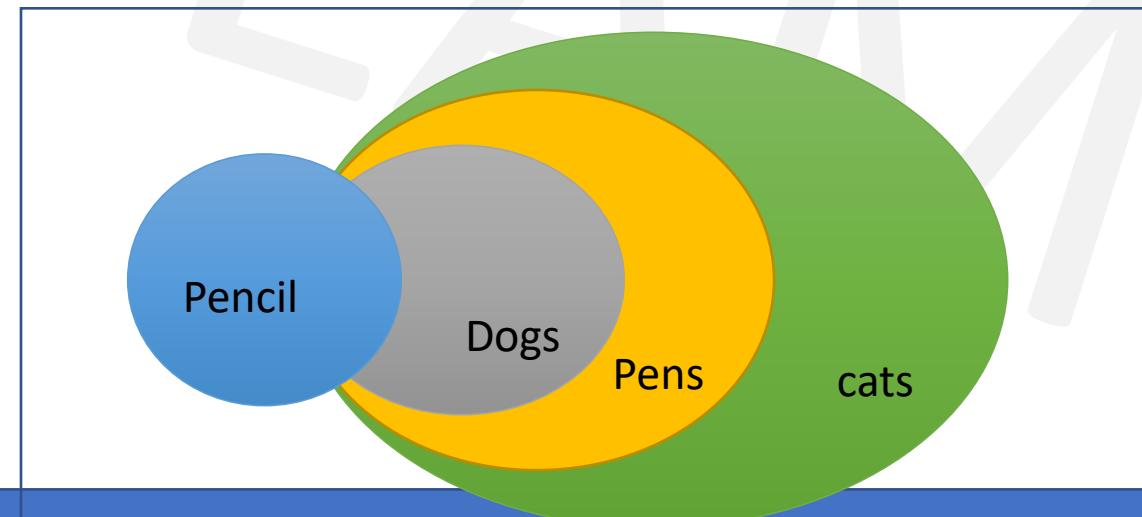
All dogs are pens



All pens are cats

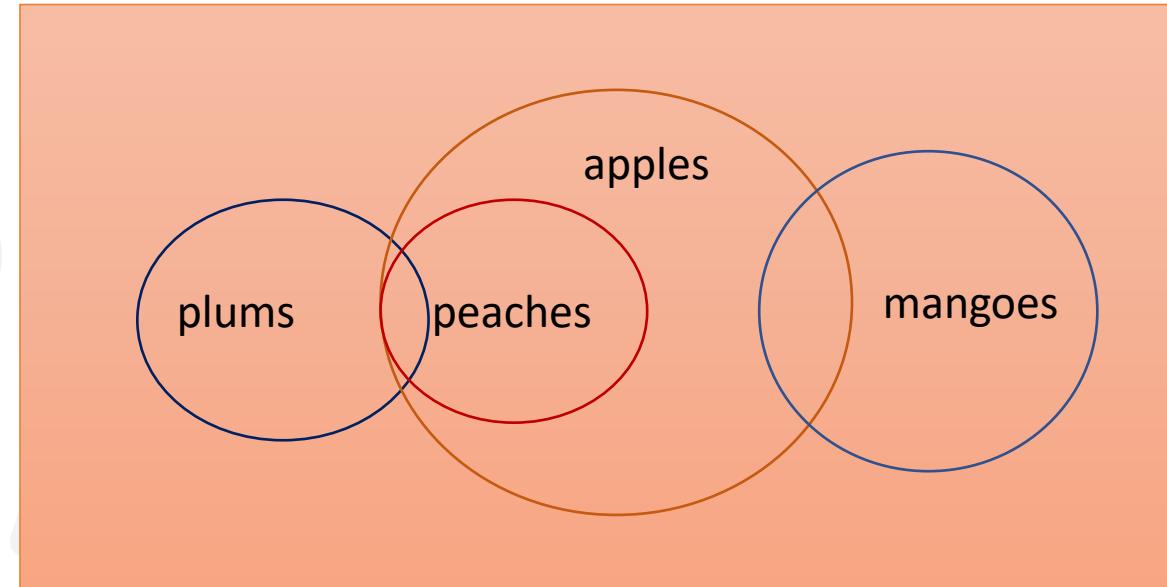


OR



Syllogisms

- Statement I: Some plums are peaches
- Statement II: All peaches are apples
- Statement III: Some apples are mangoes
- Conclusion I: Some mangoes are peaches
- Conclusion II: Some apples are peaches
- A. If only conclusion I follow
- B. If only conclusion II follows
- C. If conclusion I and II both follow
- D. If neither conclusion I nor conclusion II follows
- E. If either conclusion I or conclusion II follows
- **Ans: B**



