LILHA EDUCATION CENTRE
LEC
A Complete Commerce Education Centre

BHU
& OTHER UNIVERSITIES

B.Com
ENTRANCE EXAM 2020

MATHEMATICS
LILHA EDUCATION CENTRE

LILHA EDUCATION CENTRE

BEST COMMERCE COACHING IN INDIA

COURSES OFFERED

- 11TH & 12TH COMMERCE
- CA/CS
- BHU B.COM ENTRANCE
- B.COM
- ACCA
- CMA

INDEX

S.No.	Contents	Page No.
CH-1	Least Common Multiple and Highest Common Factor	2-21
CH-2	Number System	22-40
CH-3	Simple Interest	41-56
CH-4	Compound Interest	57-70
CH-5	Ratio And Proportion	71-86
CH-6	Mixture or Alligation	87-100
CH-7	Average	101-120
CH-8	Time, Speed and Distance	121-139
CH-9	Time and Train	140-152
CH-10	Boat and Stream	153-161
CH-11	Profit ,Loss and Discount	162-179
CH-12	Time, Work and Wages	180-198
CH-13	Menstruation	199-219
CH-14	Percentage	220-232

1 | LEAST COMMON MULTIPLE and HIGHEST COMMON FACTOR

Introduction:

Factor and Multiple: If two numbers are such that the smaller number divides the greater number then the smaller number is called factor of the greater number and the greater number is called multiple of the smaller number.

Example: 3 is a factor of 24 and 24 is a multiple of 3.

❖ Least Common Multiple (L. C.M.) : L.C.M. of
   Two or more numbers is the smallest number which is divisible by each of the given numbers.

❖ Methods of finding L.C.M.: There are two methods of finding L.C.M.

> Prime Factorization Method

> **Working Rule**
>
> 1. First of all we factorize all the numbers into prime numbers.
>
> 2. If same factor is available in more than one numbers.
>
> 3. If a factor is used once. It is taken as it is.
>
> 4. All the taken factors as said above are multiplied to get L.C.M.

Example: What is the L. C. M. of 18, 28, 108 and 105?

Tricky Soln.   Here, $18 = 2 \times 3 \times 3 = 2 \times 3^{2},$

$28 = 2 \times 2 \times 7 = 2^2 \times 7,$

$108 = 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$

And $105 - 3 \times 5 \times 7$

Required L.C.M. $= 2^2 \times 3^3 \times 5 \times 7$

$= 4 \times 27 \times 5 \times 7 =$ **3780 Ans.**

Note: Here, the highest power of 2 and 3 which are used are 2^2 and 3^3 , 7 is used twice and 5 once.

$$\boxed{\text{Division Method}}$$

> **Working Rule**
>
> 1. Given numbers are written in a line separated by comma sign. At least two numbers are divided by same prime number. This work is done till at least two numbers are divided by same prime number.
>
> 2. All divisors and the numbers in last line are multiplied to find the required L. C. M.

L.C.M. of Decimals :

(Working Rule) : To find the L.C.M. of numbers in decimals, we equate the number of digits after decimal points, then find the L.C.M. of the numbers without decimal and then put the decimal point from right- side after same number of digits. Thus the L.C.M. of the given numbers is obtained.

L.C.M. of Fractions :

Formula: L.C.M. of fractions = $\dfrac{\text{L.C.M. of Numerators}}{\text{H.C.F. of Denominators}}$

Example: What is the L.C.M. of 1/3, 5/9, 5/6, 4/27?

Tricky Soln.: Required L.C.M. = $\dfrac{\text{L.C.M. of 1, 5, 5, 4}}{\text{H.C.F. of 3, 9, 6, 27}}$ = 20/3 **Ans.**

L.C.M. of exponent:

TYPE 1: TRICK- If base number be same and power be different then the L.C.M. is the number having maximum power.

Example: What is the L.C.M. of 3^3, 3^{12}, 3^{17} ?

Tricky Soln.: L.C.M. = 3^{17} **Ans.**

TYPE 2: TRICK- If base and power of numbers are different then L.C.M. is found out by factorization method.

Example: (a) What is the L.C.M. of 2^2 and 3^2 ?

Tricky Soln.: L.C.M. = $2^2 \times 3^2$ = 8 × 9 =72 **Ans.**

Example: (b) What is the L.C.M. of 3^{-2}, 2^{-5}, 4^{-3} ?

Tricky Soln.: L.C.M. of 3^{-2}, 2^{-5} and 4^{-3}

$\qquad$ =L.C.M. of $1/3^2$ $1/2^5$ and $1/4^3$

$\qquad$ = L.C.M. of 1/9 1/32 and 1/64

$\qquad$ ∴ L.C.M. = $\dfrac{\text{L.C.M of 1, 1, 1}}{\text{H.C.F. of 9, 32, 64}}$ = 1/1 = 1 **Ans.**

❖ **Highest common factor:**

$\qquad$ Highest common factor of two or more numbers is the greatest number which divides each of the give numbers.

1. Methods of finding H.C.F. – There are two methods of finding H.C.F.
   a. **Prime Factorization Method :**

> Working Rule
>
> 1. All numbers are written as prime factors.
> 2. The product of common factors of all the numbers is called H.C.F. of those numbers.

Example: What is the H.C.F. of 28 and 32?

Tricky Soln.: 28 = 2 × 2 × 7

$\qquad$ 32 = 2 × 2 × 2 × 2 × 2 × 2

$\qquad$ Clearly 2 × 2 is the common factors of the two numbers

$\qquad$ ∴ H.C.F. of 28 and 32 = 2 × 2 = 4 **Ans.**

> Working Rule
>
> 1. Fi*rst of all greater number is divided by the smaller number*.
>
> 2. If there is no remainder then the smaller number is the H.C.F. If there is remainder then the divisor is divided by the remainder.
>
> 3. Above process is done successively until the remainder is zero.
>
> 4. The last divisor id the H.C.F. of the two numbers.

Example: What is the H.C.F. of 493 and 928?

Tricky Soln.: 493) 928 (1

            <u>493</u>

          435) 493 (1

               <u>435</u>

              58) 435 (7

                   <u>406</u>

                 29) 58 (2

                     <u>58</u>

                       ×

So, H.C.F. of 493 and 928 = 29 **Ans.**

❖ **Continued division method for finding H.C.F of three or more numbers :**

Working Rule

1. H.C.F. of any two numbers of the given numbers is obtained by the continued division method.

2. H.C.F. of the above H.C.F. and any one of the remain number is obtained.

3. This process is done up to last number.

4. Last H.C.F. is the H.C.F. of all the given numbers

Example: What is the H.C.F. of 828, 1311 and 1955?

Tricky Soln.: 826) 1311 (1

             <u>828</u>

         483) 828 (1

           <u>483</u>

           345) 483 (1

             <u>345</u>

            138) 345 (2

              <u>276</u>

              69)138 (2

                <u>138</u>

               ×××

∴   H.C.F. of 828 and 1311 =69

Now,   69) 1955 (28
              138
              575
              552
              23) 69 (3
              69
              ×

∴ Required H.C.F. =23 **Ans.**

❖ **H.C.F. of Decimals:**

> Working Rule
>
> To find the H.C.F. of numbers in decimals, we equate the number of digits after decimal points, then find theH.C.F. of the numbers without decimal and then put the decimal point from right – side after same number of digits. Thus the H.C.F. of the given number is obtained.

Example: What is the H.C.F. of 1.5, 0.24 and 0.036 ?

Tricky Soln.: H.C.F. of 1.5, 0.24 and 0.036

= H.C.F. of 1.500, 0.240 and 0.036

Now , H.C.F. of 1500 , 240 and 36 = 12

H.C.F. of 1.5, 0.24 and 0.036 = 0.012 **Ans.**

❖ **H.C.F. of Fractions:**

Formula: H.C.F. of fractions = $\dfrac{\text{H.C.F. of Numerators}}{\text{L.C.M. of Denominators}}$

Example: What is the H.C.F. of 16/21, 8/15, 2/3, 24/27 ?

Tricky Soln.: Required H.C.F. = $\dfrac{\text{H.C.F. of 16, 8, 2, 24}}{\text{L.C.M. of 21, 15, 3, 27}}$ = 2/945 **Ans.**

❖ **H.C.F. of Power and exponent :**

TYPE 1: TRICK- If the given numbers have same base and different power then H.C.F. is equal to the minimum power of the base.

Example: What is the H.C.F. of 2^8, 2^{10}, 2^{15}?

Tricky Soln.: Required H.C.F. = 2^8 **Ans.**

TYPE 2: TRICK- If the base and power of the given numbers be different then their H.C.F is obtained using factor method.

Example: What is the H.C.F. of 5^2 and 4^3?

Tricky Soln.: $5^2 = 1 \times 5^2$ and $4^3 = 1 \times 4^3$

∴ Required H.C.F. = 1 **Ans.**

> **Formula :** First number × Second number = H.C.F. × L.C.M.

Example: H.C.F. and L.C.M. of two numbers be respectively 12 and 396 . One of the numbers be 36 then what is the second number?

Tricky Soln.: 36 × Second Number = 12 × 396

∴ Second Number = (12 × 396 / 36) = 132 **Ans.**

Some more solved examples of different types

Example: 1. Find the largest 4- digit number which is exactly divisible by each of 12, 15, 18 and 27 ?

Tricky Soln.: The largest number of 4-digits is 9999.

```
2 | 12, 15, 18, 27
3 | 6,  15,  9, 27
3 | 2,  5,   3,  9
  | 2,   5,  1,  3
```

L.C.M. = 2 × 3 × 3 × 2 × 5 × 3 = 540

www.lilhaeducationcentre.in   **Mob: 9305907823**

$$540) 9999 (18$$
$$\underline{540}$$
$$4599$$
$$\underline{4320}$$
$$0279$$

Hence, the required number = 9999 − 279

= 9720 **Ans.**

Example: **2.** What is the H.C.F. of 2/3, 4/5, and 6/7 ?

Tricky Soln.: H.C.F of 2/3, 4/5 and 6/7

$$= \frac{\text{H.C.F. of 2, 4, and 6}}{\text{L.C.M. of 3, 5, and 7}} = \textbf{2/105 Ans.}$$

Example: **3.** What is the greatest number by which 1657 and 2037 are divided to give remainders 6 and 5 respectively ?

Tricky Soln.: We have to find H.C.F. of (1657 − 6 = 1651)

And (2037 − 5 = 2032)

1651 = 13 × 127

2032 = 16 × 127

H.C.F. = 127

Hence, the required number

= 127 **Ans.**

Primary Exercise

1. The L.C.M of 2/3, 3/5, 4/7 and 9/13 is :-

    a. 36

    b. 1/1365

    c. 12/455

    d. 1/36

    e. None

2. The H.C.F. of 7/9, 14/15, and 7/10 is :-

    a. 14/45

    b. 7/675

    c. 7/90

    d. 7/45

    e. None

3. The simplest from of 391/667 is :-

    a. 19/23

    b. 23/31

    c. 15/19

    d. 17/29

    e. None

4. H.C.F. and L.C.M. of two numbers are respectively 30 and 2310. If one of those numbers be 330 then what is the second number ?

    a. 231

    b. 210

    c. 200

    d. 215

    e. None

5. The product of two numbers is 1000. If their H.C.F. is 5 then what is their L.C.M.?

    a. 5000

    b. 300

    c. 250

    d. 200

    e. None

6. H.C.F. and L.C.M. of two numbers are respectively 44 and 264. When the first numbers is divided by 2 then the quotient 44 is obtained what is the second number?

    a. 68

    b. 138

c. 132

d. 48

e. None

7. L.C.M. of two numbers is 180. The ratio of the two numbers is 4 : 5. What is the smaller number?

    a. 36

    b. 45

    c. 54

    d. 63

    e. None

8. Three numbers are in the ratio 1 : 2 : 3 and their H.C.F. is 12. The number are :-

    a. 4, 8 and 12

    b. 10, 20 and 30

    c. 5, 10 and 15

    d. 12, 24 and 36

    e. None

9. What is the smallest whole number which is divisible by 4, 5, 6, 12, 15, 18, and 36 ?

    a. 3240

    b. 2250

    c. 900

    d. 3600

    e. None

10. What is the smallest number which gives remainder 1 when divided by any of 8, 9, 12 and 15?

    a. 361

    b. 179

    c. 181

    d. 361

    e. None

11. The sum of two numbers is 192 and their H. C. F. is 24. How many such pair of numbers are possible?

    a. 6

    b. 5

    c. 4

    d. 2

    e. None

12. What is the smallest number which is exactly divisible by 9 but gives remainder 3 in all the cases when it is divided by any of 5, 6, 7 and 8?

    a. 3363

    b. 2523

    c. 1683

    d. 1677

    e. None

13. What is the greatest number which can divide 25, 73 and 97 leaving the same remainder in each case?

    a. 24

    b. 21

    c. 23

    d. 6

    e. None

14. What is the least number of five digits which is a perfect square and divisible by 3, 4, 5, 6 and 8?

    a. 14400

    b. 32400

    c. 10800

    d. 10201

    e. None

15. Two number are in the ratio 3 : 4 and their H. C. F. is 4. What is their L.C.M. ?

a. 12

b. 16

c. 24

d. 48

e. None

16. The product of two numbers is 4107 and their H. C. F. is 37. What is the greater number
    ?

    a. 185

    b. 111

    c. 107

    d. 101

    e. None

17. What is the greatest number which on dividing 122 and 243 leaves remainders 2 and 3
    respectively?

    a. 12

    b. 24

    c. 30

    d. 120

    e. None

18. The L.C.M. of 24, 36 and 40 is :-

    a. 120

    b. 240

    c. 360

    d. 480

    e. None

19. What is the least integer divisible by 3 and next two prime numbers?

    a. 15

b. 21

c. 60

d. 105

e. None

20. What is least number which in completely divisible by 12, 15 and 20 and is a perfect square?

   a. 400

   b. 900

   c. 1600

   d. 3600

   e. None

21. What is the least number whose double is completely divisible by 12, 19, 21 and 30?

   a. 2520

   b. 1260

   c. 630

   d. 196

   e. None

22. What is the ratio in the L.C.M. and H.C.F. of 28 and 42?

   a. 6 : 1

   b. 2 : 3

   c. 3 : 2

   d. 7 : 2

   e. None

23. The smallest multiple of 13 which, when divided by ant of the numbers 4, 5, 6 ,7 and 8 gives remainder 2 in each case is :-

   a. 2520

   b. 842

   c. 2522

   d. 840

e. None

24. The sum of two numbers is 36 and their H.C.F is 4. How many such pair of numbers are possible?

   a. 1
   b. 2
   c. 3
   d. 4
   e. None

25. The smallest number which on dividing by any of the numbers 12, 15, 20, and 54 gives remainder 4 in each case is:-

   a. 450
   b. 454
   c. 540
   d. 544
   e. None

26. The product of L.C.M. and H.C. F. of two numbers is 24. If the difference between the two numbers is 2. The numbers are:-

   a. 8 and 6
   b. 8 and 10
   c. 2 and 4
   d. 6 and 4
   e. None

27. Let N be the least number of six digits which on dividing by any of 4, 6, 10, 15 give remainder 2 in each case. What is the sum of digits in N?

   a. 3
   b. 5
   c. 4
   d. 6
   e. None

28. The L. C. M. of two numbers is 495 and their H.C. F. is 5. If the sum of the two numbers

is 100 then their difference is :-

    a. 10

    b. 46

    c. 70

    d. 90

    e. None

A d v a n c e d   E x e r c i s e

29. The smallest number which, when divided by 35, 45, and 55 gives remainders 18, 28 and
38 respectively is :-
    a. 2468
    b. 3265
    c. 3448
    d. 3482
    e. None

30. What is the least number which, when divided by 7, 9 and 12 gives equal remainder 1?

    a. 253

    b. 352

    c. 505

    d. 523

    e. None

31. What is the smallest multiple of 13 which, when divided by any of 4, 5, 6, and 7 gives

equal remainder 3?

    a. 3780

    b. 3783

    c. 2520

    d. 2522

    e. None

32. The L.C.M. of two numbers is 6 time the H.C. F. of the two numbers. If the smaller number be 6 then what is the another number?

   a. 15
   b. 18
   c. 9
   d. 12
   e. None

33. If the product of two numbers is 2160 and H.C.F. of those numbers is 6 then what is ratio of H.C.F and L.C.M.?

   a. 21 : 60
   b. 60 : 21
   c. 1 : 60
   d. 60 : 1
   e. None

34. The sum of pair of two integers is 336 and H.C. F. of those numbers is 21. What is the possible number of pairs of such numbers?

   a. 2
   b. 3
   c. 4
   d. 5
   e. None

35. The H.C.F. of two numbers is 96 and L.C.M. of those numbers is 1296. If one of those numbers be 864 then what is the another number?

   a. 132
   b. 135
   c. 140
   d. 144
   e. None

36. The H.C.F. and L.C.M. of two positive even integers are respectively 2 and 84. What is the sum of those numbers?

    a. 24

    b. 30

    c. 14

    d. 34

    e. None

37. Find two numbers greater than 100 and less than 200 and whose H.C.F. is 48:-

    a. 144, 192

    b. 112, 118

    c. 136, 190

    d. 112, 180

    e. None

38. The L.C.M of three different numbers is 120. Which of the following number can not be the H.C. F. of those numbers?

    a. 8

    b. 12

    c. 24

    d. 35

    e. None

39. The H.C.F. and L.C.M. of two numbers are respectively 13 and 1989. If one of the two numbers be 117 then what is the value of second number?

    a.   121

    b. 143

    c. 217

    d. 221

    e. None

40. Find the maximum number of students in which 1001 pens and 910 pencils can be distributed such that each student gets equal number of pens and equal number of pencils.

    a. 91
    b. 1001
    c. 910
    d. 1911
    e. None

41. A milkman has 75 liters of milk in a tank and 45 liters of milk in another tank. What can be the maximum volume of a pot which can measure the milk in both the tanks?

    a. 1 liter
    b. 5 liter
    c. 15 liter
    d. 25 liter
    e. None

42. Three numbers are in the ratio 1 : 5 : 4 and there H.C. F. is 7 . What is the greatest number?

    a. 40
    b. 45
    c. 35
    d. 65
    e. None

M a s t e r   E x e r c i s e

43. Find the smallest number which dividing by 42, 72, and 84 give the remainder 25, 55, and 67 respectively.

    a. 521
    b. 512
    c. 504

d. 487

e. None

44. What is the L.C.M. of 1/3, 5/6, 2/9, 4/27 ?

    a. 1/54

    b. 10/27

    c. 20/3

    d. 27/4

    e. None

45. 21 mango trees, 42 apple trees and 56 orange trees are to be planted in such a way that only one type of trees will be in a row and number of trees in each row will be equal. What will be the minimum number of rows so that all the trees will be planted?

    a. 3

    b. 15

    c. 17

    d. 20

    e. None

46. The L.C. M. of two numbers is 16 times their H.C. F. The sum of L.C. M. and H.C.F. is 850. If one of the numbers is 50 then what is the second number?

    a. 800

    b. 1200

    c. 1600

    d. 2400

    e. None

47. A man has 4 rods of measurements 24m, 36m, 48m and 75m. He wants to divide these rods into equal pieces. If no part of the rods be unuseful then what is the minimum number of the pieces of the rods/

    a. 10

    b. 15

    c. 20

d. 25

e. None

48. Five bells begin to ring together and ring again after interval of 2, 4, 5, 6, 8 and 10 seconds respectively. How many times all the bells ring together in the interval of 20 minutes?

    a. 10

    b. 11

    c. 12

    d. 15

    e. None

49. A bell rings after an interval of 5 seconds, second bell rings after an interval of 6 seconds and the third bell rings after an interval of 8 seconds. If the three bells ring at 8 : 00 AM together then at what time all the bells will ring together again?

    a. 8 : 01 AM

    b. 8 : 02 AM

    c. 8 : 03 AM

    d. 8 : 04 AM

    e. None

50. The L.C.M. of two numbers is 14 times their H.C.F. The sum of L.C.M. and H.C.F. is 600. If 80 be one of the two numbers then what is the another number?

    a. 40

    b. 60

    c. 160

    d. 280

    e. None

51. The L.C.M. of two numbers is 4 times their H.C.F. If the sum of the two numbers is 125 and one number is 100 then the second number is:-

    a. 5

    b. 25

c. 100

d. 125

e. None

Answer

1.(a)	2.(c)	3.(d)	4.(b)	5.(d)	6.(c)	7.(a)	8.(d)	9.(e)	10.(d)
11.(d)	12.(c)	13.(a)	14.(a)	15.(d)	16.(b)	17.(d)	18.(c)	19.(d)	20.(b)
21.(c)	22.(a)	23.(c)	24.(c)	25.(d)	26.(d)	27.(b)	28.(a)	29.(c)	30.(a)
31.(b)	32.(c)	33.(c)	34.(c)	35.(d)	36.(d)	37.(a)	38.(d)	39.(d)	40.(a)
41(c)	42.(c)	43.(d)	44.(c)	45.(c)	46.(a)	47.(b)	48.(a)	49.(b)	50.(d)
51.(b)									

2 | NUMBER SYSTEM

Introduction:

- **Natural numbers** : Counting numbers are called natural numbers. These are 1, 2, 3, 4, 5 …………etc.

- **Whole numbers** : The set of zero (0) and natural numbers are called set of whole numbers. Whole numbers are 0, 1, 2, 3, 4, ……….etc

Note : 0 (zero) is not a natural number.

- **Even natural numbers** : Natural numbers divisible by 2 are called even natural numbers. As – 2, 4, 6, 8, etc.

- **Odd natural numbers** : Natural numbers which are not divisible by 2 are called odd natural numbers. As - 1, 3, 5 etc.

- **Prime numbers** : Natural numbers greater than 1 and not divisible by any other number except 1 and itself are called prime numbers. As – 2, 3, 5, 7, 11, 13 etc.

- **Composite numbers** : Natural numbers greater than 1 and not prime i.e. a natural numbers which has at least one factor except 1 and itself are called composite numbers. As- 4, 6, 8, 9, 10 etc.

  Note : 1 is neither prime nor composite number.

- **Co-prime numbers** : A pair of numbers whose H.C.F is 1 are called co-prime numbers. As- (2, 3) (4, 9) (15, 8) etc.

- **Prime –triplet numbers** : A triplet of numbers whose H.C.F. is 1 is called prime triplet numbers. As – 8, 9, 25 etc. Or Three consecutive odd prime numbers are called Prime – triplet numbers. As – (3, 5, 7)

- **Rational numbers** : A number which can be expressed in the form p/q where K and q are integers and q ≠ 0 is called a ration number. As- 0, 1, 2/3, 5/7, 8/3 etc.

  Note : The set of rational numbers includes integers and fractions.

- **Irrational numbers** : Those real numbers which are not rational are called irrational numbers. As $\sqrt{2}$, $\sqrt{3}$, etc. irrational numbers are non-terminating and non-repeating.

- **Positive and negative integers** : 1, 2, 3, 4, 5, ... are called positive integers and -1, -2, -3, -4 are called negative integers.

- **Real numbers** : Rational numbers and irrational numbers together are called real numbers.

- **Imaginary quantities** : Those numbers which are not read are called imaginary numbers or A number whose square is negative is called an imaginary number. As $\sqrt{-3}, \sqrt{-7}$ etc.

- **Identity element of addition** : 0 + a = a + 0 = a where a is a real number. Therefore, 0 is called identity element of addition or additive identity.

- **Identity element of multiplication** : 1 × a = a × 1 = a where a is a real number. Therefore , 1 is called identity element of multiplication or multiplicative identity.

- **Inverse element of addition** : a is called additive inverse of a. The sum of a number and it's additive inverse is zero.

- **Inverse element of multiplication** : If the product of two real numbers is 1, then each of them is multiplicative inverse or reciprocal of each other.

  a × 1/a = 1 if a ≠ 0 therefore, a and 1/a are multiplicative inverse of each other. 0 has no multiplicative inverse or reciprocal.

Example: The sum of a two – digits number and the number obtain by exchanging it's digits is 121 , then what is the sum of digits used?

Tricky Soln.: Let the two digit number be = $10x + y$

∴ The number formed by exchanging the digits = $10y + x$

∴ $10x + y + (10y + x) = 121$

$= 11(x + y) = 121 = x + y = (121/11) =$ **11 Ans.**

Example: If the difference between a two – digit number and the number obtained by exchanging it's digit is 63, then find the difference of the digits?

Tricky Soln.: Let the number is = $10x + y$. Therefore , the number obtained by

exchanging the digit is $10x + y$

According to the question

$$10x + y - (10x + y) = 63$$

$$9 (x + y) = 63 = x + y = (63/9) = \textbf{7 Ans.}$$

Example: If a number be multiplied by 13 and then 13 is subtracted from the product, the difference is divisible by 9. What is the such type of smallest number?

Tricky Soln.: Required number = 13 × (9 +1) – 13

= (13 × 10 – 13) = (130 -13) = **117 Ans.**

Example: If a number be multiplied by 7 and the product is increased by 7 then the number obtained is divisible by 17. What is the such type of smallest number?

Tricky Soln.: Required number = 7 × (17 - 1) + 7

= (7 × 16 + 7) = (112 +7) = **119 Ans.**

Example: What is the number of numbers of 4 digits in number system?

Tricky Soln.: Required number = 9999 – 999 = **9000 Ans.**

Example: One – fourth of one – third of a number is 24. What is the number?

Tricky Soln.: Let the required number be x

$$\therefore 1/3 \times 1/4 \times x = 24 = x = (24 \times 3 \times 4) = \textbf{288 Ans.}$$

Example: If 2/7th of a number is 18 then what is the one third of that number?

Tricky Soln.: Let the number be x

$$\therefore 2/7x = 18 \quad = x = (18 \times 7/ 2) = 63$$

$$\therefore \text{Required number} = (63 \times 1/3) = \textbf{21 Ans.}$$

Example: How much one – fourth of 96 is less than two – third of 54?

Tricky Soln.: Required difference = (54 × 2/3 – 96 × 1/4)

$$= (36 – 24) = \textbf{12 Ans.}$$

　　　　　　　www.lilhaeducationcentre.in　　　　　　**Mob: 9305907823**

Example: If a number is more than It's $2/5^{th}$ by 18, then what is the number?

Tricky Soln.: Let the required number be x

$\therefore$ x - $2/5x$ =18 = $3/5x$ =18

= x = (18 × 5/3) = **30 Ans.**

Example: If two – third of a number is less than it's three – fourth by 12 then what is the number?

Tricky Soln.: Let the required number be x

$\therefore$ $3/4x$ – $2/3x$ = 12 = $9x$ -$8x$/12 =12

= x /12 =12 = x = (12 × 12)

= **144 Ans.**

Example: One – third of a two digit number is greater than one – fourth of itself by 8. What is the sum of digits of that number ?

Tricky Soln.: Let x be the number

$\therefore$ x/3 – x/4 = 8 = x/12 = 8

= x = (8 × 12) = 96

$\therefore$ The sum of digits of the number = (9 + 6) = **15 Ans.**

Example: The difference of a number and it's square is 72. What is the number?

Tricky Soln.: Let the required number be x

x^2- x =72 = x(x -1) =9 ×8 =

x = **9 Ans.**

Example: If 76 is divided into four parts in the ratio 7 : 5: 3 : 4 . What is the smallest part?

Tricky Soln.: The smallest part = 3/ (7+ 5 + 3 + 4) × 76

= (3/19 × 76) = **12 Ans.**

Example: When 7 times of a number is divided by 21 then 5 is obtained, what is the number?

Tricky Soln.:   Let the number be x

$7x/21 = 5 = x = (5 × 21 /7) =$ **15 Ans.**

Example: The difference between two two – digit numbers is 24. The sum of these two numbers is 102 . What is the greater number?

Tricky Soln.: The greater number =

The sum of two numbers + The difference of two numbers
_____

2

= 102 + 24/2 = 126/2 = **63 Ans.**

Example: The ratio of a two – digit number to the sum of it's digits is 4 : 1 . If the digit of unit place is exceeds the digit at ten place by 3 then what is the number?

