

Numerical Ability

# TCS Digital Test Preparation Series

## About me

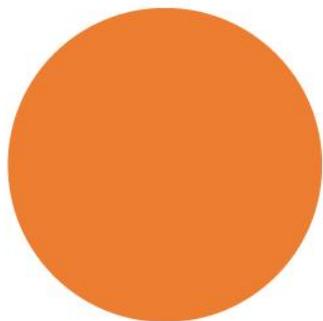
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- TCS Digital Cleared.
- Gold Medalist in Academics in the branch of Mechanical and Automation Engineering in 2019 at Amity University.
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# Pattern

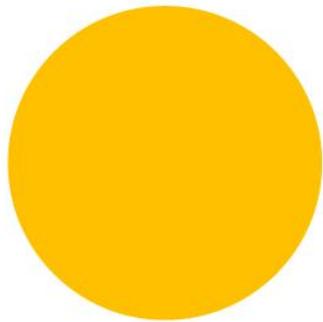
Topic Name	Marks per Item	No of Items	Time
Numerical Ability	1	15	40 mins

- **Negative marking-You must read all instructions carefully. If there is any negative marking, it will be clearly mentioned in the instructions.**
- **For more details, please visit this link - <https://www.tcs.com/careers/tcs-off-campus-hiring> .**

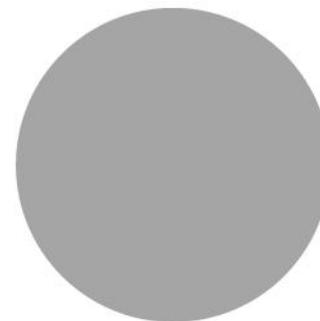
# Approach



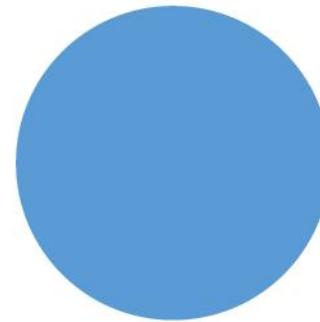
Complete understanding of questions covered during the Session.



Go through the link provided in the resource slide and try to solve them.



Try to attempt practice assignment questions.



Try to attempt questions from the book details of which have been provided in the resources slide.

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# Formulas

## What is the cost of borrowing or borrowing interest rate?

- When we borrow money, we usually pay money for using that money. An interest is charged as a percent (per year) of the sum borrowed. It can also be defined as follows:
- Let Ram borrow money from Sneha for a certain time period, after the completion of time period, he returns the borrowed money and also pay some extra or additional money. This extra money that Ram Paid to Sneha is called interest. The money Ram borrowed from Sneha is known as Principal. Interest is computed as a % of Principal & this % is called Rate of interest.

## Understanding Simple Interest

- There is well known fact about Rate of interest, which is always assumed to be Per annum. For example 10% rate of interest Per annum.  
Let us understand these definitions better and go through the simple interest formula:
- Suppose Diya invests Rs. 1000 in a bank. The bank says “10% interest”. It means the bank will pay an amount increased by 10% after 1 year.  
 $\text{Interest} = \text{Rs. } 1000 \times 10\% = \text{Rs. } 100$ . So, the increased amount after one year =  $\text{Rs. } 1000 + \text{Rs. } 100 = \text{Rs. } 1100$ .
- What if Diya invests the money for 2 years?  
 $\text{Interest for first year} = \text{Rs. } 1000 \times 10\% = \text{Rs. } 100$   
 $\text{Interest for second year} = \text{Rs. } 1000 \times 10\% = \text{Rs. } 100$   
 $\text{Total interest} = (\text{Rs. } 1000 \times 10\%) + (\text{Rs. } 1000 \times 10\%) = \text{Rs. } 1000 \times 10\% \times 2 = \text{Rs. } 200$   
Here, Rs. 1000 is the Principal (P), 10% is the percentage increase or interest rate (R), 2 is the time period (T).
- Therefore, the general formula for simple interest (S.I.) is  $S.I. = P \times R \times T / 100$ .  
Now, the total money that Diya will get after 2 years will be  $\text{Rs. } 1000 + \text{Rs. } 200 = \text{Rs. } 1200$ . The sum of money which Diya will get back is called amount.  
So, **Amount = Principal + Interest**.
- As per the formula of simple interest =  $P \times R \times T / 100$ . This can be further written as  $S.I. \times 100 = P \times R \times T$ . Now here if any of the three components on the Right hand side is missing, then Interest  $\times 100$  can be divided by the other two components to find the third one e.g. the formula for calculating the time becomes  $(\text{Interest} \times 100) / (\text{Principal} \times \text{Rate})$ . Similarly the rate/principal can be calculated. These concepts are useful in solving simple interest problems.

# Formulas

## Understanding Compound Interest

- Let us try to understand basics of compound interest and how it differs from Simple Interest. In Simple Interest, the Principal remains constant throughout the whole term. However, in practice, different financial institutions like banks, post offices, insurance companies etc, do not take the principal to be constant throughout the term. After every fixed interval of time, the interest is added to the principal. The combined total of the Principal and the Interest is taken as the new principal. This process is continued until the interest for the full term is calculated.
- So, we can say that in the Compound Interest formula, interest is periodically calculated and converted to principal. "Converting interest to Principal" means that the interest is added to the principal and is thereafter treated as Principal.
- Suppose, you invest Rs. 1,00,000 at 10% compounded annually for 3 years. "Compounded annually" means that "Interest is compounded once per year." Therefore, the compounding period is one year. Let us understand this complete process in an easy way:
  - FIRST YEAR, Principal is Rs. 1,00,000. You will earn Rs. 10,000 interest (10 % of Rs. 1,00,000).
  - At the end of the first year, this Rs. 10,000 will be added to the principal and balance of your account will show Rs. 1,10,000.
  - SECOND YEAR, new Principal is Rs. 1,10,000. You will earn Rs. 11,000 interest (10 % of Rs. 1,10,000). At the end of the second year, this Rs. 11,000 will be added to the principal and balance of your account will show Rs. 1,21,000.
  - THIRD YEAR, new Principal is Rs. 1,21,000. You will earn Rs. 12,100 interest (10 % of Rs. 1,21,000). At the end of the third year, this Rs. 12,100 will be added to the principal and balance of your account will show Rs. 1,33,100.

# Formulas

## **When Interest is compounded yearly:**

- In case of Compound Interest, firstly Amount is calculated. Then, we get the Compound Interest by subtracting the Principal from Amount.

The formula used to calculate Amount is as follows:

$$\text{Compound interest formula: } A = P (1 + R/100)^T$$

Where A is the Amount,

P is the Principal,

R is the rate of Interest, and

T is the time period for which the money is invested.

Hence, to calculate compound interest= Amount – Principal.

## **When Interest is compounded half-yearly:**

- When the interest is compounded half-yearly, the amount after the first half year becomes the principal for the next half-year and so on.

# Formulas

The formula for Compound Amount

$P [1+ R/100]^n$  [When money is compounded annually]

$= P [1+ R/(2*100)]^{2n}$  [When money is compounded half-yearly]

$= P [1+ R/(12*100)]^{12n}$  [When money is compounded monthly]

Also,  $A = CI + P$

Where,

P= Principal

R= Rate of Interest

n=Time (in years)

A= Amount

CI= Compound Interest

**Note:** The above formula:  $A = CI + P$  will give us total amount. To get the Compound Interest only, we need to subtract the Principal from the Amount.

## Sample Question 1

A four year Indira Vikas certificate with a maturity value of Rs. 700 is purchased for Rs. 500.

The rate % p.a. is

- a) 15 %
- b) 7 1/2 %
- c) 5 %
- d) 10 %
- e) 7 %

## Sample Question Solution 1

**Sol : Option D**

**Explanation:** Interest = 200  $\Rightarrow$   $200 = (500 \times R \times 4)/100 \Rightarrow R = 10\%$ .

## Sample Question 2

Anoop borrowed Rs. 800 at 6 % p.a. & Rs. 1200 at 7 % p.a. for the same duration. He had to pay Rs. 1584 in all as interest. Find the time period.

