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SECOND EDITION 2018

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Bank Quantitative Aptitude

Chapter

1

Number System, Simplification and Approximation

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Chapter 1

Number System, Simplification and Approximation

This chapter forms a basis of many other topics in mathematics. Let us begin by understanding various types of numbers.

(1) Natural Numbers: All the counting numbers are called natural number.

Example: 1, 2, 3, 4, 5, ...

(a) Even Numbers: The numbers which are exactly divisible by 2 are called even numbers.

Example: 2, 4, 6, 8, ...

(b) Odd Numbers: The numbers which leave a remainder 1 when divided by 2 are called odd numbers.

Example: 1, 3, 5, 7, ...

(c) Prime Numbers: If a number is not divisible by any other number except 1 and itself, it is called a prime number.

Example: 2, 3, 5, 7, 11, ...

Co-primes → Two numbers which have no common factor between them except 1 are said to be co-prime to each other. The two numbers individually may be prime or composite.

Example: 13 and 29 are co-primes.

(d) Composite Numbers: Numbers which are divisible by other numbers along with 1 and itself are called composite numbers.

Example: 4, 6, 8, 9, 10, ...

The number 1 is neither prime nor composite.

(2) Whole Numbers: Natural numbers along with '0' form the set of whole numbers.

Example: 0, 1, 2, 3, ...

(3) Integers: All counting numbers and their negatives along with zero are called Integers.

Example: .....-4, -3, -2, -1, 0, 1, 2, 3, 4, ...

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(4) Rational and Irrational Numbers: Any number which can be expressed in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$, is a rational number.

Example: $\frac{3}{5}$, 4, –6, etc.

Numbers which are represented by non–terminating and non–recurring decimals are called irrational numbers.

Example: $\sqrt{2}$ = 1.414....., $\sqrt{3}$ = 1.732.....

(5) Real Numbers: Rational and irrational number taken together are called real numbers.

We can summarise the above discussion as follows :

Some important formula :

1. $a^2 - b^2 = (a + b)(a - b)$
2. $(a + b)^2 = a^2 + b^2 + 2ab$
3. $(a - b)^2 = a^2 + b^2 - 2ab$
4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$
5. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
6. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
7. $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$
8. $a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$
9. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$

Tests of divisibility

Divisibility by 2: A number is divisible by 2 if its unit digit is zero or an even number.

Example: 248, 130

Divisibility by 3: A number is divisible by 3 if the sum of its digit is divisible by 3.

Example: 279 $\rightarrow$ 2 + 7 + 9 = 18.

18 is divisible by 3, hence 279 is divisible by 3.

Divisibility by 4: A number is divisible by 4 if the number formed by its last two digits is divisible by 4.

Example: 236784

Here, 84 is divisible by 4, hence 236784 is divisible by 4.

Divisibility by 5: A number is divisible by 5 if the number or its unit digit is either 5 or 0.

Example: 115, 240, etc.

Divisibility by 6: A number is divisible by 6 if it is divisible by both 2 and 3.

Example: 318, 396, etc.

Divisibility by 8: A number is divisible by 8 if the number formed by its last 3 digit is divisible by 8.

Example: 23816.

Here, 816 is divisible by 8, hence 23816 is divisible by 8.

Divisibility by 9: A number is divisible by 9 if the sum of all its digits is divisible by 9.

Example: 72936 $\rightarrow$ 7 + 2 + 9 + 3 + 6 = 27

27 is divisible by 9, hence 72936 is divisible by 9.

Divisibility by 11: A number is divisible by 11 if the difference of the sum of the alternate digits starting from the units digit and the sum of the alternate digits starting from the tens digit is either '0' or is a multiple of 11.

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Example: 1 3 3 1

$(1 + 3) – (3 + 1) = 0 \Rightarrow$ 1331 is divisible by 11.

Divisibility by 19: A number is divisible by 19 if the sum of the number formed by digits other than the unit digit and twice the unit digit is divisible by 19.

Example: 76 $\Rightarrow$ $7 + (2 \times 6) = 19$.

Therefore 76 is divisible by 19.

Least Common Multiple (LCM)

LCM of two or more numbers is the least number which is divisible by each of these numbers.

Finding LCM

Write the numbers as product of prime factors. Then multiply the product of all the prime factors of the first number by those prime factors of the second number which are not common to the prime factors of the first number.

The product is then multiplied by those prime factors of the third number which are not common to the prime factors of the first two numbers.

The final product after considering all the numbers will be the LCM of these numbers.

Example: Find the LCM of 540 and 108?

$540 = 2 \times 27 \times 10 = 2^2 \times 3^3 \times 5$

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

$LCM = 2^2 \times 3^3 \times 5 = 4 \times 27 \times 5 = 540$

Finding LCM by division

Choose one prime factor common to at least two of the given numbers write the given numbers in a row and divide them by the above prime number. Write the quotient for each number under the number itself. If a number is not divisible by the prime factor selected, wirte the number as it is Repeat this process untill you get quotients which have no common factor.

The product of all the divisors and the numbers in the last line will be the LCM.

Example: Find the LCM of 36, 84 and 90

3	36,	84,	90
3	12,	28,	30
2	4,	28,	10
2	2,	14,	5
	1,	7,	5

LCM = 3 × 3 × 2 × 2 × 7 × 5 = 1260

Highest Common Factor (HCF)

HCF is the largest factor of two or more given numbers.

HCF is also called Greatest Common Divisor (GCD).

Finding HCF by Factorisation method

Express each given number as a product of primes factors. The product of the prime factors common to all the numbers will be the HCF.

Example: Find the HCF of 144, 336 and 2016?

$144 = 12 \times 12 = 3 \times 2^2 \times 3 \times 2^2 = 3^2 \times 2^4$

$336 = 2^4 \times 3 \times 7$

$2016 = 2^5 \times 7 \times 3^2$

$HCF = 3 \times 2^4 = 48$

Finding HCF by Division method

Divide the greater number by the smaller number. Then divide the divisor by the remainder. Now, divide the second divisor by the second remainder

We repeat this process till no remainder is left. The last divisor is the HCF.

Then using the same method, find the HCF of this HCF and the third number. This will be the HCF of the three numbers.