Tricky Soln.:   let the two parts be x and $(31 – x)$

$= 5x + 7 (31 – x) = 181$

$= 5x + 217 - 7x = 181$

$= 2x = 36 = x = 18$

The second part = (31 – 18)

= **13 Ans.**

<div style="text-align:center">

╔═══════════════════════════╗
║ *P r i m a r y E x e r c i s e* ║
╚═══════════════════════════╝

</div>

1. Three – fourth of two – third of a number is 24. What is the number?

   a. 36

   b. 48

   c. 32

   d. 42

   e. None

2. 4/5 of two –third of 3/7 of a number is 48 . What is 40% of the number?

   a. 56

b. 64

c. 84

d. 96

e. None

3. If 15% of 60% of a number is 45 then what is the number?

   a. 300

   b. 350

   c. 400

   d. 500

   e. None

4. By how much does three – fourth of two – third of 24 exceeds 1/5 of 3/5 of 75?

   a. 3

   b. 6

   c. 4

   d. 9

   e. None

5. 3/8 of a number is less than the number by 25. What is the number?

   a. 35

   b. 36

   c. 38

   d. 40

   e. None

6. Two consecutive natural numbers, the sum of whose squares is 221, are:-

   a. 10, 11

   b. 11,12

   c. 12,13

   d. 9,10

   e. None

7. Three numbers are in the ratio 3 : 4 : 6 . Their product is 576000 then what is the smallest number?

   a. 45
   b. 54
   c. 65
   d. 56
   e. None

8. Two numbers are in the ratio 5 : 3 . If the square of the greater number is less than three times of the square of the smaller number by 64 then what is the greater number?

   a. 150
   b. 100
   c. 200
   d. 250
   e. None

9. What is the unit digit of the product of the numbers 3452, 578, 753 and 9767?

   a. 2
   b. 3
   c. 4
   d. 6
   e. None

10. Which of the following is the scientific form of the number 3289200000?

    a. 3.2892×10^9
    b. 32.892×10^7
    c. 32892×10^8
    d. 3289.2×10^5
    e. None

11. How many numbers are there between 400 and 600 which either begins with 5 or ends with 5?

a. 20

b. 10

c. 50

d. 110

e. None

12. How many zeros are in the product 5 × 10 × 15 x 20 × 25 × 30 x 35 x 40 x 45 x 50?

a. 6

b. 5

c. 7

d. 8

e. None

13. What is the difference between the place value and face value of 9 in the number 43901?

a. 9

b. 900

c. 891

d. 882

e. None

14. The sum of two digit number and the number obtained by reversing the digits o the number is 66. What is the sum of digits?

a. 3

b. 12

c. 8

d. 7

e. None

15. The sum of two consecutive numbers is 35. What is the smallest number?

a. 14

b. 15

c. 17

d. 18

e. None

16. The sum of three consecutive numbers is 87. What is the second number?

    a. 27

    b. 28

    c. 29

    d. 30

    e. None

17. The sum of two numbers is 22 and the sum of their squares is 404 then what is their product?

    a. 80

    b. 40

    c. 120

    d. 20

    e. None

18. The sum of squares of two numbers is 725 and the difference of their squares is 525. What are the numbers?

    a. 23, 18

    b. 18, 25

    c. 23,14

    d. 18,36

    e. None

19. The sum of two numbers is 34 and the sum of their squares is 650. What is the smaller number?

    a. 11

    b. 13

    c. 15

    d. 16

    e. None

20. The sum of squares of two numbers is 85 and square of their difference is 1. What is the product of the two numbers?

    a. 30

    b. 42

    c. 56

    d. 72

    e. None

21. When a number is add to it's 9 times 120 is obtained. What is the number?

    a. 12

    b. 14

    c. 15

    d. 16

    e. None

I n t e r m e d i a t e E x e r c i s e

22. What is the number of numbers of three digits which are divisible by 6?

    a. 149

    b. 151

    c. 150

    d. 148

    e. None

23. What is the number of numbers between 200 and 600 which are divisible by each of 4, 5 and 6?

    a. 5

    b. 6

    c. 7

    d. 9

    e. None

24. How many number of numbers of five- digits?

a. 9000

b. 9050

c. 90000

d. 89999

e. None

25. If the sum of digits in an even number is divisible by 9 then the number will be divisible by:-

a. 7

b. 13

c. 12

d. 11

e. None

26. Which of the digits can not be the unit digit of a perfect square number?

a. 0

b. 6

c. 9

d. 8

e. None

27. Out of three consecutive even numbers the sum of first two exceeds the third number by 6. What is the second number?

a. 10

b. 8

c. 12

d. 14

e. None

28. How many numbers are there between 1 and 100 which are divisible by 7?

a. 13

b. 14

c. 11

d. 10

e. None

29. What is the sum of first four prime numbers?

    a. 10

    b. 11

    c. 16

    d. 17

    e. None

30. Which of the following is the smallest prime number?

    a. 0

    b. 1

    c. 2

    d. 3

    e. None

31. How many prime numbers are less than 60?

    a. 20

    b. 19

    c. 18

    d. 17

    e. None

32. Which of the following number is divisible by 45?

    a. 181560

    b. 331145

    c. 202860

    d. 2023550

    e. None

33. What is the smallest number which , when multiplied by 72 the product is a multiple of 112?

    a. 6

    b. 12

    c. 14

    d. 18

    e. None

34. What is the smallest number of four – digits which is completely divisible by 7 and when 10 is added to the number then the sum is divisible by 3?

    a. 9987

    b. 9989

    c. 9996

    d. 9947

    e. None

35. From a rod of 19.5 meter how many equal pieces are possible if the length of one piece is 65 cm?

    a. 20

    b. 300

    c. 30

    d. 3

    e. None

36. One – fifth of two – third of a number is 14. What is the number?

    a. 35

    b. 105

    c. 45

    d. 115

e. None

37. The average of five consecutive odd numbers is 23. What is the greatest number?

    a. 27

    b. 21

    c. 29

    d. 25

    e. None

38. If a number is divided by 8, the remainder is 5 and if the number is divided by 12 then remainder is 1. What is the number?

    a. 135

    b. 133

    c. 136

    d. Can't be determined

    e. None

39. If 18 is subtracted from a given number then the remainder is two – third of the given number. What is the sum of digits of the number?

    a. 8

    b. 3

    c. 4

    d. 6

    e. None

40. One – fourth of two – third of a number is 30. What is the number?

    a. 360

    b. 180

    c. 240

    d. 192

    e. None

41. In three consecutive odd positive integers the sum of first two numbers exceeds the third number by 5. What is the greatest number of the three numbers?

a. 7

b. 9

c. 11

d. 13

e. None

42. What should be added to 4456 so that the sum is divisible by 6?

a. 2

b. 8

c. 14

d. Can't be determined

e. None

43. How much three – fourth of 68 is greater that two – fifth of 45?

a. 33

b. 23

c. 43

d. 53

e. None

44. The sum of three consecutive even integers exceeds the smallest number by 26. What is the middle number?

a. 8

b. 10

c. 14

d. 12

e. None

M a s t e r   E x e r c i s e

45. A number is less than three times an another number by 15. If the sum of the numbers is 17 then what is the greatest number?

a. 9

b. 8

c. 12

d. 15

e. None

46. What least number should be added to 13291 so that the sum is divisible by 11?

    a. 7

    b. 8

    c. 9

    d. 4

    e. None

47. If the sum of three consecutive numbers is 81 then what is the square of the middle

    number?

    a. 529

    b. 676

    c. 784

    d. 729

    e. None

48. What least number should be added to 18962 so that the sum is completely divisible

    by 13?

    a. 4

    b. 7

    c. 8

    d. 6

    e. None

49. The sum of two numbers is 37 and their product is 330. What is the difference

    between the numbers?

    a. 7

    b. 5

    c. 2

    d. 4

e. None

50. The sum of two numbers is 26 and their product is 144. What is the smaller number?

    a. 18

    b. 8

    c. 11

    d. 9

    e. None

51. The greatest number which on dividing 2274, 2061 and 1054 leaves remainders respectively 6, 3 and 4 is :-

    a. 3

    b. 42

    c. 21

    d. 36

    e. None

52. How many number are between 300 and 785 which are multiple of 13?

    a. 36

    b. 38

    c. 39

    d. 37

    e. None

53. How many digits are used in writing the numbers from 1 to 100?

    a. 91

    b. 9

    c. 192

    d. 364

    e. None

54. A number exceeds two – fifth of it by 60. What is the number?

    a. 100

    b. 160

c. 80

d. Can't be determined

e. None

55. The product of two consecutive odd numbers is 2303. What is the greater number?

    a. 45

    b. 47

    c. 51

    d. 49

    e. None

56. The sum of two consecutive even numbers is less than their product by 98. What is the sum of these numbers?

    a. 32

    b. 18

    c. 14

    d. 12

    e. None

57. The difference between a number and two – fifth of itself is 72. What is the number?

    a. 120

    b. 72

    c. 96

    d. Can't be determined

    e. None

58. The difference between a two – digit number and the number obtained by interchanging the two digits is 63. What is the sum of the two digits?

    a. 7

    b. 9

    c. 11

    d. 8

    e. None

59. The difference between two consecutive even number is 2. What is the first

number?

a.   2

b.   4

c.   6

d.   Can't be determined

e.   None

60. If   24 is added to a number the sum is 11/4 times the number. What is the

number?

a.   48

b.   72

c.   84

d.   Can't be determined

e.   None

Answer

1.(b)	2.(c)	3.(d)	4.(a)	5.(d)	6.(a)	7.(e)	8.(e)	9.(d)	10.(a)
11.(d)	12.(d)	13.(c)	14.(e)	15.(c)	16.(c)	17.(b)	18.(e)	19.(a)	20.(b)
21.(a)	22.(c)	23.(b)	24.(c)	25.(e)	26.(d)	27.(a)	28.(b)	29.(d)	30.(c)
31.(d)	32.(c)	33.(c)	34.(b)	35.(c)	36.(b)	37.(a)	38.(b)	39.(e)	40.(b)
41.(c)	42.(a)	43.(a)	44.(d)	45.(a)	46.(b)	47.(d)	48.(e)	49.(a)	50.(b)
51.(b)	52.(d)	53.(c)	54.(a)	55.(d)	56.(e)	57.(a)	58.(d)	59.(d)	60.(e)

3 | SIMPLE INTEREST

Introduction:

➢ **Principal** : The money which we deposite in or borrow from a bank or money lender is called the Principal. It is denoted by P.

➢ **Time** : The period of time for which the principle is kept in a bank or borrowed from a money lender is called time. It is denoted by T or t.

➢ **Rate** : The interest on Rs. 100 for 1 year is known as rate of interest per year or rate of interest per annum . It is denoted by R or r.

➢ **Interest** : The additional money paid by the borrower to the lender for using the money id called interest. It is denoted by I.

➢ **Simple interest** : Simple interest is also the additional money paid by the borrower to the money borrowed . It is denoted by S. I.

➢ **Amount** : The sum of principal and interest is called amount . It is denoted by A.

Formulae with Solve Examples

1. $S.I. = \dfrac{P \times R \times T}{100}$ 2. $P = \dfrac{I \times 100}{R \times T}$ 3. $R = \dfrac{I \times 100}{P \times T}$

4. $T = \dfrac{I \times 100}{P \times R}$ 5. $A = P + I$ 6. $P = A - I$

7. $P = \dfrac{A \times 100}{100 + R \times T}$ 8. $A = P \times (1 + \dfrac{R \times T}{100})$ 9. $I = A - P$

Example : What is the simple interest on Rs 2,500 for 4 years at 5% per annum ?

Tricky Soln.: $I = \dfrac{2500 \times 5 \times 4}{100}$ = **500 Ans.**

Example : In how many years the S. I. on Rs 5,000 at the rate of 10% per annum will be Rs. 1,000?

Tricky Soln.:   T = (1000 × 100/ 5000 × 10) year

            2 year Ans.

Example : Ajay borrowed Rs. 2000 and after 3 years he paid Rs. 300 extra. What is the rate of S.I. per annum?

Tricky Soln.: R = (300 × 100 / 2000 × 3) % = **5% Ans.**

Example : Simple interest on a sum of money at the rate of 15% per annum for 2 years is Rs. 600. What is the principal?

Tricky Soln.:   P = Rs.(600 × 100 / 15 × 2)

            = **Rs. 2,000 Ans.**

Example : Shyam borrowed Rs. 3,200 at the rate of 6 ½ % per annum simple interest . How much money he will have to return after 5 years?

Tricky Soln.:   A = P × (1 + r × t / 100) = Rs. 3200 × (1 + 13 × 5/ 2 ×100)

            = Rs. (3200× 53/40)

            = **Rs. 4,240 Ans.**

Tricks with Trickily Solve Examples

TYPE-1. TRICK   If the simple interest of a principal is a / b of it and number of years is equal to the rate then Rate = number of years = √a/b ×10

Example :   If S. I. of a money is 4/25 of it and number of years is equal to rate percent numerically. What is the rate percent of the interest?

  Tricky Soln.: R = √ 4/25 ×10% = (2/5 x10)%

            4% Ans.

TYPE- 2. TRICK   a. If a money becomes n times in T years at a rate of simple interest then (R) = { (n-1) × 100/T}%.

b. If a money becomes   n Times at R% per annum of simple interest in a fixed time, then

T = (n- 1) ×100/R years.

Example :   If a money becomes 4 times in 20 years at a rate of simple interest. What is the rate per annum?

Tricky Soln.: R = { (4-1) × 100 / 20}%

= (3 × 100/20)% =15% Ans.

Example :   In how many years a money will double to itself at the rate f 10% per annum?

Tricky Soln.:   T ={(2-1) × 100/ 10} year = **10 Years Ans.**

TYPE- 3. TRICK A money K amounted to A, in T years at a rate of simple interest. If the rate of interest is increased by r% then the new amount

$$A_2 = A_1 + P \times R \times T / 100$$

Example :   With a fixed rate of simple interest Rs. 2,400 becomes Rs. 2,760 in 5 years. If the rate of interest increased by 2% then what is the new amount?

Tricky Soln.: A_2 = Rs.(2760 + 2400 × 2 × 5 / 100) = Rs. (2760 + 240)

= **Rs. 3000 Ans.**

TYPE- 4. TRICK   If the difference of simple interest of a sum be Rs. x then

1. P = Rs. { x × 100 / T × (Difference between R_1 and R_2)}

2. P = Rs. { x × 100 / R × (Difference between T_1 and T_2)}

   Example :   A money is lend for 4 years at a fixed rate of simple interest. If the rate of interest be 2% more then the simple interest increased by Rs. 120. What is the principal?

   Tricky Soln.: P = Rs.(120 × 100 / 4 × 2) = **Rs. 1,500 Ans.**

Example : If two equal amounts are deposited in two different banks for 7 years and 5 years respectively at the same rate of 10% per annum. If difference of the interests of the two banks be Rs. 500 then what is the amount deposited in each bank?

Tricky Soln.: P = Rs. (500 × 100/ 10 × (7-5) = Rs. (500 × 100/ 10 ×2)

= **2,500 Ans.**

TYPE- 5. TRICK

1. Principal in percent = 100%

2. S.I. in percent = (r × t)%

3. Amount in percent = 100% + (r × t)%

Example : In how many Years a money will increase by 40% at 5% annual simple interst?

Tricky Soln.: 5 × t% = 40%

= 5 × t =40

= t = 40/5 year = **8 years Ans.**

Example : The simple interest of a principal in 10 years is Rs. 1200. If the principal becomes three times after 5 years then what will be the interest in 10 years?

Tricky Soln.: Interest of 10 years = Rs. 1200

∴ Interest of 5 years = Rs. 600

Interest of next 5 years =3 × 600 = Rs. 1800

Hence, Interest of 10 years

= Rs. (600 + 1800) =**Rs. 2,400 Ans.**

Example :   Kriti borrowed some money at 6% per annum in first year and 0.5% per annum increment in next coming years, She paid Rs. 3.375 after 4 years as interest. What was the amount borrowed?

Tricky Soln.: S.I.= P × R × T / 100

Let the amount borrowed = Rs. x

∵ x × 1 × 6/100 + x × 6.5/100 + x × 7.5/100 =3375

= x/100(6 + 6.5 +7 + 7.5) =3375

= x/100 × 27 =3375

= x = 3375 × 100/27 = **Rs. 12,500 Ans.**

Example :   Simple interest of Rs. 2500 in 6 years is Rs. 1875. What will be the simple interest of Rs. 6875 at the same rate of interest and in the same time interval?

Tricky Soln.:

∵ simple interest of Rs. 2500 in 6 years = Rs. 1875

∵ simple interest of Rs. 6875 in 6 years.

    = 1875 × 6875 / 2500

= **Rs. 5156.25 Ans.**

Example :   Naresh deposited Rs. 12,500 in a fixed deposite plan which gives 8% interest per annum. How much money will he receive at the end of three years?

Tricky Soln.:   S.I. = 12500 × 8 × 3 /100 = Rs.3000

∴ Required amount = Rs. (12500 + 3000) = **Rs. 15500 Ans.**

Example : Mithilesh has invested Rs. 11,200 for 3 years in a plan which gives him 8.5% per annum simple interest. How much money will he receive at the end of 3 years?

Tricky Soln.: S.I. = 11200 × 8.5 × 3 / 100 = Rs.2856

∴ The money received by Mithilesh = Rs. 11200 + 2856

= **14056 Ans.**

Intermediate Exercise

1. Find the S.I. on Rs. 1,400 at the rate of 6% per annum in 2½ years.
   a. Rs. 185
   b. Rs. 200
   c. Rs.215
   d. Rs.210
   e. None

2. Pradip lended Rs. 1,200. After 5 years he get Rs. 360 as S.I. What is the rate of interest per annum?
   a. 6%
   b. 6½%
   c. 25/4%
   d. 7%
   e. None

3. In how many years Rs. 2000 at the 5% rate will give Rs. 400 as simple interest?
   a. 2
   b. 3
   c. 4
   d. 5/2

e. None

4. At the rate of 25/2% : Simple interest of a certain amount becomes Rs. 5,100 after 3 years. Find the principal.
    a. Rs.12600
    b. Rs.11,500
    c. Rs.10,500
    d. Rs. 8,300
    e. None

5. Sanjay lends Rs. 10000 to Manoj at 10% per annum. Manoj gave Rs. 11,200 and a watch to Sanjay after 2 years. What is the price of the watch?
    a. Rs.500
    b. Rs.700
    c. Rs.400
    d. Rs.800
    e. None

6. Balbir borrowed a certain amount at the rate of 10% per annum. After 4 years, he returns the amount with the interest. If he return Rs. 7000 : then what was the principal?
    a. 5000
    b. 4500
    c. 6000
    d. 6500
    e. None

7. Sarita borrows a certain amount from Naresh at the rate of 6% per annum. She lends the same principal to Ramesh at the rate of 9% per annum. If she earns Rs. 540 after 3 years then how much money did she borrow from Naresh?
    a. Rs.3,600
    b. Rs.4,800
    c. Rs.5,400

d. Rs.6,000

e. None

8. A moneylender finds that if the rate of simple interest be 15/4% instead of 4% , then he earns Rs. 56 less in that year. Find his principal.

    a. Rs.22,000

    b. Rs.22,400

    c. Rs.24,000

    d. Rs.24,600

    e. None

9. If Rs. 360 amounts to Rs. 435.60 in 3 years, then how much will Rs. 700 be in 11/2 years?

    a. Rs.869.60

    b. Rs.969.50

    c. Rs.976.40

    d. Rs.872.60

    e. None

10. In how many years the simple interest of Rs. 90 at the rate of 6% per annum will be same as the simple interest of Rs. 540 in 8 years?

    a. 4

    b. 5

    c. 7/2

    d. 9/2

    e. None

11. A gives Rs. 600 for 4 years to B and Rs. 500 for 3 years to C if he gets a total of Rs. 390 as simple interest then find out the rate of simple interest.

    a. 5%

    b. 8%

    c. 10%

    d. 15%

e. None

12. Suresh gives Rs. 1,500 for 2 years to Shanti and Rs. 800 for 3 years to Sunil. If he gets Rs. 30 more from shanty as simple interest : then find out the rate of interest.

    a. 2%

    b. 3%

    c. 7%

    d. 10%

    e. None

13. The simple interest for a given principal is 1/5 of it after 4 years. Find the yearly rate of interest.

    a. 5%

    b. 7%

    c. 8%

    d. 10%

    e. None

14. The simple interest for a given principal is 1/6 of itself and the yearly rate of interest is equal to the no. of years. Find the rate of interest.

    a. 5%

    b. 7/2%

    c. 9/2%

    d. 5/2%

    e. None

15. The simple interest is ¾ of the principal. If the number of years is $1/3^{rd}$ of the rate of interest, then find out the number of years.

    a. 5

    b. 10

    c. 4

    d. 9

    e. None

16. A given principal becomes 3 times in 25 years at a given rate of simple interest. What is the rate of simple interest?

    a. 8%

    b. 10%

    c. 9%

    d. 5%

    e. None

17. At what yearly rate of simple interest a given sum will become four times of itself in a fixed time where as in the same given time , at 6% yearly interest, it becomes 6 times?

    a. 7%

    b. 8%

    c. 10%

    d. 12%

    e. None

18. A given principal becomes 5 times of itself in 12 years. Find out how many times will it become of itself in 8 years.

    a. Double

    b. Triple

    c. 4 times

    d. 5 times

    e. None

19. Rs. 6,000 becomes Rs. 7200 with a rate of simple interest in 4 years. If the rate is increased by 2% : then find the amount.

    a. Rs.7680

    b. Rs.7480

    c. Rs.7240

    d. Rs.7236

    e. None

20. For Rs. 4,000 the rate of simple interest for first 4 years is 3% per annum, for next 3 year 4% per annum and after then 5% per annum. What will be the amount after 11 years?

    a. Rs.5,000
    b. Rs.4,500
    c. Rs.5,650
    d. 5,760
    e. None

21. A given principal becomes Rs. 2,400 is 3 years and Rs. 3000 in 5 years. What is the principal?

    a. Rs.1400
    b. Rs.1,500
    c. Rs.1,700
    d. Rs.2,000
    e. None

22. The simple interest of a given sum at the rate of 12% per annum in 2 years is Rs. 840. What will be excess interest on the same money in same time excess interest on the same money in same time of interval at the rate of 15% per annum?

    a. Rs.320
    b. Rs.260
    c. Rs.250
    d. Rs.210
    e. None

23. Rs.2,550 is divided into two parts such that if one part be invested at 5% and other at 8% then the total simple interest in 3 years is Rs. 396. What is the ratio of the two parts of the money?

    a. 16 : 1

b. 48 : 31

c. 15 : 16

d. 31 : 48

24. Out of Rs.45,000 some amount was given at 4% yearly and the rest at 6% yearly. If the simple interest is same in both the cases then find out the rate of interest on the whole amount.

    a. 29/5%

    b. 27/5%

    c. 17/4%

    d. 76/5%

    e. None

25. Rs. 3,300 is lended in two parts. The first part is given at 4% yearly for 3 years and the second part at 5% rate yearly for 2 years. The simple interest is same in both the cases. What was the first part of the money?

    a. Rs.1,500

    b. Rs.2,000

    c. Rs.1,200

    d. Rs.1,400

    e. None

26. The simple interest on a given principal is Rs.600 in 12 years. If after 6 years, the principal becomes four times : then find the principal.

    a. Rs.200

    b. Rs.100

    c. Rs.150

    d. Rs.300

    e. None

27. What is the yearly rate of interest if a certain principal becomes 48% more of itself in 8 year?

    a. 3%

b. 4%

c. 5%

d. 6%

e. None

28. Rs. 2902 is divided in 3 parts in such a way that the amount is same in each cases. Rate of interest is 5% yearly and the number of years are 1 year, 2 year and 3 year respectively. Find the difference between the biggest and the smallest parts.

a. Rs. 44

b. Rs.88

c. Rs.176

d. Rs.85

e. None

29. At a certain rate of simple interest, a person gives Rs. 500 and Rs.700 on 1% more than the previous rate. After 3 years he gets Rs.165 as simple interest at whole. Find out the definite rate of interest?

a. 2%

b. 3%

c. 4%

d. 5%

e. None

Master Exercise

30. At the same rate of interest and in the same time of interval the dimple interest of A is Rs. 300 and that of B is Rs. 20. What is the different between A and B?

a. Rs.150

b. Rs.600

c. Rs.450

d. Can't be determined

e. None

31. On a given principal the simple interest for 4 years. Is Rs. 2,134. If the simple interest is 44% of the principal, then the principal will be-

a. Rs. 1212.50

b. Rs.2121.50

c. Rs.4884

d. Data insufficient

e. None

32. A had borrowed Rs. 5000 from B at simple interest. If B got Rs. 400 more after 4 years, the what is the rate%?

a. 5

b. 3

c. 2

d. Can't be determined

e. None

33. Rs. 12000 amounts to Rs. 14,400 at a rate of simple interest in 4 years. What is the rate of interest per annum?

a. 5

b. 10

c. 12

d. 6

e. None

34. In 2 years, a given principal becomes Rs. 3660 and in 4 years, it becomes Rs. 4320. Find the yearly rate of simple interest.

a. 11%

b. 10%

c. 12%

d. 6%

e. None

35. A certain amount becomes Rs. 2800 in 2 years and Rs. 3250 in 5 years. Find the yearly rate of simple interest.

a. 5%

b. 4%

c. 3%

d. 6%

e. None

36. Rs. 800 becomes Rs. 920 in 3 years at the rate of S.I. If the rate increases by 3% for the same period, then find the amount.

a. Rs.192

b. Rs.1082

c. Rs.1192

d. Rs.929

e. None

37. 6132 becomes Rs 6951 in 4 years. Wat was the yearly rate of interest approximately?

   a. 2%

   b. 4%

   c. 1%

   d. 3%

   e. None

38. Nitish borrowed Rs. 15,000 at a rate of simple interest. He gives back Rs. 2700 as interest after 3 year then the rate of interest is :-

   a. 18%

   b. 5%

   c. 5.4%

   d. 6%

   e. None

39. A person lends Rs. 5000 at a rate of simple interest. After 3 years, he gets Rs. 300 as interest. Find out the yearly rate of interest.

   a. 6%

   b. 3%

   c. 2%

   d. Data insufficient

   e. None

40. At a rate of simple interest after 20 years a given amount of money becomes double. Find out the yearly rate of interest.

   a. 4%

   b. 5%

   c. 10%

   d. data insufficient

   e. None

41. By what yearly rate of interest would any given amount of money would become double in 25/2 years?

   a. 4%

   b. 6%

   c. 8%

   d. Data insufficient

   e. None

42. Yogesh borrowed Rs. 12,000. After 5 years he gives Rs. 3600 as interest. What would be the yearly rate of simple interest?

a. 30%

b. 4%

c. 6%

d. Can't be determined

e. None

43. The simple interest of a principal in 25 years is two times the principal. What is the rate of interest?

a. 10

b. 20

c. 5 d. None

Answer

1.(d)	2.(a)	3.(c)	4.(e)	5.(d)	6.(a)	7.(d)	8.(b)	9.(b)	10.(a)
11.(c)	12.(e)	13.(a)	14.(d)	15.(a)	16.(a)	17.(e)	18.(e)	19.(a)	20.(d)
21.(b)	22(d)	23.(a)	24.(e)	25.(a)	26.(b)	27.(d)	28.(b)	29.(c)	30.(d)
31.(e)	32.(c)	33.(a)	34.(a)	35.(d)	36.()	37.(d)	38.(d)	39.(c)	40.(b)
41.(c)	42.(c)	43.(d)							

4 | COMPOUND INTEREST

Introduction:

There is another way of taking or giving interest. In this way the interest obtained after a fixed time interval is added to the principal and in the next interval of times this new principal is taken to be principal for interest. The interest obtained in this way is called compound interest.

Formulae with Solve Examples

If principal = P, Rate = r% yearly, time = t year and Amount = A then

1. $A = P(1+r/100)^t$

2. If r_1 %, r_2 % and r_3% be the rate of interest for first year, second year and third year respectively then $A = P(1+r_1/100)(1+r_2/100)(1+r_3/100)$

3. Compound interest = $P(1+r/100)^t - P$

4. C.I. = $P(1+r_1/100)(1+r_2/100)(1+r_3/100) - P$

5. When time be fractional such as 5/2 years then
   $A = P(1+r/100)^2 \times (1+\frac{1}{2}r/100)$

Example : Jayant borrowed Rs. 64,000 at the rate of 5% compound interest for 3 years. How much money he will have to return?

Tricky Soln.: $A = 64000 \times (1+5/100)^3$ $= 64000 \times (21/20)^3$

= (64000 × 21 × 21 × 21/ 20 × 20 × 20) = **Rs. 74,088 Ans.**

Example : What will be the compound interest of Rs 8,000 at the rate of 10% per annum for 3/2 years if the interest is compound half yearly?

Tricky Soln.: r = 10/2% =5% half yearly, t =3/2 year = 3 half years

∴ A = 8000 × (1+ 5/100)^3 = 8000 ×(21/20)^3

= (8,000 ×21 × 21 × 21/ 20 × 20 × 20) = Rs. 9261.00

So, compound Interest = Rs. (9261 – 8000) = **Rs. 1,261Ans.**

Example : What will be compound interest of Rs. 2000 at the rate of 10% per annum for 5/2 years if interest is compounded yearly?

Tricky Soln.: A =2000 × (1 + 10 /100) ^{2} × (1 + ½ ×10/100)

= 2000 × (11/10)^2 × 21/20 = (2000 × 11 × 11 × 21 /10 × 10 ×20) = Rs. 2541

C.I. = Rs. (2541 – 2000) = **Rs. 541 Ans.**

Example : The population of a village is 8000. If the population increases 10% in first year and 20% in second year then what will be the population of that village after 2 years?

Tricky Soln.: A = 8000 × (1 + 10/100) × (1 + 20/100) = (8000 × 11/10 × 6 / 5)

= **10,560 Ans.**

Example : In how many years the compound interest of Rs. 3,200 at the rate of 25/2 % per annum will be Rs. 850?

Tricky Soln.: 3200 × (1 + 25 / 2 × 100)^t= (3200 + 850) =4050

= (9/8)^t = 94050/3200) = 81/64 = (9/8)^2

= **t= 2 years Ans.**

Example : A principal amounted to Rs. 16,900 in 2 years and Rs. 17,576 in 3 years. What is the rate of compound interest?

Tricky Soln.: r = { (17576 / 16900) $^{1/3-2}$ – 1} × 100% = (17576 /16900 -1) X 100%

= (676/16900 × 100) % = **4% Ans.**

Example : At what rate of compound interest a money will be 36/25 times of itself in 2 years?

Tricky Soln.: $r = \{(36/25)^{\frac{1}{2}} - 1\} \times 100\% = (6/5 - 1) \times 100\%$

$= (1/5 \times 100)\% = \textbf{20\%Ans.}$

Example : At what rate of compound interest a money will be 1.6 times in 5 years and 2.5 times in 7 years?

Tricky Soln.: $r = \{(2.5/1.6)^{1/7-5} - 1\} \times 100\% = \{(25/16)^{\frac{1}{2}} - 1\} \times 100\%$

$= (5/4 - 1) \times 100\% = (1/4 \times 100)\% = \textbf{25\% Ans.}$

Example : Simple interest and compound interest of a money in 2 years are respectively Rs. 800 and Rs. 820. What is the rate of interest?