- a) 10 years
- b) 11 years
- c) 12 years
- d) 13 years
- e) 15 years

## Sample Question Solution 2

**Sol : Option C**

**Explanation:** Interest at 1<sup>st</sup> rate for 1 year =  $800 \times (6 \times 1)/100$  = Rs. 48.

Interest for 1 year at 2<sup>nd</sup> rate =  $1200 \times (7 \times 1)/100$  = Rs. 84

therefore, Total interest for 1 year = Rs. 132.

Hence, the required time =  $1584/132$  = 12 years.

### Sample Question 3

In how many years will Rs. 25 lent at compound interest at 6 % p.a. amount to Rs. 28.09?

- a) 1 1/2 Year
- b) 2 Year
- c) 2 1/2 Year
- d) 3 Year
- e) 4 Year

## Sample Question Solution 3

Sol : Option B

**Explanation:**  $28.09 = 25 (1 + 6/100)^t$

$$\rightarrow 2809/2500 = (53/50)^t$$

$$\rightarrow t = 2 \text{ years.}$$

## Sample Question 4

Rahul invested a sum of money at compound interest. It amounted to Rs. 6741 in 3 years and Rs. 6420 in 4 years. Find the rate of interest.

- a) 11 %
- b) 18 %
- c) 12 %
- d) 5 %
- e) 10 %

## Sample Question Solution 4

**Sol : Option D**

**Explanation:** Rate of interest =  $(6741-6420)/6420 \times 100 = 5\%$

# Number System



# Formulas

- **Natural Numbers:** The numbers 1,2,3,4.... are called natural numbers or positive integers.
- **Whole Numbers:** The numbers 0,1,2,3.... are called whole numbers. Whole numbers include “0”.
- **Integers:** The numbers .... -3, -2, -1, 0, 1, 2, 3,... are called integers. You will see questions on integers in almost all the exams where you see number system aptitude questions.
- **Negative Integers:** The numbers -1, -2, -3, ... are called negative integers.
- **Positive Fractions:** The numbers  $(2/3)$ ,  $(4/5)$ ,  $(7/8)$  ... are called positive fractions.
- **Negative Fractions:** The numbers  $-(6/8)$ ,  $-(7/19)$ ,  $-(12/17)$  ... are called negative fractions.
- **Rational Numbers:** Any number which is a positive or negative integer or fraction, or zero is called a rational number. A rational number is one which can be expressed in the following format  $\Rightarrow (a/b)$ , where  $b \neq 0$  and a & b are positive or negative integers.
- **Irrational Numbers:** An infinite non-recurring decimal number is known as an irrational number. These numbers cannot be expressed in the form of a proper fraction  $a/b$  where  $b \neq 0$ . e.g.  $\sqrt{2}$  ,  $\sqrt{5}$  ,  $\pi$ , etc.
- **Surds:** Any root of a number, which cannot be exactly found is called a surd. Essentially, all surds are irrational numbers. e.g.  $\sqrt{2}$  ,  $\sqrt{5}$  etc.
- **Even Numbers:** The integers which are divisible by 2 are called even numbers e.g. -4, 0, 2, 16 etc.
- **Odd Numbers:** The integers which are not divisible by 2 are odd numbers e.g. -7, -15, 5, 9 etc.
- **Prime Numbers:** Those numbers, which are divisible only by themselves and 1, are called prime numbers. In other words, a number, which has only two factors, 1 and itself, is called a prime number. e.g. 2, 3, 5, 7, etc.
- **Note:** 2 is the only even prime number.
- There are 25 prime numbers upto 100. These are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 & 97. These should be learnt by heart.

# Formulas

- **Co-Prime Numbers:** Two numbers are considered to be prime to each other if their HCF is 1. e.g. 5 and 24 are prime to each other. In other words, 5 and 24 are co-prime.
- To check whether a number is prime, e.g. 79, we do not need to check all the factors below 79. The square of 8 is 64 & that of 9 is 81. Therefore, check if any of the prime numbers less than 9 is a factor of 79. The prime numbers 2, 3, 5, 7 are not the factors of 79. So, 79 is a prime number.
- **Composite Number:** A number, which has factors other than itself and 1, is called a composite number. e.g. 9, 16, 25....
- **Note:** 1 is neither a composite number nor a prime number.
- **Sol:** Here 91 is divisible by 7, so 91 is not a prime number. 87 is divisible by 3. So it is also not a prime number. 57 is not a prime number as it is divisible by 3. 31 has only two factors 1 and 31, so it is a prime number.
- **Consecutive Numbers:** Numbers arranged in increasing order and differing by 1 are called consecutive numbers. e.g. 4, 5, 6, 7 etc.
- **Real Numbers:** The natural numbers, integers, whole numbers, rational numbers and irrational numbers constitute the set of real numbers. Every real number can be represented by a point on a number line.
- **Perfect Numbers:** If the sum of all the factors of a number excluding the number itself happens to be equal to the number, then the number is called as perfect number. 6 is the first perfect number. The factors of 6 are 1, 2, 3 & 6. Leaving 6 the sum of other factors of 6 are equal to 6. The next three perfect numbers after 6 are: 28,496 and 8128.
- **Complex Numbers:** Complex numbers have a real and an imaginary component; e.g.  $(\sqrt{-2} - 4)$ ,  $(2 + \sqrt{-3})$ , etc. Square root of any negative number is an imaginary number - e.g.  $\sqrt{-2}$ ,  $\sqrt{-3}$ . The square root of a negative number does not exist in the real sense. Such numbers are called imaginary numbers.
- **Fibonacci Numbers:** The numbers, which follow the following series are known as Fibonacci numbers. E.g. 1,1,2,3,5,8,13,21..... The series is obtained by adding the sum of the preceding two numbers. In general for a Fibonacci number  $X$ ,  $X_{i+2} = X_{i+1} + X_i$ .

# Formulas

## Operations on Odd & Even Numbers

- Addition or subtraction of any two odd numbers will always result in an even number or zero. E.g.  $2 + 5 = 7$ ;  $11 - 5 = 6$ .
- Addition or subtraction of any two even numbers will always result in an even number or zero. E.g.  $6 + 8 = 14$ ;  $8 - 2 = 6$ .
- Addition or subtraction of an odd number from an even number will result in an odd number. E.g.  $8 + 5 = 13$ ;  $12 - 5 = 7$ .
- Addition or subtraction of an even number from an odd number will result in an odd number. E.g.  $7 + 6 = 13$ ;  $11 - 6 = 5$ .
- Multiplication of two odd numbers will result in an odd number. E.g.  $5 \times 7 = 35$ .
- Multiplication of two even numbers results in an even number. E.g.  $4 \times 6 = 24$ .
- Multiplication of an odd number and an even number will result in an even number. E.g.  $7 \times 4 = 28$ . An odd number raised to an even or an odd power is always odd.
- An even number raised to an odd or an even power is always even.

# Formulas

## Divisibility Rules

- **Divisibility rule of 2** - A number is divisible by 2 when its units place is 0 or divisible by 2. e.g. 120, 138.
- **Divisible by 3** - 19272 is divisible by 3 when the sum of the digits of 19272 i.e. 21 is divisible by 3. Note that if n is odd, then  $2n + 1$  is divisible by 3 and if n is even, then  $2n - 1$  is divisible by 3.
- **Divisibility rule of 4** - A number is divisible by 4 when the last two digits of the number are 0s or are divisible by 4. As 100 is divisible by 4, it is sufficient if the divisibility test is restricted to the last two digits. e.g. 145896, 128, 18400
- **Divisibility by 5** - A number is divisible by 5, if its unit's digit is 5 or 0. e.g. 895, 100
- **Divisibility rule of 7:** How to check whether a number is divisible by 7 or not. Let us check divisibility of 343. Double the last digit of the given number:  $3 \times 2 = 6$ , subtract it from the rest of the number:  $34 - 6 = 28$ . Check if the difference is divisible by 7 i.e. 28 is divisible by 7, therefore 343 is divisible by 7.
- **Divisibility rule of 8** - A number is divisible by 8, if the last three digits of the number are 0s or are divisible by 8. As 1000 is divisible by 8, it is sufficient if the divisibility test is restricted to the last three digits e.g. 135128, 45000.
- **Divisibility rule of 9** - A number is divisible by 9, if the sum of its digits is divisible by 9. e.g. 810, 92754
- **Divisibility rule of 11** - A number is divisible by 11, if the difference between the sum of the digits at odd places and the digits at even places of the number is either 0 or a multiple of 11. e.g. 121, 65967. In the first case  $1 + 1 - 2 = 0$ . In the second case  $6 + 9 + 7 = 22$  and  $5 + 6 = 11$  and the difference is 11. Therefore, both these numbers are divisible by 11.
- **Divisibility rule of 25** - Any number is divisible by 25, if the last 2 digits of the number are 00 or they are multiples of 25.e.g. 2358975 is divisible by 25 as its last two digits are 75.

