



# GENERAL APTITUDE

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# LCM

Q. LCM for 12,24,20

A. 210

B. 180

C. 120

D. 144

**Ans : C**



# 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
Till all quotients are 1	1	1	1	1

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

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

- $\text{LCM} = 120$
- 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**

• 20	36	45	} 5
• 15	31	40	

- Result =  $180 - 5$   
 $= 175$



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 reminder 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)

**$\text{HCF}(1.\underline{08}, 0.\underline{36} \text{ and } 0.\underline{90}) = 0.\underline{18}$**



# 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)

→  $\text{HCF}(437, 342) = 19$

→ Boys Classes =  $437/19 = 23$

→ Girls Classes =  $342/19 = 18$

→ 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 number 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 reminder 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 25/12 & 35/18

LCM = 175/6

HCF of 25/12 & 35/18

HCF = 5/36



# HCF & LCM Fractions(Assignment)

- Find HCF & LCM of  $\frac{5}{9}$  and  $\frac{25}{36}$
- Ans : HCF =  $\frac{5}{36}$  and LCM =  $\frac{25}{9}$



# HCF & LCM(Assignment)

Q. There are three numbers, these are co-prime to each other are such that the product of the first two is 551 and that of the last two is 1073. What will be the sum of three numbers :

A. 80                      B. 82                      C. 85                      D. 87

**Soln:**

numbers are co primes, so there is only 1 as their common factor.  
Given that two products have the middle number in common.

So, middle number = H.C.F. of 551 and 1073 = 29;

So first number is :  $551/29 = 19$

Third number =  $1073/29 = 37$

So sum of these numbers is =  $(19 + 29 + 37) = 85$

**Ans: C**



# Number system(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 :  $a, a+d, a+2d, a+3d, \dots, a+(n-1)d$
- $n^{\text{th}}$  term  $T_n = a + (n-1)d$  ,  **$n = 1, 2, \dots$**
- Sum of  $n$  terms  $S_n = \frac{n}{2} [2a + (n-1)d]$

$$S_n = \frac{n}{2} (a + l)$$



# Progression

- Prove that the sum  $S_n$  of  $n$  terms of an Arithmetic Progress (A.P.) whose first term 'a' and common difference 'd' is
- $S = n/2[2a + (n - 1)d]$
- Or,  $S = n/2[a + l]$ , where  $l$  = last term =  $a + (n - 1)d$
- **Proof:**
- $a, a+d, a+2d, a+3d, \dots, a(n-2)d, a(n-1)d$ , as  $l$  = last term
- $a, a+d, a+2d, a+3d, \dots, l-d, l$
- $S = a + a+d + a+2d + a+3d + \dots + l-d + l$  -----1
- Writing equation 1 in reverse order(sum remains same even if we write in reverse order)
- $S = l + l-d + l-2d + l-3d + \dots + a+d + a$  -----2
- Adding equation 1 and 2
- $2S = (a + l) + (a + l) + (a + l) + \dots + (a + l) + (a + l)$
- So for  $n$  terms,
- $2S = n(a + l)$
- $S = \frac{n}{2} (a + l)$



# 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.

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

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

$$3n = 90, \quad n = 30$$

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

**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<sup>2</sup>, ar<sup>3</sup>, ....., ar<sup>n-1</sup>
- n<sup>th</sup> term  $T_n = ar^{(n-1)}$
- Sum of 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-

- $S = a + ar + ar^2 + ar^3 + ar^4 + \dots + ar^{n-1} \quad \text{-----} \quad 1$

- Multiply both sides of this equation by r

- $Sr = ar + ar^2 + ar^3 + ar^4 + \dots + ar^{n-1} + ar^n \quad \text{-----} \quad 2$

- - - - -

- 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 10<sup>th</sup> 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
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 =  $22 \times 21$
- After teacher is added,

Total age of all students + Age of the teacher =  $23 \times 22$

- Age of the teacher =  $23 \times 22 - 22 \times 21$   
=  $22(23 - 21)$   
=  $22 \times 2$   
= 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 +  $(n \pm 1)(\text{diff})$

- Where, n = total no. of students

- New value =  $21 + (22+1)(1)$   
=  $21 + 23$   
= 44 years

+ 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:**

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

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

$$= 45 + 49(0.1)$$

$$= 45 + 4.9$$

$$= 49.9 \text{ kg}$$

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

**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 =  $(45 \times 50)$  kg = 2250 kg

Average weight of 49 students =  $45\text{kg} - 100\text{g} = 44.9$  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 =  $2250 - 2200.1 = 49.9$  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 = (student) x avg + (teacher) x avg

$(z + 10) \times 8 = (z) \times 7 + (10) \times 50$

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

Z = 420 students

**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**

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



# 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 10<sup>th</sup> 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 x 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

So,  $x + 15 = 5(x - 5)$

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

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

**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 -> 5x, A -> 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,