Tricky Soln.: $r = 2 \times (820 - 800)/800 \times 100\% = (2 \times 20/800 \times 100)\% = \textbf{5\% Ans.}$

Example : Simple interest of second year of money is rs. 400 and compound interest of second year of same money at the same rate of interest is Rs. 450. What is the rate of interest ?

Tricky Soln.: $r = (450 - 400)/400 \times 100\% = (50/400 \times 100)\%$

$= 25/2\% = \textbf{25/2\%Ans.}$

Example : For a principal the compound interest and simple interest of second year are respectively Rs. 249.60 and Rs.240. What is the principal?

Tricky Soln.: $P = Rs.\ 1200 \times 1200/(1450 - 1200) = Rs.\ 1200 \times 1200/250)$

$= \textbf{Rs. 5,760 Ans.}$

Example : If the compound interest in 2 years at the rate of 5% per annum be Rs. 328 then what is the simple interest of the same principal at the same rate of interest in same time?

Tricky Soln.: Simple interest $= Rs.\ 328/(1+5/200) = Rs.\ (328/41/40)$

$Rs.\ (328 \times 40/41) = \textbf{Rs. 320 Ans.}$

Example : Which principal will be amounted to Rs. 3025 at the rate of 10% per annum compound interest in 2 years?

Tricky Soln. x = Rs. 3025 ×100/ 100 + 10 × 2 + $(10)^2$ /100 = Rs. (3025 × 100 /100 + 20 + 1)

= Rs. (3025 × 100/121) = **Rs. 2,500 Ans.**

Example : What is the difference between compound interest and simple interest of Rs. 50000 after 3 years at the rate of 4% per annum?

Tricky Soln.: Required difference = 50000 × $(4)^2$ × (300 + 4)/$(100)^3$

= Rs. 50000 × 16 × 304/ (100 × 100 × 100) = **Rs. 243.20Ans.**

Example : If the difference between the compound interest and simple interest in two year of a principal at the rate of 15% per annum be Rs. 144 then find the principal.

Tricky Soln.: $P(15)^2/(100)^2$ = 144

= P × 15 × 15 /100 × 100 =144

= P = Rs. (144 × 100 × 100 / 15 × 15)

= **Rs. 6,400 Ans.**

Example : What is the difference between the compound interest and the simple interest of Rs. 960 at the rate of 12% per annum in 2 years?

Tricky Soln.: Difference between C.I. and S.I.   = P $(r/100)^2$

= 960 $(12/100)^2$ = Rs. 13.824 = **Rs. 13.82Ans.**

Example : The simple interest of Rs. 40000 in three years at a rate is Rs. 12,000. What is the compound interest of same money at the same rate of interest in same time interval?

Tricky Soln.:   R = S.I. × 100 / P × T

= 12000 × 100 /40000 x 3 = 10%

∴ C.I. = P $[(1+ r/100)^n – 1]$

= 40000 $[(1 + 10/100)^3 -1]$

= 40000 $[(1.1)^3 – 1]$

= 40000 [(1.331 − 1]

= 40000 × 0.3331

= **Rs. 13240Ans.**

Example : Sonika invested Rs. 5,800 for 2 years at a rate of compound interest. She received Rs. 594.5 as interest. What is the rate of interest annually?

Tricky Soln.: Amount = P $(1+ R/100)^n$

= 5800 + 594.5 = 5800 $(1+R/100)^2$

= 6394.5 /5800 = $(1+ R/100)^2$

= 441/400 = $(1+ R/100)^2$

= $(21/20)^2$ = $(1+ R/100)^2$

= 1 + R/ 100 = 21 / 20 = R / 100 = 1 / 20

= R = 1/20 × 100 = **5%per year Ans.**

Example : A man receives Rs. 1000 as simple interest at the end of 4 years at the rate of 5% per annum. What will be the C.I. of the double money at the same rate of interest in 2 years?

Tricky Soln.: P = S.I. × 100/ T × R

= 1000 X 100 /4 x 5 = Rs. 5000

In second case,

P = Rs. 10000

∴ C.I. = P $[(1+ R/100)^n$ -1]

= 10000 $[(1+ 5/100)^2$ -]

= 10000 $[(21/20)^2$ -1] = 10000 × 41/400 = **Rs. 1025 Ans.**

1. What will be the amount of Rs. 5,000 at the rate of 4% per annum of compounding interest in 3 years ?

    a. Rs. 5624.32

    b. Rs.5630.38

    c. Rs.5400

    d. Rs.4441

    e. None

2. What sum will amount to Rs.1352 in 2 years at the rate of 4% per annum of compound interest?

    a. Rs.1,300

    b. Rs.1,250

    c. Rs.1,500

    d. Rs.1,800

    e. None

3. What is the compound interest of Rs.8,000 in 3 years at the rate of 5% per annum?

    a. Rs.1,261

    b. Rs.1,250

    c. Rs.1,260

    d. Rs.1,200

    e. None

4. What will be the compound interest of Rs. 2,500 in 2 years at the rate of 8% per annum?

    a. Rs.789.06

    b. Rs.789.14

    c. Rs.500

    d. Rs.514.06

    e. None

5. What will be compound interest of Rs.50,000 in 3 years if the rate of interest is 10% in first years, 15% in second years and 20% in third Year?

    a. Rs.25,820

    b. Rs.20,820

    c. Rs. 20,725

    d. None

6. At what rate of compound interest per annum will a sum of Rs. 4,000 become Rs.6912 in 3 year?

    a. 20%

    b. 18%

    c. 15%

    d. 12%

    e. None

7. At a rate compound interest Rs. 1,600 amounts to Rs. 2,500 in two years. At the same rate of interest the amount of Rs. 4,500 in 3 year will be approximately:-

    a. Rs. 8789

    b. Rs. 8879

    c. Rs. 8500

    d. Rs. 8514

    e. Rs. 9000

8. In how many years the compound interest of Rs. 800 at the rate of 10% per annum is Rs. 168?

    a. I year

    b. 2 year

    c. 4 year

    d. 3 year

    e. None

9. In what time will Rs. 80 become Rs. 92.61 at the rate of 10% per annum compounded half yearly?

    a. 4/3 years

    b. 3/2 years

    c. 5/2 years

    d. 7/3 years

    e. None

10. The compound interest of Rs. 8,000 in 3 years if it is compounded yearly is Rs. 1261. What is the rate of interest per annum?

    a. 4%

    b. 5%

    c. 8%

    d. 10%

    e. None

11. A sum of money invested at compound interest amounts to Rs. 5,160 in years and Rs. 5,547 in years. The rate of interest per annum is:

    a. 4%

    b. 5%

c. 6%

d. $7\frac{1}{2}$ %

e. None

12. A sum of money invested at compound interest amounts to Rs. 5,000 in 2 years and Rs. 8,450 in 4 years. The rate of interest per annum is:

a. 20%

b. 10%

c. 30%

d. 15%

e. None

13. At what rate of compound interest a sum of money becomes 2.7 times in 4 years and 6.4 times in 7 years?

a. 20%

b. 30%

c. $33\frac{1}{3}$ %

d. $12\frac{1}{2}$ %

e. None

14. The difference between compound interest and simple interest on an amount of Rs. 3,600 for years is Rs. 324. What is the rate of interest per annum?

a. 20%

b. 15%

c. 25%

d. $37\frac{1}{2}$ %

e. None

15. If a sum invested at compound interest becomes three times in 2 years then with the same rate of interest, he sum will become 27 times in:

a. 18 years

b. 8 years

c. 12 years

d. 15 years

e. None

16. A sum of money invested at compound interest becomes 4 times in 8 years. In 24 years it will become

a. 32 times

b. 48 times

c. 64 times

d. 36 times

e. None

17. The simple interest of a sum of money in 2 years is Rs. 260 and the compound interest of the same money in same time and with same rate is Rs. 266.50. What is the rate of interest per year?

   a. 4%

   b. 5%

   c. 5.4%

   d. 6%

   e. None

18. If the simple interest and compound interest of second year of a given sum are respectively Rs. 250 and Rs. 300. What is the rate of interest per annum?

   a. 20%

   b. 30%

   c. 40%

   d. 50%

   e. None

19. The simple interest and compound interest of a sum of money of two years are respectively Rs. 340 and Rs. 357. What is the sum?

   a. Rs. 1,500

   b. Rs. 1,600

   c. Rs. 1,700

   d. Rs. 2,000

   e. None

20. The compound interest of a sum of money at the rate of 12% per annum is Rs.1590 in two years. What is the simple interest of same sum of money, at the same rate of rate of interest and for the same period of time?

   a. R. 1,500

   b. Rs. 1,540

   c. Rs. 1,470

   d. Rs. 1,530

   e. None

21. A businessman lends some money on compound interest earns a profit of 25% per annum. After 3 years, if he has Rs. 10,000 then what was the money invested?

    a. Rs. 5,120

    b. Rs. 5,520

    c. Rs. 4,120

    d. Rs. 5,000

    e. None

22. In how many years will a sum of Rs. 1200 at 5% per annum compounded annually become Rs. 1323?

    a. 2 years

    b. 3 years

    c. 4 years

    d. 5 years

    e. None

23. The least number of complete years in which a sum of money put out at 20% compound interest will be more than double is:

    a. 2 years

    b. 3 years

    c. 4 years

    d. 5 years

    e. None

24. The difference between compound interest and simple interest of a sum of money at 10% per annum compounded annually is Rs. 8 in 2 years. What is the sum?

    a. R. 1,600

    b. Rs. 800

    c. Rs. 1,200

    d. Rs. 640

    e. None

25. The compound interest of the second year of a principal at the rate of 10% per annum is Rs. 770. What is the principal?

    a. Rs. 2,500

    b. Rs. 2,700

    c. Rs. 3,000

    d. Rs. 3,200

e. None

26. A sum of money is borrowed and paid back in two annual installments of Rs. 882 each, allowing 5% compound interest. The sum borrowed was:
    a. Rs. 3,000
    b. Rs. 1,600
    c. Rs. 2,500
    d. Rs. 2,000
    e. None

27. What is the compound interest of Rs. 25,600 at the rate of $12\frac{1}{2}$% per annum after 1 year if the interest is compounded half yearly?
    a. Rs.8,900
    b. Rs. 6,500
    c. Rs. 6,600
    d. Rs. 3,300
    e. None

28. What is the sum of money whose compound interest at the rate of 5% per annum after 2 years is Rs. 82?
    a. Rs. 800
    b. Rs. 600
    c. Rs. 1,000
    d. Rs. 900
    e. None

29. The sum whose compound interest at the rate of 20% per annum compounded quarterly after 9 months is Rs. 3,783 is:
    a. Rs. 20,000
    b. Rs. 24,000
    c. Rs. 15,000
    d. Rs. 25,000
    e. None

30. The share of A after 7 years is equal to the share of B after 9 years if the ate of compound interest is 4% per annum. What is the share of A in Rs. 3,903?
    a. Rs. 1,928
    b. Rs. 2,018
    c. Rs. 2,028

d. Rs. 1,875

e. None

31. Rs. 2,000 was invested at the rate of 10% per annum of compound interest for 3 ears. What is the compound interest?

    a. Rs. 1,800

    b. Rs. 800

    c. Rs. 663

    d. Rs. 660

    e. None

32. The difference between simple interest and compound interest of a sum Rs. 15 in two years. If the rate of interest is 10% per annum then what is the sum?

    a. Rs. 3,000

    b. Rs. 1,500

    c. Rs. 750

    d. Rs. 375

    e. None

33. The different between compound interest and simple interest on sum for 2 years at 10% per annum is Rs. 4. What is the sum?

    a. Rs. 1,600

    b. Rs. 8,000

    c. Rs. 3,200

    d. Can't be determined

    e. None

34. The compound interests of second year and third year of a sum are Rs. 50 and Rs. 53 respectively. What is the rate % of interest per annum?

    a. 6

    b. 4

    c. 5

    d. Can't be determined

    e. None

35. At the end of third year the compound interest of a sum at the rate of 10% per annum is more than the simple interest of same principal at the same rate by Rs. 50. What is he principal?

    a. Rs. 1,612.90

    b. Rs. 2,092

c. Rs. 1,560

d. Data insufficient

e. None

36. A sum of money doubled in six with a certain rate of compound interest. In how many years the sum will be 16 times?

    a. 26

    b. 18

    c. 24

    d. 48

    e. None

37. The simple interest of a sum of money at the rate of 9% per annum for 1 year is Rs. 369. If the rate of interest is reduced by 4% then the compound interest for 2 years will be:

    a. Rs. 475

    b. Rs. 410

    c. Rs. 750

    d. Can't be determined

    e. None

38. A sum of money amounted to Rs. 3289 in 3 years and Rs. 2990 in 2 years. What was the rate of interest per annum?

    a. 5%

    b. 10%

    c. 20%

    d. Can't be determine

    e. None

39. What is the compound interest of Rs. 12,000 at the rate of 5% per annum for 2 years?

    a. Rs. 1,200

    b. Rs. 1,260

    c. Rs. 1,220

    d. Rs. 1,230

    e. None

40. The difference between compound interest and simple interest of a sum of money in 3 years is Rs. 12.20. What is the sum?

    a. Rs. 1,600

    b. Rs. 800

c. Rs. 2,400

d. Data insufficient

e. None

41. With a certain rate of compound interest a sum of money amounts to Rs. 900 in years and Rs. 936 in 4 years. What is the rate % of interest?

a. 6

b. 4

c. 8

d. Can't be determine

e. None

42. Rs. 1,000 amounts to Rs. 1,331 at a certain rate of compound interest in 3 years. What is the percent rate per annum?

a. 10

b. 4

c. 5

d. Can't be determine

e. None

ANSWER

1.(a)	2.(b)	3.(a)	4.(e)	5.(e)	6.(a)	7.(a)	8.(b)	9.(b)	10(b)
11.(d)	12.(c)	13.(c)	14.(e)	15.(e)	16.(c)	17.(b)	18.(a)	19.(c)	20.(a)
21.(a)	22.(a)	23.(c)	24.(b)	25.(e)	26.(e)	27.(d)	28.(a)	29.(b)	30.(c)
31.(e)	32.(b)	33.(a)	34.(a)	35.(a)	36.(d)	37.(e)	38.(b)	39.(d)	40.(d)
41.(b)	42.(a)								

5 | RATIO AND PROPORTION

Introduction:

Ratio: Mutual relation between two quantities of same unit which represents that first quality is how much times the second quality is called ratio. It is denoted by (:). For *Example:* - The ratio between 5 meter and 7 meter is denoted by 5 : 7 or 5/7.

Here first term of ratio is called antecedent and second term is called consequent. In the above ratio 5 is antecedent and 7 is consequent.

➢ **Inverse or reciprocal ratio :** The ratio between the reciprocals of two quantities is called reciprocals ratio.

Reciprocals ratio of a : b = (1/a : 1/b) = 1/a × ab : 1/b × ab = b : a

(L.C.M. of a and b = ab)

For *Example :* - The reciprocals ratio of 3 : 4 = 1/3 : ¼ = 4 : 3

Similarly, reciprocals ratio of 2 : 3 : 5 = ½ : 1/3 : 1/5 = 15 : 10 : 6

➢ **Compound Ratio :** The ratio between the product of antecedents and the product of consequents of two or more ratios is called compound ratio.

For *Example :* - Compound ratio of 2 : 3, 4 : 5 and 3 : 5

$$= (2 \times 4 \times 3) : (3 \times 5 \times 5) = 8 : 25$$

➢ **Duplicate Ratio :** $a^2 : b^2 : c^2$ is called the duplicate ratio of a : b : c.

Example : What is the duplicate ratio of 5 : 7 : 8 ?

Tricky Soln.:   The duplicate ratio of 5 : 7 : 8 ?

$$= 5^2 : 7^2 : 8^2 = 25 : 49 : 64$$

➤ **Sub duplicate Ratio:** √a : √b : √c is called the sub duplicate ratio of a : b : c.

Example : What is the sub duplicate ratio of 81 : 256 : 121 ?

Tricky Soln.: √81 : √256 : √ 121 = 9 : 16 : 11

➤ **Triplicate ratio :** $a^3 : b^3 : c^3$ is called triplicate ratio of a : b : c

Example : What is the triplicate ratio of 3 : 5 : 4 ?

Tricky Soln.: the triplicate ratio of 3 : 5 : 4 = $3^3 : 5^3 : 4^3$ = 27 : 125 : 64

➤ **Sub triplicate ratio :** ^{3}√a : ^{3}√b : ^{3}√c is called sub triplicate ratio of a : b : c.

Example : What is the sub triplicate ratio of 64 : 729 : 125?

Tricky soln.: The sub triplicate ratio of 64 : 729 : 125 = ^{3}√64 : ^{3}√729 : ^{3}√125 = 4 : 9 : 5

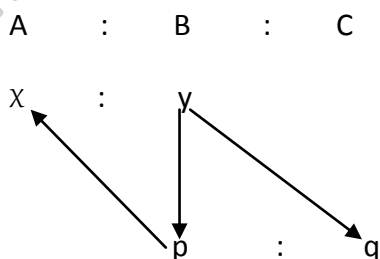
Tricks with Trickily Solve Examples

TYPE-1. TRICK If A: B = x : y and B : C = p : q then

1. A : C = x × p : y × q

2. A : B : C = (x : y) × p : y × q = x × p : y × p : y × q

OR

A : B : C

X : y

p : q

x × p : y × p : y × q

Example :   If A : B = 4 : 5 and B : C = 6 : 7 then A : C = ?

Tricky Soln. : A : C = 4 × 6 : 5 × 7 = **24 : 35 Ans.**

Example :   If the value of A is 1/3 of the value of B and the value of B is ½ of the value of C then A : B : C = ?

Tricky Soln.:   A   :   B   :   C

     1 × 1 : 3 × 1 : 3 × 2   i.e.   **1 : 3 : 6 Ans.**

TYPE-2. TRICK   If A : B = x y, B : C = p : q and C : D = m : n then

1. A : D = x × p × m : y × q × n

2. A : B : C : D = (xp : yp : yq) × m : y × q × n

                    = $x$pm   : ypm : y qm : yqn

                    OR

          A   :   B   :   C   :   D

          X :   y

                    p   :   q

                    m   :   n

          $x$pm   :   ypm   :   yqm   :   yqn

Example :   If A : B = 3 : 4, B : C = 8 : 9 and C : D = 12 : 13 then A : D = ?

Tricky Soln.:   A : D = 3 × 8 × 12 : 4 × 9 ×   13 = **8 : 13 Ans.**

Example :   The value of A is 2/5 of the value of B, the value of B is 2/3 of the value of C

and the value of C is ¼ of the value of D then A : D =?

Tricky Soln.: A : D = 2 × 2 × 1 : 5 × 3 × 4 = **1 : 15 Ans.**

Example :   If A : B = 4 : 5, B : C = 3 : 4 and C : D = 6 : 7 then A : B : C : D = ?

Tricky Soln.: A : B : C = (4 : 5) × 3 : 5 × 4

$$= 12 : 15 : 20$$

$\therefore$ A : B : C : D   = (12 : 15 : 20) × 6 : 20 ×7

$$= \mathbf{36 : 45 : 60 : 70 \; Ans.}$$

Proportion : Equality of two ratios is also called Proportion.

For *Example* :   a : b = c :d = a : b : c : d

In the proportion a, b, c and d are called First, second, third and fourth proportion respectively. a and d are called **extreme quantities** and b and c are called **mean qualities.** The product of extreme quantities = The product of mean quantities.

TYPE-3. TRICK :- For the proportion a : b : : c : d

1. 1st Proportion, a = b × c / d
2. 2nd Proportion, b = a × d / c
3. 3rd proportion, c = a × d / b
4. 4th Proportion, d = b × c /a

Example :   ? : 3 : : 15 : 9

Tricky Soln.: ? = 3 × 15 / 9 = **5 Ans.**

Example :   7 : ? : : 17.5 : 22.5

Tricky Soln.: ? = 7 × 22.5 / 17.5 = **9 Ans.**

➤ **Continued proportion :** Three quantities a, b, c are said to be in continued proportion if a : b = b: c Here , a, b and c are called first proportion, mean proportion and third proportion respectively.

For *Example* :   a : b = b : c = a : b : : b : c

TYPE-4. TRICK :-   For the relation a : b : : b : c

1. 1st Proportion, $a = b^2/c$
2. Mean proportion, $b = \sqrt{ac}$
3. 3rd Proportion, $c = b^2/a$

   Example :   What is the first proportion of 6 and 9?

   Tricky Soln.: $A = b^2/c = 6^2/9 = 36/9 =$ **4 Ans.**

TYPE-5. TRICK :- x be divided between P and Q in the ratio a : b then

1. The share of P $= a/(a+b) \times x$

2. The share of Q $= b/a+b \times x$

3. The difference between the share of P and Q $= a - b/a+b \times x$

$$[\text{Where } a > b]$$

Example :   If Rs. 320 be divided between A and B in the ratio 3 : 5 then find the values of A's share, B's share and difference between A's share and B' share?

Tricky Soln.: A's share = 3/8 × 320 = Rs. 120

   B's share = 5/8 × 320 = Rs. 200

   The difference between A's and B's share = 5 – 3/8 × 320

$$2/8 \times 320 = \textbf{80 Ans.}$$

TYPE-6. TRICK :- If the ratio between P' s share and Q's share be a : b and difference their shares be x unit then

1. P's share = a/a -b $\times$ x units

2. Q's share = b/a-b $\times$ x units

3. The sum of P's share and Q's share = (a + b)/(a-b) $\times$ x units

[when a> b]

Example : The ratio between shares of Amar and Suresh is 3 : 2. The share of Amar is greater than the share of Suresh by Rs. 550. What is the share of Suresh?

Tricky Soln.: The share of Suresh = 2/ 3-2 $\times$ 500 = **Rs. 1000 Ans.**

TYPE-6. TRICK :- If ratio between P's Share and Q's share be a : b and x be the share of P then

1. The share of Q = b/a $\times$ x

2. The sum of P's and Q's shares = a+b/a $\times$ x,

3. The difference between P's and Q's share = a+b/a $\times$ x

Example : How much zinc should be melted with 24 kg of copper so that the alloy may has copper and zinc in the ratio 9 : 4 ?

Tricky Soln.: Quantity of Zinc = 4/9 $\times$ 24 = 32/3 = **32/3 kg. Ans.**

Example : An amount is distributed among Ragini, Sadhna and Alka in the ratio 4 : 3 : 6 . If the share of Sadhna is Rs. 750. What is the difference between the shares of Alka and Ragini?

Tricky Soln.: Required difference = 6-4/3 $\times$ 750 = 2/3 $\times$ 750 = **Rs. 500 Ans.**

Example : An amount is distributed among 'A', 'B' and 'C' in the ratio 2 : 5 : 9 . If the share of 'A' is Rs. 2500 then what is the total amount?

Tricky Soln.: Total amount = Rs. 2 + 5 + 9 / 2 $\times$ 2500 = 16 / 2 $\times$ 2500 = **20,000 Ans.**

P r i m a r y E x e r c i s e

1. Which of the following is inverse ratio of 15 : 27

   a. 5 : 9

   b. 3 : 5

   c. 5 : 3

   d. 9 : 5

   e. None

2. Which of the following is inverse ratio of 3: 5 : 2

   a. 10 : 6 : 15

   b. 2 : 5 : 3

   c. 5 : 8 : 2

   d. 2 : 3 : 5

   e. None

3. First number is 25% more than the second number/ What is the ratio of the two numbers?

   a. 4 : 5

   b. 5 : 4

   c. 3 : 2

   d. 2 : 3

   e. None

4. If A : B = 3 : 5 and B : C = 7 : 2 then A : B : C =?

   a. 5 : 6 : 1

   b. 5 : 6 : 2

   c. 2 : 6 : 5

   d. 1 : 6 : 5

   e. None

5. If A : B = 2 : 1 , B : C = 3 : 4 and C : D = 6 : 5 then A : D = ?

   a. 9 : 5

   b. 5 : 9

c. 4 : 5

d. 5 : 4

e. None

6. If A = 3/7 B, = 2/3 C and C = ½ D then A :D = ?

   a. 7 : 1

   b. 7 : 3

   c. 3 : 5

   d. 1 : 7

   e. None

7. What should be added to each of the numbers 13, 45 , 18, 60 to make them proportional?

   a. 1

   b. 3

   c. 7

   d. 5

   e. None

8. What is the first proportion of 2.4 and 3.6?

   a. 1.2

   b. 1.6

   c. 1.8

   d. 0.9

   e. None

9. Two numbers are in the ratio 5 : 7 and their sum is 600. Which of the following is equal to the greater number?

   a. 250

   b. 350

   c. 200

   d. 400

   e. None

10. In a School the ratio of boys and girls is 5 : 2 . If the number of boys be 150 then what is the number of students in the school?

    a. 210

    b. 200

    c. 230

    d. 220

    e. None

11. A sum of money is divided between Ajay and Vijay in the ratio 4 : 3. The share of Vijay is Rs. 2400 then what is the sum o money?

    a. Rs. 5600

    b. Rs. 3200

    c. Rs. 9600

    d. Rs. 16800

    e. None

I n t e r m e d i a t e E x e r c i s e

12. In an Industry, 100/3% of the production by a man is equal to 50% of the production by another man . If the second man produces 1500 screw per day then how many screw is prodcuced by the first man in day?

    a. 500

    b. 1000

    c. 2000

    d. 2250

    e. None

13. The monthly income of A, B and C are in the ratio 4 : 5 : 7. If the monthly income of A is less than the monthly income of C by 900 then what is the yearly income of B?

    a. 12000

    b. 15000

c. 18000

d. 20000

e. None

14. The ratio of salaries of A, B and C is 2 : 3 : 4 . If the total salary of B and C is Rs. 14,000 then by what percent the salary of C is greater than that of A?

    a. 100%

    b. 50%

    c. 200%

    d. 400%

    e. None

15. The total money of A and B is Rs. 4550. If 3/8 of A's money is equal to 9/32 of B's money then what is the money of B>

    a. 2200

    b. 2400

    c. 2600

    d. 3000

    e. None

16. Rs. 2400 is divided among three persons A, B and C . If A' share is $3/7^{th}$ part of total share of B and C then what is the share of A?

    a. 1020

    b. 1040

    c. 1060

    d. 720

    e. None

17. 378 coins consist of a rupee, 50 paisa and 25 paisa coins. Their values are in the ratio 13 : 11 : 7. What is the number of 50 paisa coins?

    a. 123

    b. 115

    c. 216

d. 132

e. None

18. If The difference, the sum and the product of two numbers are in the ratio 1 : 7 : 24 then what is the product of the two numbers?

    a. 6

    b. 12

    c. 24

    d. 48

    e. None

19. In a class boys and girls are in the ratio 3 :5. It 5 boys and 5 girls leave the class then the ratio becomes 1 : 2. How many students were in the class?

    a. 24

    b. 32

    c. 40

    d. 48

    e. None

Advanced Exercise

20. In a bag, there are coins of Rs. 1, 50 paise and 25 paise in the ratio 2: 3 :10 and total value of all the coins is Rs. 72. What is the number of total coins?

    a. 100

    b. 120

    c. 180

    d. 150

    e. None

21. A man has Rs . 60 in the form of coins of Rs. 1,50 paisa and 25 paisa in the ratio 5 : 6 : 8. What is the number of coins of 50 paisa?

    a. 30

            www.lilhaeducationcentre.in   Mob: 9305907823

b. 48

c. 36

d. 37

e. None

22. The students of a school are asked to stand in such a way that there may be 35 students in a column that there is 16 columns. If same students are stand in a column of 40 students then the number o columns will be:=

a. 15

b. 10

c. 20

d. 14

e. None

23. In a colony the ratio of male and female voters is 3 : 5. IF the female voters are more than the male voters by 900 then the number of male voters in the colony is:-

a. 1800

b. 1200

c. 4500

d. 1350

e. None

24. Rs. 18000 is to distribute among 66 men and women. Shares of all the men and all the women are in the ratio 5 : 4. Shares of one man and one woman are in the ratio 3 : 2. What is the number of men?

a. 5

b. 26

c. 30

d. 40

e. None

25. A shopkeeper mixed three types of sugar in the ratio 2 : 3 : 5 and obtained a mixture of Rs. 40 per Kg. If the prices of first two types of sugar are Rs. 20 per kg and Rs. 30 per kg then what was the price of third type of sugar per kg?

    a. 56

    b. 50

    c. 52

    d. 54

    e. None

26. Rs. 55,000 is to divide among three persons Ram, Shyam and Mukesh in the ratio 2 : 4 : 5. What will be the difference between the shares of shyam and Mukesh?

    a. 20000

    b. 25000

    c. 15000

    d. 10000

    e. None

27. A sum is to divide among P, Q and R in the ratio 2 : 3 : 5. If the total share of P and Q is Rs. 400 more than the share of Q then what is the share of R?

    a. 600

    b. 400

    c. 1000

    d. 300

    e. None

M a s t e r   E x e r c i s e

28. What is the mean proportion of 8 and 72.

    a. 24

    b. 40

    c. 32

d. 36

e. None

29. A man had Rs. 26,540. He gave Rs. 9,200 to his wife and distributed rest amount among his three sons in the ratio 1 : 2 : 3. What amount did the first son receive?

    a. Rs. 2,890

    b. Rs. 5,780

    c. Rs. 7,650

    d. Rs.8,670

    e. None

30. Rs. 4,800 is divided among A, B and C in the ratio 6 : 5 : 4 . What is the difference between the shares of A and C?

    a. 600

    b. 640

    c. 500

    d. 320

    e. None

31. Suresh sold 100 Kg of mixture of two types of rice A and B for Rs. 1,100 and gained Rs. 300. If the cost prices of A and B be respectively Rs. 10 and Rs. 5 per kh then what is the ratio of A and B in the mixture??

    a. 2 : 5

    b. 3 : 2

    c. 5 : 2

    d. 2 : 3

    e. None

32. 729 litres of mixture contains milk and water in the ratio 7 : 3 ?

    a. 60 L.

    b. 71 L

    c. 520 L

    d. 810L

e. None

33. The ratio of monthly salary of A, B and C is 2 : 3 : 5. If the monthly salary of C is Rs. 1,200 more than the monthly salary of A then what is the yearly salary of B?

   a. 14400
   b. 24000
   c. 2000
   d. 1200
   e. None

34. In a School boys and girls are in the ratio 5 : 2. The number of boys is more than the number of girls by 450. How many students are there in the school?

   a. 750
   b. 1050
   c. 300
   d. 340
   e. None

35. Rs. 30000 is divided among A, B and C in the ratio 3 : 5 : 7. What is the difference between the shares of B and C ?

   a. 2000
   b. 4000
   c. 10000
   d. 14000
   e. None

36. If 5 : 8 = 150 : x then x =?

   a. 180
   b. 190
   c. 200
   d. 240
   e. None

37. 25 liters of mixture contains alcohol and water in the ratio 3 : 2. How much more water is to be added to get a new mixture containing equal amount of alcohol and water?

    a. 10L

    b. 5L

    c. 15L

    d. 12.5L

    e. None

38. The ratio of the number of boys and girls in a class is 5 : 7. When 24 more boys join the class the ratio becomes reverse ? What is the number of girls in the class?

    a. 42

    b. 35

    c. 32

    d. 25

    e. None

39. The ratio of the prices of a black and white T. V. and a color T. V. is 3 : 8. The sum of their prices is Rs. 12,100. What is the difference between their prices?

    a. 6,600

    b. 6,050

    c. 5,500

    d. 5,100

    e. None

Answer

1.(d)	2.(a)	3.(b)	4.(a)	5.(a)	6.(d)	7.(b)	8.(b)	9.(b)	10.(a)
11.(a)	12.(d)	13.(c)	14.(a)	15.(c)	16.(d)	17.(d)	18.(d)	19.(c)	20.(c)
21.(c)	22.(d)	23(d)	24.(c)	25.(d)	26.(a)	27.(c)	28.(a)	29.(a)	30.(b)
31.(b)	32.(e)	33.(a)	34.(b)	35.(b)	36.(d)	37.(b)	38.(b)	39.(c)	

6 | MIXTURE or ALLIGATION

Introduction:

Mean price : The cost price of unit mass of a mixture is called mean price.