Example: HCF of 144, 336

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```
144)336(2
    288
    ---
     48)144(3
        144
        ---
          0
```

HCF = 48

LCM and HCF of fractions:

$$\text{LCM of fractions} = \frac{\text{LCM of Numerators}}{\text{HCF of Denominators}}$$

$$\text{HCF of fractions} = \frac{\text{HCF of Numerators}}{\text{LCM of Denominators}}$$

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Simplification

BODMAS Rule

This rule depicts the correct sequence in which the operations are to be executed, so as to find out the value of a given expression.

B → Bracket

O → Of

D → Division

M → Multiplication

A → Addition

S → Subtraction

Thus in simplifying an expression, first of all the brackets must be removed, strictly in the order (), { }, [].

After removing the brackets, we must use the following operations strictly in the order :

(i) of (ii) Division (iii) Multiplication (iv) Addition (v) Subtraction

Approximation

One needs to solve the questions of approximation by taking the nearest approximate values and mark the answers accordingly.

Example: If the given value is 3.009, then the approximate value is 3.
If the given value is 4.45, then the approximate value is 4.50.

Example 1: $2959.85 \div 16.001 - 34.99 = ?$

(a) 160 (b) 150 (c) 140 (d) 180 (e) 170

Sol. (b); $2959.85 \div 16.001 - 34.99 \cong 2960 \div 16 - 35 = 185 - 35 = 150$

Example 2: $(1702 \div 68) \times 136.05 = ?$

(a) 3500 (b) 3550 (c) 3450 (d) 3400 (e) 3525

Sol. (d); $(1702 \div 68) \times 136.05 \cong (1700 \div 68) \times 136 \approx 3400$

Some shortcuts and tricks for calculations

Multiplication by a number close to 10, 100, 1000, etc

Example: $999 = 1000 - 1$; $101 = 100 + 1$

To multiply with such numbers, convert the number into the form of $(10 \pm C)$ or $(100 \pm C)$ etc.

Example: $46 \times 98 = 46 \times (100 - 2) = 46 \times 100 - 46 \times 2 = 4600 - 92 = 4508$

Multiplication by 5 or powers of 5: can be converted into multiplication by 10 or powers of 10 by dividing it by 2 and its powers.

Example: $2345 \times 125 = 2345 \times 5^3 = 2345 \times \left(\frac{10}{2}\right)^3 = \frac{2345000}{8} = 293125$

Square of a number which ends with 5.

(1) Last two digits of the square are always 25.
(2) To find the number which comes before 25, perform the operation $n \times (n+1)$, where n is the digit before 5 in the original number.
(3) Put the number received in step 2 before 25 and you get the square.

Example: $(65)^2 = ?$

(1) Last two digits are 25.

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(2) The digit before 5 is 6 perform n × (n + 1) operation on this
= 6 × (6 + 1) = 6 × 7 = 42

(3) Hence th square of 65 will be 4225.

Square of a number containing repeated 1's

(1) Count the number of digits. Let the count be n.

(2) Now, starting from 1, write the number till n.

(3) Then, starting from n write the number till 1.

Example: Find the square of 1111?

Sol. There are four 1's. Now we write numbers from 1 to 4. Then again form 4 to 1. So, $(1111)^2 = 1234321$

Multiplying 2-digit numbers where the unit's digits add upto 10 and ten's digits are same

Example: 42 × 48 = ?

(1) First multiply the unit digits of the numbers. 2 × 8 = 16

(2) Then multiply 4 by (4 +1) ⇒ 4 × 5 = 20.

(3) The answer is 2016.

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Multiplying numbers just over/below 100

Example: 108 × 109 = 11772.

The answer is in two parts : 117 and 72.

117 is (108 + 9) or (109 + 8), and 72 is 8 × 9.

new, check for 107 × 106 = 113 42 → (7 × 6)

↓

(107+6)

or

(106+7)

Multiplication of a 2-digit number by a 2-digit number

Example: 12 × 13?

Sol. Steps:

1. Multiply the right-hand digits of multiplicand and multiplier (unit-digit of multiplicand with unit-digit of the multiplier).

$$\begin{array}{cc} 1 & 2 \\ & \updownarrow \\ 1 & 3 \\ \hline & 6(2\times 3) \end{array}$$

2. Now, do cross-multiplication, i.e., multiply 3 by 1 and 1 by 2. Add the two products and write down to the left of 6.

$$\begin{array}{cc} 1 & 2 \\ 1 & 3 \\ \hline & 56 \end{array}$$

3. In the last step we multiply the left-hand figures of both multiplicand and multiplier (ten's digit of multiplicand with ten's digit of multiplier).

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$$\begin{array}{cc} 1 & 2 \\ \updownarrow & \\ 1 & 3 \\ \hline & 156(1\times 1) \end{array}$$

So, the answer is 156.

Example: 325 × 17 = ?

Sol. Steps:

1.
$$\begin{array}{cc} 3\,2 & 5 \\ & \updownarrow \\ 1 & 7 \\ \hline & 5 \end{array}$$

($5\times 7 = 35$, put down 5 and carry over 3)

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2. 3 2 5

1 7

2 5

(2 × 7 + 5 × 1 + 3 = 22, put down 2 and carry over 2)

3. 3 2 5

1 7

2 25

(3 × 7 + 2 × 1 + 2 = 25, put down 5 and carry over 2)

4. 3 2 5

1 7

5 5 2 5

So, answer is 5525

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Multiplication of a 3-digit number by a 3-digit number

Example: 321 × 132 = ?

Sol. Steps:

1. 3 2 1

↕

1 3 2

$2(1 \times 2 = 2)$

2. 3 2 1

1 3 2

72 (2 × 2 + 3 × 1 = 7)

3. 3 2 1

1 3 2

(2 × 3 + 3 × 2 + 1 × 1 = 13, write down 3 and carry over 1)

4. 3 2 1

1 3 2

2 3 7 2 (3 × 3 + 1 × 2 + 1 = 12, write down 2 and carry over 1)

5. 3 2 1

↕

1 3 2

4 2 3 7 2 $(1 \times 3 + 1 = 4)$ So, answer is 42372.

Some more short tricks:

(1) 2 + 22 + 222 + 2222 = 2 (1 + 11 + 111 + 1111)
2 (1234) = 2468

(2) 0.2 + 0.22 + 0.222 + 0.2222 + 022222 = 2 (0.1 + 0.11 + 0.111 + 0.1111 + 0.11111) = 2 (0.54321) = 1.08642

(3) 2 + 8 + 22 + 88 + 222 + 888 + 2222 + 8888 + 22222 + 88888 = 2 (12345) + 8 (12345) = (12345) (2 + 8) = 12345 × 10 = 123450

(4) $(2222)^2 = 2^2 \times (1111)^2 = 4 \times (1234321) = 4937284$

(5) If unit digit in each number is 5 and difference of the numbers is 10, then they are multiplied as:

Example: (1) 65 × 75 = 48 75

(6 × 8) (Constant)

(2) 125 × 135 = 168 75

(12 × 14) Constant

Percentage – fraction conversion:

The following percentage values of corresponding fractions must be on your tips :

Example: $62\frac{1}{2}\%$ of 256 can be easily calculated if we know the fractional value of $62\frac{1}{2}\%$ i.e., $\frac{5}{8}$.

$$\begin{bmatrix} 1 = 100\% \\ \frac{1}{2} = 50\% \end{bmatrix} \begin{bmatrix} \frac{1}{3} = 33\frac{1}{3}\% \\ \frac{2}{3} = 66\frac{2}{3}\% \end{bmatrix} \begin{bmatrix} \frac{1}{4} = 25\% \\ \frac{3}{4} = 75\% \end{bmatrix} \begin{bmatrix} \frac{1}{5} = 20\% \\ \frac{2}{5} = 40\% \\ \frac{3}{5} = 60\% \\ \frac{4}{5} = 80\% \end{bmatrix} \begin{bmatrix} \frac{1}{6} = 16\frac{2}{3}\% \\ \frac{5}{6} = 83\frac{1}{3}\% \end{bmatrix}$$

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$$\begin{bmatrix} \frac{1}{7} = 14\frac{2}{7}\% \\ \frac{2}{7} = 28\frac{4}{7}\% \\ \frac{3}{7} = 42\frac{6}{7}\% \\ \frac{4}{7} = 57\frac{1}{7}\% \\ \frac{5}{7} = 71\frac{3}{7}\% \\ \frac{6}{7} = 85\frac{5}{7}\% \end{bmatrix} \begin{bmatrix} \frac{1}{8} = 12\frac{1}{2}\% \\ \frac{3}{8} = 37\frac{1}{2}\% \\ \frac{5}{8} = 62\frac{1}{2}\% \\ \frac{7}{8} = 87\frac{1}{2}\% \end{bmatrix} \begin{bmatrix} \frac{1}{9} = 11\frac{1}{9}\% \\ \frac{2}{9} = 22\frac{2}{9}\% \\ \frac{4}{9} = 44\frac{4}{9}\% \\ \frac{5}{9} = 55\frac{5}{9}\% \\ \frac{7}{9} = 77\frac{7}{9}\% \\ \frac{8}{9} = 88\frac{8}{9}\% \end{bmatrix} \begin{bmatrix} \frac{1}{11} = 9\frac{1}{11}\% \\ \frac{2}{11} = 18\frac{2}{11}\% \\ \frac{3}{11} = 27\frac{3}{11}\% \\ \frac{4}{11} = 36\frac{4}{11}\% \\ \frac{5}{11} = 45\frac{5}{11}\% \end{bmatrix}$$

$\frac{1}{20} = 5\%$, $\frac{1}{19} = 5 + \frac{5 \times 5}{100} = 5.25\%$, $\frac{1}{21} = 5 - \frac{5 \times 5}{100} = 4.75\%$

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Similarly,

$\frac{1}{25} = 4\%$, $\frac{1}{24} = 4 + \frac{4 \times 4}{100} = 4.16\%$, $\frac{1}{26} = 4 - \frac{4 \times 4}{100} = 3.84\%$

$\frac{1}{11} = 9.09\%$, $\frac{1}{7} = 14.2857\%$, $\frac{1}{22} = 4.54\%$

$\frac{1}{14} = 7.14\%$ $\frac{1}{33} = 3.03\%$, $\frac{1}{28} = 3.57\%$

Finding the unit place digit when a number is raised to some power

(1) When the unit digit of a number is 0, 1, 5, or 6, then on raising that number to any power, the new number obtained will have its unit digit 0, 1, 5, or 6 respectively.

(2) When the unit digit of a number is 2:

Example: $(122)^{159}$

Divide 159 by 4

$$\frac{159}{4} \rightarrow \text{remainder} = 3$$

(unit digit of 122)^3 = 2^3 = 8

So, the unit digit of $(122)^{159}$ = 8

(3) When the unit digit of the number is 3 .

Example: $(53)^{145}$

Sol. $$\frac{145}{4} \Rightarrow \text{Remaider} = 1$$

$3^1 = 3$

So, unit digit of $(53)^{145}$ is 3.

(4) When the unit digit is 4 :

Example: 144

if it is raised to an odd power $\rightarrow$ Example : $(144)^{145}$, then unit place is 4.

if it is raised to an even power $\rightarrow$ Example : $(144)^{144}$, then unit place is 6.

(5) When the unit digit is 7:

Example: $(327)^{329}$

Sol. $329 \div 4 \Rightarrow$ rem. = 1 $\Rightarrow$ $7^1 = 7$

$\Rightarrow$ So, unit digit = 7.

(6) when the unit is 8:

Example: $(88)^{178}$

Sol. $178 \div 4 \Rightarrow$ Rem. = 2 $\Rightarrow$ $8^2 = 6\,\underline{4}$

$\Rightarrow$ So, unit digit of $(88)^{178}$ is 4

(7) When the unit digit is 9 ;

Example: 119

if it is raised to an odd power

Example: $\rightarrow (119)^{119} \Rightarrow$ unit digit = 9

if it is raised to an even power

Example: $\rightarrow (119)^{118} \Rightarrow$ unit digit = 1

Finding minimum and maximum values in fractions:

Example: Find maximum value:

$\frac{5}{7}, \frac{9}{4}, \frac{8}{13}, \frac{14}{15}$ $\Rightarrow$ Let us consider $\frac{5}{7}$ and $\frac{9}{4}$

$\frac{5}{7}$ $\frac{9}{4}$

$5 \times 4 < 9 \times 7 \Rightarrow \frac{5}{7} < \frac{9}{4}$

Now, let us take : $\frac{9}{4}$ and $\frac{8}{13}$

$\frac{9}{4}$ $\frac{8}{13}$

$13 \times 9 > 4 \times 8 \Rightarrow \frac{9}{4} > \frac{8}{13}$

$\frac{9}{4}$ is greater than both $\frac{5}{7}$ and $\frac{8}{13}$.

Now, let us compare $\frac{9}{4}$ and $\frac{14}{15}$

$$\frac{9}{4} \quad \frac{14}{15}$$