# Formulas

## Some important points

- The greatest number of 'n' digits will have 'n' 9s straightaway e.g. the greatest five-digit number will have five 9s i.e. it will be 99999.
- The smallest number of 'n' digits has 1 as the leftmost digit and the rest all the digits are zeroes. E.g. the smallest five digit number is 10000.
- The sum of a two-digit number and a number formed by reversing its digits is divisible by 11. E.g.  $34 + 43 = 77$ , which is divisible by 11. At the same time, the difference between those numbers is divisible by 9. e.g.  $43 - 34 = 9$ , which is divisible by 9.
- $\sum n = (n(n+1)/2)$  ,  $\sum n$  is the sum of first n natural numbers.
- $\sum n^2 = (n(n+1)(2n+1)/6)$  ,  $\sum n^2$  is the sum of first n perfect squares.
- $\sum n^3 = (n^2(n+1)^2/4) = (\sum n)^2$  ,  $\sum n^3$  is the sum of first n perfect cubes.
- Local Value: The local value or face value of a digit in a number is the actual value of the digit. e.g. The local value of 5 in 7415236 is 5.
- Place Value: The place value is the value of the digit at which it is placed. e.g. the place value of 5 in 7415236 is 5000 as 5 is placed at the thousand's place in the number.

## Sample Question 5

**In a class, every student shakes hand with every other student. If, the total number of students is 40, find the total number of handshakes that took place in the class.**

## Sample Question Solution 5

Answer :

The first student shakes hand with 39 other students, second student shake with 38 and so on. So, the total number of handshakes =  $39 + 38 + 37 \dots \dots + 1 = ((39 \times 40) / 2) = 780$

## Sample Question 6

What least digit should come in place of # in the 9 digit number  
15549#325, for which the number is divisible by 3?

1. 0
2. 1
3. 2
4. Any of these

## Sample Question Solution 6

Answer : Option 3

A number is divisible by 3 if sum of digits is multiple of 3. In 15549#325,  
Sum of the digits=  $1 + 5 + 5 + 4 + 9 + \# + 3 + 2 + 5 = 34 + \# = 34 + 2 = 36$   
which is divisible by 3.

## Sample Question 7

**The five digit number 7500A8 is divisible by 4. How many values of A are possible?**

1. 0
2. 3
3. 5
4. 4

## Sample Question Solution 7

Answer : Option 3

To find divisibility by 4, we need to consider last two digits of the number, these should be divisible by 4. Hence, A can take values equal to 0, 2, 4, 6 and 8. Therefore 5 values are possible. So, the correct answer is option 3.

## Sample Question 8

**The seven digit number 43567X is divisible by 3, where X is a single digit whole number. Find X.**

1. 2
2. 5
3. 8
4. All of these

## Sample Question Solution 8

Answer : Option 4

A number is divisible by 3 when sum of its digits is divisible by 3. Here, sum of digits =  $4 + 3 + 5 + 6 + 7 + X = 25 + X$ . So, X can be 2, 5, 8 which gives the sum 27, 30 and 33 respectively. Therefore, X has 3 values here, for which the number is divisible by 3. So, the answer is option 4.

# Mixture and Alligations

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# Formulas

## Understanding Alligation and Mixture

- Khal Drogo, the owner of a departmental store, bought two different kinds of sugar, one costing Rs. 60/- and the other Rs. 50/-. He bought different quantities of both and mixed them. After mixing, he could recall that he bought a total of 100 kg for Rs. 5400.
- Now, as he spent Rs. 5400 for buying 100 kg, the average price per kg is  $5400/100 = \text{Rs. } 54/-$ . Now in order to decrease his average price, Khal Drogo wants to buy more quantity of sugar worth Rs. 50.
- But the problem is that he does not remember the earlier quantities bought at each price. This made his wife, Khaleesi very sad. Let us find a way to help Khal Drogo find a solution and make Khaleesi happy.



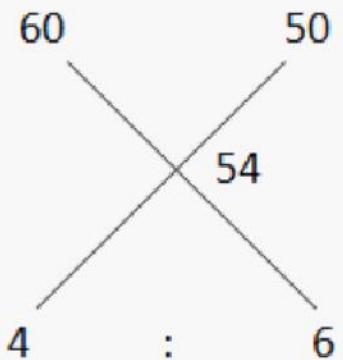
# Formulas

Now to find the answer, we can make the two equations like

$x + y = 100$ ; Total sugar purchased

$60x + 50y = 5400$ ; Total expenditure

Solving these equations we can find the value of  $x$  to be 40 and  $y$  to be 60. There is another way to find the quantity bought at each price, which states to write the two extreme prices at the top and their average price in the middle and then find the differences as explained below ;



That implies that he has purchased those in the ratio of 4 : 6, which is 2 : 3. For finding the answer, you need to break 100 kg given in this ratio to get the answer as 40 kg and 60 kg.

# Formulas

## Rule of Alligation:

- Now here are some important points, which are to be kept in mind before applying alligation method.
- While comparing the extreme values and average price, you have to take the 'difference' between the two values i.e. it is always positive, you have to subtract the smaller value from the larger value.
- The difference so obtained is to be written in the same directions as the lines of the cross are indicating. The difference of the price on the left and the average price will be going towards the right-hand side and the vice versa.
- The ratio appearing will stand for the price below which it is visible, i.e. in this example the ratio of 4: 6 is for sugar worth Rs. 60 and Rs. 50 respectively.
- This technique is applicable in all the cases, where you have two extreme values and their average price. So in the questions from the chapters like percentage, profit and loss, simple interest and average, the technique of mixture and alligation is applicable.
- The rule of alligation states "When different quantities of different ingredients are mixed together to produce a mixture of a mean value, the ratio of their quantities is inversely proportional to the differences in their cost from the mean value."

# Formulas

## Repeated dilution of a Mixture

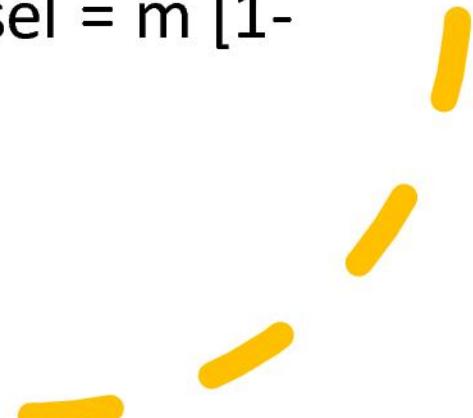
- One characteristic case in mixtures is the repeated dilution of a mixture with one of the ingredients, by removing, says n litres of the mixture and replacing it with n litres of one of the ingredients.
- Let there be m litres of water initially. Now, we remove n litres of the water and replace it by n litres of wine. This operation is done t times. Then

Quantity of water left in the vessel =  $m [1 - (n/m)]^t$

Where m = total quantity

n = quantity drawn every time

t = no. of times



## Sample Question 9

If 60 pounds of nuts that cost Rs. 12 per pound are mixed with 20 pounds of nuts that cost Rs. 16 per pound, what is the cost per pound of the mixture?

## Sample Question Solution 9

Here the rule of alligation cannot be applied, as the average price is not given, but it is to be calculated. Now the normal average logic will be applied.