<div style="border:1px solid black; text-align:center;">

Tricks with Trickily Solve Examples

</div>

TYPE-1. TRICK : First rules of Allegation : If P_1 be the cost price of the element of first kind and P_2 be the cost price of the element of second Kind and P be the mean price of the mixture is :-

Case a. If $P_1 > P > P_2$ then ⟶ $(P - P_2) : (P_1 - P)$

Case b. If $P_1 < P < P_2$ then ⟶ $(P_2 - P) : (P - P_1)$

Example : In what ratio the rice at the rate of Rs. 7.20 per kg and the rice at the rate of Rs. 9.40 per kg should be mixed so that the mean price of the mixture becomes Rs. 8.50 per kg?

Tricky Soln.:   7.20   9.40

                                    8.50

        (9.40 – 8.50)   :   (8.50 – 7.20) = 0.90 : 1.30 = **9 : 13 Ans.**

Example : In a pot there is a mixture of milk and water in the ratio 5 : 2. In another pot there is a mixture of milk and water in the ratio 8 : 5. In what ratio the mixtures from the two pots should be mixed to obtain the mixture of milk and water in the ratio 9 : 4.

Tricky Soln.: Milk in the first pot = 5/7, Milk in the second pot = 8/13,

Milk in the new mixture = 9/13

From the rule of allegation   5/7   8/13

                                    9/13

        1/13   2/91 =   **7 : 2 Ans.**

Example : A merchant has 500 kg of sugar, part of which he sells at 7% profit and the rest at 17% profit. He gains 10% on the whole. What is the quantity of sugar sold at 17% profit?

Tricky Soln.:   According to the rule of allegation

Required quantity of sugar = 3/ (7 + 3) × 500

= (3/10 × 500) = **150 Kg Ans.**

7   17

10

7   3

Example : A milkman drawn off 11 kg of milk from a vessel full of by milk and add 11 kg of water in the vessel. He repeated this process two times again. If there was 110 kg of milk in the vessel. How much milk is present in the vessel at present?

Tricky Soln.: Remain quantity of milk = $110(1- 11/110)^3$

= (110 × 9/10 × 9/10 × 9/10) = 8019/100 = **80.19 Kg. Ans.**

Example: A wine seller draws off 40 liter of wine from a vessel full of wine and adds 40 kg of water in it. He again draws off 80 liter of the mixture from the vessel and adds same amount of water in the vessel. He again draw off 160 liter of mixture from the vessel and adds same amount of water in it. If there was 800 liter of wine in the vessel in the beginning. How much wine in the vessel now?

Tricky Soln.: Rest quantity of wine in the vessel

= 800 (1- 40 /800) (1-80/ 800) (1- 160/800)

= (800 × 19/20 × 9/10 × 4/5) = 5472/10 = **547.2 liter Ans.**

Example : In 35 liter of mixture of alcohol and water, alcohol and water are in the ratio 4 : 1. How much water should be added to the mixture so that the ratio of alcohol and water in the mixture may be 2: 1?

Tricky Soln.:   Quantity of water of be mixed

= 35 × (4 × 1 – 2 × 1) / (4 + 1) × 2   = 35 × 2/ 5 × 2 = **7 Liter Ans.**

Example :   In 300 gm of mixture of sugar and water there is 40% sugar. How much sugar should be added to this mixture so that sugar may 50% in the mixture?

Tricky Soln.: The quantity of sugar to be added to the mixture

= 300 × (50 – 40)/ (100 – 50)

= 300 × 10/ 50 = **60gm Ans.**

Example :   In 360 gm of mixture of sugar and water there is 20% water. How much water should be vaporized so that the percentage of water in the mixture may be 10%?

Tricky Soln.: Quantity of water that should be vaporized

= 360 ×(20 – 10)/(100 – 10)

= 360 × 10/90 = 40 gm Ans.

Example :   What ratio spirit and water should be mixed so that there may be 50/3 % profit by selling mixture at the rate of C.P.?

Tricky Soln.: Spirit : Water = 100 % : 50/3 % = 100 : 50/3 = 2 : 1/3

6 : 1 Ans.

Example :   In a bag there is coins of Rs. 1,50 paisa and 25 paisa in the ratio 2 : 3 : 10. If the total amount in the bag is Rs. 72 then what is the number of 50 paisa coins?

Tricky Soln.:   Ratio of the values of the coins

= 2 × 1 : 3 × ½ : 10 × ¼ = 2 : 3/2 : 5/2 = 4 : 3 : 5

∴ No. of 50 paisa coins = 3 / (4 + 3 + 5) × 72 × 2

= (3/12 × 72 × 2) = **36 Ans.**

Example :   A and B are the two mixtures of Gold and Copper in which the ratio of the two metals are 7 : 2 and 7 : 11 respectively. If a mixture C is formed by taking equal amount of A and B then what is the ratio of Gold and Copper in the mixture C ?

Tricky Soln.: Gold : Copper = (7/9 + 7/18) : (2/9 + 11/18) = 21/18 : 15 /18

$$= \ 7 : 5 \ \textbf{Ans.}$$

Example :   Alok buys 20 kg of rice at the rate of Rs. 6.50 per kg and 30 Kg of rice at the rate of Rs. 8.50 per Kg. He sells the mixture of the two types of rice at the rate of Rs. 9 per Kg. How much Alok gains?

Tricky Soln.: C.P. = (20 × 6.50) + (30 × 8.50) = Rs. 385

S.P. + (50 × 9) = Rs. 450

∴ Profit = (450 − 385) = **Rs. 65 Ans.**

Example :   In a pot there is 30 liters of water to 3 liters of water is taken out and replaced by 3 liters of spirit. The process is repeated again. What is the quantity of water in the pot after then?

Tricky Soln.:

If there is x liters of a liquid in a pot. y liters of liquid is replaced by y liters of water and this process is repeated n times then quantity of the liquid in the mixture = $x (1-y/x)^n$ liters

Water remained = $30 (1 – 3 / 30)^2 = 30 × 9 × 9 /100$

$$= \textbf{24.3 liters Ans.}$$

Example: When 1 liter of water is mixed with a mixture of acid and water then acid become 20% in the mixture. If now one liter of acid is mixed in the mixture in the mixture. Then the percentage of acid becomes 67/3%. What was the percentage of acid in the mixture in the beginning?

Tricky Soln.: by mental work.

If there is 1 liter of acid in 4 liters mixture then in the first step.

Percentage of acid = 1/4 +1 × 100 = 20% In the second step.

Percentage of acid = 2/6 × 100 = 100 / 3 = 67/3 %

∴ Percentage of acid in the beginning = (¼ × 100) %

= 25% Ans.

Intermediate Exercise

1. In what ratio must wheat at Rs. 5.15 per kg be mixed with wheat at Rs. 4.80 per kg so that the mixture be worth Rs. 5.08 per kg?

    a. 1 : 4
    b. 4 : 1
    c. 3 : 4
    d. 4 : 3
    e. None

2. In what ratio must water be mixed with milk at Rs. 12 per kg so that the average price of the mixture be Rs. 8 per kg?

    a. 3 : 2
    b. 2 : 3
    c. 1 : 2
    d. 2 : 1
    e. None

3. Gold is 19 times as heavy as water and copper is 9 times as heavy as water. In what ratio should these two metals be mixed so that the mixture may be 15 times as heavy as water ?

    a. 4 : 3
    b. 3 : 4

c. 2 : 3

d. 3 : 2

e. None

4. A sum of Rs. 41 was divided among 50 boys and girls in such a way that each boy got 90 paise and each girl got 65 paisa. What was the number of boys?

    a. 34

    b. 16

    c. 30

    d. 20

    e. None

5. A man buys 20 pens and 12 books for Rs. 320. He sells pens at 4% profit and books at 25% profit. If he gains Rs. 38 at whole, then what is the C.P. of a book?

    a. 12

    b. 15

    c. 10

    d. 20

    e. None

6. Some amount out of Rs. 10,000 was lent at 16% per annum and the remaining was lent at 14% per annum. Total simple interest from both the parts in 5 years was Rs. 7,400. What was the sum lend at 14% per annum?

    a. 2000

    b. 3000

    c. 4000

    d. 5000

    e. None

7. Some amount out of Rs. 45,000 was lent at 4% alcohol. A part of this whisky is replaced by another containing 19% alcohol and now the percentage of alcohol was found to be 26%. The quantity of whisky replaced is :-

    a. 4%

b. 24/5%

c. 6%

d. 32/5%

e. None

8. A glass full of whisky contains 40% alcohol. A part of this whisky is replaced by another containing 19% alcohol and now the percentage of alcohol was found to be 26%. The quantity of whisky replaced is :-

   a. 1/3

   b. 2/3

   c. 2/5

   d. 3/5

   e. None

9. Two vessels A and B contain milk and water mixed in the ratio 5: 3 and 2: 3 respectively. What is the ratio in which these two mixtures should be mixed to get a new mixture which contains equal amount of milk and water?

   a. 10 : 9

   b. 9 : 10

   c. 5 : 2

   d. 4 : 5

   e. None

10. How many kg of rice costing Rs. 24.20 per kg should be mixed with 70kg of rice costing Rs. 18.50 per kg so that 15% gain may be obtained by selling the mixture at Rs. 23 per kg?

    a. 25kg

    b. 15kg

    c. 20kg

    d. 30kg

    e. None

11. What amount of water should be mixed with 69 kg of milk costing Rs. 14 per kg so that 20% gain may be obtained by selling the mixture at Rs. 13.80 per kg?

    a. 23kg

    b. 25kg

    c. 15kg

    d. 21kg

    e. None

12. A container contains 50 liters of milk. From this container 10 liters of milk was taken out and replaced by water. This process was taken out and again. How much milk is now contained by the container?

    a. 20litres

    b. 32litres

    c. 30litres

    d. 18litres

    e. None

13. A milkman takes out 25 liters of milk from a drum of milk and replaces it by water Second time he takes out 50 liters of mixture from the same drum and replaces it by water. Third time he takes out 100 liters of mixture from the drum and replaces it by water. It there were 500 liters of milk in the beginning then what is amount of milk in the drum at present?

    a. 342litres

    b. 340litres

    c. 320liters

    d. 432litres

    e. None

14. There is 10% water in 40L of mixture of milk and water. What amount of water must be added to this mixture so that the percentage of water may become 20%?

    a. 5 L

    b. 4 L

c. 2 L

d. 10 L

e. None

15. A dishonest milk trader adds some water in milk and sells the mixture at the C.P. of the pure milk. Thus he earns 25% profit. What is the percentage of water in the mixture?

a. 10%

b. 15%

c. 20%

d. 25%

e. None

16. The ratio of the values of the coins of Rs. 1.50 paisa and 25 paisa is 13: 11: 7. If the total number of coins is 378 then what is the number of coins of 50 paisa?

a. 128

b. 132

c. 133

d. 136

e. None

17. In three vessels of equal capacity, mixture of milk and water is filled. The ratio of milk and water are 6: 1, 5: 2 and 3: 1 in the three respective vessels. If all the three are vessels are emptied into a single large vessel. What is the ratio of milk and water in the large vessel?

a. 55 : 37

b. 37 : 55

c. 19 : 65

d. 65 :19

e. None

18. A shopkeeper bought 240 kg of tea at the rate of Rs. 24 per kg and 64 kg of tea at the rate of Rs. 35 per kg and mixed them. At what rate per kg should he sell the mixture so that he may gain 33%/

a. 35

b. 30

c. 25

d. 40

e. None

19. In a zoo, there are rabbits and pigeons. If heads are counted, there are 90 and if legs are counted, there are 224. How many rabbits are there?

    a. 68

    b. 22

    c. 35

    d. 32

A d v a n c e d   E x e r c i s e

20. In a company, the average monthly salary of its employees is Rs. 5000. If the average monthly salary of male – employees and female – employees are Rs. 5200 and Rs. 4200 respectively. What is the percentage of male – employees in the company?

    a. 40

    b. 50

    c. 60

    d. 46

    e. None

21. 120 students appeared in an examination. The average marks of the students who passed is 39 and the average marks of the students who failed is 15. What is the number of passed students?

    a. 100

    b. 20

    c. 80

    d. 90

    e. None

22. In a purse there are 50 notes. Some notes are of value Rs. 5 each and rest is of value Rs. 10 each. If the total amount in the purse is s. 325 then what is the number of Rs, 5 notes?

    a. 15

    b. 25

    c. 35

    d. 45

    e. None

23. Average height of 30 students out of 50 students is 160 cm and the average height of the rest 20 students is 165 cm. What is the average height of the whole students?

    a. 161cm

    b. 163cm

    c. 162cm

    d. Can't be determined

    e. None

24. The number of pets is a zoo was 60 in which some were elephants and rest was birds. If the total number of legs of the pets was 210 then what was the number of birds in the zoo?

    a. 45

    b. 25

    c. 15

    d. 35

    e. None

25. In an office, the average monthly salary of 16 officers is Rs. 3,000 and that of non-officers are RRs. 550. If the average monthly salary of total employees of the office is Rs. 600 then what is the number for non – officers in the office?

    a. 784

    b. 772

    c. 768

d. Can't be determined

e. None

26. A man covers some distance out of 40 km by riding and rest of the distance on foot. The speed of riding is 16 km/h and the speed of walking is 8 km/h .If the man covers the whole distance in 4 hours then the distance covered by riding is :-

    a. 32km

    b. 24km

    c. 16km

    d. Can't be determined

    e. None

27. Some of the students of a class received the marks whose average is 10. The average marks of the rest 10 students are 20. If 15 be the average marks of the whole students then what is the number of students whose average marks is 10?

    a. 10

    b. 20

    c. 15

    d. 60

    e. None

28. The average age of all the students of a class is 15.8 years. If the average age of boys be 16.4 years and that of girls is 15.4 years then what is the ratio of the boys and girls in the class?

    a. 3 : 2

    b. 2 : 3

    c. 3 : 4

    d. 4 : 3

    e. None

29. A businessman mixes two types of pulses in the ratio 2 : 3. He earns 10% profit by selling the mixture at the rate of Rs. 22 per kg. If the cost price of the pulse of first type be Rs. 14 per kg then what is the cost price per kg of the second type of pulse?

a. 26

b. 25

c. 24

d. 34

e. None

30. In a bag there are 125 notes. In these notes there are Rs. 100 notes and Rs. 50 notes. If the total value of the notes is Rs. 10,000 then what is the number of notes of Rs. 100?

    a. 50

    b. 75

    c. 65

    d. 85

    e. None

31. In a game a person is awarded by 25 paisa for his each correct shot and fined by 10 paisa for his each wrong shot. If Vinayak tried 40 shots and he had to pay 50 paisa then what was the number of his correct shots?

    a. 10

    b. 20

    c. 30

    d. 25

    e. None

32. The rate of rice A is Rs. 16.00 per kg and that of rice B is Rs. 14.50 per kg. In what ratio should Rajnish mixed the two types of rice to have a mixture of the rate Rs. 15.40 per kg?

    a. 2 : 3

    b. 3 : 2

    c. 4 : 3

    d. Data unsufficient

    e. None

33. Rs. 32.50 were distributed among 50 children so that each boy received 75 paisa and each girl received 50 paisa. What was the number of boys?

    a. 10

    b. 20

    c. 30

    d. 40

    e. None

34. A laborer was employed for 30 days at the condition that he would be paid Rs. 42 for each day and he would be fined Rs. 2 of each absent day. After 30 days the laborer received Rs. 952. How many days was the laborer absent?

    a. 23

    b. 7

    c. 18

    d. 12

    e. None

35. The combined value of a wrist watch and a clock is Rs. 399. The clock is sold at 10% gain and the wrist watch is sold at 15% gain. If the total gain be Rs. 47.88 then what is the C.P. of the wrist watch?

    a. Rs. 200

    b. Rs. 199

    c. Rs. 150

    d. Can't be determined

    e. None

Answer

1.(b)	2.(d)	3.(d)	4.(a)	5.(c)	6.(e)	7.(e)	8.(b)	9.(d)	10.(a)
11.(c)	12.(b)	13.(a)	14.(a)	15.(c)	16.(b)	17.(d)	18.(a)	19.(b)	20.(e)
21.(a)	22.(c)	23.(c)	24.(c)	25.(c)	26.(c)	27.(a)	28.(b)	29.(c)	30.(b)
31.(a)	32.(b)	33.(c)	34.(b)	35.(e)					

7 | AVERAGE

Introduction: The average of two or more quantities of same unit is the number which is obtained by dividing the sum of the quantities by their number.

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{Number of quantities}}$$

<div style="border:1px solid">

Formulae with Solve Examples

</div>

> **Formulae related to natural numbers –**

1. Average of first n natural numbers = $n + 1\,/2$

2. Average of the squares of first n natural numbers

$$= (n + 1) (2n + 1)/6$$

3. Average of the cubes of first n natural numbers = $n(n + 1)^2\,/4$

> **Formulae related to even natural numbers –**

   1. Average of first n even natural numbers = $n + 1$

   2. Average of all the even natural number upto n = $n + 1/2$

> **Formulae related to odd natural numbers –**

   1. Average of first n odd natural numbers = n

   2. Average of all the odd natural numbers upto n = $n + 1\,/2$

> **Formulae related to multiples –**

   1. Average of first n multiples of K = $K \times (n + 1)/2$

Example : What is the average of first 50 natural numbers ?

Tricky Soln.: Required average = 50 + 1 /2 = 51/2 = **25.5 Ans.**

Example : What is the average of squares of first 25 natural numbers ?

Tricky Soln.: Required average = (25 + 1) (2 × 25 + 1) /6 = 26 × 51 /6

Example : What is the average of cubes of first 11 natural numbers ?

Tricky Soln.: Required average = 11 × (11 + 1)^2/4 = 11 × 12 × 12 /4

= **396 Ans.**

Example : What is the average of first 199 even natural numbers?

Tricky Soln.: Required average = (199 + 1) = **200 Ans.**

Example : What is the average of all the even natural numbers up to 98 ?

Tricky Soln.: Required average = 98 + 2 / 2 = 100 /2 = **50 Ans.**

Example : What is the average of first 80 odd natural numbers ?

Tricky Soln.: Required average = **80 Ans.**

Example : What is the average of all the odd natural numbers upto95?

Tricky Soln.: Required average = 95 + 1 /2 = 96 / 2 = **48 Ans.**

Example : What is the average of first 31 multiples of 5 ?

Tricky Soln. : Required average = 5 × 31 + 1 /2 = 5 × 32/2 = **80 Ans.**

Some more solved examples based on above formulae

Example : What is the average of 82/5, 164 /7, 163/5 and 109 / 7 ?

Tricky Soln. : Average = $\dfrac{82/5 + 164 /5 + 163 / 5 + 109 / 7}{4}$

86 + 1 + 1 /4 = 88 /4 = **22 Ans.**

Example :   The average expenditure of first 5 months of a person is Rs. 1,200 and that of next 7 months is Rs. 1,300. If he saves Rs. 2,900 in a year then what is the average monthly income of that person?

Tricky Soln.: Average monthly income = 5 × 1200 + 7 × 1300 + 2900 /12

$$= 6000 + 9100 + 2900 /12 = 18000 /12 = \textbf{1,500 Ans.}$$

Example :   A batsman played 13 innings and he became out in each inning. He scored 65 runs in his 13th inning which increased his previous average by 2 runs. What was his average runs upto 12th match?

Tricky Soln.: Let the average upto 12th innings = x

$$12x + 65 = 13 (x + 2) = 13 x + 26$$

$$= x = (65 - 26) = \textbf{39 Ans.}$$

Example :   A library has an average of 510 visitors on each Sunday and 240 on other days. What is the average number of visitors per day in a month of 30 days beginning with a Sunday?

Tricky Soln.: Required average = 5 × 510 + 25 × 240 /30

$$= 2550 + 6000 /30 = 8550 /30$$

285 Ans.

Example :   The average weight of 6 persons increases by 1 kg when a person of 45 kg is replaced by a new person. What is the weight of the new person?

Tricky Soln. : Weight of the new person = (45 + 6 × 1) Kg

$$= (45 + 6) \text{ kg} = \textbf{51 Kg Ans.}$$

Example : There are 5 servants in a hotel. Out of these servants one whose salary is Rs. 55 is replaced by a new servant then the average expenditure on 5 servants comes down by Rs. 4. What is the salary of the new servant?

Tricky Soln. : Salary of the new servant = Rs. (55 – 5 × 4)

$$= Rs. (55 – 20) = \textbf{Rs. 35 Ans.}$$

Example : In a committee of 8 persons , two persons whose ages are 25 years and 35 years are replaced by two women due to which their average age increased by 1.5 years. What is the average age of the two women?

Tricky Soln. : Required average age = [(25 + 35 + 8 × 1.5) /2] years

$$= (60 + 12 / 2) \text{ years} = 72 /2 \text{ years} = \textbf{36 years Ans.}$$

Example : There average age of 14 students in a class decreases by ½ year when two students whose ages are 12 years and 15 years are replaced by two girls. What is the average age of the two new girls?

Tricky Soln.: Required average age = (12 + 15 – 14 × ½ /2) years

$$(27 – 7) /2 = 20 /2 = 10 \text{ Years Ans.}$$

Example : The average height of 40 students of a class is 145 cm. 8 students whose average height is 142 cm are replaced by 8 another students whose average height is 147cm What is the new average of the height of the students of the class ?

Tricky Soln.: New average height = { 145 – 8 × (142 – 147)/40 } cm

$$= (145 + 40 /40) \text{ cm} = (145 + 1) \text{ cm} = \textbf{146cmAns.}$$

Example : The average of 13 results is 42. The average of first 7 results is 44 and the average of last 7 results is 43. What is the seventh result?

Tricky Soln.: Seventh result = 7 x (44 + 43) – 13 × 42

$$= (7 \times 87 - 13 \times 42)$$

$$= (609 - 546)$$

$$= \textbf{63 Ans.}$$

Example : The average of 11 observations is 40. If the average of first 5 observations is 38 and the average of last 5 observations is 36. What is the 6th observation?

Tricky Soln.: Sixth observation $= 11 \times 40 - 5 \times (38 + 36)$

$$= (440 - 5 \times 74)$$

$$= (440 - 370)$$

$$= \textbf{70 Ans.}$$

Example : A ship covers a fixed distance with the speed 10 km/h and returns back with the speed 15 km/h. What is the average speed of the ship in the whole journey?

Tricky Soln.: Average speed $= 2 \times 10 \times 15 / 10 + 15$ km/h

$$= 2 \times 10 \times 15 / 25 \text{ km/h}$$

$$= \textbf{12 km/h Ans.}$$

P r i m a r y   E x e r c i s e

1. Average of first 80 natural numbers is : -
   a. 40
   b. 40.5
   c. 41
   d. 39.6
   e. None

2. Average of squares of first 31 natural numbers is
   a. 330

b. 332

c. 336

d. 336

e. None

3. Average of cubes of first 16 natural numbers is

    a. 1056

    b. 1152

    c. 1154

    d. 1156

    e. None

4. Average of all odd natural number upto 100 is :-

    a. 49

    b. 49.5

    c. 50

    d. 51

    e. None

5. Average of first 51 even natural numbers is : -

    a. 51

    b. 48

    c. 49

    d. 50

    e. None

6. Average of all the even natural numbers upto 75 is : -

    a. 36

    b. 37

    c. 38

    d. 39

    e. None

7. Average of all the factors of 60 is :-

a. 12

b. 6

c. 60

d. 14

e. None

8. Average of first five multiplies of 7 is :-

   a. 14

   b. 21

   c. 28

   d. 35

   e. None

9. Average of first five prime numbers is

   a. 5.6

   b. 10

   c. 4.5

   d. 7

   e. None

10. The average age of a group of 9 children is 10 years. If two children whose ages are 9 year and 11 years left the group then what will be the average of rest children after two years?

   a. 10 years

   b. 11 years

   c. 11.5years

   d. 9 years

   e. None

11. The Average marks of 16 students was found 60. Latter it was found that the marks of a students had been read 55 at the place of 87 and the marks of another student had been read 59 it the place of 43. What was the real average of the marks of the students?

   a. 58

b. 61

c. 63

d. 59

e. None

12. In an examination, the average marks of the students was found to be 70. After deducting computational errors, the marks of the 50 students had to be changed from 90 to 59 each and the average came down to 60 marks. What is the total number of students who took the examination?

    a. 100

    b. 150

    c. 250

    d. 400

    e. None

13. In a class, the average age of boys is two – times the average age of girls . If in the class of 36 students boys and girls are in the ratio 5 : 1. What is the sum of ages of boys (in years)?

    a. 196

    b. 360

    c. 392

    d. 420

    e. None

14. The average age of five members of a family is three times the age of 6th member. If the average age of the 6 members be 92/3 years then what is the age of 6th member?

    a. 11 years

    b. 10.5 years

    c. 11.5years

    d. 12years

    e. None

15. The batting average for 50 innings of a cricket player is 40 runs. His highest score exceeds his lowest score by 172 runs. If these two innings are excluded, the average of remaining 48 innings is 38 runs. The highest and the lowest scores of the player are :-

    a. 174,2

    b. 175,3

    c. 177,5

    d. 176,4

    e. None

16. The average of three numbers is 145. If 180 be the greatest number and 15 be the diference between rest two numbers then what is the smallest number?

    a. 100

    b. 110

    c. 120

    d. 135

    e. None

17. The average age of 20 student of a class is 15 years. The age of the teacher of the class is 30 years more than the average of the students and the teacher. What is the age of the teacher?

    a. 45 years

    b. 46 years

    c. 93/2 years

    d. 95/2years

    e. None

18. A company produces on an average 3500 toys per month for the first three months. How many toys it must produce on an average per month over the next 9 months to average 4400 toys per month over the whole?

    a. 4500

    b. 4570

    c. 4680

d. 4700

e. None

19. The average of the wages of 16 labourers decreases by Rs. 1 if a person joins the group. The monthly payment of the new person is Rs. 100. What is the average wages of 16 labourers?

    a. Rs. 115

    b. Rs. 116

    c. Rs. 117

    d. Rs. 118

    e. None

20. A cricketer has a certain average for 20 innings. In the 20th inning, he scored 10 runs, there by decreasing his average by 1 run. What is the average runs in 20 innings?

    a. 35

    b. 34

    c. 33

    d. 36

    e. None

I n t e r m e d i a t e E x e r c i s e

21. The average of 20 results is 30 and that of 30 other results is 20. What is the average of all the results?

    a. 25

    b. 50

    c. 12

    d. 24

    e. None

22. The average Age of 18 women is decreased by 1 year when a woman whose age is 35 years is replaced by a girl. What is the age of the girl?

    a. 12years

    b. 14years

    c. 15years

    d. 17years

    e. None

23. The average weight of 8 persons decreases by 2 kg when a new person comes in place of one of them weighing 70 kg. What might be the weight of the new person?

    a. 54kg.

    b. 50kg.

    c. 60kg.

    d. 52kg.

    e. None

24. The average age of 8 men is increases by 2 years when two of them whose ages are 35 years and 45 years are replaced by two women. The average age of the two women is

    a. 48years

    b. 40years

    c. 45years

    d. 58years

    e. None

25. The average age of 14 men is increased by 2 years when three of them whose ages are 21 years, 24 years and 26 years are replaced by three new men. What is the average age of the three new men?

    a. 30years

    b. 32years

    c. 33years

    d. 35years

    e. None

26. The average age of 10 members of a committee was 50 years. After retiring a member of age 60 years, a new member of age 40 years joined the committee. What is the average age of the present members of the committee?

a. 39years

b. 38years

c. 52years

d. 48years

e. None

27. The average weight of 4 students A, B, C and D is 46 kg and that of 4 students B, C, D and E is 52 kg. If the weight of A is 38 kg then what is the weight of E?