$15 \times 9 > 4 \times 14 \quad \Rightarrow \quad \frac{9}{4} > \frac{14}{15}$

So, $\frac{9}{4}$ is the greatest value among all given values.

Foundation

2. 69.69 – 51.54 + 73.64 = ? + 32.42
   (a) 47.44 (b) 53.88 (c) 58.38
   (d) 44.34 (e) None of these
3. 14.28% of 49 = ?
   (a) 8 (b) 11 (c) 7
   (d) 16 (e) 15
4. $1\frac{1}{3} - 1\frac{1}{9} + 1\frac{1}{6} = ?$
   (a) $1\frac{5}{18}$ (b) $1\frac{7}{18}$ (c) $1\frac{1}{9}$
   (d) $1\frac{4}{9}$ (e) None of these
5. 3/7 of 49/6 of 4/7 = ?
   (a) 1 (b) 2 (c) 3
   (d) 4 (e) 5
6. 25% of 48 + 50% of 120 = ?% of 1200
   (a) 4 (b) 5 (c) 6
   (d) 8 (e) 16

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7. $\sqrt{52 \times 27 \div 6 + 26 - 4} = ?$

(a) $\sqrt{24}$ (b) $(16)^2$ (c) 24

(d) $\sqrt{16}$ (e) None of these

8. 65% of 240 + ? % of 150 = 210

(a) 45 (b) 46 (c) 32

(d) 36 (e) None of these

9. $4\frac{4}{5} \div 6\frac{2}{5} = ?$

(a) 3/4 (b) 5/7 (c) 7/11

(d) 5/8 (e) None of these

10. 26.5% of 488 = ?

(a) 205.65 (b) 211.72 (c) 145.67

(d) 129.32 (e) None of these

11. 140% of 56 + 56% of 140 = ?

(a) 78.4 (b) 158.6 (c) 156.8

(d) 87.4 (e) None of these

12. $\frac{16}{24} + \frac{4}{10} - \frac{1}{6} = ?$

(a) $\frac{9}{10}$ (b) $\frac{7}{10}$ (c) $\frac{5}{10}$

(d) $\frac{3}{10}$ (e) None of these

13. 8000 ÷ 16-200 = ? × 6

(a) 75 (b) 60 (c) 50

(d) 25 (e) None of these

14. 73 × 18 + 486 = ? + $(13)^2$

(a) 1485 (b) 1631 (c) 1525

(d) 1225 (e) None of these

15. $\frac{1}{8}$th of $\frac{6}{7}$th of 11200 = ?

(a) 1100 (b) 1220 (c) 1430
(d) 1200 (e) None of these

16. (6990 ÷ 15) × (468 ÷ 18) = ?

(a) 12161 (b) 12116 (c) 14000
(d) 13342 (e) None of these

17. $\frac{3}{5}$th of 24% of 500 – 32 = ?

(a) 20 (b) 30 (c) 50
(d) 40 (e) None of these

18. $\frac{17}{29} \times \frac{87}{102} \times \frac{48}{27} \times \frac{3}{2} = ?$

(a) $1\frac{2}{3}$ (b) $2\frac{1}{3}$ (c) $1\frac{1}{3}$
(d) $2\frac{2}{3}$ (e) None of these

19. $(\sqrt{2209} - 12) \times 5 = ?$

(a) 175 (b) 180 (c) 225
(d) 195 (e) None of these

20. (0.88 × 880 ÷ 8) × 6 = ?

(a) 508.08 (b) 580.80 (c) 408.08
(d) 680.08 (e) None of these

21. $90 \times \frac{6}{18} + 73 = ?$

(a) 130 (b) 110 (c) 103
(d) 120 (e) None of these

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22. $\sqrt{8 \times 220 \div 11 + 85 - 20} = ?$

(a) 15 (b) 25 (c) 35
(d) 20 (e) None of these

23. $1\frac{5}{6} + 2\frac{3}{5} + 4\frac{2}{3} = ?$

(a) $2\frac{1}{10}$ (b) $7\frac{1}{10}$ (c) $6\frac{1}{10}$

(d) $9\frac{1}{10}$ (e) None of these

24. $\frac{28 \times 36}{18\% \text{ of } 50} = ?$

(a) 124 (b) 118 (c) 112
(d) 114 (e) None of these

25. $2 \times 256 \times ? = 8^2 \times 10^2 \times 2$

(a) 60 (b) 50 (c) 46
(d) 54 (e) None of these

26. 38% of ? = 3596 – 632

(a) 7800 (b) 7900 (c) 8900
(d) 8700 (e) None of these

27. 63 + 371 ÷ 7 = ?

(a) 62 (b) 116 (c) 52
(d) 123 (e) None of these

28. $2\frac{3}{5} + 3\frac{4}{9} + 4\frac{3}{15} = ?$

(a) $9\frac{17}{15}$ (b) $7\frac{8}{15}$ (c) $9\frac{22}{15}$

(d) $11\frac{22}{15}$ (e) None of these

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29. $92^2 - 12^2 = 3535 + ?$

(a) 4885 (b) 4785 (c) 5795
(d) 11855 (e) None of these

30. $958 \times 21 \div 4 = ?$

(a) 5029.5 (b) 5039.3 (c) 5049.3
(d) 5019.5 (e) None of these

31. $\frac{6}{5}$ of $\frac{3}{4}$ of $\frac{1}{2}$ of $? = 3600$

(a) 6000 (b) 7000 (c) 8000
(d) 18000 (e) None of these

32. $36 + 451 \div 11$

(a) 65 (b) 44.27 (c) 77
(d) 454.27 (e) None of these

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33. $11 \times 468 \div 26 = ? + 8$

(a) 206 (b) 190 (c) 198
(d) 215 (e) None of these

34. $\left(2+\sqrt{5}\right)^2 = ? + 4\sqrt{5}$

(a) $9+4\sqrt{5}$ (b) 9 (c) $2\sqrt{5}$
(d) $9+2\sqrt{5}$ (e) None of these

35. $\frac{3}{23}$ of $\frac{5}{12}$ of 1104 $= ?$

(a) 70 (b) 60 (c) 20313.6
(d) 50 (e) None of these

36. $\sqrt{15 \times 163 \div 5 - 89} = ?$

(a) 25 (b) 20 (c) $\sqrt{578}$
(d) 26 (e) None of these

37. $\frac{1}{4}$th of $\frac{1}{2}$ of $\frac{3}{4}$th of 52000 = ?

(a) 4785 (b) 4877 (c) 4857
(d) 4875 (e) None of these

38. 26 × 451 – ? = 5109

(a) 5617 (b) 6517 (c) 6627
(d) 6597 (e) None of these

39. 47 × 251 – 13343 + 1547 =

(a) –3093 (b) 0 (c) 1
(d) 2 (e) None of these

40. $\frac{3}{11}$ of $\frac{5}{7}$ of (?) = 63

(a) 3134 (b) 312.4 (c) 323.4
(d) 3100 (e) None of these

Moderate

1. 9229.789 – 5021.832 + 1496.989 = ?

(a) 6500 (b) 6000 (c) 6300
(d) 5700 (e) 5100

2. 1002 ÷ 49 × 99 – 1299 = ?

(a) 700 (b) 600 (c) 900
(d) 250 (e) 400

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3. 29.8% of 260 + 60.01% of 510 – 103.57 = ?

(a) 450 (b) 320 (c) 210
(d) 280 (e) 350

4. $(21.98)^2 – (25.02)^2 + (13.03)^2 = ?$

(a) 25 (b) 120 (c) 10
(d) 65 (e) 140

5. $\sqrt{2498} \times \sqrt{626} \div \sqrt{99} = ?$

(a) 110 (b) 90 (c) 200
(d) 160 (e) 125

6. 1599 × 199 ÷ 49 –1398 + 3877 = ?

(a) 9400 (b) 9000 (c) 8700
(d) 8400 (e) 9200

7. 4433.764 – 2211.993 – 1133.667 + 3377.442 = ?

(a) 4466 (b) 4377 (c) 363
(d) 4144 (e) 3344

8. $(13.96)^2 – (15.03)^2 + (18.09)^2 – 32.65 = ?$

(a) 223 (b) 264 (c) 334
(d) 354 (e) 201

9. $[(7.99)^2 – (13.001)^2 + (4.01)^3]^2 = ?$

(a) –1800 (b) 1450 (c) –1660
(d) 1680 (e) – 1450

10. $(21.5\% \text{ of } 999)^{1/3} + (42\% \text{ of } 601)^{1/2} + ?$

(a) 18 (b) 22 (c) 26
(d) 30 (e) 33

11. $(\sqrt{4489} – \sqrt{2601}) = (?)^2$

(a) 14 (b) $(16)^2$ (c) 4
(d) 24 (e) None of these

12. 9067 + 2065 – 8400 + 3045 – 1520 = ?

(a) 4257 (b) 4157 (c) 4357
(d) 4047 (e) None of these

13. $\frac{1}{16}$ of 8432 + 50% of ? = 4429

(a) 6804 (b) 8224 (c) 7884
(d) 7804 (e) None of these

14. 250% of ? ÷ 250 – 444 = 200

(a) 634000 (b) 6440 (c) 64400
(d) 64444000 (e) None of these

15. $0.01024 \times (0.4)^9 = (0.4)^? \times (0.0256)^3$

(a) 1 (b) 2 (c) 3
(d) 4 (e) 5

16. 18 × 16 – 3445 ÷ 13 = ? – 344

(a) 369 (b) 367 (c) 368
(d) 467 (e) None of these

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17. $\left[(3^2)^6\right]^5 = 9^?$

(a) 30 (b) 60 (c) 90
(d) 20 (e) None of these

18. $1\frac{1}{4} + 1\frac{5}{9} \times 1\frac{5}{8} \div 6\frac{1}{2} = ?$

(a) $1\frac{23}{36}$ (b) 17 (c) 27
(d) 18 (e) None of these

19. $(2\sqrt{392} - 21) + (\sqrt{8} - 7)^2 = (?)^2$

(a) 5 (b) 6 (c) 7
(d) 8 (e) None of these

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20. $(\sqrt{9})^3 \times (\sqrt{81})^5 \div 27^2 = (3)^?$

(a) 21 (b) 25 (c) 29
(d) 7 (e) None of these

21. 18.5 % of 220 + 12.4% of 680 = ?

(a) 132.05 (b) 125.02 (c) 142.07
(d) 118.7 (e) None of these

22. $\sqrt[3]{1331} + \sqrt[3]{1728}$ = ?

(a) 11 (b) 12 (c) 23
(d) 34 (e) None of these

23. 5.6 × 12.5 ÷ 0.5 + 15.5 = ? + 49.5

(a) 105 (b) 106 (c) 104
(d) 200 (e) None of these

24. 72% of 390 + 28% of 165 = (x– 3)

(a) 320 (b) 325 (c) 327
(d) 330 (e) None of these

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25. 42% of a number is 357. What is 63% of that number?

(a) 530 (b) 530.5 (c) 535
(d) 535.5 (e) None of these

26. What is least number added to 4042 to make it perfect square?

(a) 54 (b) 58 (c) 64
(d) 41 (e) None of these

27. What least number must be subtracted from 5500 to make it perfect square?

(a) 34 (b) 12 (c) 24
(d) 41 (e) None of these

28. The sum of 33% of a number and 14% of same number is 3055. What is 72% of that number?

(a) 4675 (b) 4685 (c) 4670
(d) 4680 (e) None of these

29. If 64 is subtracted from a number then it reduce to 36% itself then what is $\frac{4}{5}$ of that number?
(a) 100 (b) 125 (c) 80
(d) 75 (e) None of these

30. If the sum of 4 consecutive odd number is 184 then find the largest number.
(a) 46 (b) 43 (c) 49
(d) 48 (e) None of these

31. If 35% of a number is 182 then, what is 150% of that number ?
(a) 760 (b) 780 (c) 520
(d) 560 (e) None of these

32. Difference between one-fourth of a number and one seventh of same number is 24. What is number?
(a) 205 (b) 210 (c) 224
(d) 204 (e) 214

33. What is the value of 68% of two fifth of 550?
(a) 149.6 (b) 150 (c) 154
(d) 158 (e) None of these

34. 30% of a number is 190.8. What will be 175% of that number?
(a) 1113 (b) 1115 (c) 11502
(d) 1002 (e) None of these

35. What least number must be added to 1056, so that the sum is completely divisible by 23?
(a) 2 (b) 3 (c) 18
(d) 21 (e) None of these

36. The difference of two numbers is 1365. On dividing the larger number by the smaller, we get 6 as quotient and 15 as remainder. What is the smaller number?
(a) 240 (b) 270 (c) 295
(d) 360 (e) None of these

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37. The sum of first 45 natural number is:
(a) 1035 (b) 1280 (c) 2140
(d) 2140 (e) None of these

38. $\dfrac{753 \times 753 + 247 \times 247 - 753 \times 247}{753 \times 753 \times 753 + 247 \times 247 \times 247} = ?$
(a) 1/1000 (b) 1/5056 (c) 253/500
(d) 260/550 (e) None of these

39. If the number 481*673 is completely divisible by 9, then the smallest whole number in place of * will be:
(a) 2 (b) 5 (c) 6
(d) 7 (e) None of these

40. On dividing a number by 56, we get 29 as remainder. On dividing the same number by 8, what will be the remainder?
(a) 4 (b) 5 (c) 6
(d) 7 (e) None of these

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Difficult

1. (0.83 × 0.83 × 0.83 + 0.17 × 0.17 × 0.17) is equal to ___.
(a) 1 + 0.51 × 0.83 (b) 1 – 0.51 × 0.83
(c) 0.51 × 0.83 – 1 (d) 2 + 0.51 × 0.83
(e) None of these

2. Find the simplified value of $63\sqrt{(729)^{-\frac{2}{3}} + (343)^{\frac{-2}{3}}}$?
(a) $63\sqrt{1072}$ (b) $\dfrac{63}{\sqrt{30}}$ (c) $63\sqrt{63}$
(d) $\sqrt{130}$ (e) None of these

3. Find the units digits of $(128)^{182}$?
(a) 8 (b) 4 (c) 2
(d) 6 (e) None of these

4. Find the square root of

$$(2.25)^2 + 16 - 4(2.25) - \frac{(2.25)^3}{2.25 + 4} \ ?$$

(a) 6.4 (b) 4.8 (c) 3.2
(d) 1.6 (e) None of these

5. What is the unit digit in $\{(6374)^{1793} \times (625)^{317} \times (341)^{491}\}$?
(a) 0 (b) 2 (c) 3
(d) 5 (e) None of these

6. If a six digit number 53a 29 b is divisible by 88 then find the value of a and b.
(a) 2 and 8 (b) 8 and 2 (c) 8 and 6
(d) 4 and 8 (e) None of these