Syllogisms

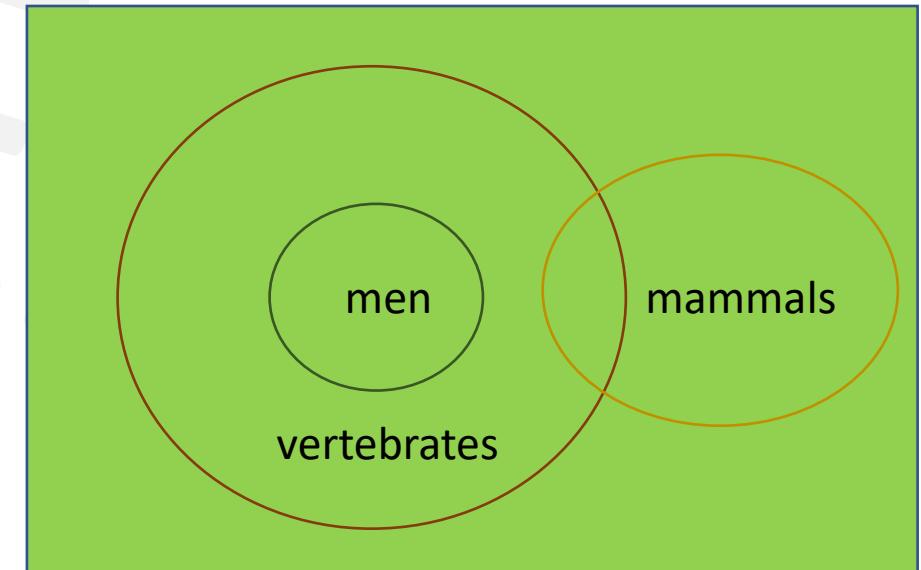
Q. Statements: All men are vertebrates. Some mammals are vertebrates.

Conclusions:

1. All men are mammals.
2. All mammals are men.
3. Some vertebrates are mammals.
4. All vertebrates are men.

- A. Only (4)
- B. Only (2)
- C. Only (3)
- D. Only (1)
- E. Only (1) and (3)

Ans: C



Syllogisms

- **Statement I:** Some spiders are pigeons
- **Statement II:** All pigeons are apples
- **Conclusion I:** All apples are pigeons
- **Conclusion II:** Some spiders are apples
- A. If only conclusion I follow
- B. If only conclusion II follows
- C. If conclusion I and II both follow
- D. If neither conclusion I nor conclusion II follows
- E. If either conclusion I or conclusion II follows
- **Ans: B**



Syllogism

Statements:

Some actors are singers.

All the singers are dancers.

Conclusions:

1. Some actors are dancers.
2. No singer is actor.

- A. Only (1) conclusion follows
- B. Only (2) conclusion follows
- C. Either (1) or (2) follows
- D. Neither (1) nor (2) follows
- E. Both (1) and (2) follow

Ans: A



Miscellaneous

If you write down all the numbers from 1 to 100, then how many times do you write 3 ?

- A. 11
- B. 18
- C. 20
- D. 21

Ans: C



Miscellaneous

Q. What will be the difference between the sum of all the odd digits and sum of the even digits in the number 857423?

- A. 0
- B. 1
- C. 2
- D. 4

Ans: B



Miscellaneous

Q. How many 7s immediately preceded by 6 but not immediately followed by 4 are there in the following series?

7 4 2 7 6 4 3 6 7 5 3 5 7 8 4 3 7 6 7 2 4 0 6 7 4 3

- A. 1 B. 2 C. 4 D. 6

Ans: B

Soln:

• 7 4 2 7 6 4 3 **6 7 5** 3 5 7 8 4 3 7 **6 7 2** 4 0 6 7 4 3

There are 2 such 7s in the series that are immediately preceded by 6 and not immediately followed by 4.



Miscellaneous

Q. Arrange the given words in the sequence in which they occur in the dictionary.

1. Terrible 2. Thaw 3. Thank less 4. Testify 5. Terrain

- A. 3, 4, 5, 1, 2
B. 2, 1, 5, 4, 3
C. 5, 1, 4, 3, 2
D. 2, 1, 3, 4, 5

Ans: C

- The dictionary sequence is:
- **Terrain → Terrible → Testify → Thank less → Thaw.**



Miscellaneous

Q. Arrange the given words in the sequence in which they occur in the dictionary and then choose the correct sequence.

1. Select 2. Seldom 3. Send 4. Selfish 5. Seller

- A. 1,2,4,5,3
B. 2,1,5,4,3
C. 2,1,4,5,3
D. 2,5,4,1,3

Ans: C

- The dictionary sequence is:
- Seldom → Select → Selfish → Seller → Send



Miscellaneous

Q. If \$ means +, # means - , @ means x and * means ÷, then what is the value of 16 \$
4 @ 5 # 72 * 8 ?

A. 27

B. 25

C. 29

D. 36

Ans: A



Miscellaneous

Q. If '+' stands for division,' ÷' stands for multiplication , 'x' stands for subtraction and '-' stands for addition. Which one of the following equation is correct?