    a. 56kg.

    b. 62kg.

    c. 52kg.

    d. 44kg.

    e. None

28. The average rain fall on Tuesday. Wednesday, Thursday and Friday was 19 mm. Again the average rain fall on Wednesday. Thursday, Friday and Saturday was 18 mm. If there was 20 mm rain fall on Saturday then what was the rainfall (in mm) on Tuesday?

    a. 18.5

    b. 19

    c. 19.5

    d. 24

    e. None

29. The average of 11 results is 46. If the average of first 6 results is 44 and that of last 6 results is 48. What is the 6th result?

    a. 46

    b. 48

    c. 42

    d. 44

    e. None

30. The average of 9 observations is 60. If the average of the first 4 observations is 58 and that of last 4 observations is 56 then what is the 5th observation?

a. 80

b. 82

c. 84

d. 78

e. None

31. The average weight of a class of 30 students is 45kg. If the weight of the teacher is included then the average weight of the class becomes 46 kg then what is the weight of the teacher ?

    a. 65kg

    b. 66kg.

    c. 75kg

    d. 76kg

    e. None

32. The average of the marks of 5 subjects obtained by Mukesh is 86. The average marks of 4 subjects other than Mathematics is 84. What is the marks obtained by Mukesh in Mathematics?

    a. 88

    b. 92

    c. 94

    d. 96

    e. None

33. Then years ago the average age of a family of four members was 24 years. After the birth of two children the present average age of the family is same. If the difference between the ages of the two children be 2 years then what is the present age of the younger child?

    a. 1year

    b. 2year

    c. 3year

    d. 5years

e. None

34. 5 years ago the average age of four persons A, B, C and D was 35 years. Now, another man X joins the group and the average age of the five persons becomes 39 uears. What is the present age of X?

   a. 30years

   b. 33years

   c. 35years

   d. 40years

   e. None

35. The average weight of 100 students is 46 kg. The average age of the boys is 50 kg and that of the girls is 40 kg. What is number of boys?

   a. 50

   b. 55

   c. 60

   d. 65

   e. None

36. The average age of a group of persons going for picnic is 16 years. Twenty new persons with an average age of 15 years join the group on the spot due to which their average age becomes 15.5Years. The number of persons initially going for picnic is :-

   a. 20

   b. 25

   c. 35

   d. 40

   e. None

37. Out of three numbers, first number is double the second number and half of the third number. If the average of the three numbers is 56, then what is the value of the greatest number?

   a. 96

   b. 90

c. 80

d. 89

e. None

38. The average salary of 20 employees of a branch of General Insurance Company is Rs. 2400. If the salary of the branch manager is included then the average salary becomes Rs. 200 more. What is the salary of the branch manager?

    a. Rs. 6,600

    b. Rs. 4,950

    c. 7,200

    d. Can't be determined

    e. None

39. The average age of three students is 15 years. If their ages are in the ratio 3 : 5 : 7 then what is the age of the oldest student?

    a. 21years

    b. 15years

    c. 28years

    d. 9years

    e. None

40. The average of 5 numbers is 30. When a new number is included the average increases by 5%. What is the new number?

    a. 41

    b. 49

    c. 39

    d. 51

    e. None

41. The average of 5 consecutive odd numbers is 84% of the greatest number. What is the sum of first two numbers?

a. 62

b. 32

c. 36

d. 44

e. None

42. The average of runs of 10 batsman in a match is 30 runs. If the runs of the captain is included then the average increases by 3 runs. What is the runs of the captain?

   a. 33

   b. 63

   c. 60

   d. 78

   e. None

43. The average of 50 numbers is 38. If two numbers 45 and 55 are excluded then the average of rest 48 numbers will be

   a. 37

   b. 38

   c. 37.5

   d. 38.5

   e. None

44. What is the average of first 5 prime numbers greater then 20?

   a. 29

   b. 31

   c. 37

   d. 32.2

   e. None

45. The average salary of the workers of a company is Rs. 600 and that of 16 officers is Rs. 3000. If the average salary of all the employees (workers and officers is Rs. 550 then how many workers are there in the company?

   a. 768

b. 772

c. 558

d. 782

e. None

<div align="center">

_M a s t e r   E x e r c i s e_

</div>

46. The average marks of the some of the students of a class was 20 while the average marks of the rest 60 students was 40. If the average marks of the whole class was 32 then how many students have average marks 20?

    a. 130

    b. 120

    c. 20

    d. 30

    e. None

47. When a person of 50kg weight is replaced by a new person then the average weight of 25 persons increases by 2kg. What is the weight of the new person?

    a. 98kg.

    b. 100kg

    c. 102kg.

    d. Can't be determined

    e. None

48. A man wants to know the average of 8 results. By mistake he reads the third result 12 more while he reads the 6th result 5 less. He does mistake also in reading the fourth result. After all the average is same as that of correct readings. What mistake is done by the man in the reading of the fourth result?

    a. 6 less

    b. 7 more

    c. 7 less

    d. Can't be determined

e. None

49. The average of 4 readings in a laboratory is 24. When two other readings are included then the average increased by 2. If the 6th reading is 26 then what is the 5th reading?

    a. 36
    b. 34
    c. 28
    d. 29
    e. None

50. The average age of 20 students was 10 years. Due to entry of some new students whose average age was 20 years, the average increased by 2 years. What was the number of the new students?

    a. 5
    b. 10
    c. 12
    d. 13
    e. None

51. The average of 11 observations was 13. The average of first six observations was 12 and that of last six was 15. What was the 6th observation?

    a. 19
    b. 21
    c. 12
    d. 15
    e. None

52. The average marks of Nitin in 8 subjects is 72. His average marks in 6 subjects is 68. What is his average marks in rest two subjects?

    a. 84
    b. 74
    c. 82
    d. 80

e. None

53. The marks obtained by Deva in Physics is 20 more than his average marks in Physics, Chemistry and Mathematics. If his marks in Math and Chemistry is 60. What is his marks in Physics?

    a. 160

    b. 40

    c. 80

    d. Can't be determined

    e. None

54. The average of 5 consecutive odd numbers is 19. What is the last number?

    a. 29

    b. 23

    c. Can't be determined

    d. 32

    e. None

55. The average of two number is 50. If first number is increased by 7 and the second number is decreased by 19 then what is the average of the two new numbers?

    a. 47

    b. 46

    c. 44

    d. Data Insufficient

    e. None

56. A man went to his destination with the speed 40 km/h and return back with the speed 60 km/h. What was his average speed in km/h during the whole journey?

    a. 50

    b. 48

    c. 52

    d. 45

    e. None

57. In a group of three consecutive odd numbers the sum of first and second is 7 more than the third number. What is the average of the three numbers?

    a. 9

    b. 7

    c. 11

    d. 12

    e. None

Answer

1.(b)	2.(c)	3.(d)	4.(c)	5.(e)	6.(c)	7.(e)	8.(b)	9.(a)	10.(e)
11.(b)	12.(e)	13.(b)	14.(c)	15.(a)	16.(c)	17.(c)	18.(d)	19.(c)	20.(e)
21.(e)	22.(d)	23.(a)	24.(a)	25.(c)	26.(d)	27.(b)	28.(d)	29.(a)	30.(c)
31.(d)	32.(c)	33.(c)	34.(c)	35.(c)	36.(a)	37.(a)	38.(a)	39.(a)	40.(c)
41.(c)	42.(b)	43(c)	44.(d)	45.(e)	46.(e)	47.(b)	48.(c)	49.(b)	50.(a)
51.(a)	52.(a)	53.(e)	54.(e)	55.(c)	56.(b)	57.(c)			

8 | TIME, SPEED and DISTANCE

Introduction:

Facts & Formulae | SECTION - A

1. a. Distance = Speed × Time   b. Speed = Distance/Time

    c. Time = Distance/Speed

2. a. 1 km/h = 5/18 m/s.   b. 1 m/s = 18/5 km/h.

3. If the ratio of the speeds of moving items be x : y then the ratio the times taken by them to cover equal distances = y : x

4. a. If a train passed a pole or a standing man then the time taken by it is equal to the time taken by the train to cover a distance equal to it's length.

    If a train whose length is a meter and speed is x m/s passes by a pole in t seconds then $\boxed{\text{T = a } / \, x \text{ sec.}}$

    b. If a train passes a fixed distance such as a platform, a bridge, tunnel then the time taken by it to pass the distance is equal to the time taken by the train to travel the distance equal to the sum of length of the train and the platform /bridge / tunnel.

    If a train whose length is a meter and whose speed is x m/s passes a platform of length b meter in t seconds then $\boxed{\text{T = a + b } / x \text{ sec.}}$

SECTION - B

5. a. IF two trains have speeds x m/s and y m/s in opposite direction then their relative speed = (x – y) m/s.

    b. If two trains have speeds x m/s and y m/s in the same direction then their

---

Relative velocity = (x + y) m/s.

6. If two trains of lengths a meter and b meter have speeds x m/s and y m/s respectively then

   a. If the two trains are running in opposite direction then the time taken by them to pass each other

   | t = a + b /x +y sec. |

   b. If the two trains are moving in he same direction then the time taken by first train to pass the second train

   | t = a + b /x - y sec. [where, x > y] |

SECTION - C

7. a. If a train of length a meter moving with a speed of x m/s passes a man who is running with a speed of y m/s in the direction of the train in t seconds then

   | t = a /x - y sec. |

   b. If a train of length a meter moving with a speed of x m/s passes a man who is running in the opposite direction of the train in t seconds the

   | t = a /x + y sec. |

Example : The speed of a car is 72 km/h. What is it's speed in m/s?

Tricky Soln.: 72 km /h. = (72 × 5 /18) m/s.

20 m/s. Ans.

Example : The speed of a bus is 72 km/h. What is the distance covered by the bus in 5 seconds?

Tricky Soln.: distance = Speed × time

$$= (72 × 5/18 × 5)\ m.$$

= 100 m. Ans.

Example : A cyclist covers a distance of 91 km in 13/2 hours. What is the speed of the cyclist?

Tricky Soln.:   Speed = Distance /Time = 91 /13 /2 km/h.

$$= (91 × 2 /13)\ km/h.$$

14 km/h. Ans.

Example : Two trains are moving with speeds of 45 km/h and 10 m/s then what is the ratio of their speeds?

Tricky Soln.:   Required ratio = (45 × 5 /18) : 10 = 25 /2 : 10

= 5 : 4 Ans.

Example : The ratio of the speeds of A and B is 4 : 5. If B takes 32 minutes to cover a distance then how much time will A take to travel the same distance ?

Tricky Soln.: Ratio of the speeds of A and B = 4 : 5

∴ Ratio of the time taken by A and B to cover the same distance = 5 : 4

∴ The time taken by A to cover the distance

$$= (5/4 × 32)\ minute$$

= 40 minute Ans.

Example : In how much time a train of length 150m will pass through a tamp – post if the speed of the train is 50/3 m/s?

Tricky Soln.: t = 150 /50 /3 sec.

$$= (150 × 3 /50) \text{ Sec.} = \textbf{9 Sec. Ans.}$$

Example :   A train whose speed is 45 km/h passes through a 140 m long bridge in 20 seconds. What is the length of the train?

Tricky Soln.: Let the length of the train = x m.

$$\therefore \quad x + 140 / 5 = 20$$

$$= x + 140 = (20 × 25 /2) = 250$$

$$= x = 250 - 140 =$$

$$\textbf{= 110 m. Ans.}$$

Example :   Two trains of lengths 230m and 270 m are running in the opposite directions on parallel tracks If the speed of the two trains be 40 km/h and 50 km/h respectively then what is the time in which the two trains will cross each other ?

Tricky Soln.:   t = 230 + 270 (40 + 50) × 5/18 sec. = (500 × 18 / 90 × 5) sec.

$$\textbf{= 20 sec. Ans.}$$

Example :   A 120 m long train is running with a speed of 60 km/h. How long does the train cross a man running at the speed of 6 km/h in the same direction?

Tricky Soln.: t = 120 / (60 − 6) × 5/18 sec. = (120 × 18 /54 × 5) sec.

$$\textbf{= 8 sec. Ans.}$$

Example :   If a bus goes from Patna to Chapra with a speed 60 km/h and return with the speed of 40 km/h. What is the average speed of the bus in the whole journey?

Tricky Soln.:   Average speed = 2 × 60 × 40 / 60 + 40 km/h.

$2 \times 60 \times 40 / 100$ km/h

= 48 km/h. Ans.

Example : A scooterist covers a distance in 10 hours. If he covers half of the distance with the speed 21 km/h and rest of the half distance with the speed 24 km/h. What is the total distance covered by him?

Tricky Soln.: Total distance = ($2 \times 21 \times 24 / 21 + 24 \times 10$) km.

= ($2 \times 21 \times 24 / 45 \times 10$) km.

= 224 km.Ans.

Example : Manoj goes from Delhi to Aligarh by moter cycle with the speed of 60 km/h and returns back to Delhi with the speed of 40 km/h. If he takes 5 hours in going and returning back then what is the distance between Delhi and Aligarh?

Tricky Soln.: Required distance = ($60 \times 40 / 60 + 40 \times 5$) km.

= ($60 \times 40 / 100 \times 5$) km.

= 120 km. Ans.

Example : A bus goes from Mujaffarpur to Raxaul with the speed of 50 km/h and return by the same route with the speed of 40 km/h. If it take 1 hour more in returning then what is the distance between Mujaffarpur and Raxaul?

Tricky Soln.: Required distance = ($50 \times 40 / 50 - 40 \times 1$) km.

= ($50 \times 40 / 10$) km

= **200 km.Ans.**

Example : Moving at the rate of 5 km/h Pramod reached his school 7 minutes late . If he moves with the speed 6 km/h then he reached the school 5 minutes before. What is the distance between the school and his house?

Tricky Soln.: Required distance = 5 × 6/ 6 − 5 × (7 + 5) /60 km.

$$= (5 × 6 /1 × 12 / 60) \text{ km.}$$

= 6 km.Ans.

Example : The lengths of train A and B are respectively 225 m and 250 m. If their speed be respectively 54 km/h and 36 km/h then in how long the train B will pass through a man seating in train A if the two trains are running in opposite directions?

Tricky Soln.: Required time =   250 / (54 + 36) × 5/18 sec. = 250 × 18 /90 × 5 sec.

= 10 sec. Ans.

Example : A thief stole a car at 2 : 30 pm and ran away with the speed 80 km/h.At 3 : 00 pm the police was informed and the police at once followed the thief with the speed 100 km/h. At what time the thief was caught?

Tricky Soln.: Time in which the thief was caught = 80 × ½ / 100 − 80 hour

$$= 40/ 20 \text{ hours} = 2 \text{ hours}$$

Time when the thief was caught = (3 + 2) pm

= 5 : 00 pm Ans.

Example : Moving with 6/7 times of it's original speed a man reaches his destination 25 minutes late.In what time he may caver the distance with his orginal speed?

Tricky Soln.: Time taken by original speed = (6/ 7 − 6 × 25 /60) hours

$$= (6 × 25 / 60) \text{ hours}$$

$$= 5/2 \text{ hours}$$

= 5/2 hours Ans.

Example : A man covers a distance by car with the speed 56 km/h in 5 hours. If he wants to covers the distance in 7 hours then what should be his speed ?

Tricky Soln.: $56 \times 5 = ? \times 7$

= ? = ($56 \times 5 / 7$) km/h.

= 40km/h.Ans.

Example : If the speed of a student be 4 km/h more than his usual speed then he reaches his college 20 minutes earlier while if his speed be 2 km/h less than his usual speed then he reaches the college 40 minutes late. What is his usual speed?

Tricky Soln. : Usual speed = 4×2 ($20 + 40$) / $4 \times 40 - 2 \times 20$)

= $4 \times 2 \times 60 / 160 - 40 = (4 \times 2 \times 60 / 120)$

= 4km/h. Ans.

Example: A train passes by a man standing on the plateform in 3 seconds. An another train of equal length which is running in opposite direction passes by the man in 4 seconds in what the two trains will pass through each other?

Tricky Soln.: Time taken in passing each other = ($2 \times 3 \times 4 / 3 + 4$)

= 24 /7 sec.

= 24/7 sec. Ans.

Example : A man starts from Chapra to gorakhpur and an another man starts at the same time from Gorakhpur to Chapra. After meeting they takes 7/3 hours and 24 /5 hours to reach their destinations respectively. If the speed of the first man be 12 km/h then what is the speed of the second man?

Tricky Soln.: $12 / y = \sqrt{24/5} / 10/3 = \sqrt{24 \times 3 / 5 \times 10}$

= $\sqrt{36 / 25} = 6 /5$

= y = (12 × 5 / 6) km/h.

= 10 km/h.Ans.

Example : A thief is his 50 steps ahead from a policeman. The time taken by the thief to travel 3 steps is equal to the time taken by the policeman to travel 4 steps. One step of thief is equal to 7/4 m and one step of the policeman is 11/4 m. In how many steps the police man will catch the thief?

Tricky Soln.: No. of step = 50 ×7/4/ 11/4 – 4/3 × 7/4

= 50 × 7 × 12 / 4 × 5

= 210 Ans.

Example : The average speed of a car is 75 km/h. If the driver decreases the speed by 40% then what will be the average speed of the car?

Tricky Soln.: Required average speed of the car

= 60% of 75 km/h.

= (60 × 75 / 100) km/h.

= 45km/h.Ans.

Example : A tourist bus travels 522 km in 11 hours at the rate of 58 km/h. During the journey the bus has taken rest. What is the time of rest?

Tricky Soln.:   Without rest, the distance travelled

= 11 × 58 = 638 km.

The distance really travelled = 522 km.

Difference = 638 – 522 = 116 km.

∴ Time of rest = 116 /58 = **2 hours Ans.**

Example : A car travels 528 km at the rate of 66 km/h. What distance will be travelled by a truck at the rate of 24 km/h less than the speed of the car and in the time which is 7 hour more than the time of the car?

Tricky Soln.: Time taken by the car = 528/66 = 8 hours

In the second condition,

Time = 15 hours

Speed = 66 – 24 = 42 km/h.

∴ Distance travelled by the truck = Distance × Time

= 15 × 42 **= 630 km. Ans.**

P r i m a r y E x e r c i s e

1. 50 /3 m/s is equivalent to :-
    a. 50 km/h
    b. 56 km/h
    c. 60 km/h
    d. 40 km/h
    e. None

2. A 300 m train crosses a person standing near it's track in 20 seconds. What is the speed of the train?
    a. 48 km/h.
    b. 50 km/h
    c. 60 km/h
    d. 54 km/h
    e. None

3. A train which is running with the speed 72 km/h passes an electric pole in 15 seconds. What is the length of the train?
    a. 250m

b. 300m

c. 350m

d. 275m

e. None

4. The ratio of the speeds of A and B is 3 : 4. A takes 15 minutes more to cover a distance than B. In what time does B cover the distance?

a. ½ hour

b. ¾ hour

c. 1 hour

d. 5/4 hour

e. None

5. A train whose length is 250 m and running with a speed 60 km/h will cross an electric pole in :-

a. 12.5sec.

b. 15sec

c. 25sec

d. 30sec.

e. None

6. A train whose length is 200 m passes 300 m platform in 25 seconds. What is the speed of the train?

a. 54km/h.

b. 60km/h

c. 72km/h

d. 75km/h.

e. None

7. A train whose length is 300 m and running with the speed 54 km/h, takes 40 second to cross a bridge . What is the length of the bridge?

a. 250m.

b. 300m.

c. 325m.

d. 350m.

e. None

8. A cyclist covers a distance in 1 hour 20 minutes. If his speed is 18 km/h then the distance travelled by him is : -

   a. 20km.

   b. 24km.

   c. 27km.

   d. 30km.

   e. None

9. A train whose speed is 40 km/h overtakes a horserider who is riding in the same direction with the speed 25 km/h, in 48 seconds. What is the length of the train?

   a. 240m.

   b. 120m.

   c. 140m.

   d. 200m.

   e. None

10. A train has 25 bogies. Each bogy is 8 m lung. The distance between two bogies and the distance between the engine and bogy is 1m. The speed of the train is 45 km/h. In what time the train will cross a bridge which is 1 km long?

    a. 1 m

    b. 1 m 40 Sec.

    c. 1 m 30 Sec.

    d. Can't be determined

    e. None

11. A train is running with the speed 75.5 km/h and a man is running in the direction of the rain with the speed 3.5 km/h. If the train crosses the man in 10 seconds then what is the length of the train?

    a. 100m

b. 120m

c. 200m.

d. 250m

e. None

12. A 200 m long train crosses a man which is running with the speed 5 km/h in the opposite direction, in 14.4 seconds. What is the speed of the train?

    a. 55km/h.

    b. 45km/h.

    c. 5km/h.

    d. 50km/h.

    e. None

13. How much distance will be travelled by a train in 10 minutes with the speed 92.4 km/h?

    a. 14,400 m.

    b. 12,700 m.

    c. 11,500 m.

    d. 14,500 m.

    e. None

14. A scooterist travels 100 km with the speed 50 km/h and one – third of the journey is travelled with the speed 40 km/h and rest distance is travelled with the speed 50 km/h. What is the average speed of the traveler during the journey?

    a. 44.55km/h

    b. 45 km/h

    c. 44 km/h.

    d. The question is incomplete

    e. None

15. A car covers a distance in 18 hours. If half of distance is covered with the speed 40km/h and rest half is covered with the speed 60 km/h then what is the distance?

    a. 432 km.

    b. 450 km.

c. 864 km.

d. 900 km.

e. None

16. A man covers a distance with the speed of 10km/h and returns with the speed of 12

km/h. If the total distance is travelled in 11/2 hours then what is the distance?

a. 20km.

b. 30km

c. 25km.

d. 27km.

e. None

<div style="text-align:center;">

_I n t e r m e d i a t e E x e r c i s e_

</div>

17. A bus travels from Patna to Bhagalpur with the speed 75 km/h and returns back with the

speed 60 km/h and returns back with the speed 60 km/h. If returning time is 40 minutes

more then what is the distance between Patna and Bhagalpur?

a. 180 km.

b. 200 km.

c. 175 km.

d. 225 km.

e. None

18. A man went to his office with the speed 10 km/h and became late 3 minutes. Second

day he increased his speed by 2 km/h and reached the office 2 minutes before. What is

the distance of his office from his house?

a. 4 km.

b. 5 km.

c. 6 km.

d. 15/ 2 km.

e. None

19. Walking with the speed 5 km/h a labourer reaches a factory 15 minutes late. If he walks with the speed 6 km/h he reaches the factory 15/2 minutes before it required. What is the distance of the factory from the hours of the labourer?

    a. 11km.
    b. 11.5km.
    c. 11.25km.
    d. 12km.
    e. None

20. A train crosses a man in 15 seconds and it crosses a platform of length 100 meters in 25 seconds.What is the length of the train?

    a. 40 meter
    b. 60 meter
    c. 150 meter
    d. 300 meter
    e. None

21. Two men starting from the same point walk in the same direction at the rate at 6 km/h and 8.5 km/h respectively. What time will they take to be 17 km apart?

    a. 2h
    b. 2.5h
    c. 3h
    d. 3.5h
    e. None

22. A train travels a fixed distance at the rate of 60 km/h in 45 minutes. At what rate will it travel the same distance in 36 minutes?

    a. 55 km/h.
    b. 65 km/h.
    c. 72 km/h.
    d. 85 km/h.
    e. None

23. A boy takes time in running a distance 10 m in which a car travels 25 m. What distance will be covered by the boy in the time in which the car covers 1 km ?

    a. 500m.

    b. 350m.

    c. 600m.

    d. 400m.

    e. None

24. A rabbit is 70 leaps ahead from a dog. The time which the dog takes 4 leaps, the rabbit takes 5 leaps but one leap of the rabbit is 2 m and one leap of the dog is 3 m. In what number of leaps the dog will catch the rabbit?

    a. 200

    b. 300

    c. 250

    d. 280

    e. None

Advanced Exercise

25. A train 150 m long passes an electric pole in 12 seconds. What is the speed of the train?

    a. 42 km/h.

    b. 50 km/h.

    c. 60 km/h.

    d. Data inadequate

    e. None

26. The speed of a train is 92.4 km/h. The distance travelled by the train in 20 minutes is :

    a. 30800m

    b. 308m

    c. 3080m

    d. 23000m

e. None

27. 150 m long train crosses a man running in opposite direction with the speed 6 km/h in 6 seconds. What is the speed of the train?

    a. 90 km/h.

    b. 84 km/h.

    c. 96 km/h.

    d. 45 km/h.

    e. None

28. Which of the following speeds is the slowest?

    a. 30 m/sec.

    b. 150 m/minutes

    c. 86 km/h.

    d. 1.4 km/h.

    e. None

29. A boat covers 60 km in 5 hours in downstream. It takes 1 hour more in returning. What is the speed of the current?

    a. 1km/h.

    b. 11 km/h.

    c. 6 km/h.

    d. 2 km/h.

    e. None

30. A train running with the speed 84 km/h crosses an electric – pole in 6 seconds. What is the length of the train?

    a. 45 m

    b. 120m

    c. 140m

    d. 160m

    e. None

31. A car running with uniform speed travels 6 km in 4 minutes. What is the speed of the car?

    a. 45km/h

    b. 90km/h

    c. 60km/h

    d. 75km/h.

    e. None

32. A train running with uniform speed 72 km/h crosses a signal pole in 6 seconds. What is the length of the train?

    a. 132 m

    b. 120 m

    c. 110 m

    d. 143 m

    e. None

33. A train which is running with the speed 90 km/h crosses a signal pole in 6 seconds. What is the length of the train?

    a. 125 m.

    b. 150 m.

    c. 110 m.

    d. 220 m

    e. None

34. A train which is running with the speed 90 km/h takes 12 seconds. To cross a pillar. What is the length of the train?

    a. 240 m

    b. 120m

    c. 300m

    d. Data inadequate

    e. None

35. A train whose speed is 54 km/h crosses a platform in 16 seconds. What is the length of the platform?

    a. 100
    b. 241
    c. 141
    d. Data inadequate
    e. None

36. A 125 m long train crosses an electric pole in 5 seconds. What is the speed of the train in km/h ?

    a. 54
    b. 72
    c. 90
    d. 89
    e. None

37. The diameter of the wheel of a train is 40 cm. In how many revolutions it will move 352 meters?

    a. 140
    b. 280
    c. 220
    d. Can't be determined
    e. None

38. A train crosses a 100 m long platform in 60 seconds. If it's speed is 45 km/h then in what time it will cross an electric pole?

    a. 130/3 sec.
    b. 52 sec.
    c. 33 sec.

d. 45 sec.

e. None

39. A 80 m long train is running at the rate of 48 km/h. In what time it will cross a 800 long tunnel?

    a. 60 sec.

    b. 36 sec.

    c. 1 minutes 6 sec.

    d. 18 sec.

    e. None

40. The distance travelled by a train which is running with the speed 92.4 km/h in 18 minutes is :-

    a. 27. 72 km

    b. 29.92 km

    c. 28.82 km

    d. 59.84 km

    e. None.

1.(c)	2.(c)	3.(b)	4.(b)	5.(b)	6.(c)	7.(b)	8.(b)	9.(d)	10.(b)
11.(c)	12.(b)	13.(e)	14.(c)	15.(c)	16.(b)	17.(b)	18.(b)	19.(c)	20.(c)
21.(e)	22.(e)	23.(d)	24.(d)	25.(e)	26.(a)	27.(b)	28.(d)	29.(a)	30.(c)
31.(b)	32.(b)	33.(b)	34.(c)	35.(d)	36.(c)	37.(b)	38.(b)	39.(c)	40.(a)

9 | TIME and TRAIN

Introduction: This chapter is a part of "Time and Distance". In this chapter we mostly study those type of problems in which length of train is considerable. We also study the relative speed of trains.

- ➢ **Relative speed –** When two trains run on parallel tracks then rate of change of the distance of a train with respect to another train is called relative speed of the first train.
- ➢ When two trains are moving in the same direction then the relative speed is obtained by subtracting their speeds.
- ➢ When two trains are moving in opposite directions then the relative speed is equal to the sum of their speeds.
- ➢ When a train passes an electric pole or telephone pole or a standing person then it has to travel a distance equal to its length.

> ∵ The time in which a train will pass a pole
>
> $$= \frac{\text{Length of the train}}{\text{Speed of the train}}$$

- ➢ When a train passes a bridge or a platform or a tunnel or a train then it has to travel a distance equal to the sum of its length and the length of the bridge or plate form or tunnel or train.

> ∵ Speed of the train
>
> $$= \frac{\text{Length of (Train + platform)}}{\text{Time of passing}}$$

1. To change km/h into m/s we multiply the speed by 5/8.

Example : What is the value of 72 km/h in m/s?

Tricky Soln.: 72 km/h. = 72 × 5/18 m/s. **= 20 m/s. Ans.**

2. To change m/s into km/h we multiply the speed by 18/5 km/h.

= 90 km/h. Ans.

Example : How long does a train 195 meters long running at the rate of 54 km/h take to cross a bridge 180 meters long?

Tricky Soln.: l_1 = 195 m ; v = 54 × 5/18 m/s. = 15 m/s.

L_1 = 180 m

T = $l_1 + l_2$/v = 195 + 180 /15

375 /15 = **25 seconds Ans.**

Example : If a train crosses a platform of length 96 meters in 12 seconds and another platform of length 141 meter in 15 seconds then what is the length of the train?

Tricky Soln.: Length of the train = l m (Let)

Length of first platform = l1 = 96 m

Length of second platform = l_2 = 141 m

Speed of the train = v m/s.