7. If a number is multiplied by $\frac{3}{5}$th of itself. The value so obtain is 3^2 less than 12^2. What is fifth third of that number?
(a) 375 (b) 75 (c) 25
(d) 225 (e) None of these

8. Which of the following are in descending order of their value?

(a) $\frac{1}{3}, \frac{2}{5}, \frac{3}{7}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}$ (b) $\frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{4}{7}, \frac{5}{6}, \frac{6}{7}$ (c) $\frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{4}{6}, \frac{5}{7}, \frac{6}{7}$

(d) $\frac{6}{7}, \frac{5}{6}, \frac{4}{5}, \frac{3}{7}, \frac{2}{5}, \frac{1}{3}$ (e) None of these

9. $\sqrt{3\sqrt{3\sqrt{3\sqrt{3\sqrt{3\sqrt{3}}}}}} = ?$

(a) $3^{\frac{31}{64}}$ (b) $3^{\frac{31}{32}}$ (c) $3^{\frac{1}{64}}$

(d) $3^{\frac{1}{65}}$ (e) None of these

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10. P, Q and R scored 581 runs such that four times P's runs are equal to 5 times Q's runs which are equal to seven times R's runs. Find the difference between P and R.
(a) 49 (b) 105 (c) 46
(d) 100 (e) None of these

11. How many natural numbers are there between 23 and 100 which are exactly divisible by 6?
(a) 8 (b) 11 (c) 12
(d) 13 (e) None of these

12. The price of commodity X increases by 40 paise every year, while the price of commodity Y increases by 15 paise every year. If in 2001, the price of commodity X was Rs. 4.20 and that of Y was Rs. 6.30, in which year commodity X will cost 40 paise more than the commodity Y?
(a) 2010 (b) 2011 (c) 2012
(d) 2013 (e) None of these

13. $24 - [2.4 - \{0.24 \times 2 - (0.024 - ?)\}] = 22.0584$
(a) 0.0024 (b) 0.024 (c) 0.24
(d) 0.00024 (e) None of these

14. $3648.24 + 364.824 \div ? - 36.4824 = 3794.1696$
(a) 2 (b) 3 (c) 4
(d) 5 (e) None of these

15. $6 - \left[\frac{5}{6} + \left\{3\frac{7}{8} - 2\frac{1}{3} + 1\frac{7}{9}\right\}\right] = ?$

(a) $3\frac{9}{13}$ (b) $1\frac{9}{11}$ (c) $2\frac{11}{72}$

(d) $1\frac{51}{71}$ (e) None of these

16. $\left[10 + \left\{4 \times \left(\overline{\frac{2}{3} + \frac{1}{4}} \times \sqrt{\frac{144}{121}} + 23\right) \div 12 + 5\right\} - 3\right] = ?$

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(a) 20 (b) 8 (c) 10
(d) 15 (e) 5

17. $\left[8+\left\{\left(\frac{21\times\sqrt{\frac{9}{441}}-1}{5}\text{ of }60\%-\frac{1}{5}\right)\times 625+7\right\}\div 4\right]=?$

(a) 10 (b) 15 (c) 7
(d) 16 (e) 12

18. $(0.25)^6 \div (0.125)^2 \times (.5)^4 = (0.5)^{?+3}$

(a) 1 (b) 3 (c) 5
(d) 7 (e) None of these

19. Find the greatest fraction among the fractions $\frac{17}{18}, \frac{21}{22}, \frac{26}{27}$ and $\frac{36}{37}$?

(a) $\frac{17}{18}$ (b) $\frac{21}{22}$ (c) $\frac{26}{27}$
(d) $\frac{36}{37}$ (e) None of these

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20. The square root of $\left[\frac{(3.25)^3}{3.25-1}-(3.25+(3.25)^2+1)\right]$ is equal to:

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{4}{3}$
(d) $\frac{5}{3}$ (e) None of these

Previous Year (Memory Based)

1. 7% of 4000 – 12% of 550

(a) 224 (b) 214 (c) 234
(d) 324 (e) None of these

2. 18% of 125 × 9% of 25 = ? – 100
   (a) 148.625 (b) 148.225 (c) 150.625
   (d) 150.225 (e) None of these
3. How many 3-digit numbers are completely divisible 6?
   (a) 149 (b) 150 (c) 151
   (d) 166 (e) None of these
4. On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of this number is divided by 5?
   (a) 0 (b) 1 (c) 2
   (d) 4 (e) None of these
5. 323.232 + 32.3232 + 3.23232 = ?
   (a) 678.324652 (b) 6687665.2 (c) 358.78752
   (d) 368.76752 (e) None of these
6. 525 × 24 ÷ 8 + 25 = $(?)^2$
   (a) 50 (b) 30 (c) 40
   (d) 60 (e) None of these
7. 46818 + 34484 – 24642 – 21232 = ?
   (a) 35428 (b) 32468 (c) 58248
   (d) 46428 (e) None of these
8. 499.99 + 1999 ÷ 39.99 × 50.01 = ?
   (a) 3200 (b) 2700 (c) 3000
   (d) 2500 (e) 2400
9. $\frac{601}{49} \times \frac{399}{81} \div \frac{29}{201} = ?$
   (a) 520 (b) 360 (c) 460
   (d) 500 (e) 420
10. $(13.99)^2 - (15.02)^2 + (18.07)^2 - 36.64 = ?$
   (a) 250 (b) 260 (c) 270
   (d) 280 (e) 240

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11. 40.005% of 439.998 + ? % of 655.011 = 228.5
(a) 8 (b) 17 (c) 12
(d) 20 (e) 5

12. 6894.986 + 5025.005 + 600.020 = ?
(a) 12170 (b) 13540 (c) 12950
(d) 11560 (e) 12520

13. 149.9% of 149.9 + 149.9 = ?
(a) 375 (b) 400 (c) 1000
(d) 1020 (e) 1060

14. $\sqrt{2601} - \sqrt{1156} + \sqrt{484} = ?$
(a) 50 (b) 90 (c) 40
(d) 20 (e) 30

15. $\frac{901}{29} \times \frac{91}{301} \div \frac{51}{599} = ?$
(a) 140 (b) 120 (c) 60
(d) 80 (e) 110

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16. $\sqrt{?}\%$ of $160 = 128 \div 4$
(a) -20 (b) $\sqrt{20}$ (c) 400
(d) $\sqrt{400}$ (e) None of these

17. $3\frac{6}{7} + 6\frac{1}{4} - 5\frac{1}{3} + 2\frac{1}{2} = ?$
(a) $6\frac{11}{28}$ (b) $7\frac{11}{28}$ (c) $6\frac{17}{28}$
(d) $7\frac{23}{84}$ (e) None of these

18. If the difference between a number and $\frac{3}{5}$th of the same number is 30 then find the number.

(a) 80 (b) 75 (c) 100
(d) 45 (e) None of these

19. 5999.99 + 1999 ÷ 39.99 × 50.01 = ?
(a) 8500 (b) 8000 (c) 7500
(d) 850 (e) 750

20. $[(7.98)^2 – (13.002)^2 + (4.02)^3]^2$ = ?
(a) 1703 (b) 1680 (c) 1650
(d) 2050 (e) 1600

21. 74.01% of 1301 + 9.99% of 1901 = ?
(a) 1150 (b) 1200 (c) 1125
(d) 1325 (e) 1400

22. 5894 ÷ 15.01 + 590.01 – 111.98 = ?
(a) 980 (b) 780 (c) 880
(d) 920 (e) 645

23. 2438.79 –1233.99 + 399.99 = ? + 989.99
(a) 600 (b) 700 (c) 900
(d) 500 (e) 450

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24. 21.9% of 511.987 – 42.49 = $\frac{?}{5.5}$
(a) 440 (b) 450 (c) 380
(d) 300 (e) 315

25. 1601 × 198 ÷ 49 – 1399 + 3878 = ?
(a) 8500 (b) 8700 (c) 8900
(d) 9100 (e) 9500

26. $(13.95)^2 – (15.04)^2 + (18.08)^2 – 32.64$ = ?
(a) 260 (b) 300 (c) 350
(d) 400 (e) 450

27. 441.01 – 232.99 + 1649.99 = ? + 1225.92
(a) 600 (b) 630 (c) 660
(d) 690 (e) 720

28. $\sqrt{624} \times \sqrt{63} + \sqrt{398} \div \sqrt{17} = ?$

(a) 205 (b) 225 (c) 175
(d) 170 (e) 180

29. 1523.89 ÷ 19.95 + 496.28 + 249.927 = ?

(a) 825 (b) 840 (c) 800
(d) 900 (e) 950

30. 2439.97 – 1234.01 + 401.99 = ? + 989.99

(a) 620 (b) 650 (c) 680
(d) 700 (e) 600 .

31. Simiplify $\dfrac{(0.9743)^3 - (0.0257)(0.0257)(0.0257)}{(0.9743)^2 + (0.9743)(0.0257) + (0.0257)^2}$

(a) 0.9486 (b) 0.9362 (c) 1
(d) 1.028 (e) None of these

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32. $\sqrt[3]{6\dfrac{35}{216}}$ is equal to _____.

(a) $\dfrac{13}{6}$ (b) $\dfrac{7}{3}$ (c) $\dfrac{11}{6}$

(d) $\dfrac{11}{3}$ (e) None of these

33. $(8.5 \times 8.5 + 93.5 + 5.5 \times 5.5)^{1/2}$ is equal to _____.

(a) 9 (b) 14 (c) 13
(d) 10 (e) None of these

34. $\dfrac{8.25 \times 8.25 + 6.75 \times 6.75 - 2 \times 8.25 \times 6.75}{8.25 \times 8.25 - 6.75 \times 6.75}$.

when simplified equals _____.

(a) 0.1 (b) 0.2 (c) 0.05
(d) 0.25 (e) None of these

35. $\left(\sqrt[3]{8000}+\sqrt[3]{0.027}-\sqrt[3]{0.216}\right)$ is ____.

(a) 19.97 (b) 19.997 (c) 19.9997
(d) 19.7 (e) None of these

36. $\dfrac{(0.146+0.092)^2+(0.092-0.146)^2}{0.073\times0.073+0.046\times0.046}$ is equal to

(a) 8 (b) 0.8 (c) 0.94
(d) 0.156 (e) None of these

37. $6\frac{1}{15}-4\frac{1}{12}+7\frac{1}{3}-2\frac{1}{6}=?$

(a) $7\frac{3}{20}$ (b) $8\frac{7}{20}$ (c) $9\frac{11}{20}$
(d) $10\frac{7}{20}$ (e) None of these

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38. $\left[(72)^2\div36+(?)^2\right]\div5=45$

(a) 9 (b) 81 (c) 6561
(d) 729 (e) None of these

39. $\dfrac{(0.6^3-0.1^3-0.4^3-3\times0.6\times0.1\times0.4)}{(0.6^2+0.1^2+0.4^2+0.6\times0.1+0.6\times0.4-0.1\times0.4)}$

(a) 1.1 (b) 0.1 (c) 0.9
(d) 0.3 (e) None of these

40. $\dfrac{(0.188+0.077)^2+(0.188-0.077)^2}{0.188\times0.188+0.077\times0.077}=?$

(a) 0.2 (b) 0.265 (c) 0.111
(d) 2 (e) None of these

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Foundation

1. (a); $\frac{320 \times 40}{100} = 128$

2. (e); 69.69 – 51.54 + 73.64 = ? + 32.42 $\Rightarrow$? = 59.37

3. (c); 14.28% of $49 = \frac{1}{7} \times 49 = 7$

4. (b); $1\frac{1}{3} - 1\frac{1}{9} + 1\frac{1}{6} = (1 - 1 + 1) + \left(\frac{1}{3} - \frac{1}{9} + \frac{1}{6}\right)$

$$= 1 + \left(\frac{6 - 2 + 3}{18}\right) = 1 + \frac{7}{18} = 1\frac{7}{18}$$

5. (b); $\frac{3}{7}$ of $\frac{49}{6}$ of $\frac{4}{7} = \frac{3}{7} \times \frac{49}{6} \times \frac{4}{7} = 2$

6. (c); $\frac{1}{4} \times 48 + \frac{1}{2} \times 120 = x\%$ of 1200

$$\Rightarrow 12 + 60 = \frac{x \times 1200}{100} \quad \Rightarrow \quad x = \frac{72 \times 100}{1200} = 6$$

7. (e); $\sqrt{52 \times \frac{27}{6} + 26 - 4} = \sqrt{26 \times 9 + 26 - 4} = \sqrt{256} = 16$

8. (d); 65% of 240 + x% of 150 = 210 $\Rightarrow$ 210 – 65% of 240 = x% of 150

$$210 - \frac{65 \times 240}{100} = \frac{x \times 150}{100}$$

$$\frac{x \times 150}{100} = 210 - 156 = 54 \quad \Rightarrow \quad x = \frac{5400}{150} = 36$$

9. (a); $\frac{24}{5} \times \frac{5}{32} = \frac{3}{4}$

10. (d); $? = \frac{26.5 \times 488}{100} = \frac{265 \times 488}{100 \times 10} = 129.32$

11. (c); $? = \frac{140 \times 56}{100} + \frac{56 \times 140}{100} = \frac{2 \times 56 \times 140}{100} = 156.8$

12. (a); $\frac{16}{24} + \frac{4}{10} - \frac{1}{6} = \frac{5 \times 16 + 12 \times 4 - 1 \times 20}{120} = \frac{80 + 48 - 20}{120} = \frac{108}{120} = \frac{9}{10}$

13. (c); 8000 ÷ 16 – 200 = ? × 6 $\Rightarrow$ $? = \frac{\frac{8000}{16} - 200}{6} = \frac{500 - 200}{6} = 50$

14. (b); 73 × 18 + 486 = ? + $(13)^2$

? = 73 × 18 + 486 – 169 = 1314 + 317 = 1631

15. (d); $\frac{1}{8}$th of $\frac{6}{7}$th of $11200 = ?$

$\Rightarrow ? = \frac{1}{8} \times \frac{6}{7} \times 11200 = \frac{1}{8} \times 6 \times 1600 = 6 \times 200 = 1200$

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16. (b); (6990 ÷ 15) × (468 ÷ 18) $= \frac{6990}{15} \times \frac{468}{18}$ = 466 × 26 = 12116

17. (d); $\frac{3}{5} \times \frac{24 \times 500}{100} - 32 = ?$ $\Rightarrow$? = 72 – 32 = 40

18. (c); $\frac{17}{29} \times \frac{87}{102} \times \frac{48}{27} \times \frac{3}{2} = \frac{4}{3} = 1\frac{1}{3}$

19. (a); $\left(\sqrt{2209} - 12\right) \times 5$ = (47 – 12) × 5 = 35 × 5 = 175