The total cost of the 80 pounds of nuts is  $60 \times 12 + 20 \times 16 = \text{Rs. } 1040$ .  
The cost per pound is  $1040/80 = \text{Rs. } 13$ .

## Sample Question 10

A person has 6 litres of milk solution A which has 10 percent water in it and  $n$  litres of milk solution B which has 20 percent water in it. How many liters of solution B must he mix with solution A to obtain a milk solution 14 percent water .

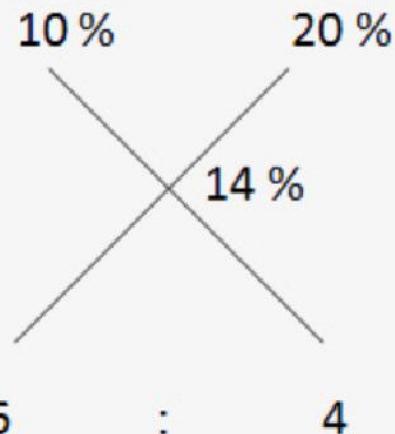
## Sample Question Solution 10

Sol: Let us solve this question by both the methods i.e. the equation as well as alligation.

Here,  $n$  represent the number of litres of the 20 % solution. The amount of water in this 20 % solution  $[0.2n]$  plus the amount of water in the 10 % solution  $[(0.1)(6)]$  must be equal to the amount of water in the 14% mixture  $[0.14(n + 6)]$ .

Therefore,  $0.2n + 0.1(6) = 0.14(n + 6) \Rightarrow 0.2n + 0.6 = 0.14n + 0.84 \Rightarrow 0.06n = 0.24 \Rightarrow n = 4$  liters.

4 liters of the 20% salt solution must be added to the 10% solution to obtain 14% solution. This question was solved with the help of equations. Now let us solve this question by alligation rule



There are already 6 litres of 10 % solution, this means 4 litres of 20 % solution should be added.

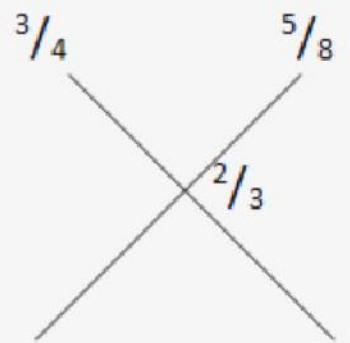
## Sample Question 11

Two vessels contain milk and water in the ratio of 3 : 1 and 5 : 3 respectively. Find the ratio in which these are to be mixed to get a new mixture in which the ratio of milk to water is 2 : 1.

# Sample Question Solution 11

Sol: In such questions, you should simply take one component out of the two given i.e. milk and water and then take its mean value and find the ratio.

Let us take milk. Milk is  $\frac{3}{4}$ th in the first vessel and  $\frac{5}{8}$ th in the second vessel and the average milk needed is  $\frac{2}{3}$ rd.



$$\frac{1}{24} : \frac{1}{12}$$

$$1 : 2$$

⇒ Ratio is 1 : 2 and this is the answer. If 1 litre is taken from the first vessel 2 litres should be taken from the second vessel.

## Sample Question 12

There are 80 litres of water in a vessel. 8 litres of water are withdrawn & replaced with milk, then 8 litres of mixture are withdrawn & replaced with milk. What is the quantity of water left in the mixture?

## Sample Question Solution 12

Sol: Water left in the vessel =  $80(1 - 8/80)^2$

$$80 \times 9/10 \times 9/10 = 64.8 \text{ litres}$$

## Sample Question 13

A tank has a mixture of milk and water in the ratio of 3: 1. What proportion of the mixture should be withdrawn and replaced with water so that the resulting mixture has equal proportions of milk and water?

## Sample Question Solution 13

Sol: Water is initially  $\frac{1}{4}$ th of the total and what you are mixing in it is the water. Water has how much water in it (seems odd). But true, water has 100 % water in it (in percentage) or 1 time of water (in fractions). So the rule of alligation will be applied as,

$$\begin{array}{ccc} \frac{1}{4} & & 1 \\ & \diagdown & \diagup \\ & \frac{1}{2} & \\ \frac{1}{2} & : & \frac{1}{4} \\ 2 & : & 1 \end{array}$$

Now they are to mixed in the ratio of 2 : 1. It is also known that the proportion of water is actually by replacing the mixture, this means 1 out of a total of 3 ( $1 + 2$ ) should be replaced i.e.  $\frac{1}{3}$ rd of the total should be replaced.

## Sample Question 14

The vendor has two types of liquid solutions and he mixes them in ratio 5 : 3. The cost of first liquid is Rs 4 more than the other liquid. Find the cost price of each of the liquids if he gains 20 % on selling the mixed solution at Rs 12 per litre.

## Sample Question Solution 14

Sol: Let the cost of 1st liquid be  $x$ . Therefore, the cost of 2nd liquid =  $x - 4$ .

The cost of 8 litres of the mixture =  $5x + 3(x - 4) = 8x - 12$

Therefore, the cost of 1 litre (dividing the above calculated value by 8) of the mixture =  $x - 1.5$

As the vendor gains 20 % by selling a litre of the mixture at Rs. 12, we get

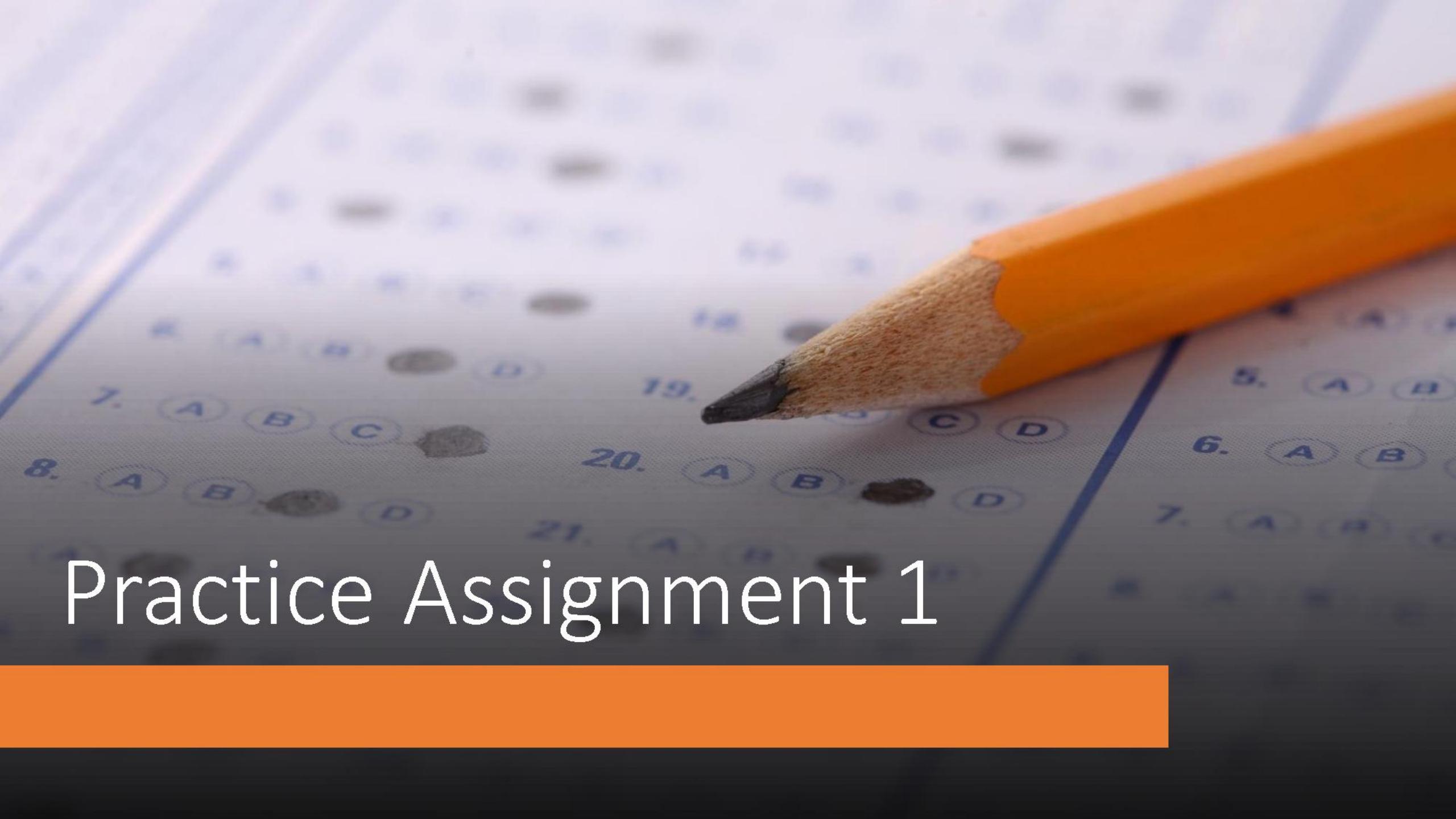
$$(120/100) * (x-1.5) = 12$$

$$(12/10)(x-1.5) = 12$$

Solving for “ $x$ ”, we get,  $x = 11.5$

Therefore, the costs of the liquids are Rs. 11.5 and Rs. 7.50 respectively.