Now, l + 96 / v = 12 = v = l + 96 /12 ………….. (1)

Again l + 141 /v = 15 = v = l + 141 / 15 ……………..(2)

From (1) and (2), l+ 96 /12 = l + 141 /15

= l = 564 – 480 = **84 m Ans.**

Example : A train 500 meters in length is running at the rate of 63 km/h. In what time will it pass a man who is walking 3 km/h in the same direction?

Tricky Soln.: Required time = 500/ (63 – 3) 5/18 = 500 × 18 / 60 × 5

<div align="center">

= **30 seconds Ans.**

</div>

Example : Two trains whose lengths are 176 meters and 200 meters ate running in opposite directions with speeds 27 km/h and 45 km/h respectively. In what time will the second train cross a man seating on the first train?

Tricky Soln.: l_1 = 176 meter, l_2 = 200 meter

V_1 = 27 km/h, v_2 = 45 km/h

Required time = l_2 / v_1 + v_2 = 200 / (45 + 27) 5/18

= 200 /72 × 5/18 = **10 seconds Ans.**

Example : Two trains of lengths 121 meters and 99 meters are running with speeds 40 km/h and 32 km/h respectively in opposite directions. In what time will these two trains will pass each other after meeting?

Tricky Soln.: l_1 = 121 meter, l_2 = 99 meter,

V_1 = 40 km/h and v_2 = 32 km/h

Required time = 121 + 99 / (40 + 32) /18 = 220 /72 × 5/18

220 / 4 × 5 = 220 /20 **= 11 sec. Ans.**

Example : Two trains are moving with the speeds 60 km/h respectively in the same direction. The length of the first train is 150 meter and the length of the second train is 100metre. In what time will the first train cross a man seating in the second train?

Tricky Soln.: l_1 = 150 meter, l_2 = 100 meter,

V_1 = 60 km/h and v_2 = 40 km/h

Required time = l_1 / $v_1 - v_2$ = 150 / (60 -40) × 5/18

= 150 × 18 /20 × 5 = **27 sec. Ans.**

Example : A train which is running with the speed 60 km/h, crosses a 200 m long platform in 27 seconds. What is the length of the train?

Tricky Soln.: Speed of the train = 60 km/h.

= 60 × 5 /18 m/s.

= 50/3 m/s.

∴ Speed of the train = Length of (Train + Platform) / Time taken to cross

= 50 /3 = 200 + x / 27 [Length of the train = x m. (let)]

= 600 + 3x = 1350 = 3x = 750

= x = 750/3 = **250 m Ans.**

Example : A goods train whose length is 500 m, crosses a platform in 36 seconds. If the length of the platform be 220 m then what is the speed of the rain?

Tricky Soln.: Speed of the train = Length of (Platform + Train) / Time taken to cross

= (220 + 500) /36 m/s.

= 20 m/s.

= (20 × 18) / 5 km/h.

= **72 km/h.Ans.**

Example :   A train whose length is 160 m and is running with the speed 90 km/h crosses a platform in 18 seconds. What is the length of the platform?

Tricky Soln.:   Speed of the train = 90 km/h.

   = (90 × 5 / 18) m/s. = 25 m/s.

   When a train crosses a platform the speed of the train

   = Length of (Train + Platform) / Time taken to cross

   = 25 = 160 + x /18 [Length of the platform = xm. (let)]

   = 450 = 160 + x

   = x = 450 – 160 = **290 meters Ans.**

Example :   A man crosses a stationary train A whose length is 720 m, in 8 minutes. A woman crosses an another train B in 2 minutes and 30 seconds. The speeds of the man and the woman are in the ratio 15 : 16. What is the length of the train B?

Tricky Soln.: Let the length of the train B = x meters

   Speed of the man = 720/ 8 × 60 = 3/2 m/s.

   Speed of the woman = x / 150 m/s.

∴ 3/2 : x /150 = 15 : 16   ∴ x / 150 × 15 = 3/2 × 16

   = x /10 = 24   = x = **240 meters Ans.**

Example :   The length of a train and a platform are equal . The train crosses the platform with the speed 90 km/h in 1 minute. What is the length of the platform?

Tricky Soln.:   Let the length of the platform = Length of the train = x m

Speed = 90 km/h.

= (90 × 5 /18) m/s. = 25 m/s.

Time = 1 minute = 60 seconds

= $2x$/ 25 = 60

= $2x$ = 25 × 60

= x = 25 × 60 /2 = 750 meters Ans.

Example :   Two trains of equal length are running on parallel tracks in the same directions with the speeds 46 km/h and 36 km/h respectively. The faster train crosses the slower one in 36 seconds . What is the length of the each train?

Tricky Soln.: Let the length of each train = x m

Relative speed = (46 – 36) km/h. = 10 km/h.

= 10 × 5 /18 m/s = 25 /9 m/s.

25/9 × 36 = $2x$

= $2x$ = 100   = x **= 50 meters Ans.**

Example :   A 240 m long train crosses a platform whose length is equal to the length of the train, in 27 seconds. What is the speed of the train?

Tricky Soln.:   Speed of the train = (240 + 250 /27) m/s.

= 480 /27 m/s. = (480 /27 × 18/ 5) km/h.

= **64 km/h. Ans.**

Example : A train whose length is 220 m, crosses a signal pole in 12 seconds. What is the speed of the train?

Tricky Soln.: When a train crosses a pole then it travels a distance equal to the length of the train

Speed of the train = (220 /12) m/s.

= 220 /12 × 18 /5 km/h.

= **66 km/h. Ans.**

1. A train is running at the rate of 180 km/h. What is it's speed in m/s?
    a. 15 m/s
    b. 30 m/s
    c. 40 m/s
    d. 50 m/s
    e. None

2. A 100 m long train is running at the rate of 30 km/h. In what time will it cross a man standing near the track?
    a. 10 sec.
    b. 11 sec.
    c. 12 sec.
    d. 15 sec.
    e. None

3. If a train running at the rate of 60 km/h crosses a pole in 30 seconds then what is the length of the train?
    a. 500 m.

b. 750 m.

c. 1000 m.

d. 900 m.

e. None

4. A train crosses a pole in 15 seconds. If the speed of the train is 36 km/h then what is the length of the train?

    a. 120 m.

    b. 150 m.

    c. 175m.

    d. 200m.

    e. None

5. If the speed of a 100 m long train is 144 km/h then in what time will it cross an electric pole?

    a. 2.5 sec.

    b. 3 sec.

    c. 3.5 sec.

    d. 5 sec.

    e. None

6. A 120 m long train takes 10 seconds to cross a man standing on the platform. What is the speed of the train?

    a. 10 m/s

    b. 12 m/s

    c. 15 m/s

    d. 20 m/s

    e. None

7. A 800 m long train is running at the rate of 78 km/h. If it crosses a tunnel in one minute then what is the length of the tunnel?

    a. 500m.

    b. 600m.

c. 700m.

d. 750m.

e. None

8. A man sitting on a moving train can count 21 telephone poles in one minute. If the distance between two poles is 50m then what is the speed of the train?

    a. 55 km/h.

    b. 57 km/h.

    c. 60 km/h.

    d. 63 km/h.

    e. None

9. A 220 m long train can cross a signal pole in 12 seconds. What is the speed of the train in km/h?

    a. 60

    b. 66

    c. 69

    d. 72

    e. None

10. A 180 m long train is moving with speed 20 m/s. In what time will it cross a man who is running in the same direction at the rate 10 m/s?

    a. 6 Sec

    b. 9 Sec

    c. 18 Sec

    d. 17 Sec

    e. None

11. A train is running at the rate of 40 km/h. A man is running in the same direction at the rate of 25 km/h. If the train crosses the man in 48 seconds then what is the length of the train?

    a. 50m

    b. 100m

c. 150m

d. 200m

e. None

12. A man running at 9 km/h along side a railway track is 240 meters a head of the engine of a 120 meters long train running at 45 km/h in the same direction. In how much time will the train pass the man?

a. 12sec.

b. 30 sec.

c. 40 sec.

d. 45 sec.

e. None

13. A train 500 m long is running at a speed of 63 km/h. In what time will it cross a man running in the same direction at a speed of 3 km/h?

a. 25sec.

b. 30 sec.

c. 40sec.

d. 45sec.

e. None

14. A train 125 m long passes a man, running at 5 km/h in the same direction in which the train is going, in 10 seconds. What is the speed of the train?

a. 45 km/h.

b. 50km/h

c. 54 km/h.

d. 55 km/h.

e. None

15. A train which is 165 m long is running at the rate of 58 km/h. In how much time will it cross a man running at the rate of 8 km/h in the opposite direction?

a. 10

b. 11

c. 9

d. 11.88

e. None

16. A man is standing on a bridge whose length is 180 m. A train crosses him and the bridge in 8 seconds and 20 seconds respectively. What is the length and speed the train?

    a. 120 m., 54km/h

    b. 130m.48 km/h.

    c. 150m. , 75km/h.

    d. Data insufficient

    e. None

17. A train A which is running at the rate 120 km/h crosses an another train B which is running in the same direction, in 2 minutes. If the lengths of the two trains are 100 m and 200 m respectively then what is the speed of the train B?

    a. 111

    b. 123

    c. 129

    d. 127

    e. None

A d v a n c e d   E x e r c i s e

18. A train passes two bridges whose lengths are 800 m and 400 m in 100 seconds and 60 seconds respectively. What is the length of the train?

    a. 80 m

    b. 90 m

    c. 150 m

    d. 200 m

    e. None

19. A train whose length is 150 m. Passes an electric pole in 15 seconds and an another train of equal length which is running in opposite direction, in 12 seconds. What is the speed of another train?

    a. 45 km/h.

    b. 48 km/h.

    c. 52 km/h.

    d. 54 km/h.

    e. None

20. A train crosses a man standing on a platform in 8 seconds and it crosses the platform whose length is 264 meters in 20 seconds. What is the length of the train?

    a. 125m

    b. 150m

    c. 175m

    d. 176m

    e. None

21. Two trains which are running on parallel tracks in opposite directions, pass each other in 7.5 seconds. The speed of these trains is 50 km/h and 70 km/h. If the length of the first train be 150 m then what is the length of the second train?

    a. 100m.

    b. 125m.

    c. 150m.

    d. 200m.

    e. None

22. A train 110 meters long takes 6 seconds to cross a man walking at 5 km/h in the direction opposite to that of the train. What is the speed of the train?

    a. 54 km/h

    b. 72 km/h

    c. 60 km/h

    d. 66km/h

e. None

23. A train which is running with the speed 60 km/h crosses a man who is running in the same direction in 7 seconds. What is the length of the train?

    a. 100
    b. 110
    c. 120
    d. Can't be determined
    e. None

24. A man is standing on a platform notices that a train crosses him in 9 sec. and the 88 m long platform in 21 sec. What is the length of the train?

    a. 60 m
    b. 66 m
    c. 70 m
    d. 65 m
    e. None

25. A train crosses two bridges of lengths 600 m and 400 m in 80 seconds and 60 sec. respectively. What is the length of the train?

    a. 80 m
    b. 90 m
    c. 200 m
    d. 150m.
    e. None.

Answer

1.(d)	2.(c)	3.(a)	4.(b)	5.(a)	6.(b)	7.(a)	8.(c)	9.(b)	10.(c)
11.(d)	12.(c)	13.(b)	14.(b)	15.(c)	16.(a)	17.(a)	18.(c)	19.(b)	20.(d)
21.(a)	22.(c)	23.(d)	24.(b)	25.(c)					

10 | BOAT and STREAM

Introduction: "Boat and stream" Means the speed of Boat in upstream and downstream, the distance travelled in upstream and downstream and time taken in upstream and downstream.

- ➤ **Still Water –** When the speed of the water is zero, that condition is called still water.
- ➤ **Stream Water –** When there is speed in the water of a river of lake then that water is called stream water.
- ➤ **Downstream-** The speed of the boat along the stream is called downstream.
- ➤ **Upstream –** The speed of the boat against the stream is called upstream.
- ➤ **Speed of stream and man**

   i.   If the speed of a boat in still water be x km/h and speed of the steam be y km/h then

   ii. Speed of the boat in downstream (A) = (x + y) km/h.

   iii. Speed of the boat in upstream (B) = (x – y) km/h.

Example: If a man can swim with the speed of 6 km/h in upstream and with the speed of 2 km/h is downstream then what is the speed of the man in still water?

Tricky Soln.: Speed in still water = ½ (A + B) = ½ (6 + 2)

$$= ½ × 8 = \textbf{4 km/h. Ans.}$$

Example: A man takes 675 second to row a boat 750m upstream and returns back in 15/2 minutes. What is the speed of the boat in still water?

Tricky Soln.: B = 750 m / 675sec. = 30/27 = 10/9 m/sec.

A = 750m/15/2 × 60 sec. = 750m /15 × 30sec.

= 5/3 m/sec.

Speed of the boat in still water = 10 /9 + 5/3 /2 = 25/18 m/sec.

= 25 /18 × 18/5 km/h.

= 5 km/h. Ans.

Example: A boat row a certain distance in down stream and in upstream. The time taken by the boat to row in upstream is four times the time taken in downstream. If the speed of the stream is 6 km/h then what is the speed of the boat in still water?

Tricky Soln.: Speed of the boat in still water =

Speed of the stream (n+ 1/ n- 1)

= 6 (4 + 1 /4 − 1) = 6 × 5/3 = **10 km/h. Ans.**

Example : A man can row 9 km/h in still water. The speed of the stream is 6 km/h the time taken by the man to row to a place and come back is 8 hours. What is the distance between the two places ?

Tricky Soln.: The fixed distance = ($A^2 − B^2$) t/2.A

$(9^2 − 6^2) × 8 /2 × 9$

$(81 − 36) × 8 /18 \quad = \quad 45 × 8 /18$

= **20 km.Ans.**

Example : Mahesh can row a distance downstream in 6 hours. He takes 9 hours to return the same distance. If the speed of the stream be 13 km/h then what is the speed of Mahesh in still water?

Tricky Soln.: Speed of Mahesh in still water = (9 + 6 / 9 − 6) × 13

15 × 13 /3 = **65 km/h. Ans.**

Example : The speed of a boat in still water is 15 km/h and the speed of the boat upstream is 7 km/h. What is the speed of the boat downstream?

Tricky Soln.: Speed of the boat downstream

= Speed of the boat in still water + speed of the stream

= 15 + (15 -7) = **23 km/h. Ans.**

Example : A boat covers 16 km down stream in 2 hours. It covers the same distance upstream in 4 hours. What is the speed of the boat in still water?

Tricky Soln.: Let the speed of the boat in still water be x km/h

And the speed of the stream be y km/h

$\therefore x + y = 16 / 2 = 8$ $= y = 8 - x$

And $x - y = 16/4 = 4$ $= x - (8 - x) = 4$

$X - 8 + x = 4$ $= 2x = 4 + 8$

$X =$ **6 km/h. Ans.**

Example : The speed of a boat downstream is 32 km/h while speed of the boat against the stream is 28 km/h. What is the speed of the boat in still water ?

Tricky Soln.: Speed of the boat in still water

= ½ (Speed downstream + speed upstream)

= ½ (32 + 28)

= **30 km/h. Ans.**

Example : A river is flowing at the rate of 2 km/h. A man takes double time to row against the stream than to row downstream. What is the speed of the man in still water?

Tricky Soln.: Let the speed upstream $= x$ km/h.

∴ Speed downstream = $2x$ km/h.

∴ Speed of the stream = ½ ($2x - x$) = x km/h.

∴ $x/2 = 2$ = $x = 4$

∴ Speed upstream = 4 km/h.

∴ Speed downstream = 8 km/h.

∴ Speed of the man in still water = ½ (8 + 4)

= **6 km/h.Ans.**

I n t e r m e d i a t e E x e r c i s e

1. The speed of a boat in still water is 4 km/h. If the speed of stream be 1 km/h then in how much time will the boat travel 9 km upstream?
    a. 3 hours
    b. 3.5 hours
    c. 4 hours
    d. 1.8 hours
    e. None

2. A boat running upstream covers a distance of 72 km in 4 hours. If the speed of the stream be 3 km/h then what is the speed of the boat in still water?
    a. 18 km/h.
    b. 21 km/h.
    c. 24 km/h.
    d. 27 km/h.
    e. None

3. A boat running downstream covers a distance 30 km in 2.5 hours while for covering the same distance upstream, It takes 15/4 hour. What is the speed of the stream?
    a. 2 km/h.

b. 3 km/h.

c. 10 km/h.

d. Data insufficient

e. None

4. A boat goes 3 km against the current of the stream in 3 hours and goes 15 km along the current in 3 hours. What is the speed of the current?

   a. 4 km/h.

   b. 6 km/h.

   c. 9 km/h

   d. 2 km/h.

   e. None

5. A boat covers 24 km upstream and 36 km downsteam in 6 hours. It covers 36 km upstream and 24 downstream in 6.5 hours. What is the speed of the current?

   a. 2 km/h.

   b. 4 km/h.

   c. 3 km/h.

   d. 1 km/h.

   e. None

6. A swimmer rows downstream 25 km and 10 km upstream. If he takes 5 hours to cover each distance, then what is the velocity of the stream?

   a. 1.5 km/h.

   b. 2.5 km/h.

   c. 3 km/h.

   d. 4 km/h/

   e. None

7. A man can row 8 km/h in still water. He takes 4 hours to row to a place and come back, how far is the place?

   a. 10

   b. 12

c. 15

d. 16

e. None

8. A boat covers a distance of 6 km in an hours. But it takes thrice as long to row up as to row down the river. What is the speed of the stream?

   a. 2 km/h.

   b. 3 km/h.

   c. 4 km/h.

   d. 5 km/h.

   e. None

9. A boat rows 40 km upstream in 8 hours. It rows 36 km downstream in 6 hours. What is the speed of the boat in still water?

   a. 5.5

   b. 6.5

   c. 6

   d. 5

   e. None

10. In a fixed time, a boy travels double distance in the direction of the stream as he travels in the opposite direction. If the speed of the stream be 3 km/h then what is his speed in still water?

    a. 6 km/h.

    b. 9 km/h.

    c. 10 km/h.

    d. 12 km/h.

    e. None

11. Two boats A and B starts towards each other from two different points which are 108 km apart in a river. The speeds of A and B in stil water are 12 km /h and 15km/h respectively. If A is moving down stream and B is moving upstream then in how much time will they meet each other?

a. 4.5 hours

b. 4 hours

c. 5.4 hours

d. 6 hours.

e. None

A d v a n c e d   E x e r c i s e

12. A boat travels a distance down the stream in 8 hours and comes back in 10 hours. If the speed of the stream be 1 km/h then what is the distance of on side?

    a. 60

    b. 70

    c. 80

    d. 90

    e. None

13. A man takes 5 hours in going to a fixed place and coming back in a river. If the speed of the man in still water be 10 km/h and speed of the stream be 4 km/h then what is the distance of the fixed place?

    a. 16 km.

    b. 18 km.

    c. 21 km.

    d. 25 km.

    e. None

14. A man can row with the speed 5 km/h in still water. If he takes one hour in going to a fixed distance and coming back while the speed of the stream be 1 km/h then what is the distance?

    a. 2.5 km.

    b. 3 km.

    c. 2.4 km.

d. 3.6 km.

e. None

15. A man can row at 10 km/h in still water. If he takes 5 hours in rowing 24 km and coming back then what is the speed of the stream?

    a. 2 km/h.

    b. 3 km/h.

    c. 0.5 km/h.

    d. 1 km/h.

    e. None

16. A boat man rows upstream 2 km in 20 minutes and comes back in 15 minutes. What is the speed of the stream?

    a. 3 km/h.

    b. 4 km/h.

    c. 1 km/h.

    d. 2 km/h.

    e. None

17. A boat travels 24 km upstream in 6 hours and 24 km downstream in 4 hours what is the speed of the boat in still water and what is the speed of the stream?

    a. 4 km/h., 3 km/h.

    b. 4/5 km/h., 0.5 km/h.

    c. 4 km/h., 2 km/h.

    d. 5 km/h., 2 km/h.

    e. None

18. A man can row 40 km upstream in 8 hours and 36 km downstream in 6 hours. What is the speed of the stream?

    a. 0.5 km/h.

    b. 1.5 km/h.

    c. 1 km/h.

    d. 3 km/h.

e. None

19. In a stream running at 2 km/h. a motorboat goes 10 km upstream and back again to the starting point in 55 minutes. What is the speed of the motorboat in still water?

   a. 24 km/h.

   b. 22 km/h.

   c. 32 km/h.

   d. 28 km/h.

   e. None

20. A man can row 7.5 km/h in still water. It takes him twice as long to row up as to row down the river. What is the rate of stream?

   a. 2 km/h.

   b. 3 km/h.

   c. 2.5 km/h.

   d. 15 /4 km/h.

   e. None

21. A man rows 18 km down stream in 4 hours and returns in 12 hours. What is the speed of the stream ?

   a. 1 km/h.

   b. 1.5 km/h.

   c. 2 km/h.

   d. 1.75 km/h.

   e. None

Answer

1.(a)	2.(b)	3.(a)	4.(d)	5.(a)	6.(a)	7.(c)	8.(b)	9.(a)	10.(b)
11.(b)	12.(c)	13.(c)	14.(c)	15.(a)	16.(c)	17.(b)	18.(a)	19.(b)	20.(c)
21.(b)									

11 | PROFIT, LOSS and DISCOUNT

Introduction:

- **Cost Price :** The price at which an article is purchased, is called it's cost price. It is denoted by C.P. in short from.
- **Selling Price :** The price at which an article is sold, is called it's selling price. It is denoted by S.P. in short form.
- If selling price is greater than cost price, there is profit.
- If cost price is greater than selling price, there is loss.
- **Profit Percent :** Profit at each Rs. 100 is called profit percent.
- **Loss Percent :** Loss at each Rs. 100 is called loss percent.
- **Overhead (Extra Expense) :** If there is some expenditure other than the cost price, such as expenditure on modification of articles, repair, transportation etc. then such types of expenditure is called extra expense. It is included in C.P. to find the actual cost price.

Note : Profit and loss are calculated at C.P.

- **Discount :** The difference between the marked price and selling price is called discount.
- **Successive Discount :** If more than one discounts are given successively on marked price then the discounts are called successive discounts.

FORMULAE

1. Profit = S. P. − C. P.	12. C. P. = S.P. × 100 /100 − loss %
2. Loss = C. P. − S.P.	
3. C. P. = S. P. − Profit	13. C.P. = Difference in S.Ps / Difference in Profit % ×100
4. S. P. = C. P. + Profit	
5. S. P. = C. P. − Loss	

6. C. P. = S. P. + Loss	14. C.P. = Difference in S.Ps / Profit % + Loss % × 100
7. Profit% = (Profit / C.P. × 100) %	15. C.P. Difference in S.Ps /Difference in loss % × 100
8. Loss % = (loss /C.P. × 100) %	16. S.P. × (100 – discount %)/ 100 – loss %
9. S.P. = C.P × (100 – loss %)/100	17. Printed price = S.P. × 100 /100 – discount %
10. S.P. = C.P × (100+ Profit %)/100	18. Discount % (Discount × 100 / market price) %
11. C.P = S.P. × 100 / 100 + profit %	19. M.P. = Difference in savings /Difference in discount % × 100

Example : Manoj bought 20 kg rice at the rate of Rs. 8.50 per kg and 30kg rice at the rate of Rs. 10. 50 per kg and mixed them. He sold the mixture at the rate of Rs. 11.50 per kg. How much Manoj gained?

Tricky Soln.:   C.P. = Rs. (20 × 8.50 + 30 X 10.50)

                           = Rs. 485

                   S.P. = Rs. (50 × 11.50) = Rs. 575

                   Gain = Rs. (575 – 485) = **Rs. 90 Ans.**

Example : A shopkeeper bought 25 kg of apples at the rate of Rs. 4 per kg. He sold 11 kg of apples at the rate of Rs. 5 kg and rest at the rate of Rs. 3 per kg. What was the gain or loss of the shopkeeper?

Tricky Soln.:   C.P. = Rs. (25 × 4) = Rs. 100

S.P. = Rs. (11 × 5 + 14 × 3) = Rs. 97

Loss = Rs. (100 – 97) = **Rs. 3 Ans.**

Example :   A man bought 20 kg of milk at the o Rs. 8 per kg. He spent Rs. 100 to convert it in 5 kg of cream and 15 kg of toned milk. He sold the cream at the rate of Rs. 30 per kg and toned milk at the rate of Rs. 4 per kg. What was the percent profit of the man?

Tricky Soln.:   C.P. = Rs. (20 × 8 + 10) = Rs. 170

S.P = Rs. (5 × 30 + 15 × 4) = Rs. 210

Profit = Rs. (210 – 170) = Rs. 40

Profit % = (40 /170 × 100) % = **400/17% Ans.**

Example :   A man bought an article for Rs. 80 and marked it's price Rs. 120. If the man sold the article at 40% discount then what was his loss or gain percent?

Tricky Soln.:   C.P. = Rs. 80

S.P. = Rs. (120 of 60 %) = Rs. (120 × 60 /100) = Rs. 72

Loss = Rs. (80 – 72) = Rs. 8

Loss % = (8 /80 × 100) % = **10% Ans.**

Example :   What is the cost price of a horse, if there is a gain of Rs. 235 on selling it for Rs. 1785?

Tricky Soln.:   C.P. = S.P. – Profit = Rs. (1785 – 235)

= **Rs. 1550 Ans.**

Example :   A table was sold for Rs. 180 at a loss of Rs. 20. What is the C.P. of the table ?

Tricky Soln.:   C.P. = S.P. + Loss = Rs. (180 + 20)

= **Rs. 200 Ans.**

Example : The selling price of an article becomes Rs. 500 more If it is sold at 20 % profit in the place of 15% profit. What is the cost price of the article?

Tricky Soln.: C.P. = Rs. 500/ (20 – 15) × 100

Rs. (500/5 ×) = **Rs. 10,000 Ans.**

Example : An article is sold at 12.5% profit. If the same article is sold at 5% loss then the selling price decreases by Rs. 9.80. What is the cost price of the article?

Tricky Soln.: C.P. = 9.80 / (12.5 + 5) × 100

Rs. (9.80 / 17.5 × 100) = **Rs. 56 Ans.**

Example : The selling price of an article increases by Rs. 250 if it sold at 8.5% loss in the place of 33. 5% loss. What is the C.P. of the article?

Tricky Soln.: C.P. = Rs. 250 / (33.5 – 8.5) × 100

(250 / 25 × 100) = **Rs. 1,000 Ans.**

Example : A shopkeeper sells watches at 5% discount. If he sells the watches at 7 % discount, his profit per watch decreases by Rs. 15. What is the marked price of a watch?

Tricky Soln.: Marked price (M.P.) = Rs. 15 / (7 – 5) × 100

= Rs. (15 /2 × 100) = **Rs. 750 Ans.**

Example : An object is sold for Rs. 240 at 20% profit. What is the cost price ?

Tricky Soln.: C.P. = 240 × 100 / (100 + 20)

240 × 100 /120 = **Rs. 200 Ans.**

Example : A table is bought for Rs. 250 and it is sold at 20% loss. What is the selling price of the table?

Tricky Soln.:   S.P. = 250 × (100 – 20) /100

= (250 × 80 /100) = **Rs. 200 Ans.**

Example :   The marked price of an article is Rs. 500. What will be selling price if discount is 10%?

Tricky soln.:   Selling price = (100 – discount %) × marked price (M.P.) /100

= 500 × (100 – 10) / 100 = 500 × 90 /100

= **Rs. 450 Ans.**

Example :   An article is sold at 20% discount %. If it's M.P. is Rs. 800 then what is marked price?

Tricky Soln.: M.P. = 100 × S.P. / 100 – discount%

= 800 × 100 / 100 – 20

= 800 X 100 /80

= Rs. 1,000 Ans.

Example :   The marked price of sofaset is Rs. 12000. If it is sold for Rs. 10,500 then what is discount %?

Tricky Soln.:   Discount % = (Discount × 100 /M.P.) % (12000 – 10500 / 12000 × 100) %

= (1500 /12000 × 100) % = 25 /2 % **= 25/2 % Ans.**

Example :   A watch is bought for Rs. 750 and sold at 16% profit. What is the selling price of the watch?

Tricky Soln.:   S.P. = 750 × (100 + 16) /100 = (750 X 116 /100)

= Rs. 870 Ans.

Example : By selling 34 books a shopkeeper losses the selling price of 6 books. What is the loss percent of the shopkeeper?