20. (b); (0.88 × 880 ÷ 8) × 6 = ? $\Rightarrow$ $? = \left(0.88 \times \frac{880}{8}\right) \times 6 = 96.8 \times 6 = 580.80$

21. (c); $90 \times \frac{6}{18} + 73 = 30 + 73 = 103$

22. (a); $\sqrt{8\times\frac{220}{11}+85-20} = \sqrt{8\times20+85-20} = \sqrt{140+85} = \sqrt{225} = 15$

23. (d); $1\frac{5}{6}+2\frac{3}{5}+4\frac{2}{3} = (1+2+4)+\left(\frac{5}{6}+\frac{3}{5}+\frac{2}{3}\right)$

$$= \left(7+\frac{25+18+20}{30}\right) = 7+\frac{63}{30} = 7+\frac{21}{10} = \frac{91}{10} = 9\frac{1}{10}$$

24. (c); $? = \frac{28\times36\times100}{18\times50}$ = 2 × 2 × 28 = 112

25. (e); 2 × 256 × ? = 64 × 100 × 2 $\Rightarrow$ $? = \frac{64\times100\times2}{2\times256} = 25$

26. (a); 38% of ? = 3596 – 632

$$\frac{38\times x}{100} = 2964 \quad\Rightarrow\quad x = \frac{1482\times100}{19} = 78\times100 = 7800$$

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27. (b); $63+\frac{371}{7} = ?$ $\Rightarrow$? = 63 + 53 = 116

28. (e); $2\frac{3}{5}+3\frac{4}{9}+4\frac{3}{15} = (2+3+4)+\left(\frac{3}{5}+\frac{4}{9}+\frac{3}{15}\right)$

$$= 9+\frac{27+20+9}{45} = 9+\frac{56}{45} = \frac{461}{45} = 10\frac{11}{45}$$

29. (b); $92^2 - 12^2$ = 3535 + ? $\Rightarrow$ (92 + 12) (92 – 12) = 3535 + ?

104 × 80 = 3535 + ? $\Rightarrow$? = 8320 – 3535 = 4785

30. (a); $958\times\frac{21}{4}$ = 239.5 × 21 = 5029.5

31. (c); $\frac{6}{5}$ of $\frac{3}{4}$ of $\frac{1}{2}$ of $x = 3600$

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$$\frac{6}{5}\times\frac{3}{4}\times\frac{1}{2}\times x = 3600 \quad \Rightarrow \quad x = \frac{3600\times5\times4\times2}{6\times3} = 8000$$

32. (c); 36 + 451 ÷ 11= 36 + 41 = 77

33. (b); 11 × 468 ÷ 26 = ? + 8 $\Rightarrow$ 11 × 18 = ? + 8 $\Rightarrow$? = 198 – 8 = 190

34. (b); $\left(2+\sqrt{5}\right)^2 = ?+4\sqrt{5} \quad \Rightarrow \quad 4+5+4\sqrt{5} = ?+4\sqrt{5} \quad \Rightarrow \quad ? = 9$

35. (b); $\frac{3}{23}$ of $\frac{5}{12}$ of 1104 $= \frac{3}{23}\times\frac{5}{12}\times1104 = 3\times5\times\frac{48}{12}$ = 3 × 5 × 4 = 60

36. (b); $x = \sqrt{15\times163\div5-89} \quad \Rightarrow \quad x = \sqrt{489-89} \quad \Rightarrow \quad x = \sqrt{400} = 20$

37. (d); $\frac{1}{4}\times\frac{1}{2}\times\frac{3}{4}\times52000 = \frac{3}{4}\times6500 = \frac{19500}{4} = 4875$

38. (e); $26\times451-?=5109 \quad \Rightarrow \quad ? = 26\times451-5109 = 11726-5109 = 6617$

39. (c); $47\times251-13343+1547 = 11797-13343+1547 = 13344-13343 = 1$

40. (c); $\frac{3}{11}$ of $\frac{5}{7}$ of $x = 63$

$$\frac{3}{11}\times\frac{5}{7}\times x = 63 \quad \Rightarrow \quad x = \frac{63\times7\times11}{3\times5} = \frac{21}{5}\times77 = 4.2\times77 = 323.4$$

Moderate

1. (d); $9230-5022+1497 = 5705 \approx 5700$

2. (a); $1002\div49\times99-1299 = \frac{1002}{49}\times99-1299$

$$\approx \frac{1000}{50}\times100-1300 \approx 2000-1300 = 700$$

3. (d); $\approx 30\%$ of $260 + 60\%$ of $510 - 100 \approx 78+306-100 \approx 384-100 \approx 280$

4. (a); $(22)^2-(25)^2+(13)^2 = 484+169-625 = 653-625 = 28 \approx 25$

5. (e); $\sqrt{2498}\times\sqrt{626}\div\sqrt{99} \approx \sqrt{2500}\times\sqrt{625}\div10 \approx 50\times\frac{25}{10} \approx 125$

6. (b); $1599 \times 199 \div 49 - 1398 + 3877$

$$\approx 1600 \times \frac{200}{50} - 1400 + 3900 = 6400 - 1400 + 3900 = 8900 \approx 9000$$

7. (a); $4400 - 2200 - 1100 + 3400 = 4500 \approx 4466$

8. (b); $14^2 - 15^2 + 18^2 - 32 = 196 - 225 + 324 - 32 \approx 264$

9. (d); $\left[8^2 - 13^2 + 4^3\right]^2 = (64 - 169 + 64)^2 = (-41)^2 = 1681 \approx 1680$

10. (b); $(22\% \text{ of } 1000)^{\frac{1}{3}} + (42\% \text{ of } 600)^{\frac{1}{2}}$

$$= (220)^{\frac{1}{3}} + (252)^{\frac{1}{2}} \approx \left(6^3\right)^{\frac{1}{3}} + \left(16^2\right)^{\frac{1}{2}} = 6 + 16 = 22$$

11. (c); $\sqrt{4489} - \sqrt{2601} = x^2 \Rightarrow x^2 = 67 - 51 = 16 \Rightarrow x = 4$

12. (a); $9067 + 2065 - 8400 + 3045 - 1520 = 4257$

13. (d); $\frac{1}{16} \times 8432 + 50\% \text{ of } x = 4429$

$$527 + \frac{x}{2} = 4429 \Rightarrow \frac{x}{2} = 3902 \Rightarrow x = 7804$$

14. (c); $250\% \text{ of } x \div 250 - 444 = 200$

$$\left(\frac{250 \times x}{100}\right) \div 250 = 644 \Rightarrow x = \frac{644 \times 250 \times 100}{250} = 64400$$

15. (b); $0.01024 \times (0.4)^9 = (0.4)^x \times (0.0256)^3$

$$= \frac{1024}{10^5} \times (0.4)^9 = (0.4)^x \times \left(\frac{256}{10^4}\right)^3$$

$$= \frac{4^5 \times 4^9}{10^{14}} = \frac{4^x}{10^x} \times \left(\frac{4^4}{10^4}\right)^3 = \frac{4^{14}}{10^{14}} = \frac{4^x}{10^x} \times \frac{4^{12}}{10^{12}} = \frac{4^{12+x}}{10^{12+x}}$$

$$\Rightarrow 12 + x = 14 \Rightarrow x = 2$$

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16. (b); $18 \times 16 - 3445 \div 13 = x - 344$

$x = 288 - 265 + 344 = 632 - 265 = 367$

17. (a); $\left[\left(3^2\right)^6\right]^5 = 9^x \Rightarrow \left(3^{12}\right)^5 = 3^{2x} \Rightarrow 3^{60} = 3^{2x}$

$\Rightarrow 2x = 60 \Rightarrow x = 30$

18. (a); $1\frac{1}{4} + 1\frac{5}{9} \times 1\frac{5}{8} \div 6\frac{1}{2} = \frac{5}{4} + \frac{14}{9} \times \frac{13}{8} \times \frac{2}{13} = \frac{5}{4} + \frac{14}{36} = \frac{45+14}{36} = \frac{59}{36} = 1\frac{23}{36}$

19. (b); $\left(2\sqrt{392} - 21\right) + \left(\sqrt{8} - 7\right)^2 = x^2$

$= 2\sqrt{14 \times 14 \times 2} - 21 + 8 + 49 - 14\sqrt{8} = x^2$

$= 28\sqrt{2} - 21 + 57 - 14\sqrt{8} = x^2$

$x^2 = 36 \Rightarrow x = 6$

20. (d); $\left(\sqrt{9}\right)^3 \times \left(\sqrt{81}\right)^5 \div (27)^2 = 3^x$

$\frac{3^3 \times 9^5}{3^6} = 3^x = \frac{3^3 \times 3^{10}}{3^6} \Rightarrow 3^x = 3^7 \Rightarrow x = 7$

21. (b); $\frac{18.5 \times 220}{100} + \frac{12.4 \times 680}{100} = \frac{185 \times 22 + 124 \times 68}{100} = \frac{4070 + 8432}{100}$

$= \frac{12502}{100} = 125.02$

22. (c); $\sqrt[3]{1331} + \sqrt[3]{1728} = \left(11^3\right)^{\frac{1}{3}} + \left(12^3\right)^{\frac{1}{3}} = 11 + 12 = 23$

23. (b); $5.6 \times 12.5 \times 2 + 15.5 = x + 49.5 \Rightarrow 70 \times 2 + 15.5 = x + 49.5$

$155.5 - 49.5 = x \Rightarrow x = 106$

24. (d); $\frac{72 \times 390}{100} + \frac{28 \times 165}{100} = x - 3 \Rightarrow \frac{28080}{100} + \frac{4620}{100} = x - 3$

$\Rightarrow 327 = x - 3 \Rightarrow x = 330$

25. (d); $\frac{42 \times x}{100} = 357 \Rightarrow x = \frac{357 \times 100}{42} \Rightarrow$ 63% of x

$= \frac{63 \times 357 \times 100}{42 \times 100} = \frac{3}{2} \times 357 = \frac{1071}{2} = 535.5$

26. (a); $64^2 = 4096$

So, the least number to be added to 4042 is: 4096 – 4042 = 54

27. (c); $5476 = (74)^2$

So, the least number to be subtracted from 5500 is 5500 – 5476 = 24

28. (d); $\frac{33x}{100} + \frac{14x}{100} = 3055 \Rightarrow \frac{47x}{100} = 3055 \Rightarrow x = \frac{3055 \times 100}{47}$

72% of $x = \frac{72}{100} \times \frac{3055 \times 100}{47} = 65 \times 72 = 4680$

29. (c); $x - 64 = \frac{36 \times x}{100} \Rightarrow x - \frac{36x}{100} = 64 \Rightarrow \frac{64x}{100} = 64 \Rightarrow x = 100$

$\frac{4}{5}$ of $x = \frac{4}{5} \times 100 = 80$

30. (c); Sum = 184

$\Rightarrow$ Average $= \frac{184}{4} = 46$

The average will be the middle term

43 45 47 49

\ /

46

Largest number = 49

31. (b); $\frac{35 \times x}{100} = 182 \Rightarrow x = \frac{182 \times 100}{35}$

$\Rightarrow$ 150% of $x = \frac{150 \times 182 \times 100}{35 \times 100} = 780$

32. (c); $\frac{x}{4}-\frac{x}{7}=24 \Rightarrow 3x = 28 \times 24 \Rightarrow x = 8 \times 28 = 224$

33. (a); 68% of $\frac{2}{5}$ of 550 = 68% of 220 $=\frac{68\times 220}{100}$ = 149.6

34. (a); $\frac{30\times x}{100}=190.8 \Rightarrow x=\frac{19080}{30}=636$

175% of 636 $=\frac{175\times 636}{100}=7\times 159=1113$

35. (a); $\frac{1056}{23}\Rightarrow$ remainder $=21 \Rightarrow 23 - 21 = 2$

So, 2 must be added to 1056 to make it completely divisible by 23.

36. (b); Let two numbers are x and y

x – y = 1365 ... (i)

x – 6y = 15 ... (ii)

Solving (i) and (ii)

y = 270, x = 1365 + 270 = 1635

So, smaller number is 270

37. (a); Sum of first 45 natural numbers $=\frac{n(n+1)}{2}=\frac{45\times 46}{2}=\frac{2070}{2}=1035$

38. (a); Let a = 753, b = 247

Then, the given expression is $=\frac{a^2+b^2-ab}{a^3+b^3}$

$$=\frac{\left(a^2+b^2-ab\right)}{(a+b)\left(a^2+b^2-ab\right)}=\frac{1}{a+b}=\frac{1}{753+247}=\frac{1}{1000}$$

39. (d); Let the smallest whole number in place of * be x.

$4 + 8 + 1 + x + 6 + 7 + 3 = (29 + x)$

For the number to be completely divisible by 9, (29 + x) must be completely divisible by 9.

out of the given options, if we add 7 to 29, we get 36 which is divisible by 9.

40. (b); Remainder on dividing by 56 = 29.

Remainder on dividing the same number by 8 is equal to the remainder on dividing 29 by 8 i.e; 5

Difficult

1. (b); Required value = $(0.83)^3 + (0.17)^3$

if $a + b + c = 0$, $a^3 + b^3 + c^3 = 3abc$

$0.83 + 0.17 + (-1) = 0$

$\Rightarrow (0.83)^3 + (0.17)^3 + (-1)^3 = 3\cdot(0.83)\cdot(0.17)\,(-1)$

$\Rightarrow (0.83)^3 + (0.17)^3 = 1 - (3 \times 0.83 \times 0.17 \times 1) = 1 - 0.51 \times 0.83$

2. (d); $63\sqrt{(729)^{-\frac{2}{3}} + (343)^{-\frac{2}{3}}} = 63\sqrt{\frac{1}{(729)^{\frac{2}{3}}} + \frac{1}{(343)^{\frac{2}{3}}}}$

$(729)^{\frac{2}{3}} = (9^3)^{\frac{2}{3}} = 9^2 \quad \Rightarrow \quad (343)^{\frac{2}{3}} = (7^3)^{\frac{2}{3}} = 7^2$

So, The required value is:

$$63\sqrt{\frac{1}{9^2} + \frac{1}{7^2}} = 63\sqrt{\frac{7^2 + 9^2}{9^2 \cdot 7^2}} = \frac{63}{9 \cdot 7}\sqrt{49 + 81} = \sqrt{130}$$

3. (b); Powers of 8 have a cyclicity of 4 for their unit digits. When we divide 182 by 4, we get 2 as the remainder so, $(128)^{182}$ will have the same unit digit as 8^2 i.e; 64, which is 4.

4. (c); Let the required square root be $\sqrt{k}$.

$$k = \frac{\{(2.25)^2 + 4^2 - 4(2.25)\}(2.25 + 4) - (2.25)^3}{(2.25 + 4)}$$

$$\Rightarrow \quad k = \frac{(2.25)^3 + 4^3 - (2.25)^3}{(2.25 + 4)}$$

[because, $(a + b)(a^2 + b^2 - ab) = a^3 + b^3$]

So, $k = \dfrac{64}{\frac{9}{4} + 4} = \dfrac{64}{\frac{25}{4}} \quad \Rightarrow \quad k = \dfrac{64 \times 4}{25} \quad \Rightarrow \quad \sqrt{k} = \dfrac{8 \times 2}{5} = \dfrac{16}{5} = 3.2$