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

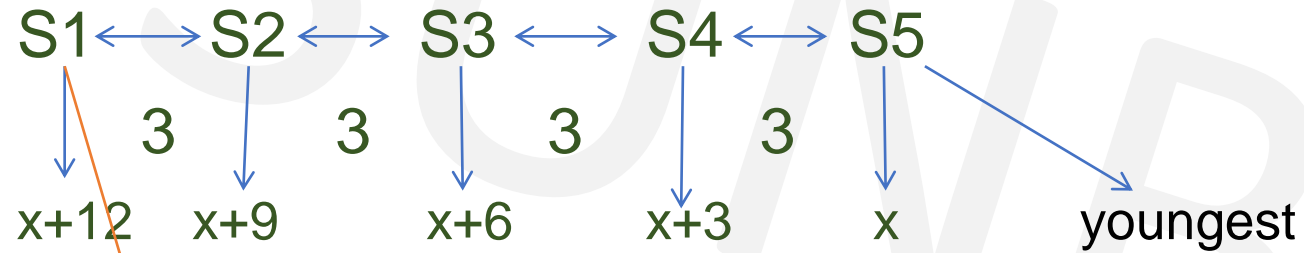
**Ans: B**



# 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 :



Eldest

Given,

Sum of ages = 50 years

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

$$5x + 30 = 50$$

$$x = 4 \text{ years (age of youngest child)}$$



# 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

$$38 - x = x$$

$$38 = 2x$$

$$x = 19 \text{ years (present age of daughter)}$$

5 years 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 ,

$x = 27$  years and  $y = 15$  years



# Ratio & Proportion

- **Ratio** : Ratio is a comparison of two numbers (quantities) by division.
- The ratio of a to b is written as
- $a : b = a/b = a \div b$ .

\* 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.  $a/c = b/d$

(Alternendo)

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 proportional.

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

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

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

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



# Ratio & Proportion(Assignment)

**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:**

$$X : Y = 3 : 4$$



(Inverted N)

$$Y : Z = 8 : 9$$

$$= 3 \times 8 : 8 \times 4 : 4 \times 9$$

$$= 24 : 32 : 36$$

$$= 6 : 8 : 9$$

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**

- $\frac{A}{B} = \frac{2}{3}$

- $\frac{B}{C} = \frac{4}{5}$

$A : B : C$

$2 : 3 : 4$   
 $4 : 5$



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



# 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

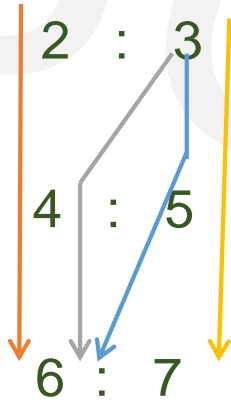
If  $A : B = 2 : 3$ ,  $B : C = 4 : 5$  and  $C : D = 6 : 7$ . Find  $A:B:C:D$

A.  $2 : 3 : 4 : 5$

B.  $2 : 12 : 30 : 7$

C.  $16 : 24 : 30 : 35$  D.  $4 : 5 : 6 : 7$

**Soln:**

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


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

**Ans: C**



# Ratio & Proportion

## Dividing a given number in the given Ratio :

Let T be the Total Amount . Let the given ratio be a:b:c

This means A is divided into three parts such that

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

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

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

$$\text{And First Part} + \text{Second Part} + \text{Third Part} = T$$

$$\text{Any Part} = \text{Total Amount} \times (\text{Its related ratio term} / \text{Sum of Ratio Terms})$$



# 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:**

$A/B$   
 $2/3$

$B/C$   
 $4/5$

$C/D$   
 $3/7$

$$A : B = 2 : 3$$

$$B : C = 4 : 5$$

$$C : D = 3 : 7$$

$$A : B : C : D$$

$$8 : 12 : 15 : 35$$

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

**Ans : A**



# 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

- $\frac{7-x}{9-x} = \frac{11-x}{15-x}$

- $(7 - x)(15 - x) = (11 - x)(9 - x)$

- $105 - 22x + x^2 = 99 - 20x + x^2$

- $2x = 6$

- $x = 3$



# Percentage

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

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





# 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% (from chart)

Fraction x100	%	Fraction	%
	100		
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% = 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
- $100 \uparrow$  by 50% = 150
- Again,  $150 \uparrow$  by 20% = 30, So  $150 + 30 = 180$
- 10%  $\uparrow$  of 180 = 18, So,  $180 + 18 = 198$

• 100      150      180      198



98% = net change



# 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

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



# 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 =  $a + b + \frac{ab}{100}$  (+ve or -ve)**

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



# 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  $\implies$  20% $\downarrow$ (Decrease in Price)  $\implies$  80  $\implies$  20% $\uparrow$ (Increase in Consumption)  $\implies$  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 =  $\frac{\text{first number}}{\text{second number}} = \frac{\frac{140x}{100}}{\frac{160x}{100}} = \frac{140x}{160x} = \frac{7}{8} = 7 : 8$

**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 =  $\pi r^2$  where  $r$  is the radius  
 $\Rightarrow$  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**

Required % =  $5/4 \times 100 = 125\%$



# Percentage(Assignment)

Q. 12% 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.  $15\%$  of 578 +  $22.5\%$  of 644 = ?

A. 231.4

B. 231.6

C. 231.8

D. 233.6

**Ans: B**