Tricky Soln.:   Loss% = (6 / 34 + 6 X 100) %

$$= (6 /40 \times 100) \% = \textbf{15 \% Ans.}$$

P r i m a r y E x e r c i s e

1. A fruit seller buys a basket of 100 mangoes at 75 paisa per mango. 10 mangoes got rotten. He sold the remaining mangoes at Rs. 1 each ; find his profit?
    a. Rs. 10
    b. Rs. 15
    c. Rs. 20
    d. Rs. 12
    e. None

2. A shopkeeper buys 80 kg of rice at the rate of Rs. 13.50/kg and 120 kg of rice at the rate of Rs. 16 he sell the mixture to get 20% profit?
    a. Rs. 18/kg
    b. Rs. 20/kg
    c. Rs.15/kg
    d. Rs.22/kg
    e. None

3. Pradip buys 4 dozen bananas at Rs. 12 per dozen and 2 dozen at Rs. 16 per dozen. He sells all the bananas at 20% profit, then at what rate does he sell the bananas per dozen?
    a. Rs. 15
    b. Rs. 18
    c. Rs. 16
    d. Rs. 19
    e. None

4. A man buys an old cycle for Rs. 162 and he spends Rs. 18 on its repair. He sells it for Rs. 171. Find his loss or profit percent.

    a. 5% Loss

    b. 5% profit

    c. 7% Loss

    d. 15/2% Profit

    e. None

5. The cost price of 21 items is equal to the selling price of 18 items. Find the gain or loss percent.

    a. 50/3% Profit

    b. 50/3% Loss

    c. 100/7% Profit

    d. 100/7% Loss

    e. None

6. The cost price of 16 books is equal to the selling price of 20 books. Find the gain or loss percent.

    a. 10% Profit

    b. 20% Loss

    c. 25% Profit

    d. 4% Loss

    e. None

7. A fruitseller buys oranges at the rate of 10 for Rs. 15 and sells oranges at 16 for Rs. 25. Find his gain or loss percent.

    a. 34/7%

    b. 25/4%

    c. 25/2%

    d. 25/6%

    e. None

8. A boy buys oranges at the rate of 4 for Rs. 3 and sells 6 oranges for Rs. 5. To earn a profit of Rs. 5 : how many oranges he has t sell?

    a. 30
    b. 45
    c. 60
    d. 75
    e. None

9. A person gets 20% profit on selling 5 eggs for Rs. 1: find out how many eggs did he buy for Rs. 1.

    a. 6
    b. 15
    c. 4
    d. 8
    e. None

10. A fruit seller buys guavas at the rate of 8 for Rs. 1. To earn 60% profit, at what rate should he sell the guavas ?

    a. 3 for Rs. 1
    b. 5 for Rs. 1
    c. 6 for Rs. 1
    d. 7 for Rs. 1
    e. None

11. A person gets 20% profit on selling 20 items for Rs. 60. Find out how many items did he buy for Rs. 60 ?

    a. 22
    b. 25
    c. 26
    d. 28
    e. None

12. A shopkeeper on selling 140 pens gets the profit equal to the selling price of 20 pens. Find his profit percentage.

    a. 20%

    b. 10%

    c. 25/2%

    d. 50/3%

    e. None

13. A publisher sells each book at Rs. 5 to a retailer but by mistake he gives 25 books in stead of 24 books. If the retailer sells each book at Rs. 6. Find his profit percent.

    a. 45/2%

    b. 20%

    c. 25%

    d. 25/2%

    e. None

14. A dishonest businessman shows a 5% loss; but uses a faulty weighing machine and weights 900 gm instead of 1kg. Find his profit percent.

    a. 40/9%

    b. 50/9%

    c. 5%

    d. 46/9%

    e. None

15. A tea vendor sells tea at the gain of 10% but weights 20% less than the original weight. Find his total profit%

    a. 30%

    b. 35%

    c. 75/2%

    d. 67/2%

    e. None

16. Sameer buys a horse and a cow at Rs. 8000 each. He sells the horse at 20% profit and the cow at 20% loss. Find his gain or loss % in the transaction.

   a. 4% loss

   b. 4% profit

   c. No profit & no loss

   d. 20% profit

   e. None

17. The selling price of a scooter and a T.V. set are equal and total cost price of both the items is Rs. 40,000. If the scooter is sold at a profit of 10% and the T. V. at a loss of 10% ; find out the difference between the C.P. of both the items.

   a. Rs. 2,000

   b. Rs. 3,000

   c. Rs. 4,000

   d. Rs. 6,000

   e. None

18. The selling prices of two cycles are equal : and the total cost price of the two cycles is Rs. 3010. One is sold at 5% profit and the another at 10% profit then find out the C.P. of each cycle.

   a. 1400

   b. 1340

   c. 1540

   d. 1620

   e. None

I n t e r m e d i a t e E x e r c i s e

19. A businessman buys a sofaset and a dinning table for Rs. 52,000. He sells the dinning table at 22% Profit and sofaset at 27% profit and makes a total profit of 326/13%. Find the cost price of the sofa set.

a. 16000

b. 32000

c. 3200

d. 24000

e. None

20. On selling an item at Rs. 320, there is a loss of 20%. Find the cost price of the item.

    a. 17,820

    b. 21,780

    c. 18,000

    d. 18,500

    e. None

21. On selling an item at Rs. 320, there is a loss of 20%. Find the cost price of the item.

    a. 150

    b. 200

    c. 250

    d. 380

    e. None

22. An item is bought at Rs. 800. If it is sold at 10% loss; find the selling price of the item.

    a. 720

    b. 780

    c. 650

    d. 690

    e. None

23. Mahesh sells an item at Rs. 460 and earns a profit of 15%. Find the C.P. of the item.

    a. 250

    b. 300

    c. 350

d. 400

e. None

24. A person sells a radio at Rs. 605 and makes a profit of 10%. What should be the selling price of the item to make a profit of 16%?

    a. 638

    b. 538

    c. 650

    d. 625

    e. None

25. On selling a sofa set at Rs. 2,500 a shopkeeper makes 20% loss. If he sells sofaset at Rs. 3150. Find out his gain or loss percent.

    a. 4/5% Profit

    b. 4/5% Loss

    c. 2/5% Loss

    d. 2/5% Profit

    e. None

26. The value of a machine depreciates by 20% annually. If the cost of the machine will be Rs. 4800 after 2 years. What is it's present value?

    a. 7,000

    b. 7,500

    c. 6,500

    d. 5,400

    e. None

27. A shopkeeper buys a sewing machine at 15% discount and sells it at Rs. 1955 earning 15% profit. How much discount was given?

    a. 250

    b. 275

    c. 300

    d. 350

e. None

28. Marked price of a chair is Rs. 300. Two successive discounts of 20% and 10% were given on it. If again a discount of 5% was given on the cash paid, then at what price was the chair bought?

    a. 205.20

    b. 240

    c. 216

    d. 210

    e. None

29. A person sells an item at 10% loss. If he would have sold it for 15% loss, then he would have got Rs. 50 less. Find the C.P. of the item.

    a. 1000

    b. 800

    c. 750

    d. 920

    e. None

30. A person buys an item and sells at 10% loss. If he had bought at 20% less and sold at Rs. 55 more, then he would have got 40% profit. Find the cost price.

    a. 200

    b. 250

    c. 275

    d. 300

    e. None

31. A person buys a watch at 20% discount and saves Rs. 15. Then at what price did he buy the watch?

    a. 60

    b. 75

    c. 80

    d. 85

e. None

32. Dhawan sells his scooter at 12% profit selling it for Rs. 6720. He gains 2% from the brokerage also. Find Dhawan 's profit percent?

    a. 9%

    b. 9.76%

    c. 9.5%

    d. 9.25%

    e. None

33. An item is sold at Rs. 110 instead of Rs. 80, then the profit% would be 3 times. Find the cost price.

    a. 60

    b. 65

    c. 68

    d. 70

    e. None

34. The difference between the manufacturing cost and the selling price of an item is Rs. 720. If the profit is 20%, then what was the selling price?

    a. 3,720

    b. 4,200

    c. 4,320

    d. 4,500

    e. None

35. Successive discounts of 10% and 15% is equal to which single discount?

    a. 30%

    b. 32%

    c. 33.5%

    d. 35%

    e. None

36. A shopkeeper gives 20% discount on a particular item, he again gives 15% discount to those people who has share holders coupon. If a customer holds a share holder coupon, then what discount does he get?

    a. 30%

    b. 25%

    c. 32%

    d. 35%

    e. None

37. Three successive discounts of 5% , 10% and 20% is equal to which of the following single discount?

    a. 35%

    b. 35.25%

    c. 32.5%

    d. 32/5%

    e. None

Advanced Exercise

38. A shopkeeper pretends to give discount at 15% on each item but actually increases the price by 25% on each item. Find the discount percent on each item.

    a. 10%

    b. 6.25%

    c. 8.5%

    d. 12%

    e. None

39. A shopkeeper gives 10% discount on a book but still earns 10% profit. If the book costs Rs. 9 then what is the marked price of the book?

    a. 10.80

    b. 10

c. 11

d. 10.89

e. None

40. A shopkeeper given 8% discount on the marked price (printed price) and earns 15%

Profit. Find the ratio between the cost price and the marked price or printed price.

    a. 4 : 5

    b. 8 : 15

    c. 45 : 56

    d. 15 : 23

    e. None

41. On selling a car at Rs. 23,800, profit made is 19%. What is the amount of profit?

    a. 2380

    b. 4760

    c. 3800

    d. 4080

    e. None

42. The difference between the cost price and selling price of an item is 270. If profit is 20%

then find the selling price.

    a. 1340

    b. 1400

    c. 1300

    d. Can't be determined

    e. None

43. A profit of 10% is made when an item is sold at Rs. 44. What is the cost price of the

item?

    a. 39.60

    b. 41

    c. 40

    d. 38

e. None

44. The profit on an item by selling it for Rs. 90 is equal to the loss by selling it for Rs. 60. What is the cost price of the item?

    a. 85
    b. 80
    c. 70
    d. Data insufficient
    e. None

45. Bittu buys an item at a discount of 25% on the marked price. He earns a profit of 10% when sells it at Rs. 660. What is the marked price?

    a. 720
    b. 850
    c. 800
    d. Cant't be determined
    e. None

46. If a book is bought at Rs. 200, and sold at Rs. 450 , then find the profit on selling 8 such books.

    a. 250
    b. 280
    c. 1200
    d. Can't be determined

47. The profit made by selling an item at Rs. 900 is equal to the double at loss if sold at Rs. 450. To get a profit of 25% ; at what price should he sell the item?

    a. 900
    b. 750
    c. 600
    d. Can't be determined
    e. None

48. Saroj buys an item at Rs. 2090. 42 and sells it at Rs. 2509. Find the profit percent approximately?

    a. 15
    b. 20
    c. 30
    d. 25
    e. None

49. By selling a car at Rs. 1,56,000, a man gets a loss of 20%. Find the amount of loss.

    a. 23400
    b. 742
    c. 38,200
    d. 42,00
    e. None

Answer

1.(b)	2.(a)	3.(c)	4.(a)	5.(a)	6.(b)	7.(d)	8.(c)	9.(a)	10.(b)
11.(e)	12.(d)	13.(c)	14.(b)	15.(c)	16.(c)	17.(c)	18.(e)	19.(b)	20.(e)
21.(e)	22.(a)	23.(d)	24.(a)	25.(a)	26.(b)	27.(c)	28.(a)	29.(a)	30.(b)
31.(a)	32.(b)	33.(b)	34.(c)	35.(e)	36.(c)	37.(e)	38.(b)	39.(c)	40.(a)
41.(c)	42.(e)	43.(c)	44.(e)	45.(c)	46.(e)	47.(b)	48.(b)	49.(e)	

www.lilhaeducationcentre.in   Mob: 9305907823

12 | TIME, WORK and WAGES

Introduction:

1. If A finishes a work in n days then work done by him in one day = 1/n

2. If work done by A in one day is 1/n then he will finish the work in days.

3. If the numbers of workers of two groups be in the ratio x : y then the ratio of the time taken by them to finish the work = y : A

4. If ratio of the capacity of doing work of A and B be a : b then the time taken by A and B to finish a work = b : a.

Tricks with Trickily Solve Examples

Trick : If A and B can do a work in x days and y days separately then together they will do the work in xy / $x + y$ days.　　　　　Or.

The time taken by A and B together to finish the work = l / l/x + l/y days.

Example: If Mohan and Sunil can do a work separately in 16 days and 24 days respectively then in how many days will they together finish the same work?

Tricky Soln.: Required time = 16 × 24 /16 + 24 days = 16 × 24 /40 days

= 48 / 5 days = **48 /5 days. Ans.**

Example: If A, B and C can do a work in 10 days, 15 days and 12 days respectively. In how many days will the three persons together finish the work?

Tricky Soln.: Required time = 10 × 15 × 12 / 10 × 15 + 15 × 12 + 12 × 10

= 10 × 15 × 12 /450 = **4 days Ans.**

Example: If (A + B) can do a piece of work in 20 days, (B + C) can finish the same work in 24 days and (C + A) can finish the work in 30 days then in how many days will (A + B + C) finish the work?

Tricky Soln.: Required time = 2 × 20 × 24 × 30 /20 × 24 + 24 × 30 + 20 × 20

$$= 2 × 20 × 24 × 30 / 480 + 720 + 600$$

$$= 28800/1800 = \textbf{16 days Ans.}$$

Example: A and B together can finish a work in 18 days and A alone can finish the same work in 30 days then in how many days can B alone finish the work?

Tricky Soln.: Required time = 18 × 30 / 30 − 18 = 18 × 30 / 12

$$= \textbf{45 days Ans.}$$

Example: Ganesh, Prasant and Sohan together can do a work in 36 days. If Ganesh and Prasant together can do that work in 48 days then in how many days can Sohan alone do that work?

Tricky Soln.: L.C.M. of 36 and 48 = 144

Required time = 144 /144/36 − 144/48 = 144 /4-3 =**144 days Ans.**

Example: A can do a work in 15 days. He worked for 5 days and rest work was done by B in 20 days. In how many days can B alone do that work?

Tricky Soln.: Required time = 15 × 20 / 15 − 5 = 15 × 20 /10 = **30 days Ans.**

Example: A can do a work in 20 days. A worked 4 days and rest work was completed by B in 8 days. In how many days can A and B together finish that work?

Tricky Soln.: Required time = 20 × 8 /20 − 4 + 8

Days = 20 × 8 /24 = **20 /3 days. Ans.**

Example: A and B can do a work in 10 days and 20 days respectively. They started together but after 5 days A stoped to work and B finished the rest work. In how many days did B finish the rest work ?

Tricky Soln.: The time taken by B to finish the rest work

$$= 10 \times 20 - (10 + 20) \times 5 / 10 \text{ days}$$

$$= 200 - 150 / 10 \text{ days}$$

$$= 50 / 10 \text{ days} = \textbf{5 days Ans.}$$

Example: A and B can do a work in 20 days and 30 days respectively. They started to work together but after 10 days A left the work. In how many days the whole work was finished?

Tricky Soln.: The time in which the work became finished

$$= (20 - 10) \times 30 / 20 \text{ days}$$

$$= (10 \times 30 / 20) \text{ days} = \textbf{15 days Ans.}$$

Example: A , B and C can do a work in 10 days, 15 days and 12 days respectively. They started to work together but A left the work after 1 day. In how many days the work became finished?

Tricky Soln.: Total time = 15 × 12 /15 + 12 × 9 1- 1/10) days

$$= 15 \times 12 / 27 \times 9 / 10 \text{ days} = \textbf{6 days Ans.}$$

Example: A can do a work in 15 days, B can do the same work in 24 days and C can do the same work in 20 days. The three persons started to work but after 3 days a left the work and after 4 days B left the work. In how many days the work was finished?

Tricky Soln.: Total time = 20 × (1 – 3/ 15 – 4 /24)

$$= 20 \times (1 - 1/5 - 1/6)$$

= (20 × 19 /30) = **38 /3 days Ans.**

Example: A can do a work in 15 days while B can do the same work in 20 days and C can do the same work in 12 days. If A , B and C together start to work and A leaves the work 5 days before it finished. In how many days the work was finished ?

Tricky Soln.: Total time = (15 + 5) × 20 × 12 / 15 × 20 + 20 × 12 + 12 × 15 days

= 20 × 20 × 12 /300 + 240 = 180 days

= 20 × 20 × 12 /720 days = **20/3 days Ans.**

Example: A, B and C can finish a work in 10 days, 20 days and 30 days respectively. The three person start to work together but A leaves the work before 1 day and B leaves the work before 3 days in which the work finished. In how many days the work became finished?

Tricky Soln.: = 10 × 20 × 30 / 10 × 20 + 20 × 30 + 30 × 10 (1 + 1/10 + 3/20)

= 10 × 20 × 30 / 200 + 600 + 300 × 25 /20

= 10 × 20 × 30 /1100 × 25 /20 **= 75 /11 days Ans.**

Example: If 32 persons can cultivate the crop of a field in 21 days then in how many days 28 persons can cultivate the same crop?

Tricky Soln.:   32 × 21 = 28 × ?

= ? = 32 × 21 /28 = **24 days Ans.**

Example: 20 men working 7 hours a day can do 2/3 of a work in 20 days then how many men can finish the rest work in 25 days working 8 hours a day?

Tricky Soln.: = 20 × 7 × 20 /2/3 = ? × 8 × 25 /1/3

= 3 × 20 × 7 × 20 /2 = ? × 8 × 25 × 3 /1

= ? = (3 × 20 × 7 × 20 / 2 × 8 × 25 × 3) **= 7 men Ans.**

Example: The work done by a boy in one day is equal to one third of the work done by a man in one day and half of the work done by a woman in one day. If one boy, one woman and one man together can do the work in 2 days then in how many days will the work be done by 4 boys?

Tricky Soln.:   1 man = 3 boys

1 woman = 2 boys

1 man , 1 woman and 1 boy

= 3 + 2 + 1 = 6 boys

6 boys can do the work in 2 days

1 boy will do the work in 2 × 6 = 12 days

4 boys will do the work in 2 × 6 /4 **= 3 days Ans.**

Example:15 men can do a piece of work in 6 days then how many men are needed to do the work n 7.5 days?

Tricky Soln.: Let the required number of men = x

According to the question,

15 × 6 = x × 7.5

X = 15 × 6 /7.5 = 15 × 6 × 10 /75 = **12 Ans.**

P r i m a r y E x e r c i s e

1. The ratio of the rate of doing work of A and B is 5 : 7. What is the raio of the time taken by A and B to do the work?

a. 5 : 7

b. 4 : 5

c. 7 : 5

d. 1/7 : 1/5

e. None

2. If 7 men and 3 boys do same work as 5 men and 8 boys do in the same time. What is the ratio of the capacity of a man and a boy doing work?

a. 5 : 2

b. 2 : 5

c. 7 : 5

d. 3 : 8

e. None

3. A , B and C can do a piece of work in 10 days, 15 days and 12 days respectively. The Three men together complete the work in Rs. 1200. What is the difference between the shares of B and C?

a. 120

b. 90

c. 100

d. 80

e. None

4. 12 men and 16 boys together can do a work in 5 days. 13 men and 24 boys together can do the same work in 4 days. What is the ratio of doing work of a man and a boy?

a. 1 : 2

b. 1 : 3

c. 2 : 1

d. 3 : 1

e. None

5. A can do a piece of work in 6 days. B can do the same work in 12 days. In how many days A and B together can do the same work?

a. 4 days

b. 6 days

c. 7 days

d. 8 days

e. None

6. A can do 1/3 of a work in 5 days. B can do 2/5 of the same work in 10 days. In how many days A and B together can do the same work?

    a. 7 days

    b. 75 / 8 days

    c. 10 days

    d. 8 days

    e. None

7. A and B decided to do a piece of work in Rs. 14,200. A can do the work in 21 days and B can do the work in 28 days. If both A and B did the work together then what is the ratio of their wages.

    a. 4 : 3

    b. 3 : 4

    c. 4 : 5

    d. 5 : 4

    e. None

8. A and B together can do a piece of work in 6 days. A alone can do the same work in 10 days. B alone can do the same work in : -

    a. 12 days

    b. 15 days

    c. 16 days

    d. 18 days

    e. None

9. A can do a piece of work in 12 days and B can do the same work in 10 days. A and B can do the same work with the help of C in 4 days. In how many days can C alone do the same work?

a. 8 days

b. 15 days

c. 16 days

d. 18 days

e. None

10. A can do a piece of work in 16 days and B can do the same work in 24 days. They can do the same work in 6 days with the help of C. If the total wages of the work is Rs. 560 then what is the share of A?

a. 140

b. 180

c. 210

d. 230

e. None

11. A alone can complete a work in 16 days and B alone in 12 days . Starting with A they work on alternate days. The total work will be completed in:-

a. 12 days

b. 13 days

c. 96/7 days

d. 55/4 days

e. None

12. A and B can do a piece of work in 15 days ; B and C can do it in 20 days and C and A can do it in 30 days. In what time can A alone do it?

a. 20 days

b. 28 days

c. 52 days

d. 40 days

e. None

13. Prasant can complete a work in 20 days. He works for 8 days after then Pradeep alone complete the rest work in 15 days. How long will Pradeep alone take to do the work?

a. 18 days

b. 21 days

c. 24 days

d. 25 days

e. None

14. Kamal can finish a piece of work in 30 days. He works for 12 days and leave the rest work for Manoj. Manoj completes the rest work in 18 days. In how many days can both Kamal and Manoj do that work?

a. 10 days

b. 15 days

c. 12 days

d. 18 days

e. None

15. Suresh can do a piece of work in 15 days and Shanti can do the same piece of work in 18 days. Shanti alone did 6 days then in how many days will Suresh alone do the rest work?

a. 10 days

b. 15 days

c. 12 days

d. 16 days

e. None

16. Sunil and Vikash can do a piece of work in 15 days and 20 days respectively. They worked for 5 days and then Vikash left the work. In how many days the rest work will be finished by Sunil?

a. 6 days

b. 8 days

c. 25/4 days

d. 26/3 days

e. None

17. Amar and Akbar finish a work in 25 days and 20 days respectively. They started to work and after 10 days Amar left the work and rest work was completed by Akbar. In how many days the whole work was finished?

    a. 8 days

    b. 10 days

    c. 15 days

    d. 12 days

    e. None

18. A, B and C complete a work separately in 20 days, 25 days and 30 days respectively. They start to work together but after 3 days C leaves the work. What will be the time to finish the whole work?

    a. 10 days

    b. 8 days

    c. 12 days

    d. 15 days

    e. None

19. A , B and C can do a piece of work in 20 days, 18 days and 30 days respectively. They start to work together but after 3 days. B leaves the work and after 4 days A leaves the work. In how many days will the work be finished?

    a. 15 days

    b. 19 days

    c. 20 days

    d. 21 days

    e. None

20. A , B and C can finish a work in 9 days, 27/2 days and 18 days respectively. They start to work and C works up to the end of the work. A leaves the work before 2 days and B leaves the work 3 days before completion of the work. In how many days will the work be completed?

    a. 3 days

b. 54/13 days

c. 4 days

d. 6 days

e. None

21. A, B and C can do a piece of work in 24 days, 30 days and 40 days respectively working alone. The three men start to work together but C leaves 4 days before its completion. In how many days the work will be finished?

    a. 7 days

    b. 10 days

    c. 11 days

    d. 15 days

    e. None

22. A, B and C can do a piece of work in 20 days , 25 days and 30 days respectively, working alone. If they starts to work and B leaves the work after 5 days and A leaves the work before 2 days of the completion of the work. In how many days will the work be finished?

    a. 10 days

    b. 54/5 days

    c. 52/5 days

    d. 25/2 days

    e. None

23. A takes four times as much time as B and C together take to finish the work. If A, B and C together finish the work in 12 days. In how many days will A finish the work?

    a. 50 days

    b. 40 days

    c. 35 days

d. 55 days

e. None

24. Jayant can do a piece of work in 15 days while Pramod can do this work in 12 days. Pramod started to work and Jayant joined him 5 days before the completion of the work. In how many days was the work finshed?

    a. 8 days

    b. 12 days

    c. 24 days

    d. 13 days

    e. None

25. A can do a piece of work in 25 days and B can do the same work in 20 days. A alone started to work and after 10 days B joined him. The work finished in : -

    a. 15 days

    b. 25/2 days

    c. 50/3 days

    d. 128/9 days

    e. None

26. A does three times as B. A and B together finish the work n 15 days. In how many days will A do the work alone?

    a. 15 days

    b. 20 days

    c. 18 days

    d. 21 days

    e. None

27. 30 men working 8 hours a day can complete a work in 24 days. In how many days will 18 men, working 10 hours a days, complete double of the work?

    a. 50 days

    b. 45 days

    c. 60 days

    d. 64 days

    e. None

28. 6 men can do a piece of work in 12 days. After 3 days of the start of the work 3 men also joined then in how many days will the remaining work be finished?

    a. 9

    b. 6

    c. 3

    d. Can't be determined

    e. None

29. A , B and C together finish a piece of work in 10 days. If A can finish the same work in 30 days and B alone can finish the work in 40 days then in how many days will C finish the work?

    a. 24

    b. 12

    c. 36

    d. 48

    e. None

30. Lily and Anju can complete a piece of work in 30 minutes and 60 minutes respectively. If Lily and Anju work together then in how many minutes will the work finish?

    a. 24

    b. 20

    c. 30

    d. 40

    e. None

31. In how many days will a work which is completed by 60 men in 15 days, be completed by 80 men?

    a. 12

b. 15

c. 9

d. 6

e. None

32. 10 men can do a piece of work in 18 days. In how many days will 12 men do the same work?

    a. 12

    b. 15

    c. 18

    d. 24

    e. None

33. 12 men can do a piece of work in 15 days. In how many days will 10 men finish the work?

    a. 12

    b. 15

    c. 18

    d. 16

    e. None

34. 16 men can do a piece of work in 30 days. In how many days will 24 men do the same work?

    a. 12

    b. 16

    c. 20

    d. 30

    e. None

35. 10 men can do a piece of work in 5 days . They started the work and after 2 days 5 more men joined them and the work was completed. In how many days the rest work was completed?

    a. 4

b. 2

c. 3

d. Data insufficient

e. None

36. 3 men can do a piece of work in 6 days. They starts the work together. After 2 days 3 new men join them. Now the rest work will be finished in :-

    a. 1 days

    b. 3 days

    c. 2 days

    d. 4 days

    e. None

37. 40 labourers can make a wall in 28 days. How many labourers are needed to complete the wall in 35 days?

    a. 36

    b. 32

    c. 64

    d. 18

    e. None

38. If a pipe fills a tank in 15 minutes and another pipe fills the tank in 10 minutes. In how many minutes will the empty tank be filled by both the pipes together?

    a. 4

    b. 6

    c. 8

    d. 5

    e. None

39. 45 men can do a piece of work in 16 days. They together start the work and after 6 days of the beginning 30 more men join them. In how many days will the rest work be finished?

    a. 6

b. 8

c. 3

d. 4

e. None

40. 15 men can do a piece of work in 10 days. 20 women can do the same work in 15 days. In how many days will be work be finished by 10 men and 10 women?

   a. 6

   b. 8

   c. 10

   d. Data insufficient

   e. None

41. 16 men can do a piece of work in 12 days. 24 boys can do the same work in 18 days. If 12 men and 8 boys work together and 3 more boys join them after 8 days. In how many days will be rest work be finished?

   a. 2

   b. 3

   c. 5

   d. Can't be determined

   e. None

Master Exercise

42. A is two times fast worker than B. The work which is done by A in 20 days will be done by B in :-

   a. 10 days

   b. 20 days

   c. 30 days

   d. 40 days

   e. None

43. 16 men can do a piece of work in 16 days. They start to work but after 4 days 8 more men join them. In how many days will the rest work rest work be done?

    a. 4
    b. 6
    c. 8
    d. 12
    e. None

44. 40 boys can do a piece of work in 6 days. In how many days will 10 boys do the same work?

    a. 36
    b. 18
    c. 24
    d. Can't be determined
    e. None

45. 12 women or 18 boys can do a piece of work in 7 days. If 4 women and 8 boys are employed to do the work then the work will be completed in:-

    a. 9 days
    b. 8 days
    c. 6 days
    d. Can't be determined
    e. None

46. A alone can do a piece of work in 9 days while B and C together can do the same work in 18 days. In how many days will the three men do the same work?

    a. 8
    b. 6
    c. 4
    d. Data insufficient
    e. None

47. Abhishek is 20% more efficient than Gaurav . The work which is done by Gaurav in 60 days will be done by Abhishek in :-

    a. 72 days

    b. 50 days

    c. 48 days

    d. 75 days

    e. None

48. 14 men can do a piece of work in 16 days. 8 men together start the work and after 12 days 8 more men join the work . In how many days will the rest work be finished?

    a. 3

    b. 6

    c. 4

    d. Can't be determined

    e. None

49. Vicky, who can do a work two times faster than Santosh does a piece of work in 20 days. In how many days will Santosh do half of the work?

    a. 20

    b. 80

    c. 60

    d. Can't be determined

    e. None

50. If 6 men earn Rs. 1680 in a week working 8 hours a days then how much money will be earned by 9 men in a week working 6 hours a day?

    a. 1890

    b. 3780

    c. 2680

    d. 5360

    e. None

51. A work is finished by 15 men in 21 days working 8 hours a day. In how many days will the same work be finished by 14 men working 6 hours a day?

    a. 42

    b. 20

    c. 30

    d. 45

    e. None

52. In the time, in which Subrat makes 10 toys, Ashwini makes 20 toys. How many toys will they both make in two and half hours?

    a. 75

    b. 90

    c. 60

    d. 80

    e. None

53. 24 boys can do a piece of work in 12 days while 16 men can do the same work in 9 days. In how many days will the work be done by 12 men and 12 boys?

    a. 8

    b. 12

    c. 16

    d. 6

    e. None

Answer

1.(c)	2.(a)	3.(d)	4.(c)	5.(a)	6.(b)	7.(a)	8.(c)	9.(b)	10.(c)
11.(d)	12.(d)	13.(d)	14.(b)	15.(a)	16.(c)	17.(d)	18.(a)	19.(b)	20.(d)
21.(c)	22.(b)	23.(e)	24.(a)	25.(c)	26.(b)	27.(d)	28.(b)	29.(a)	30.(b)
31.(a)	32.(b)	33.(c)	34.(c)	35.(b)	36.(c)	37.(b)	38.(b)	39.(a)	40.(c)
41.(e)	42.(d)	43.(c)	44.(c)	45.(a)	46.(b)	47.(b)	48.(e)	49.(a)	50.(a)
51.(c)	52.(d)	53.(a)							

13 | MENSURATION

Introduction:

<div style="border:1px solid;">

Formulae with Solved Examples

</div>

(A) Rectangle

1. Perimeter = 2 × (l + b)

   = Total cost / Rate per unit

2. Area = l × b

   = Total cost / Rate per square unit

3. Diagonal = $\sqrt{l^2 + b^2}$
   l = Length; b = Breadth

A | Diagonal | D

Breadth

B | Length | C
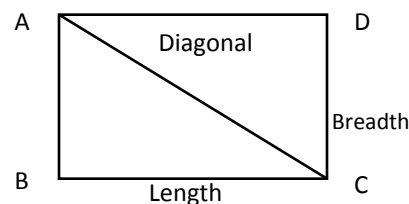
Example : A rectangular plot of dimension 80 m × 50 m is to be fence. If the distance between two pillars is 5 meters then how many pillars are required to fence the plot?