5. (a); When unit digit is 1 or 5, the number raised to any power will have unit digit 1 and 5 respectively

when unit digit is 4 then we have two cases:

If the number is raised to odd power, then unit digit is 4. If the number is raised to even power, then unit digit is 6.

$\left\{(6374)^{1793} \times (625)^{317} \times (341)^{491}\right\}$ will have the same unit digit as the unit digit in — $4 \times 5 \times 1 = 20$

So, the required unit digit is 0.

6. (c); For the number to be divisible by 88, it must be divisible by both 8 and 11.

For the given number to be divisible by 8, the number formed by last three digits must be divisible by 8.

i.e., 29b must be divisible by 8.

$\Rightarrow \quad b = 6$

For the number to be divisible by 11, the difference of the sum of alternate digits starting from the unit digit and the sum of alternate digits starting from ten's digit must be either zero or a multiple of 11.

i.e; the difference of (3 + 2 + 6) and (5 + a + 9) is either 0 or a multiple of 11.

$\Rightarrow \quad (14 + a) - 11 = 0$

or $\quad (14 + a) - 11 = 11$ (suppose)

Clearly, it cannot be 0 as a cannot be negative.

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So,

$14 + a - 11 = 11 \Rightarrow 14 + a = 22 \Rightarrow a = 8$

So, $a = 8$, $b = 6$

7. (c); Let the number be n

then, $n \times \frac{3}{5}n = 12^2 - 3^2 \Rightarrow \frac{3}{5}n^2 = (12+3)(12-3)$

$\Rightarrow \frac{3}{5}n^2 = 15 \times 9$

$n^2 = \frac{5 \times 15 \times 9}{3} = 5 \times 5 \times 3 \times 3 \Rightarrow n = 5 \times 3 = 15$

Now, $\frac{5}{3}n = \frac{5}{3} \times 15 = 25$

8. (d); We will have to check all options.

check option (d):

$$\begin{array}{cccccc} \frac{6}{7}, & \frac{5}{6}, & \frac{4}{5}, & \frac{3}{7}, & \frac{2}{5}, & \frac{1}{3} \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 0.857 & 0.833 & 0.8 & 0.428 & 0.4 & 0.33 \end{array}$$

$\longrightarrow$ Descending order

9. (e); Let, $\sqrt{3\sqrt{3\sqrt{3\sqrt{3\sqrt{3\sqrt{3}}}}}} = x \Rightarrow x^2 = 3\sqrt{3\sqrt{3\sqrt{3\sqrt{3\sqrt{3}}}}}$

$x^4 = 3^2 \cdot 3 \cdot \sqrt{3\sqrt{3\sqrt{3\sqrt{3}}}} \Rightarrow x^8 = 3^4 \cdot 3^2 \cdot 3 \cdot \sqrt{3\sqrt{3\sqrt{3}}}$

$x^{16} = 3^{12} \cdot 3^2 \cdot 3\sqrt{3\sqrt{3}} \Rightarrow x^{32} = 3^{24} \cdot 3^4 \cdot 3^2 \cdot 3\sqrt{3}$

$x^{64} = 3^{48} \cdot 3^8 \cdot 3^4 \cdot 3^2 \cdot 3 \Rightarrow x^{64} = 3^{63}$

$x = \left(3^{63}\right)^{\frac{1}{64}} \Rightarrow x = 3^{\frac{63}{64}}$

10. (b); Let the runs scored by P, Q, and R be P, Q and R.

4P = 5Q = 7R

Let 4P = 5Q = 7R = K

$P = \frac{K}{4}$, $Q = \frac{K}{5}$, $R = \frac{K}{7}$ $\Rightarrow$ P + Q + R = 581

$\frac{K}{4} + \frac{K}{5} + \frac{K}{7} = 581$ $\Rightarrow$ $\frac{35K + 28K + 20K}{140} = 581$

83K = 140 × 581 $\Rightarrow$ $K = \frac{140 \times 581}{83}$

K = 980 $\Rightarrow$ $P = \frac{K}{4} = 245$ $\Rightarrow$ $R = \frac{K}{7} = 140$

Difference between P and R is: 245 – 140 = 105

11. (d); First number = 24

Last number = 96

96 = 24 + (n – 1) 6 (n = number of terms)

72 = (n – 1) 6 $\Rightarrow$ (n – 1) = 12 $\Rightarrow$ n = 13

12. (b); Price of x increases by 40 paise every year, while price of y increases by 15 paise every year.

in 2001, price of x = Rs. 4.20 = 420 paise

price of y = Rs. 6.30 = 630 paise

Let number of years = x

Accordig to question,

420 + 40x = 40 + 630 + 15x

25x = 250, x = 10 years

So, it will take 10 years for the price of x to be 40 paise above the price of y.

2001 + 10 = 2011

13. (a); Let the missing value be x

$24 - [2.4 - \{0.48 - 0.024 + x\}] = 22.0584$

$24 - [2.4 - 0.48 + 0.024 - x] = 22.0584$

$24 - 2.4 + 0.48 - 0.024 + x = 22.0584$

$\Rightarrow$ $x + 22.056 = 22.0584$ $\Rightarrow$ $x = 0.0024$

14. (a); $3648.24 + 364.824 \div x - 36.4824 = 3794.1696$

$$3648.24 + \frac{364.824}{x} - 36.4824 = 3794.1696$$

$$\frac{364.824}{x} = 3794.1696 - 3648.24 + 36.4824$$

$$\frac{364.824}{x} = 182.412 \quad \Rightarrow \quad x = \frac{364.824}{182.412} = 2$$

15. (e); $= 6 - \left[\frac{5}{6} + \frac{31}{8} - \frac{7}{3} + \frac{16}{9}\right] = 6 - \left[\frac{60 + 279 - 168 + 128}{72}\right] = 6 - \left[\frac{299}{72}\right]$

$$= \frac{432 - 299}{72} = \frac{133}{72} = 1\frac{61}{72}$$

16. (a); $\left[10 + \left\{4 \times \left(\overline{\frac{2}{3} + \frac{1}{4}} \times \sqrt{\frac{144}{121}} + 23\right) \div 12 + 5\right\} - 3\right]$

$$= \left[10 + \left\{4 \times \left(\frac{11}{12} \times \frac{12}{11} + 23\right) \div 12 + 5\right\} - 3\right]$$

$$= \left[10 + \left\{4 \times (1 + 23) \div 12 + 5\right\} - 3\right]$$

$$= \left[10 + \left\{4 \times 24 \div 12 + 5\right\} - 3\right] = \left[10 + \left\{8 + 5\right\} - 3\right] = 20$$

17. (d); $\left[8 + \left\{\left(\frac{21 \times \sqrt{\frac{9}{441}} - 1}{5} \text{ of } 60\% - \frac{1}{5}\right) \times 625 + 7\right\} \div 4\right]$

$$=\left[8+\left\{\left(\frac{21\times\frac{3}{21}-1}{5}\text{ of }60\%-\frac{1}{5}\right)\times 625+7\right\}\div 4\right]$$

$$=\left[8+\left\{\left(\frac{2}{5}\text{ of }60\%-\frac{1}{5}\right)\times 625+7\right\}\div 4\right]$$

$$=\left[8+\left\{\left(\frac{2}{5}\text{ of }\frac{3}{5}-\frac{1}{5}\right)\times 625+7\right\}\div 4\right]$$

$$=\left[8+\left\{\left(\frac{2}{5}\times\frac{3}{5}-\frac{1}{5}\right)\times 625+7\right\}\div 4\right]$$

$$=\left[8+\left\{\frac{1}{25}\times 625+7\right\}\div 4\right]=[8+32\div 4]=16$$

18. (d); $(0.25)^6 \div (0.125)^2 \times (0.5)^4 = (0.5)^{x+3}$

$((0.5)^2)^6 \div ((0.5)^3)^2 \times (0.5)^4 = (0.5)^{x+3}$

$(0.5)^{12} \div (0.5)^6 \times (0.5)^4 = (0.5)^{x+3}$

$(0.5)^{x+3} = (0.5)^{12-6+4}$

$(0.5)^{x+3} = (0.5)^{10} \Rightarrow x + 3 = 10 \Rightarrow x = 7$

19. (d); $\frac{17}{18}=1-\frac{1}{18},\ \frac{21}{22}=1-\frac{1}{22} \Rightarrow \frac{26}{27}=1-\frac{1}{27},\ \frac{36}{37}=1-\frac{1}{37}$

Now, $\frac{1}{18}>\frac{1}{22}>\frac{1}{27}>\frac{1}{37}$

$$\Rightarrow -\frac{1}{18}<-\frac{1}{22}<-\frac{1}{27}<-\frac{1}{37}$$

$$1-\frac{1}{18}<1-\frac{1}{22}<1-\frac{1}{27}<1-\frac{1}{37}$$

So, the greatest fraction is $\left(1-\frac{1}{37}\right)$ i.e; $\frac{36}{37}$

20. (b); Let 3.25 = a

Let the given term be k

then, $\sqrt{k} = \left[\frac{a^3}{a-1} - (a + a^2 + 1)\right]^{\frac{1}{2}}$

$$\Rightarrow \sqrt{k} = \left(\frac{a^3}{a-1} - \frac{a^3-1}{a-1}\right)^{\frac{1}{2}} = \left(\frac{1}{a-1}\right)^{\frac{1}{2}} = \left(\frac{1}{2.25}\right)^{\frac{1}{2}} = \left(\frac{1}{\frac{9}{4}}\right)^{\frac{1}{2}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$$

Previous Year (Memory Based)

1. (b);
2. (c);
3. (b); First 3 digit number completely divisible by 6 is 102.

Last 3 digit number completely divisible by 6 is 996

996 = 102 + (n – 1)6 $[a_n = a + (n-1)d]$

894 = (n – 1)6

$n - 1 = \frac{894}{6} = 149 \Rightarrow n = 150$

4. (d); Let the number be 8

$\frac{8}{5} \Rightarrow$ 3 is remainder $\Rightarrow 8^2 = 64$

$\frac{64}{5} \Rightarrow$ remainder $\rightarrow 4$

5. (c); 323.232 + 32.3232 + 3.23232 = 358.78752
6. (c);
7. (a);
8. (c); 500 + 2000 ÷ 40 × 50 = 500 + 50 × 50 = 2500 + 500 = 3000
9. (e); $\frac{601}{49} \times \frac{399}{81} \times \frac{201}{29} \approx \frac{600}{50} \times \frac{400}{80} \times \frac{200}{30} \approx 420$

10. (b);
11. (a); 40% of 440 + x% of 655 = 228.5

$$\Rightarrow \frac{x \times 655}{100} = 52 \quad \Rightarrow \quad x = \frac{100 \times 52}{655} = 8\%$$

12. (e);
13. (a); 150% of 150 + 150 = 375
14. (c); $\sqrt{2601} - \sqrt{1156} + \sqrt{484}$ = 51 – 34 + 22 = 73 – 34 = 39 $\approx$ 40
15. (e); $\frac{900}{30} \times \frac{90}{300} \times \frac{600}{50} = 9 \times 12 = 108 \approx 110$
16. (c);
17. (d); (3 + 6 – 5 + 2) + $\left(\frac{6}{7} + \frac{1}{4} - \frac{1}{3} + \frac{1}{2}\right) = 6 + \frac{107}{84} = 7\frac{23}{84}$
18. (b);
19. (a); 6000 + 2000 ÷ 40 × 50 = 6000 + 50 × 50 = 8500
20. (b); $[8^2 - 13^2 + 4^3]^2 = [64 - 169 + 64]^2 = (-41)^2 \approx 1680$
21. (a); 74% of 1300 + 10% of 1900 $\approx$ 1150
22. (c); 5900 ÷ 15 + 600 – 112 $\approx$ 880
23. (a); 2438 – 1234 + 400 – 1000 = 604 $\approx$ 600
24. (c); 22% of 500 – 42 = $\frac{x}{5.5}$

$$(110 - 42) \times 5.5 = x \quad \Rightarrow \quad x = 68 \times \frac{11}{2} = 34 \times 11 = 374 \approx 380$$

25. (c);
26. (a); $(14)^2 - (15)^2 + (18)^2 - 32$
196 – 225 + 324 – 32 = 263 $\approx$ 260
27. (b); 440 – 230 + 1650 – 1226 $\approx$ 630
28. (a); $\sqrt{625} \times \sqrt{64} + \sqrt{400} \div \sqrt{16}$ = 25 × 8 + 20 ÷ 4 = 200 + 5 = 205

29. (a); $1525 \div 20 + 500 + 250 \approx 825$

30. (a); $2440 - 1234 + 402 - 990 = 618 \approx 620$

31. (a); Let a = 0.9743, b = 0.0257

Required value is of the form $\rightarrow \dfrac{a^3 - b^3}{a^2 + ab + b^2}$

$= (a - b) = (0.9743 - 0.0257) = 0.9486$

32. (c); $\sqrt[3]{6\dfrac{35}{216}} = \sqrt[3]{\dfrac{6 \times 216 + 35}{216}} = \sqrt[3]{\dfrac{1331}{216}} = \dfrac{11}{6}$

33. (b); $\left[(8.5)^2 + 2 \cdot (8.5) \cdot (5.5) + (5.5)^2\right]^{\frac{1}{2}} \Rightarrow \left[(8.5 + 5.5)^2\right]^{\frac{1}{2}} = 14$

34. (a); Let 8.25 = a, 6.75 = b

$$\frac{a^2 + b^2 - 2ab}{a^2 - b^2} = \frac{(a-b)^2}{(a+b)(a-b)} = \frac{a-b}{a+b} = \frac{8.25 - 6.75}{8.25 + 6.75} = \frac{1.5}{15} = 0.1$$

35. (d); $\sqrt[3]{8000} + \sqrt[3]{0.027} - \sqrt[3]{0.216}$

$= 20 + 0.3 - 0.6 = 19.7$

36. (a); Let 0.146 = a, 0.092 = b

$$\Rightarrow 0.073 = \frac{a}{2} \Rightarrow 0.046 = \frac{b}{2}$$

So, the required value is of the form

$$\Rightarrow \frac{(a+b)^2 + (b-a)^2}{\left(\frac{a}{2}\right)^2 + \left(\frac{b}{2}\right)^2} = \frac{2(a^2 + b^2)}{\frac{a^2 + b^2}{4}} = 8$$

37. (a); $6\dfrac{1}{15} - 4\dfrac{1}{12} + 7\dfrac{1}{3} - 2\dfrac{1}{6} = (6 - 4 + 7 - 2) + \left(\dfrac{1}{15} - \dfrac{1}{12} + \dfrac{1}{3} - \dfrac{1}{6}\right)$

$$= 7 + \left(\frac{4 - 5 + 20 - 10}{60}\right) = 7 + \frac{9}{60} = 7 + \frac{3}{20} = 7\frac{3}{20}$$

38. (a);

39. (b); Let a = 0.6, b = – 0.1, c = – 0.4.

Then, the required value is of the form

$$\Rightarrow \frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-ab-bc-ca} = a + b + c = 0.6 - 0.1 - 0.4 = 0.1$$

40. (d); $\frac{(a+b)^2+(a-b)^2}{a^2+b^2} = 2$; $\left[\text{where, } a = 0.188,\ b = 0.077\right]$