- A. $18 \div 6 - 7 + 5 \times 2 = 20$
- B. $18 + 6 \div 7 \times 5 - 2 = 18$
- C. $18 \times 6 + 7 \div 5 - 2 = 16$
- D. $18 \div 6 \times 7 + 5 - 2 = 22$

Ans: B



Miscellaneous

Q. How many such digits are there in the number 9346715 each of which is as far away from the beginning of the number as when the digits are rearranged in ascending order within the number?

A. 2 digits

B. 3 digits

C. 4 digits

D. 1 digit

Ans: A

- 9346715
- 9 - 1 places away from start
- 3 - 2 away
- 4 - 3 away
- 6 4 away
- 7 5 away
- 1 6 away
- 5 7 away
- 9346715
- 1345679
- There are **two** such digits 3 and 4 in the number 9346715 each of which is as far away from the beginning of the number as when the digits are rearranged in ascending order within the number

9346715 arranged in ascending order

1345679

1 - 1 places away from start

3 - 2 away
4 - 3 away

5 4 away
6 5 away
7 6 away
9 7 away



Miscellaneous(Assignment)

In the following list of numerals, how many 2's are followed by 1's but not preceded by 4 ?

4 2 1 2 1 4 2 1 1 2 4 4 4 1 2 2 1 2 1 4 4 2 1 4 2 1 2 1 2 4 1 4 2 1 2
4 1 4 6

- A. Two
- B. Three
- C. Four
- D. Five

Ans: C



Miscellaneous(Assignment)

Q. Arrange the given words in the sequence in which they occur in the dictionary.

1. Spruce 2. Spume 3. Spree 4. Spurt 5. Sprawl

A. 5,3,1,2,4

B. 1,2,3,4,5

C. 3,5,1,4,2

D. 5,4,3,2,1

Ans: A



Miscellaneous(Assignment)

Q. Arrange the given words in the sequence in which they occur in the dictionary.

1. Wrinkle 2. Wriggle 3. Writhe 4. Wretch 5. Wrath

- A. 4,5,1,2,3
B. 5,4,2,1,3
C. 4,2,5,1,3
D. 5,2,1,3,4

Ans: B



Miscellaneous(Assignment)

Q. BOOK coded as 32, FLOWER coded as 128 then KEYBOARD is coded as ?

- A. 512
- B. 256
- C. 1024
- D. 64

Ans: A

Soln:

$$\text{Output} = 2^{(\text{no.of letters}+1)}$$



Ranking & Ordering

Type 1 - Total persons in a queue-

Total number of persons = [Position of person from upward/right + Position of person from downward/left] – 1

Q. Arush ranks seventh from the top and twenty-sixth from the bottom in a class. How many students are there in the class?

A. 31 students

B. 32 students

C. 33 students

D. 34 students

Ans: B

- The whole class consists of:

- |-----| Arush |-----|

6 students

25 students

Total students = [Position of person from upward/right + Position of person from downward/left] – 1

$$\begin{aligned}\text{Total students} &= [7 + 26] - 1 \\ &= 33 - 1 \\ &= 32 \text{ students}\end{aligned}$$

So, total students = $(6 + 1 + 25) = 32$ students.



Ranking & Ordering

Q. Arush ranks seventh from the top and twenty-sixth from the bottom in a class. How many students are there in the class?

- A. 31 students B. 32 students C. 33 students D. 34 students

Ans: B

- The whole class consists of:



So, total students = $(6 + 1 + 25) = 32$ students.