# Practice Assignment 1



## Practice Question 1.1

In what time will Rs. 25 become Rs. 37 at % p.a. simple interest?

- a) 1/2 Years
- b) 2 Years
- c) 2 1/4 Years
- d) 2 1/2 Years
- e) 3 Years

## Practice Question Solution 1.1

**Sol : Option E**

**Explanation:** Interest = $37 - 25 = 12 \rightarrow 12 = (25/100) \times 16 \times T \rightarrow T = 3$  years

## Practice Question 1.2

A moneylender lends Rs. 60 and collects Rs. 66 at the end of four months. The rate of interest p.a. is

- a) 5 %
- b) 10 %
- c) 20 %
- d) 30 %
- e) 9 %

## Sample Question Solution 1.2

**Sol : Option D**

**Explanation:** Interest =  $66 - 60 = 6$  therefore,  $6 = 60/100 \times R \times 4/12$   
 $\Rightarrow R = 30\%$ .

### Practice Question 1.3

If Rs 16,000 is invested at 12 percent simple annual interest, how much interest is earned after 6 months?

## Practice Question Solution 1.3

**Sol:** Since the annual interest rate is 12 %, the interest for 6 months is  $(16000 \times 12 \times 6) / 12 \times 100 = \text{Rs. } 960$ .

## Practice Question 1.4

The population of a town has a constant growth of 4% p.a. If its present population is 62,500, what will be its population after two years?

## Practice Question Solution 1.4

$$\begin{aligned}\textbf{Sol:: Population after 2 years} &= P (1 + 4/100)^2 = 62500 \times (104/100)^2 \\ &= 62500 \times 26/25 \times 26/25 = 100 \times 26 \times 26 = 67600.\end{aligned}$$

Hence, the population after two years will be 67,600.

## Practice Question 1.5

The compound interest on a certain sum of money for 2 years is Rs. 52 and the simple interest for the same time at the same rate is Rs. 50. Find the rate %.

## Practice Question Solution 1.5

**Sol:** SI for 2 years = 50, CI for 2 years = 52. therefore As, SI and CI are same for the first year, therefore, SI and CI for 1<sup>st</sup> year = Rs. 25. So CI for 2<sup>nd</sup> year = 52 – 25 = 27 i.e. a difference of Rs. 2 on 1<sup>st</sup> year's interest of Rs. 25. Hence rate of interest =  $100 \times 2/25 = 8\%$ .

## Practice Question 1.6

A sum of money at compound interest amounts to eight times of itself in 3 years. In how many years will it be 512 times of itself?

- a) 28 Year
- b) 24 Year
- c) 9 Year
- d) 16 Year
- e) 14 Year

## Practice Question Solution 1.6

**Sol : Option C**

**Explanation:** Rs. 1 becomes Rs. 8 in 3 years. i.e.  $1 \rightarrow 8$  in 3 years.

So,  $8 \rightarrow 64$  in another 3 years.

Also,  $64 \rightarrow 512$  in another 3 years.

Hence, we can say that Rs. 1 becomes Rs. 512 in  $3 + 3 + 3 = 9$  years.

Hence, the answer is option C

## Practice Question 1.7

A certain sum of money invested @ 40 % p.a. compounded half-yearly amounts to Rs. 5760 in 1 year. What is the sum (in Rs.)?

A. B. C. D. E.

- a) 2100
- b) 4000
- c) 1900
- d) 2000
- e) 2200

## Practice Question Solution 1.7

**Sol : Option B**

**Explanation:** Half yearly, therefore,  $R = 40 / 2 \% = 20\%$  and  $T = 1 \times 2 = 2$  years

Applying formula,  $5760 = P (1 + 20/100)^2$

$$P = 5760 \times 25/36 = \text{Rs. } 4000$$

## Practice Question 1.8

A sum of money is invested at compound interest compounded annually. The interests in two successive years were Rs. 150 and Rs. 168. Then the rate percent was

- a) 1.5 %
- b) 3 %
- c) 6 %
- d) 12 %
- e) None Of The Above

## Practice Question Solution 1.8

**Sol : Option B**

**Explanation:**  $R = (168 - 150) / 150 = 12\%$

## Practice Question 1.9

The difference between compound interest and simple interest on a certain sum for 2 years at 10 % is Rs. 25. The sum is

- a) Rs. 1200
- b) Rs. 2500
- c) Rs. 750
- d) Rs. 1250
- e) Rs. 2000

## Practice Question Solution 1.9

**Sol : Option B**

**Explanation:** Apply: Principal =  $x (100/r)^2$  where  $x$  is the difference in CI & SI for 2 years.  $\therefore P = 25(100/10)^2 = 2500.$

## Practice Question 1.10

The simple interest on a sum of money for 2 years is Rs. 150 and the compound interest on the same sum at same rate for 2 years is Rs. 155. The rate % p.a. is

- a) 16 %
- b)  $20/3$  %
- c) 12 %
- d) 10 %
- e) None of these

## Practice Question Solution 1.10

**Sol : Option B**

**Explanation:** SI for 3 years = 150  $\rightarrow$  SI for 1 years = 75

$\therefore$  CI for 1 year = 75. So CI for 2<sup>nd</sup> year = 80 and SI for 2<sup>nd</sup> year = 75.

Difference = 5  $\therefore$  Rate of interest =  $(5/75) \times 100 = 20/3\%$ .

## Practice Question 1.11

**What is the sum of first 10 perfect cubes?**

1. 3025
2. 5625
3. 1225
4. None of these

## Practice Question Solution 1.11

Answer : Option 1

Sum of 1<sup>st</sup> 10 perfect cubes :- =  $1^3 + 2^3 + 3^3 \dots + 10^3 =$   
 $(10(10+1)/2)^2 = 3025$  Hence, the correct answer is option 1

## Practice Question 1.12

A 107 digit number is formed by writing first 58 natural numbers next to each other. Find the remainder when number is divided by 8.

1. 6
2. 10
3. 4
4. 9

## Practice Question Solution 1.12

Answer : Option 1

To find remainder by 8, we only divide the number formed by the last 3 digit by 8. The last 3 digits would give the number 758. The remainder when 758 is divided by 8 = 6. So, answer is option 1.

## Practice Question 1.13

**What is the sum of this series  $1 + 1 + 2 + 8 + 3 + 27 + 4 + 64 + \underline{\hspace{2cm}} + 10 + 1000?$**

1. 308
2. 3008
3. 3800
4. 3080

## Practice Question Solution 1.13

Answer : Option 4

Here, we are given a combination of two series

$$\begin{aligned}& (1 + 2 + 3 + 4 + \dots + 10) + (1 + 8 + 27 + 64 + \dots + 1000) \\&= (1 + 2 + 3 + 4 + \dots + 10) + (1^3 + 2^3 + 3^3 + 4^3 + \dots + 10^3) \\& (10(10+1)/2) + ((10 \times 11)/2)^2 = 3080. \text{ So, correct answer is option 4.}\end{aligned}$$

## Practice Question 1.14

**Which one of the following is not a rational number?**

1. 0.2333
2. 0.56666
3.  $\sqrt{3}$
4. 7

## Practice Question Solution 1.14

Answer : Option 3

Here, 0.2333, 0.56666 and 7 are rational numbers as these can be represented in the form  $p/q$ .  $\sqrt{3}$  is not a rational number, therefore answer is option 3.