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Chapter 2

Ratio, Proportion and Partnership

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Chapter 2

Ratio, Proportion and Partnership

The comparision between two quantities in terms of magnitude is called ratio.

For example, Mohit has 5 pens and Amit has 3 pens. It means the ratio of number of pens between Mohit and Amit is 5 is to 3. It can be expressed is 5 : 3.

So the ratio of any two quantities is expressed as $\frac{a}{b}$ or a : b. The numerator 'a' is called the antecedent and denominator 'b' is called as consequent.

Rule of Ratio: The comparison of two quantities is meaningless if they are not of the same kind or in the same units (of length, volume or currency etc.) We do not compare 5 girls and 7 toys or 15 kilometers and 3 cows. Therefore, to find the ratio of two quantities (of the same kind), it is necessary to explain them in same units.

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Properties of Ratio:

1. The nature of ratio does not change when the numerator and denominator both are multiplied by same quantities.

   i.e, $\frac{a}{b} = \frac{ka}{kb} = \frac{la}{lb}$ etc $\Rightarrow$ e.g. $\frac{3}{4} = \frac{6}{8} = \frac{9}{12}$ ... etc have the same ratio.

2. The value of a ratio does not change when the numerator and denominator both are divided by same quantities.

   i.e, $\frac{a}{b} = \frac{a/k}{b/k} = \frac{a/l}{b/l}$ etc, $\Rightarrow$ e.g. $\frac{3}{4} = \frac{3/2}{4/2} = \frac{3/3}{4/3}$. etc are in same ratio

3. The ratio of two fractions can be expressed in ratio of integers.

   e.g. $\frac{3/4}{5/4} = \frac{3}{4} \times \frac{4}{5} = \frac{3}{5}$ $\Rightarrow$ $\frac{a/b}{c/d} = \frac{a}{b} \times \frac{d}{c}$

4. When two or more than two ratio are multiplied with each other, then it is called compounded ratio e.g.,

$\frac{2}{3}\times\frac{4}{5}\times\frac{6}{7}=\frac{16}{35}$ is compounded ratio of $\frac{2}{3},\frac{4}{5},\frac{6}{7}$

So, $\frac{a}{b}\times\frac{c}{d}\times\frac{e}{f}....=\frac{k}{m}$(Compound ratio)

5. When the ratio is compounded with itself, it is called as duplicate, triplicate ratio etc.

$\frac{a}{b}\times\frac{a}{b}=\frac{a^2}{b^2}=\left(\frac{a}{b}\right)^2$ is called duplicate ratio of $\frac{a}{b}$ and $\frac{a}{b}\times\frac{a}{b}\times\frac{a}{b}=\left(\frac{a}{b}\right)^3$ is called triplicate ratio of $\frac{a}{b}$ similarly $\sqrt{\left(\frac{a}{b}\right)}=\left(\frac{a}{b}\right)^{\frac{1}{2}}$ is called as sub-duplicate ratio and $\sqrt[3]{\left(\frac{a}{b}\right)}=\left(\frac{a}{b}\right)^{\frac{1}{3}}$ is called as sub-triplicate ratio of $\frac{a}{b}$. If four quantities a, b, c and d form a proportion, many other proportions may be deduced by the properties of fraction. The results of these operation are very useful. These operations are

1. Inverterdo: if $\frac{a}{b}=\frac{c}{d}$ the $\frac{b}{a}=\frac{d}{c}$

2. Alternado: if $\frac{a}{b}=\frac{c}{d}$ then $\frac{a}{c}=\frac{b}{d}$

3. Componendo: if $\frac{a}{b}=\frac{c}{d}$, then $\left(\frac{a+b}{b}\right)=\left(\frac{c+d}{d}\right)$

4. Dividendo: if $\frac{a}{b}=\frac{c}{d}$, then $\left(\frac{a-b}{b}\right)=\left(\frac{c-d}{d}\right)$

5. Componendo and Dividendo: if $\frac{a}{b}=\frac{c}{d}$, then $\frac{a+b}{a-b}=\frac{c+d}{c-d}$

Concept 1: If two numbers are in the ratio of a : b and the sum of these number is x, then these numbers will be

$\frac{ax}{a+b}$ and $\frac{bx}{a+b}$ respectively.

Example : Two numbers are in the ratio of 4 : 5. If sum of these two number is 810, find the numbers?

Sol. Ratio of two number = 4 : 5

Sum = 810

First number = $\frac{ax}{a+b}=\frac{4\times810}{4+5}=360$

Second number = $\frac{bx}{a+b}=\frac{5\times810}{4+5}=450$

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Example: a : b = 3 : 4 and b : c = 2 : 5 Find a : b : c ?

Sol.

$$\begin{array}{l} a : b = 3 : 4 \\ \quad\quad\;\; \downarrow \nearrow \downarrow \\ b : c = 2 : 5 \\ \hline a : b : c = 3\times2 : 4\times2 : 4\times5 \\ \quad\quad\quad\quad = 6 : 8 : 20 \\ \quad\quad\quad\quad = 3 : 4 : 10 \end{array}$$

Example: a : b = 1 : 2, b : c = 3 : 2, and c : d = 1 : 3. Find a : b : c : d?

Sol.

$$\begin{array}{cccc} a & b & c & d \\ 1 & 2 \rightarrow & 2 \rightarrow & 2 \\ 3 \leftarrow & 3 & 2 \rightarrow & 2 \\ 1 \leftarrow & 1 \leftarrow & 1 & 3 \\ \hline \end{array}$$

$$\begin{array}{l} a : b : c : d = 1\times3\times1 : 2\times3\times1 : 2\times2\times1 : 2\times2\times3 \\ \quad\quad\quad\quad = 3 : 6 : 4 : 12 \end{array}$$

Partnership

Concept 1: If a group of n persons invested different amount for different period then their profit is the ratio is $At_1 : Bt_2 : Ct_3 : Dt_4 : .....: Xt_n$

Here first person invested amount A for t_1 period, second persons invested amount B for t_2 period and so on.

Example: A starts a business with Rs 2,000, B joins him after 3 months with Rs 4,000. C puts a sum of Rs 10,000 in the business for 2 months only. At the end of the year the business gave a profit of Rs 5600. How should the profit be divided among them ?

Sol: Ratio of their profits (A's : B's : C's) = 2 × 12 : 4 × 9 : 10 × 2 = 6 : 9 : 5

Now, 6 + 9 + 5 = 20

Then A's share = $\frac{5600}{20} \times 6$ = Rs 1680

B's share = $\frac{5600}{20} \times 9$ = Rs 2520

C's share = $\frac{5600}{20} \times 5$ = Rs 1400

Concept 2: If investments are in the ratio of a : b : c and the timing of their investments in the ratio of x : y : z then the ratio of their profits are in the ratio of ax : by : cz.

Example : A, B and C invested capital in the ratio 2 : 3 : 5, the timing of their investments being in the ratio 4 : 5 : 6. In what ratio would their profit be distributed?

Sol. We should know that if the duration for their investments be in the ratio x : y : z, and investment is in ratio a : b : c then the profit would be distributed in the ratio ax : by : cz.

Thus, following the same rule, the required ratio = 2 × 4 : 3 × 5 : 5 × 6 = 8 : 15 : 30

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Concept 3: If investments are in the ratio a : b : c and profits in the ratio p : q : r, then the ratio of time is $\frac{p}{a} : \frac{q}{b} : \frac{r}{c}$.

Example : A, B and C invested capital in the ratio 5 : 6 : 8. At the end of the business term, they received the profits in the ratio 5 : 3 : 12. Find the ratio of time for which they contributed their capital?

Sol: Using the above formula, we have the required ratio

$$= \frac{5}{5} : \frac{3}{6} : \frac{12}{8} = 1 : \frac{1}{2} : \frac{3}{2} : 2 : 1 : 3$$

Types of Questions

1. A sum of Rs 9000 is to be distributed among A, B and C in the ratio 4 : 5 : 6. What will be the difference between A's and C's shares ?

Sol. Total amount = Rs 9000

A's share = 4x $\Rightarrow$ B's share = 5x

and C's share = 6x

Then, 4x + 5x + 6x = 9000 $\Rightarrow$ 15x = 9000; $\therefore$ x = 600

Now, A's share = 4 × 600 = Rs 2400 and

C's share = 6 × 600 = Rs 3600

Difference between A's and C's share = Rs (3600 – 2400) = Rs 1200

2. Rs 6400 are divided among three workers in the ratio $\frac{3}{5} : 2 : \frac{5}{3}$. The share (in Rs) of the second worker is

Sol. Total amount = 6400

Let first worker's share = $\frac{3}{5}x$

Second worker's share = 2x

Third worker's share = $\frac{5}{3}x$

Then, $\frac{3}{5}x + 2x + \frac{5}{3}x = 6400$

$\Rightarrow \frac{9x + 30x + 25x}{15} = 6400 \Rightarrow 64x = 6400 \times 15 = 1500$

$\therefore$ Second worker's share = 1500×2 = 3000

3. A boy, after giving away 80% of his pocket money to one companion and 6% of the reminder to another, has Rs 47 left with him. How much pocket money did the boy have in the beginning ?

Sol. Let the boy had Rs x.

Money given to first companion = 80% of $x = \frac{4x}{5}$

Remaining money = $x - \frac{4x}{5} = \frac{x}{5}$

Money given to the another companion = $\frac{6}{100} \times \frac{x}{5} = \frac{3x}{250}$

Remaining money = $\frac{x}{5} - \frac{3x}{250} = \frac{50x - 3x}{250} = \frac{47x}{250}$

$\therefore \frac{47x}{250} = 47 \Rightarrow x = \frac{47 \times 250}{47} = \text{Rs}\,250$

4. Rs 180 contained in a box consists of Rs 1,50 paise and 25 paise coins in the ratio 2 : 3 : 4. What is the number of 50 paise coins ?

Sol. Ratio of the values of the coins = $2 : \frac{3}{2} : \frac{4}{4} = 2 : \frac{3}{2} : 1$ = 4 : 3 : 2

Sum of the ratios = 4 + 3 + 2 = 9

$\therefore$ Values of 50 paise coins = $\frac{3}{9} \times 180 = \text{Rs.}60$

Numbers of 50 paise coins = 120

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5. A, B and C enter into a partnership with shares in the ratio $\frac{7}{2}:\frac{4}{3}:\frac{6}{5}$. After 4 months, A increase his share by 50%. If the total profit at the end of the year was Rs 43200. Then, the B's share in the profit is:

Sol. Ratio of initial shares of A, B and C in the partnership

$$A : B : C = \frac{7}{2}:\frac{4}{3}:\frac{6}{5} = \frac{7\times15}{2\times15}:\frac{4\times10}{3\times10}:\frac{6\times6}{5\times6} = \frac{105}{30}:\frac{40}{30}:\frac{36}{30}$$

(LCM of 2, 3, 5 = 30) = 105 : 40 : 36

Let the respective shares of A, B and C be Rs 105x, Rs 40x and Rs 36x

New shares of A, B and C in the partnership

$$A = \text{Rs } 105x \text{ for 4 months} + 105x\times\frac{150}{100} \text{ for 8 months}$$

$$= (105x \times 4) + \left(105x\times\frac{3}{2}\times8\right) = 420x + 1260x = 1680x$$

B = 40x for 12 months = 40x × 12 = 480x

C = 36x for 12 months = 36x × 12 = 432 x

A : B : C = 1680 : 480 : 432 = 35 : 10 : 9

It is a type of simple partnership, so the profit or loss of the business is distributed among the investors in the ratio of their invested money.

∴ B's share in profit

$$= \frac{\text{B's investment}}{(A+B+C)\text{'s investment}}\times\text{Total profit}$$

$$= \frac{10}{35+10+9}\times43200 = \frac{10}{54}\times43200 = 8000$$

Hence, B's share in the profit = Rs 8000.

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7. In a business partnership among A, B, C and D, the profit is shared as follows