Total students = [Position of person from upward/right + Position of person from downward/left] – 1

$$\begin{aligned}\text{Total students} &= [7 + 26] - 1 \\ &= 33 - 1 \\ &= 32 \text{ students}\end{aligned}$$

Ranking & Ordering(Assignment)

Q. Rahim ranks 7th from the top and 28th from bottom in a class. How many students are there in the class ?

- A. 34 students
- B. 35 students
- C. 36 students
- D. 37 students

Ans: A

$$\text{Total number of students} = [7 + 28] - 1 = 35 - 1 = 34 \text{ students}$$

Type 1 - Total persons in a queue-

Total number of persons = [Position of person from upward/right + Position of person from downward/left] – 1



Ranking & Ordering

Type 2 - Rank of person in a queue-

Position of person from upward = [total number of persons – position of person from down] + 1

Position of person from downward= [total number of persons – position of person from up] + 1

Position of person from right= [total number of persons – position of person from left] + 1

Position of person from left= [total number of persons – position of person from right] + 1



Ranking & Ordering

Q. Ravi is 7 ranks ahead of Sumit in a class of 39. If Sumit's rank is seventeenth from the last, what is Ravi's rank from the start?

- A. 14th B. 15th C. 16th D. 17th

Ans: C

- Sol.
- So, Ravi is 24th from the last.
- |-----| Ravi |-----| Sumit |-----|
• ? 6 16
- Ravi's rank from start = $[39 - 17+7] + 1 = 15 + 1 = 16^{\text{th}}$
- So, Ravi is 16th from the start.

Position of person from upward = [total number of persons – position of person from down] + 1
Rank of Ravi from last(bottom) = $17+7 = 24^{\text{th}}$
Ravi's rank from start = $[39 - 24] + 1 = 15 + 1 = 16^{\text{th}}$

Type 2 - Rank of person in a queue-

Position of person from upward = [total number of persons – position of person from down] + 1

Position of person from downward= [total number of persons – position of person from up] + 1

Position of person from right= [total number of persons – position of person from left] + 1

Position of person from left= [total number of persons – position of person from right] + 1



Ranking & Ordering(Assignment)

Q. In class of 40 students rank of A from end is 20. Find rank of B from start if she is 5 ranks ahead of A?

- A. 14th B. 15th C. 16th D. 17th

Soln:

- |-----| B |-----| A |-----|
- ? 4 20 19
- Rank of B from last = $20 + 5 = 25^{\text{th}}$
- Position of person from upward = [total number of persons – position of person from down] + 1
- Rank of A from start = $(40 - 25) + 1 = 15 + 1 = 16^{\text{th}}$
- So, B is 16th from the start.

Ans : C



Ranking & Ordering(Assignment)

Q. Anita ranks twelfth in a class of forty six. What will be her rank from the last?

- A. 31th
- B. 35th
- C. 36th
- D. 37th

Ans: B

Rank of Anita from last = [total students – her rank from first] + 1

$$\begin{aligned}&= (46 - 12) + 1 \\&= 35^{\text{th}}\end{aligned}$$



Ranking & Ordering

- **Type 3 – when two persons change their rank in a queue**
- If two persons are on a definite position from up and down(or left and right) and they interchange their ranks, then Total no. of persons in order = [present position of first person + previous position of second person] - 1



Ranking & Ordering

In a row of girls , Sheena is eighth from the left and Heena is seventeenth from the right. If they interchange their positions, Sheena becomes fourteenth from the left. How many girls are there in the row?

- A. 34
- B. 35
- C. 30
- D. 37

Ans: C

$$\begin{aligned}\text{Total number of girls} &= [\text{present position of Sheena} + \text{previous position of Heena}] - 1 \\ &= [14 + 17] - 1 \\ &= 30\end{aligned}$$

Type 3 – when two persons change their rank in a queue

If two persons are on a definite position from up and down(or left and right) and they interchange their ranks, then

Total no. of persons in order = [present position of first person + previous position of second person] - 1



Ranking & Ordering

- **Type 4 – when two persons change their rank in a queue**
- Previous position of first person = Difference of two positions of second person + previous position of second person
- OR
- present position of second person = Difference of two positions of first person + previous position of second person



Ranking & Ordering

Q. In a row of children, Dipa is fifth from the left and Vinay is sixth from the right. When they interchange their places among themselves, Dipa becomes thirteenth from the left. Then, what will be Vinay's position from right?

- A. 4th
- B. 14th
- C. 8th
- D. 12th

Ans: B

Present position of Vinay = Difference of two positions of Dipa + previous position of Vinay

$$\begin{aligned} &= (13 - 5) + 6 \\ &= 14^{\text{th}} \end{aligned}$$

Type 4 – when two persons change their rank in a queue

Previous position of first person = Difference of two positions of second person + previous position of second person

OR

present position of second person = Difference of two positions of first person + previous position of second person



Ranking & Ordering

Q. Tanuj is on the 9th position from upwards and on 38th position from downwards in a class. How many students are in the class?

- A. 47
- B. 45
- C. 46
- D. 48

Ans: C

Type 1 - Total persons in a queue-

Total number of persons = [Position of person from upward/right + Position of person from downward/left] – 1