## Practice Question 1.15

**There are 20 people in a party. If every person shakes hand with every other person, what is the total number of handshakes?**

1. 180
2. 155
3. 145
4. 190

## Practice Question Solution 1.15

Answer : Option 4

1<sup>st</sup> person will shake hand with 19 other persons. 2<sup>nd</sup> person will shake hand with remaining 18 persons, and so on.

Therefore, total number of handshakes.

$$= 19 + 18 + 17 + \dots + 3 + 2 + 1 = \sum 19 = (19(19+1)/2) = 190$$

So, the correct answer is option 4.

## Practice Question 1.16

**The product of 40 odd numbers is**

1. even
2. odd
3. 625
4. Can't say

## Practice Question Solution 1.16

Answer : Option 2

The product of 40 odd numbers will give an odd number. So answer is option 2.

## Practice Question 1.17

**The six digit number 54321A is divisible by 9 where A is a single digit whole number. Find A.**

1. 0
2. 2
3. 4
4. 3

## Practice Question Solution 1.17

Answer : Option 4

A number is divisible by 9, when the sum of its digits is divisible by 9. Here,  $5 + 4 + 3 + 2 + 1 + A = 15 + A$  should be divisible by 9. Therefore,  $A = 3$  gives  $15 + 3 = 18$  as the sum of digits, which is divisible by 9. So, answer is option 4.

## Practice Question 1.18

**Find the greatest 6-digit number, which is a multiple of 12.**

1. 999980
2. 999990
3. 999984
4. None of these

## Practice Question Solution 1.18

Answer: Option 4

Greatest six-digit number is 999999. Divide this number by 12 and get remainder as 3. Since the remainder is 3, if you subtract 3 from the number, the remaining number will be a multiple of 12. So the greatest such number will be  $999999 - 3 = 999996$ .

## Practice Question 1.19

**Simplify the expression using BODMAS rule  $(105 + 206) - 550 \div 5^2 + 10$**

1. 399
2. 289
3. 298
4. 299

## Practice Question Solution 1.19

Answer : Option 4

$$(105 + 206) - 550 \div 52 + 10$$

$$= 311 - 550 \div 25 + 10$$

$$= 311 - 22 + 10$$

$$= 289 + 10 = 299$$

## Practice Question 1.20

**Find the greatest three number which is multiple of 7.**

1. 993
2. 995
3. 994
4. None of these

## Practice Question Solution 1.20

Answer : Option 3

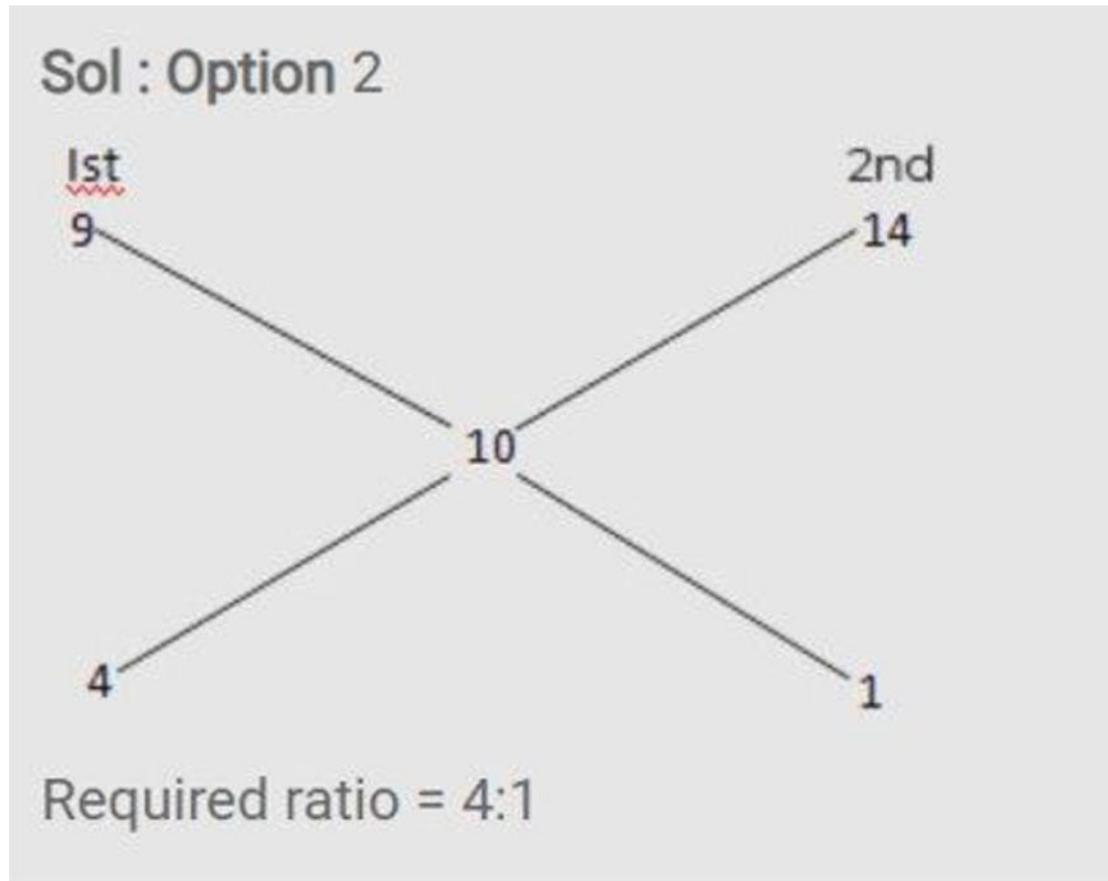
Greatest three digits number = 999. When 999 is divided by 7, the remainder will be 5. Required number=  $999 - 5 = 994$ .

## Practice Question 1.21

In what ratio must tea worth Rs. 9 per kg be mixed with tea worth Rs. 14 per kg so that the resultant mixture costs Rs. 10 per kg?

1. 1 : 4
2. 4 : 1
3. 3 : 2
4. 2 : 5
5. None of these

## Practice Question Solution 1.21



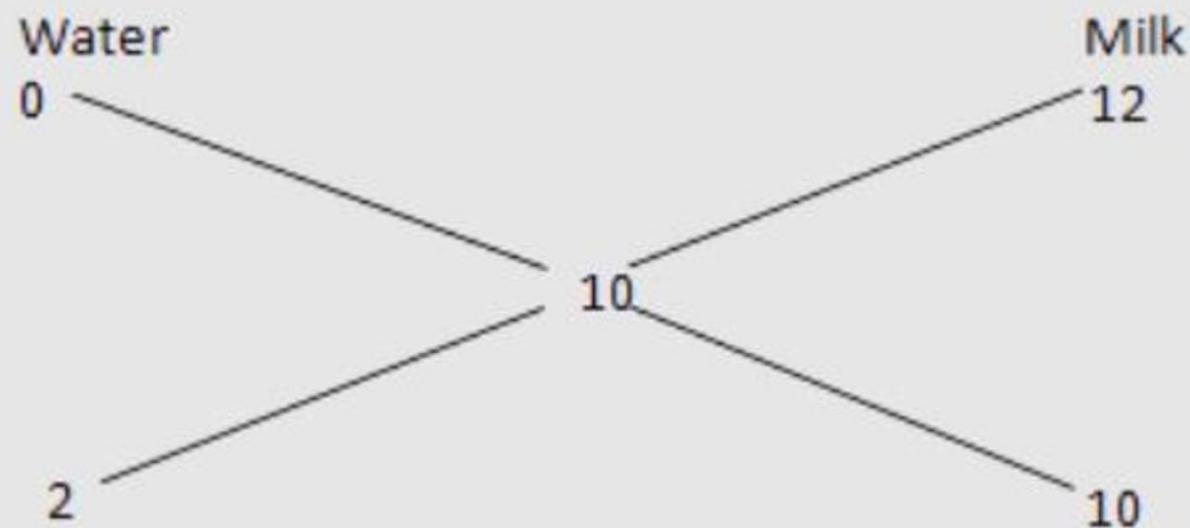
## Practice Question 1.22

In what ratio must water be mixed with milk worth Rs. 12 per litre so as to produce a mixture worth Rs. 10 per litre?