Tricky Soln.: No. of pillars = Perimeter of the plot / Distance between two pillars

= 2 × (80 + 50) /5 = (2 × 130 /5) **= 52 Ans.**

Example : The breadth of a rectangular field is three – fourth of it's length. If the area of the field is 588 m^2 then what is the difference between the length and breadth of the field ?

Tricky Soln.: Let the breadth of the field = x m

l : b = x : ¾ x = 4x : 3x

4x × 3x = 588   = 12x^2 = 588

= x^2 = 588 /12 49 = 7^2 = x = 7 m

So, the difference between length and breadth = (4x - 3x)

= x = **7 m Ans.**

(B) Square

---

1. Area = (Side)^2 = (Diagonal)^2 / 2

    = Total cost /Rate per square unit

2. Perimeter = 4 × side = Total cost /Rate per
    Unit

3. Side =   √ Area = Perimeter /4

4. Diagonal = √ 2 × side = √ 2 × area

A   Diagonal   D

B   C
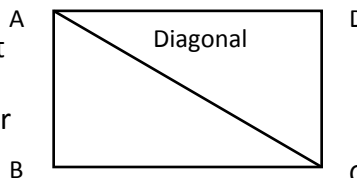
Example : One side of a square is 25 cm. What is the area of the square ?

Tricky Soln.: Area = (side)^2 **= 625 cm^2 Ans.**

Example : The area of a square field is 25 hectare. In what time one can move around it with the speed 8 km/h?

Tricky Soln.:   Area of the field = 250000 m^2

Side = √ 250000 = 500m [1 hectare = 10,000 m^2]

Perimeter = (4 × 500) m = 2,000 m = 2km.

Time = Distance /Speed = (2/8 × 60) Minutes

= 15 Minutes Ans.

Example : Find the area of the square whose diagonal is 5 √ 2 cm.

Tricky Soln.:   Area = (Diagonal)^2 / 2

= (5 √2 ^{2}) /2

= 25 cm^2 Ans.

(C) Quadrilateral

1. Area of a parallelogram = Base × height

2. Area of a rhombus = ½ × Product of diagonal

   = ½ × AC × BD

3. Area of a rhombus = Base × Height

4. Side of a rhombus = ½ $\sqrt{(d_1)^2 + (d_2)^2}$

   [Where d_1 and d_2 are diagonal]

5. Area of a trapezium

   = ½ (Sum of parallel sides) × height

6. Height of an isosceles triangle = ½ $\sqrt{4a^2 - b^2}$

7. Area of an isosceles = ¼ b $\sqrt{4a^2 - b^2}$

8. Perimeter of a triangle = Sum of three sides.

Example : The length of a side of a parallelogram is 32 cm. The perpendicular distance of this side from it's opposite side is 15 cm. What is the area of the parallelogram?

Tricky Soln.: Area = Base × Height = (32 × 15) cm^2

= **480 cm^2 Ans.**

(E) Triangle △

1. Area of a triangle

   = √ S (S − a) (S − b) (S − c)

   (Where, S = a + b + c /2 and B

   (A, b and c are the sides of the triangle)

2. Area of an equilateral triangle

   = √3/4 × (side) 2

3. Altitude of an equilateral triangle

   = √3/2 × side

4. Area of triangle = ½ × base × height

5. Area of a right angled triangle

   = ½ × base × height.

Example : One side of an equilateral triangle is 6 √ 2 cm.

What is it's area?

Tricky Soln.: Area = √ 3 /4 × (side)^2 = √ 3 /4 × (6 √ 2)^2

= √ ¾ × 6 √ 2 **= 18 √ 3 cm^2 Ans**

1. Circumference of the circle = 2 ∏ r = ∏ D

2. Radius of the circle = 'r' = Diameter /2 = D / 2

3. Area of circle = ∏ r^2

4. Area of sector = 0 /360 × ∏ r^2

5. Area of sector = ½ × l × r

6. Length of arc AB = 2 ∏ r. 0/ 360

7. Perimeter circumference of semi circle = ∏ r + 2 r

8. Area of semi circle = ½ ∏ r^2

9. Area of a ring = ∏ (R^2 – r^2)

10. Area of minor segment (shaded portion)

   = 0/360 × ∏ r ^{2} – ½ r^2 sin

11. Area of major segment =

   Area of circle – Area of minor segment

Example : What is the area of a sector of circle of radius 12 m if the central angle of the sector is 56 Degree ?

Tricky Soln.: Area of sector = 0/360 × ∏ r^2

   = (56/ 360 × 22/7 × 12 × 12) m^2 = **70.4 m^2 Ans.**

Example : The ratio between the length and the breadth of a rectangular plat is 5 : 3. If the perimeter of the plat be 48 m then what is the area of the plot?

Tricky Soln.: Let the length = $5x$ and breadth = $3x$

Perimeter = 2 (Length + Breadth)

= 48 = 2 ($5x$ + $3x$)

X = 48 /16 = 3

Area = (5 × 3) × (3 × 3) = **15 × 9 m² Ans.**

Example : There is a square park whose each side is 40 m. At it's each corner there is flower bed in a sector of radius 14m. What is the area of the rest part of the park?

Tricky Soln.: Required area =

(40 × 40 – 22/7 × 14 × 14)

= (1600 – 616) m²

= **984 m² Ans.**

Example : The area of a rectangle is 360 cm² which is 90% of the area of a square. What is the length of one side of the square ?

Tricky Soln.: Area of square × 90/100 = 360

= Area of square = 360 × 100 /90 = 400 cm²

One side of square = √ 400 = **20 cm. Ans.**

1. The length and the breadth of a play ground are respectively 32 m and 20 m. Trees are planted around the ground. If the distance between two successive trees is 4m then how many trees are around the ground?

    a. 24
    b. 22
    c. 26
    d. 28
    e. None

2. Perimeter of a rectangle is 28 m and one of the sides is 8 cm. What is the area of the rectangle?

    a. 48 cm^2
    b. 40 –
    c. 58 –
    d. 50 –
    e. None

3. The cost of fencing a garden at the rate of Rs. 5 per meter, is Rs. 2500. If the length of the garden is 3/2 times it 's breadth then what is the length of the garden?

    a. 150m
    b. 125m
    c. 200m
    d. 250m
    e. None

4. The length of a rectangular room is four times its breadth. If the area of the room be 576 m^2 then what is the length of the room?

    a. 40m.
    b. 50m

    c. 75m

    d. 48m

    e. None

5. The area of a rectangular hall is 5325 m^2 . How many tiles are required to pave the floor of the hall if length and breadth of a tile are respectively 2.5 m and 1.5 m?

    a. 1420

    b. 1520

    c. 1300

    d. 1225

    e. None

6. The length of a garden is double the breadth of the garden. The cost of leveling it at the rate of 15 paise per square meter is RS. 235.20. What will be the cost of fencing it at the rate of Rs. 1.50 per meter?

    a. 300

    b. 400

    c. 252

    d. 350

    e. None

7. The ratio between the length and the breadth of a rectangular field is 4 : 3. If ht breadth of the field be 15 m less than it's length then what is the perimeter of the field?

    a. 210m

    b. 230m

    c. 225m

    d. 320m

    e. None

8. The breadth of a rectangular plot is one – third of it's length. If the perimeter of the plot is 120 m then it's length is :-

    a. 40m

    b. 45m

c. 50m

d. 60m

e. None

9. The length and the breadth of a rectangular field are respectively 120 m and 50m. Boys are made to stand along it's diagonal at a distance of 5m. How many boys are needed to do so?

    a. 20

    b. 26

    c. 27

    d. 25

    e. None

10. In filing the floor of a rectangular hall whose length and breadth are respectively 50 m and 30 m, square tiles if the price of one tile is Rs.6?

    a. 30000

    b. 32000

    c. 32500

    d. 36000

    e. None

11. The length of a rectangle in increased by 20% . By what percent would the width have to be decreased so as to maintain the same area?

    a. 50/3%

    b. 20%

    c. 25/2%

    d. 75/2%

    e. None

12. The width of a rectangle is decreased by 10% . By what percent would the length have to be increased so as to maintain the same area?

    a. 10%

    b. 100/11%

c. 100/9%

d. 25/2%

e. None

13. If the length of a rectangle is increased by 20% and it's width is decreased by 20% then what will be effect on the area?

    a. 2% increase

    b. 2% decrease

    c. 4% increase

    d. 4% decrease

    e. None

14. If only length of a rectangle is increased by 40% then by what percent will the area of the rectangle increase?

    a. 50%

    b. 30%

    c. 35.5%

    d. 75/2%

    e. None

15. The length and the breadth of a rectangle are respectively 32 cm and 20 cm. The length is increased by 20% but it 's area remain same. What is the new breadth?

    a. 20cm

    b. 50/3cm

    c. 25cm

    d. 22.5cm

    e. None

16. During the measurement of the sides of a rectangle, one side measured 10% more and another is measured 8% more. What percent will it's area increase?

    a. 12.2%

    b. 16.8%

    c. 18.2%

    d. 18.8%

    e. None

17. If the length and the breadth of a rectangular field are increased by 40% and 10% respectively then what times will it's area become?

    a. 1.54 times

    b. 2.45 times

    c. 1.8 times

    d. 1.5 times

    e. None

18. There is two perpendicular roads of 3 m width in the middle of a rectangular plot whose length is 43 m and breadth is 28m. Except roads the plot has been used as a lawn. What is the area of the lawn?

    a. 1000m^2

    b. 7500…

    c. 1250…

    d. 8000…

    e. None

19. There is a 2m wide flower bed all around a rectangular park whose length and breadth are respectively 40m and 25m. What will be cost of flowering in the flower bed at the rate of Rs. 20 per square meter?

    a. 5030

    b. 2550

    c. 5,500

    d. 5,520

    e. None

20. If the ratio of the areas of two squares is 4 : 9 then what will be the ratio of their perimeters?

    a. 3 : 2

    b. 2 : 3

c.   4 : 9

d.   9 : 4

e.   None

21. How many bricks of the size 20 cm × 30 cm are needed for pavement of the floor of a square of side 6m?

    a.   250

    b.   300

    c.   350

    d.   600

    e.   None

22. If the length and breadth of a rectangle are increased by 20% and 10% respectively. By what percent will it's area increase?

    a.   30%

    b.   32%

    c.   36%

    d.   35%

    e.   None

23. If each side of a square is increased by 30% then it's area will be increased by:-

    a.   44%

    b.   44.5%

    c.   56.25%

    d.   52%

    e.   None

24. If each side of a square is increased by 10% then what will be the ratio between the areas of the new square and the original square?

    a.   10 : 11

    b.   121 : 100

    c.   9 : 10

    d.   10 : 9

e. None

25. If the radius of a circle is trebled then percent increase in it's area is :-

   a. 100%

   b. 150%

   c. 200%

   d. 300%

   e. None

26. From a square paper whose each side is 8 cm. four right angle triangles whose two sides at right angle are 4 cm and 2 cm . are cut off. What is the ratio of the area of the given square to that of rest part of the square?

   a. 3 : 4

   b. 3 : 2

   c. 4 : 3

   d. 2 : 3

   e. None

27. Length, breadth and height of a room are respectively 8 m, 6 m and 4m. What will be the cost of painting the four walls at the rate of Rs. 2.5 per square meter?

   a. 200

   b. 360

   c. 280

   d. 320

   e. None

28. Area of a rhombus is equal to half of –

   a. Square of a side

   b. Product of diagonals

   c. Square of a side

   d. Data insufficient

   e. None

29. Diagonal of a rhombus are 7cm and 6 cm. What is the area of the rhombus?

a. 21cm^2

b. 42.25...

c. 42....

d. 84....

e. None

30. The breadth of a rectangular room is half of it's height and the height of the room is 3/2 times it's length. The cost of carpeting the floor of the room at the rate of Rs. 6/m^2 is Rs. 288. What is the height of the room?

a. 16m.

b. 12m.

c. 8m.

d. 6m.

e. None

A d v a n c e d   E x e r c i s e

31. A rectangle is formed by placing 5 squares side by side and the perimeter of the rectangle is 3000 cm. What is the area of each square?

a. 250cm^2

b. 576....

c. 625....

d. 750....

e. None

32. In a trapezium the parallel sides are 6 cm and 10 cm and their perpendicular distance is 4 cm. What is the area of the trapezium?

a. 64cm^2

b. 48….

c. 32….

d. 240…..

e. None

33. In a parallelogram one side is 18 cm and it's perpendicular distance from opposite side is 8 cm. What is the area of the parallelogram?

    a. $48cm^2$

    b. 72…..

    c. 100….

    d. 144…

    e. None

34. There is a road of similar width around a square field whose each side is 30m. The area of the road is $256m^2$ what is the width of the road?

    a. 2m

    b. 4m

    c. 3.5m

    d. 2m

    e. None

35. The value of an isosceles triangular plot at the rate of Rs. 125 per m^2 is Rs. 50000. If the length of the base of the plot is 40 m then the length of each of equal sides is : -

    a. 20m

    b. 20√2cm

    c. 30√2m

    d. 30m.

    e. None

36. The base of a triangle is 20m and it's corresponding altitude is 12m. The area of another triangle is double the area of the former triangle. If the base of the second triangle be 15m then what is it's corresponding altitude?

    a. 16m

b. 24m

c. 32m

d. 40m

e. None

37. If the radius of a circular ground is 7 m then the distance travelled in 10 revolutions of the ground is : -

    a. 330m.

    b. 440m.

    c. 525m.

    d. 500m

    e. None

38. The breadth of a rectangular hall is three- fourth of it's length. If the area of the hall be 300m^2 then what is the difference between the length and the breadth of the hall?

    a. 5m

    b. 15m

    c. 20m

    d. Can't be determined

    e. None

39. The area of rectangle A is 6 times the area of rectangle B. The length of A is three times the length of B. If the width of rectangle A is 2m then what is the width of rectangle B?

    a. 1m.

    b. 9m.

    c. 2m.

    d. Can't be determined

    e. None

40. Length, breadth and height of a rectangular tank are 4m, 3m and 1.5m respectively. What is the capacity of the tank?

    a. 16m^3

    b. 18…

c. 80…

d. 17.5…

e. None

41. The length and the breadth of a rectangular plot are in the ratio 5 : 4. If the breadth is 20m less than the length them what is the perimeter of the plot?

    a. 280m

    b. 360m

    c. 240m

    d. Can't be determined

    e. None

42. The breadth of a rectangular plot is 40% of the length. If the perimeter of the plot is 700 m then the area (in square meters) of the plot is:-

    a. 67600

    b. 23600

    c. 25000

    d. Can't be determined

    e. None

43. The ratio between the length and the breadth of a rectangular plot is 8 : 5. If the perimeter of the plot is 780 m then what is the length of the plot?

    a. 240m

    b. 320m

    c. 280m

    d. Data insufficient

    e. None

44. Area of a rectangle is numerically 6 times it's perimeter. What is the length of the rectangle?

    a. 76m.

    b. 88m.

    c. 77m.

d. Data insufficient

    e. None

45. The length of a rectangular plot is 3/2 times it's breadth. If the area of the plot is 600
    square units then the length of the plot is :-

    a. 30 unit

    b. 20 unit

    c. 36 unit

    d. Can't be determined

    e. None

46. What is area of the semi- circle whose diameter is 14 cm?

    a. $76cm^2$

    b. 77....

    c. 96....

    d. 154....

    e. None

47. The length of rectangular field is 5/2 times it's breadth. If the area of the field is $1000m^2$
    then what is the length of the field?

    a. 20m

    b. 40m

    c. 50m

    d. 30m

    e. None

48. The length of a rectangular field is double it's breadth. If the area of the field be 72 m^2
    then what is the breadth of the field?

    a. 12metres

    b. 6metres

    c. 9metres

    d. 21metres

    e. None

49. The breadth of a field is one – third of it's length . If the perimeter of the field be 240 m then what is the length of the field ?

    a. 96metres

    b. 60metres

    c. 90metres

    d. 120metres

    e. None

50. A carpet is bought for Rs. 68666. If the measurement of the carpet be 26m × 19m then what is the cost of the carpet per square meter?

    a. 145

    b. 425

    c. 139

    d. 242

    e. None

51. The length of a field is 50% more than it's breadth. If the cost of fencing the field at the rate of Rs. 60 per meter is Rs. 12,000 then what is the breadth of the field?

    a. 40m.

    b. 60m

    c. 160m

    d. Can't be determined

    e. None

52. The area of a rectangular field is 5732 square meters. If the length is 60% more than the breadth then what is the approximate value of the length (in meters)?

    a. 60

    b. 80

    c. 96

    d. 112

    e. None

53. The length and the breadth of a rectangular field are 50 m and 20 m respectively. There is a similar road of width 7 m all around the field the inside. What is the area of the road?

    a. 216

    b. 784

    c. 324

    d. 512

    e. None

54. The length and the breadth of a rectangular field are 20 m and 10 m respectively. If the length is increased by 20 percent and breadth is decreased by 10 percent then the new area is what times the old area?

    a. 1.32

    b. 1.3

    c. 1.4

    d. Can't be determined

    e. None

55. If the radius of a circular field is decreased by 20% then the area will be decreased by: -

    a. 40%

    b. 60%

    c. 36%

    d. Can't be determined

    e. None

56. The area of a rectangle is numerically 15 times the sum of it's length and breadth. If the breadth of the rectangle is 24 m then what is the length of the rectangle?

    a. 20 meters

    b. 40 meters

    c. 36 meters

    d. Can't be determined

    e. None

57. The breadth of a rectangular room is two – third of it's length. If the area of the room be 2400 square feet then what is it's length?

    a. 60 fetes

    b. 40 fetes

    c. 600 fetes

    d. 30 fetes

    e. None

58. The breadth of a rectangular field is 75% of it's length. If the diagonal is 100 m then what is its area in square meters?

    a. 6400

    b. 5600

    c. 4900

    d. Can't be determined

    e. None

Answer

1.(c)	2.(a)	3.(a)	4.(d)	5.(a)	6.(c)	7.(a)	8.(b)	9.(c)	10.(d)
11.(a)	12.(c)	13.(d)	14.(e)	15.(b)	16.(d)	17.(a)	18.(a)	19.(d)	20.(b)
21.(d)	22.(b)	23.(e)	24.(b)	25.(e)	26.(c)	27.(c)	28.(b)	29.(a)	30.(b)
31.(e)	32.(c)	33.(d)	34.(a)	35.(b)	36.(c)	37.(b)	38.(a)	39.(a)	40.(b)
41.(b)	42.(c)	43.(a)	44.(d)	45.(a)	46.(b)	47.(c)	48.(b)	49.(c)	50.(c)
51.(a)	52.(c)	53.(b)	54.(e)	55.(c)	56.(b)	57.(a)	58.(e)		

I n t e r m e d i a t e E x e r c i s e

1) 84% of 785 - ?% = 880

   a. 231.8

   b. 202.6

   c. 256.8

   d. 220.6

   e. None

2) 25% of 965 – 69% of ? = 210.2

   a. 50

   b. 49

   c. 55

   d. 45

   e. None

3) 25% of 420 - ?% of 140 = 77

   a. 25

   b. 36

   c. 20

   d. 40

   e. None

4) 76% of (?) - $(11)^2$ = 525

   a. 850

   b. 750

   c. 740

   d. 840

   e. None

5) ? % of 600 + $(10)^2$ = 352

      a. 46

      b. 42

      c. 52

      d. 56

      e. None

6) Find out the value of (?) in the given equation.

40% of 1600 - ? = 35% of 2200 – 240

      a. 120

      b. 110

      c. 140

      d. 100

      e. None

7) Find out the value of (?) in the given equation.

      ?% of 2485 = 7 x 213

      a. 60

      b. 45

      c. 40

      d. 65

      e. None

8) 80% of a number is 30. What is the number?

      a. 24

      b. 240

      c. $37\frac{1}{2}$

      d. 66

      e. None

9) $\frac{3}{5}$ of $\frac{4}{7}$ of $\frac{2}{9}$ of a number is 16; than find out 40% of the same number

      a. 210

b. 105

c. 12684

d. None

10) If 15% is increased in the numerator and 8% is decreased in the denominator of a fraction,
we get 15/16 as a result . What is the original fraction?

   a. 2/3

   b. 1/3

   c. 4/7

   d. 3/4

   e. None

11) If 60% of a number is subtracted from 7/8 of the same number, then the remainder is
3/5 of 55. What is the number?

   a. 460

   b. 440

   c. 140

   d. 120

     e. None

12) If a number is multiplied by 16. Then the product becomes 80% of an another number
Find out the ratio of the two numbers.

   a. 20:11

   b. 1:16

   c. 1:20

   d. 1:10

   e. None

13) If A's income is 25% more than B' then what percent is B's income less than A?

   a. 30%

   b. 33%

   c. 25%

   d. 20%

e. None

14) If the price of potatoes decreases by 60% . then by what % should a housewife increase her consumption so that there is no changes in her expenses?

    a. 60%

    b. 120%

    c. 90%

    d. 150%

    e. None

15) If the price of sugar increases from Rs. 15 per kg. To Rs. 20 per kilogram, then by what percent should a housewife curtail her consumption so that her expenses may not increase?

    a. $33\frac{1}{3}$%

    b. 25%

    c. $16\frac{2}{3}$%

    d. $37\frac{1}{2}$%

    e. None

16) What will be the effect on the sale of pressure cooker if the price of pressure cooker decreases by 20% and sale increase by 40% ?

    a. Increased by 20%

    b. Decreased by 20%

    c. Decreased by 12%

    d. Increased by 12%

    e. None

17) If by mistake, the side of a square is taken 20% more, then by what % will the area of the square increase?.

    a. 40%

    b. 44%

    c. 42%

    d. 40.25%

e. None

18) If the length of a rectangle is increased by 25% and breadth is decreased by 25% then the area will be:

    a. Increased by 2%

    b. Decreased by 6.25%

    c. No change

    d. Decreased by 4%

    e. None

19) Brijesh spends 20% of his monthly income on medicines. Frome the remaining he spends 25% on children's education and 30% of the remaining on other items and then he is left with Rs. 2100. Find his monthly income.

    a. 5000

    b. 4000

    c. 3000

    d. 2000

    e. None

20) Pravin's income is 20% less than pradip and Pradip's income is 10% less than Pankaj. If Pankaj earns Rs 180 then find how much Pravin earns.

    a. Rs 126

    b. Rs 162

    c. Rs 145

    d. Rs 129.60

    e. None

21) The price of potato increases by 20% and a person can buy 10 kg less in Rs 360. Find the original price of potato per kg.

    a. Rs 5

    b. Rs 6

    c. Rs 8

    d. Rs 10

e. None

22) The price of mangoes decreases by 15% and a customer can buy 5kg more in Rs 340. Find the previous price of mangoes per kg.

   a. Rs 8
   b. Rs 10
   c. Rs 12
   d. Rs 6
   e. None

23) Out of 210 litres of a mixture of milk and water, 10% is milk. What quantity of milk should be added so as to made the quantity of milk 30% in the mixture?

   a. 50 L
   b. 40 L
   c. 60 L
   d. 80 L
   e. None

24) The price of rice increases by 35% and a family decreases the consumption in such a way that expenses rises only 17%. If the consumption was 30 kg before increase in price, then how much does the family consume now?

   a. 20 kg
   b. 22 kg
   c. 24 kg
   d. 26 kg
   e. None

25) The price of sugar decreases by 30% and a family increased it's consumption which results to 10% decrease in expenses. If the family used to consume 14 kg before the decrease in price: find the new consumption.

   a. 18 kg
   b. 20 kg
   c. 25 kg

d. 15 kg

　　　e. None

26) There are two contestants in an election, The first one got 43% of total votes but loses by 336 votes. Find the total numbers of votes polled.

　　　a. 2000

　　　b. 2100

　　　c. 2400

　　　d. 2500

　　　e. None

27) A student got 30% of the total marks and failed by 60 marks. An another student got 42% of the total marks and got 24 marks more than the passing marks. Find the minimum passing marks of the examination,

　　　a. 270

　　　b. 220

　　　c. 230

　　　d. 240

　　　e. None

28) In an examination 36% of student failed in hindi and 47% failed in English. 22% failed in both, find the % of students who passed in both subjects.

　　　a. 30

　　　b. 39

　　　c. 35

　　　d. 40

　　　e. None

29) In an examination 58% of girls failed in English, 37% failed in Maths and 19% failed in both the subjects. Find the total percentage of failed girls?

　　　a. 72%

　　　b. 75%

　　　c. 76%

226

d. 78%

e. None

30) A student got 70% out of 150 in maths. 50% out of 170 in Science and 40% out of 120 in Hindi, how much did he get in English whose total marks in 140 and he scored 60% of total marks of all subjects?

a. 78%

b. $78\frac{4}{7}$

c. $74\frac{1}{2}$

d. $74\frac{4}{9}$

e. None

31) In a school, 65% are boys. If the difference between the girls and boys is 60, find out the total number of students.

a. 200

b. 250

c. 300

d. 350

e. None

32) The ratio of income of A, B and C is 1:2:3 the total income of B and C is Rs 6000. Find out by what % the income of C is more than A.

a. 300

b. 600

c. 100

d. 200

e. None

33) In 25 litres of solution there was 10% salt. 5 litres of water was vapourised. What is the percentage of salt in the remaining solution?

a. 20%

b. 12%

c. $12\frac{1}{2}\%$

d. $15\frac{2}{3}\%$

e. None

34) The population of a village was 4500. 11/18 of the population were males and rest were females. If 40% of women were married : then find out the number of married men.

    a. 900

    b. 1500

    c. 700

    d. 1750

    e. None

35) The population of a town increases by 20% in a year and decreases by 20% in the nixt year. If the population was 4848 in the beginning at the third year, what was the population in the beginning of the first year?

    a. 5050

    b. 4949

    c. 5000

    d. 10,000

    e. None

36) A manufacturer sells a cycle at 20% profit to a businessman and the businessman sells the cycle sells at 30% loss to a buyer. The buyer pays Rs 1016.40. What was the manufacturing price of the cycle?

    a. Rs 1000

    b. Rs 1100

    c. Rs 1180

    d. Rs 1200

    e. None

37) A manufacturer sells an item at 50% profit to a wholeseller. The wholeseller sells at 20% profit to a retailer at the price Rs 3600. What was the cost price of the manufacture?

    a. Rs 2000

    b. Rs 2.500

    c. Rs 2,700

    d. Rs 3000

    e. None

38) The salary of a worker was decreased by 30% in a year and again increased by 30% in the next year . What was the change in his salary?

    a. No effect

    b. Increased by 9%

    c. Decreased by 15%

    d. Increased by 9%

    e. None

39) The price of sugar rises from Rs 6.00 to Rs 7.50 per kg. By what % should a consumer curtail his consumption so that there is no change in his expenditure?

    a. 15

    b. 20

    c. 25

    d. 2.5

    e. None

40) The price of radio set decreases by 30% and it's sale increases by 20% What is the effect on the revenue of the shopkeeper?

    a. On effect

    b. Increases by 10%

    c. Decreases by 10%

    d. Decreases by 16%

    e. None

41) When the price of a cycle was decreased by 15% then it's sale rises by 20% what was effect on revenue?

    a. Increases by 2%

    b. Increases by 35%

c. Decreases by 2%

d. can't determined

e. None

42) Approximate value of 298.993% of 44.87 is –

    a. 135

    b. 130

    c. 140

    d. 145

    e. None

43) 202% of 99 + 101% of 902 is approximately equal to----

    a. 920000

    b. 940000

    c. 900200

    d. 90200

    e. None

44) ¾ of a number is 36 more than 30% of the same number. Find out 75% of the number.

    a. 80

    b. 45

    c. 65

    d. 70

    e. None

45) In a college. 15% of students increases every year. If in the year 1996 there were 800 students. How many students were in the beginning of year 1998?

    a. 1058

    b. 1178

    c. 1200

    d. 1158

    e. None

46) Mohan spend 55% on food, 30% on transport of his salary and now he has Rs 600. Jind his salary

    a. Rs 3000

    b. Rs 4000

    c. Rs 3500

    d. Rs 4500

    e. None

47) 4% of a is equal to 12% of b. find out 20% of a.

    a. 80%

    b. 16%

    c. 64%

    d. 60%

    e. None

48) In an election, two candidates contest in which the winning candidate get 60% of total valid votes and was declared winner by 1800 votes. The total no. of valid votes in the election was ---

    a. 900

    b. 9000

    c. 1800

    d. 4500

    e. None

49) Neeru got 20 marks less than 60% of the sum total of science and Maths in her Science exam. If the sum total of Science and Maths is 250. Then how much did she get in Maths?

    a. 130

    b. 150

    c. 160

    d. Can't be determined

    e. None

50) A's income is 30% more than B. B's income is 40% of C's income. If the total income of A.

B and C is Rs 7680; find A's income.

    a. Rs1600

    b. Rs2000

    c. Rs4000

    d. Rs2080

    e. none

Answer

1.(d)	2.(d)	3.(c)	4.(a)	5.(b)	6.(b)	7.(a)	8.(c)	9.(d)	10.(b)
11.(d)	12.(c)	13.(d)	14.(b)	15.(b)	16.(d)	17.(b)	18.(b)	19.(a)	20.(d)
21.(b)	22.(c)	23.(c)	24.(d)	25.(a)	26.(c)	27.(a)	28.(b)	29.(c)	30.(b)
31.(a)	32.(d)	33.(c)	34.(c)	35.(a)	36.(b)	37.(a)	38.(d)	39.(b)	40.(d)
41.(a)	42.(a)	43.(d)	44.(e)	45.(a)	46.(b)	47.(d)	48.(b)	49.(e)	50.(d)