1. 1 : 4
2. 3 : 5
3. 2 : 3
4. 2 : 5
5. 1 : 5

## Practice Question Solution 1.22

Sol : Option 5



Ratio of water to milk = 1:5

## Practice Question 1.23

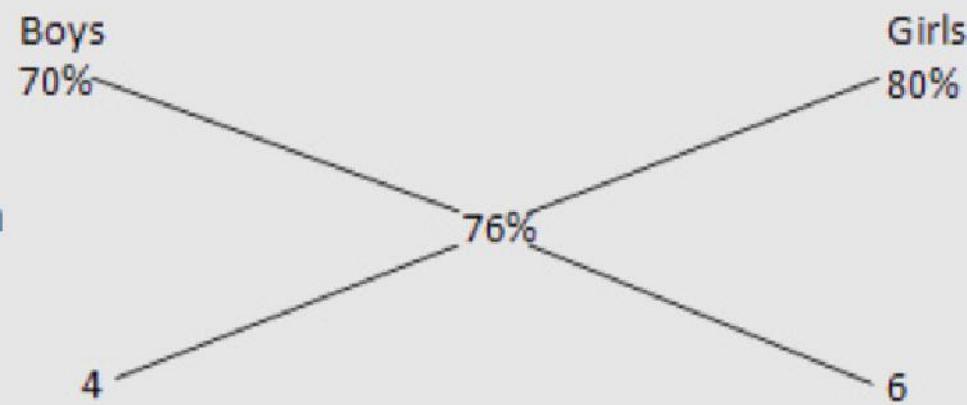
In an examination out of 1000 students 70% boys and 80% girls are passed. If total pass percentage was 76%, find the number of girls.

1. 550
2. 650
3. 625
4. 700
5. 600

## Practice Question Solution 1.23

Sol : Option 5

This question we will solve by Alligation



∴ Ratio of Boys to Girls = 2 : 3

$$\therefore \text{Girls} = \frac{3}{5} \times 1000 = 600$$

## Practice Question 1.24

If Rs. 85 is divided among 100 students such that each boy got a rupee and each girl got 50 P, find the number of girls.

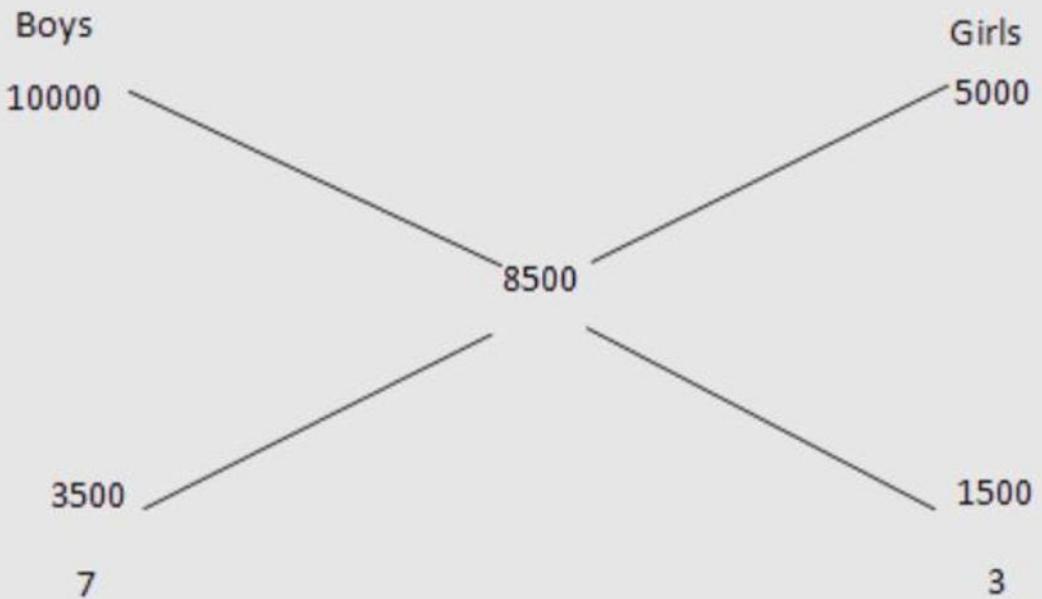
1. 50
2. 60
3. 30
4. 70
5. 40

## Practice Question Solution 1.24

Sol : Option 3

Let all are boys then total sum =  $100 \times 100 = 10000$  P.

Let all are girls then total sum =  $100 \times 50 = 5000$  P.



$\therefore$  Ratio of Boys to Girls = 7 : 3. Number of girls =  $3/10 \times 100 = 30$

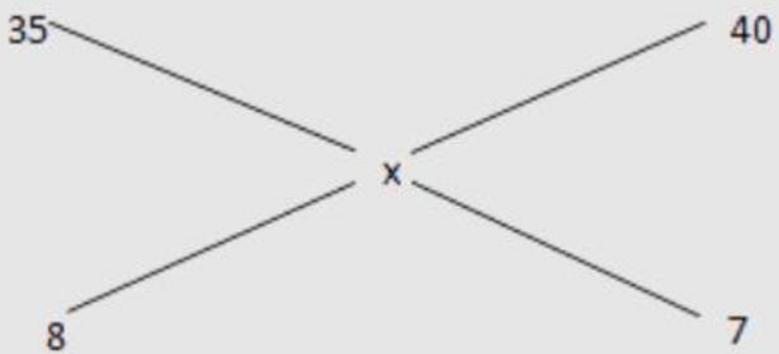
## Practice Question 1.25

A manufacturer mixes two kinds of tea costing Rs 35 and Rs 40 a Kg in the ratio of 8:7. What is his profit or loss percent if he sells the mixture @ Rs 37.50 a Kg?

1. No profit or loss
2. .455% profit
3. .455% loss
4. 25/56% loss
5. None of these

## Practice Question Solution 1.25

Sol : Option 2



$$\Rightarrow (40-x) / (x-35) = (8/7)$$

$$\Rightarrow 280 - 7x = 8x - 280$$

$$\Rightarrow 15x = 560$$

$$\Rightarrow x = 37.33$$

$$\therefore \text{Profit \%} = 37.50 - 37.33 / 37.33 \times 100 \cong .455\%$$

## Practice Question 1.26

In what ratio must two kinds of sugar at Rs. 1.15 and Rs. 1.24 per kg be mixed so that by selling at Rs. 1.50 per kg, 25% may be gained?

1. 4: 5
2. 5: 4
3. 1: 1
4. 2: 3
5. None of these

## Practice Question Solution 1.26

Sol : Option 1

$$SP = 1.50 \text{ Rs. Profit} = 25\%. CP = 1.50 \times (100/125) = 1.20 \text{ Rs.}$$

Ist

115

2nd

124

120

4

5

Therefore required ratio = 4 : 5

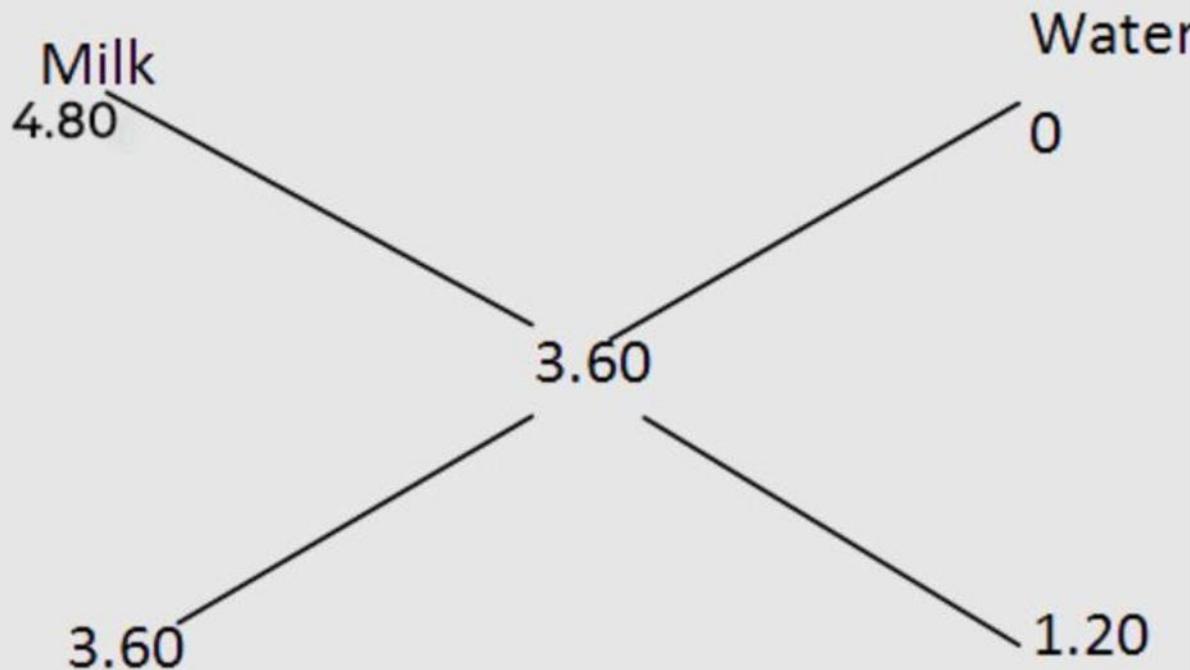
## Practice Question 1.27

How much water be mixed in 36 litre of milk worth Rs. 4.80 per litre, so that value of mixture is Rs. 3.60 per litre?

1. 10 litres
2. 12 litres
3. 11 litres
4. 14 litres
5. 17 litres

## Practice Question Solution 1.27

Sol : Option 2



Ratio of Milk to water will be = 18:6,

In 18 litre milk water added = 6 litre

In 1 litre milk water added =  $6 / 18$

In 36 litre milk water added =  $(6/18) \times 36 = 12$  litres

## Practice Question 1.28

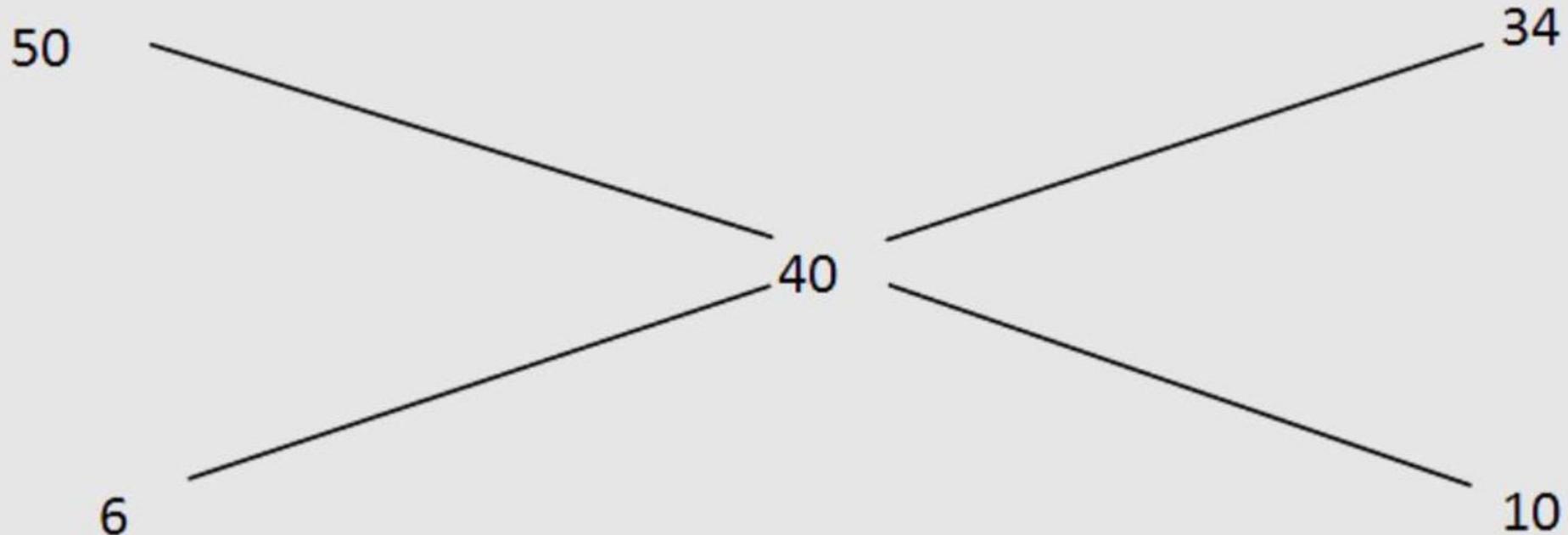
How many kg of Sugar at 50 P per kg must a man mix with 25 kg of sugar at 34P per kg so that by selling the mixture at 44P per kg he gains 10% on the outlay?

1. 10 kg
2. 15 kg
3. 20 kg
4. 16 kg
5. 18 kg

## Practice Question Solution 1.28

Sol : Option 2

$$\text{Cost price of mixture} = (44/110) \times 100 = 40$$



$$\therefore \text{sugar of 50 paisa per kg to be mixed} = (3/5) \times 25 = 15\text{kg}$$

## Practice Question 1.29

How much sugar at Rs. 9.5 a kg should be added to 17 kg of tea at Rs. 20 a kg so that the mixture be worth Rs. 13 a kg.?

1. 11 kg
2. 17 kg
3. 21 kg
4. 34 kg
5. None of these

## Practice Question Solution 1.29

**Sol : Option 4**

Ratio in which tea and sugar should be mixed

$$= 20 - 13 : 13 - 9.5 = 7 : 3.5 \Rightarrow 7 : 3.5 \Rightarrow 2:1 .$$

Let  $x$  be quantity at 9.5/kg.  $\therefore 2 : 1 = x : 17$ , hence  $x = 34$  kg.

### Practice Question 1.30

A hospital uses a mixture of salt and water at Rs. 7.62/litre. This mixture contains 5 % salt. Another mixture containing 75 % water costs Rs. 7.82/litre. How much does the patient pay if he buys 5 litres of mixture containing 18% salt?

1. Rs. 83.75
2. Rs. 73.85
3. Rs. 37.85
4. Rs. 38.75
5. None of these

## Practice Question Solution 1.30

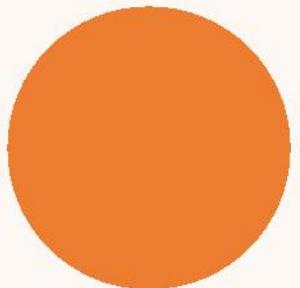
**Sol : Option 4**

1st mixture contains 5 % salt. 2nd mixture contains 75 % water i.e. 25 % salt.

Required % of salt = 18 %.  $\therefore$  Required ratio =  $25 - 18 : 18 - 5 = 7 : 13$  and required price of the mixture =  $7.82 - x : x - 7.62 = 7 : 13 \Rightarrow x = 7.75$  / liter. Hence price of 5 liters of this mixture =  $7.75 \times 5 = \text{Rs. } 38.75$ .



# Resources and Books



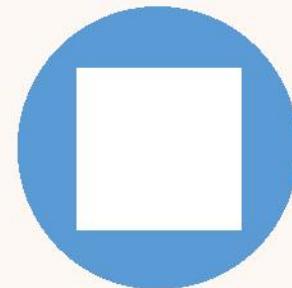
Fast Track Objective Arithmetic by Rajesh Verma –  
Arihant Publication.



<https://www.indiabix.com/aptitude/questions-and-answers/>



<https://prepinsta.com/tcs-digital/>



<https://www.hitbullseye.com/Quant>

Thank you

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