$$\frac{A's\,share}{B's\,share} = \frac{B's\,share}{C's\,share} = \frac{C's\,share}{D's\,share} = \frac{1}{3}$$

If the total profit is Rs 400000, the share of C is:

Sol. Given, A : B = 1 : 3

B : C = 1 : 3 = 3 : 9

C : D = 1 : 3 = 9 : 27

Now, by joining the above three ratios, we get

A : B : C : D = 1 : 3 : 9 : 27

Sum of the ratios = 1 + 3 + 9 + 27 = 40

$\therefore$ C's share in profit = $\frac{9}{40} \times 400000 = \text{Rs}\,90000$

8. A started a business with a capital of Rs 100000. 1 yr later, B joined him with a capital of Rs 200000. At the end of 3 yr from the start of the business, the profit earned was Rs 84000. The share of B in the profit exceeded the share of A by

Sol. Ratio of equivalent capitals of A and B

= 100000 × 36 : 200000 × 24 = 36 : 48 = 3 : 4

Profit gained by A = $\frac{3}{7} \times 84000 = 36000$

Profit gained by B = $\frac{4}{7} \times 84000 = 48000$

Required difference = 48000 – 36000 = Rs. 12000

9. The ratio of income of A and B is 3 : 4 If the ratio of expenditure of both is 2 : 3 and each save Rs 200, find the income of both A and B?

Sol. Income – Saving = Expenditure

According to question

Let the income of A and B be 3x and 4x respectively

$\frac{3x-200}{4x-200}=\frac{2}{3}$, x = 200

Income of A = 3x = 3 × 200 = 600

Income of B = 4x = 4 × 200 = 800

10. Rs 7800 distributed among A, B, and C. The share of A is $\frac{3}{4}$th of the share of B, and share of B is $\frac{2}{3}$th of the share of C. Then, find the difference between share of B and C?

Sol. $A=\frac{3}{4}B \Rightarrow A:B=3:4$ $B=\frac{2}{3}C \Rightarrow B:C=2:3$

A : B : C = 6 : 8 : 12 = 3 : 4 : 6

Share of B = $\frac{4}{13}\times 7800=2400$

Share of C = $\frac{6}{13}\times 7800=3600$

Difference of share between B and C = Rs. 1200

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Foundation

1. One year ago the ratio of Ramu and Somu age was 6 : 7 respectively. Four years hence their ratio would become 7 : 8. How old is Somu?
   (a) 24 years (b) 30 years (c) 32 years
   (d) 36 years (e) None of these
2. If 33% of A is equal to 55% of B then find the ratio of A and B?
   (a) 3 : 5 (b) 5 : 3 (c) 3 : 4
   (d) 5 : 4 (e) None of these
3. What is the value of 68% of two fifth of 550?
   (a) 149.6 (b) 150 (c) 154
   (d) 158 (e) None of these

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4. If 24 is deducted from 45% of a number result becomes 48. What will be $\frac{3}{8}$ part of that number?

(a) 140 (b) 130 (c) 145
(d) 150 (e) 60

5. 30% of a number is 190.8. What will be 175% of that number?

(a) 1113 (b) 1115 (c) 1502
(d) 1002 (e) None of these

6. What will be 32% of 3/8 th of 1000?

(a) 115 (b) 125 (c) 120
(d) 129 (e) None of these

7. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:

(a) 2 : 5 (b) 3 : 5 (c) 4 : 5
(d) 6 : 7 (e) None of these

8. A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Rs. 1000 more than D, what is B's share?

(a) Rs. 500 (b) Rs. 1500 (c) Rs. 2000
(d) Rs. 2400 (e) None of these

9. If 0.75 : x : : 5 : 8, then x is equal to:

(a) 1.12 (b) 1.2 (c) 1.25
(d) 1.30 (e) None of these

10. The sum of three numbers is 98. If the ratio of the first to second is 2 : 3 and that of the second to the third is 5 : 8, Then the second number is:

(a) 20 (b) 30 (c) 48
(d) 58 (e) None of these

11. If Rs. 872 is divided into three parts, proportional to $\frac{1}{2}:\frac{2}{3}:\frac{3}{4}$, then the first part is:
(a) Rs. 182 (b) Rs. 190 (c) Rs. 196
(d) Rs. 204 (e) None of these

12. The fourth proportional to 5, 8, 15 is:
(a) 18 (b) 24 (c) 19
(d) 20 (e) None of these

13. Two numbers are in the ratio 3 : 5. If 9 is subtracted from each, then new numbers are in the ratio 12 : 23. The smaller number is :
(a) 27 (b) 33 (c) 49
(d) 55 (e) None of these

14. If a number is reduced by 40% it become two third of another number. What is ratio of the second number to first number?
(a) 6 : 10 (b) 9 : 8 (c) 8 : 9
(d) 10 : 9 (e) None of these

15. $\frac{5a+3b}{2a-3b}=\frac{23}{5}$ then the value of a : b is:
(a) 1 : 2 (b) 1 : 3 (c) 1 : 4
(d) 2 : 3 (e) None of these

16. If P : Q = 8 : 15 and Q : R = 3 : 2, then find P : Q : R?
(a) 8 : 15 : 7 (b) 7 : 15 : 8 (c) 8 : 15 : 10 (d) 10 : 15 : 8 (e) None of these

17. If P : Q = 8 : 15, Q : R = 5 : 8 and R : S = 4 : 5, then P : S is equal to:
(a) 4 : 15 (b) 2 : 15 (c) 3 : 19
(d) 7 : 15 (e) None of these

18. Find the 4th proportional to 4, 16 and 7?
(a) 28 (b) 29 (c) 22
(d) 25 (e) None of these

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19. Find the mean proportional between 9 and 64?
(a) 25 (b) 24 (c) 27
(d) 35 (e) None of these

20. What will be the duplicate ratio of 2 : 7 ?
(a) 4 : 49 (b) 49 : 4 (c) 4 : 14
(d) 8 : 343 (e) None of these

21. Find the sub-duplicate ratio of 81 : 64?
(a) 8 : 9 (b) 4 : 9 (c) 9 : 8
(d) 7 : 8 (e) None of the above

22. Find the triplicate ratio of 7 : 5?
(a) 125 : 343 (b) 343 : 125 (c) 344 : 125
(d) 343 : 126 (e) None of these

23. What will be the inverse ratio of 17 : 19?
(a) 19 : 17 (b) 18 : 17 (c) 17 : 18
(d) 19 : 5 (e) None of the above

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24. Find the compound ratio of 2 : 7, 5 : 3 and 4 : 7?
(a) 147 : 40 (b) 40 : 147 (c) 147 : 30
(d) 30 : 147 (e) None of the above

25. If A : B = 3 : 4 and B : C = 8 : 9, then find the value of A : B : C?
(a) 3 : 4 : 5 (b) 1 : 2 : 3 (c) 7 : 12 : 17
(d) 6 : 8 : 9 (e) None of the above

26. If a : b = 3 : 5 and b : c = 4 : 7, then a : c is equal to:
(a) 11 : 35 (b) 35 : 11 (c) 35 : 12
(d) 12 : 35 (e) None of the above

27. If P : Q : R = 2 : 3 : 4 , then find $\frac{P}{Q} : \frac{Q}{R} : \frac{R}{P}$?
(a) 8 : 9 : 24 (b) 9 : 8 : 24 (c) 24 : 8 : 9
(d) 8 : 24 : 9 (e) None of these

28. If $\frac{a}{3} = \frac{b}{8}$, then (a + 3) : (b + 8) is equal to:

(a) 3 : 8 (b) 8 : 3 (c) 5 : 8
(d) 3 : 5 (e) None of these

29. The ratio of $4^{3.5} : 2^5$ is same is:

(a) 2 : 1 (b) 4 : 1 (c) 7 : 5
(d) 7 : 10 (e) None of these

30. If 2 : x : : 5 : 7, then x is equal to:

(a) 1.12 (b) 2.80 (c) 1.25
(d) 1.30 (e) None of these

31. The salaries of A, B, C are in the ratio 2 : 3 : 5 . If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be the new ratio of their salaries?

(a) 3 : 3 : 10 (b) 10 : 11 : 20 (c) 23 : 33 : 60
(d) 25 : 27 : 29 (e) None of these

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32. If Rs. 782 be divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$, then the first part is:

(a) Rs. 182 (b) Rs. 190 (c) Rs. 196
(d) Rs. 204 (e) None of these

33. Two numbers are in the ratio 1 : 2. If 7 is added to both, they changes to 3 : 5. The greatest number is:

(a) 24 (b) 26 (c) 28
(d) 32 (e) None of these

34. The ratio of three numbers is 3 : 4 : 5 and the sum of their squares is 1250. The sum of the numbers is :

(a) 30 (b) 50 (c) 60
(d) 90 (e) None of these

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35. Sachin is younger than Rahul by 4 years. If their ages are in the respective ratio of 7 : 9, how old is Sachin?
(a) 16 years (b) 18 years (c) 14 years
(d) 15 years (e) None of these

36. At present, the ratio between the ages of Arun and Deepak is 4 : 3. After 6 years. Arun's age will be 26 years. What is the age of Deepak at present?
(a) 12 years (b) 15 years (c) $19\frac{1}{2}$ years
(d) 21 years (e) None of these

37. Present ages of X and Y are in the ratio 5 : 6 respectively. Seven year hence this ratio will become 6 : 7 respectively. What is X's present age in years?
(a) 35 (b) 42 (c) 49
(d) Cannot be determined (e) None of these

38. Present ages of Sameer and Anand are in the ratio of 5 : 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years?
(a) 24 (b) 27 (c) 40
(d) Cannot be determined (e) None of these

39. The total of the ages of Jayant, Prem and Saransh is 93 years. Ten years ago, the ratio of their ages was 2 : 3 : 4. What is the present age of Saransh?
(a) 24 years (b) 32 years (c) 34 years
(d) 38 years (e) None of these

40. Hitesh is 40 years old and Ronnie is 60 years old. How many years ago was the ratio of their ages 3 : 5?
(a) 5 years (b) 10 years (c) 20 years
(d) 37 years (e) None of these

41. Aditya and Sanjay started a business investing 45000 and 30000 respectively. What will be the ratio between their profit?

(a) 2 : 3 (b) 3 : 2 (c) 4 : 9 (d) Cant be determined (e) None of these

42. Mahesh and Kishore started a business with investing Rs. 60,000 and Rs. 50,000 respectively. If after 1 year they earned Rs. 33,000 profit, what will be kishore share?

(a) 15,000 (b) 30,000 (c) 35,000
(d) 20,000 (e) None of these

43. Anil and Nikhil started a business with investing Rs. 3300 and Rs. 5000 respectively. If they earned profit of 1660 then what will be Anil's share?

(a) 640 (b) 650 (c) 655
(d) 660 (e) None of these

44. Rahul started a business by investing Rs. 45,000. 6 months later Sanjay joined him with Rs. 30,000. In what ratio should the earned profit be distributed at the end of the year?

(a) 1 : 3 (b) 3 : 1 (c) 2 : 3
(d) 3 : 2 (e) None of these

45. Anil, Nikhil and Saurabh started a business in partnership by investing in the ratio of 6 : 5 : 8 respectively. At the end of the year they earned a profit of Rs. 83,600. What will be Saurabh's share?

(a) Rs. 30,200 (b) Rs. 35,200 (c) Rs. 32,500
(d) Rs. 34,000 (e) None of these

46. Ram, Karan and Rohan invested capital in the ratio of 2 : 3 : 4 for time period of 6 : 4 : 3. Find the ratio of profit distributed?

(a) 12 : 13 : 14 (b) 13 : 12 : 14 (c) 13 : 14 : 12
(d) 14 : 12 : 13 (e) None of these

47. Ravi and Kavi start a business by investing Rs. 8000 and Rs. 72000, respectively. Find the ratio of their profits at the end of year.

(a) 2 : 9 (b) 5 : 9 (c) 7 : 9
(d) 1 : 9 (e) None of these

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48. Srikant and Vividh started a business investing amounts of Rs. 185000 and Rs. 225000, respectively. If Vividh's share in the profit earned by them is Rs. 9000, what is the total profit earned by them together?
(a) Rs. 17400 (b) Rs. 16400 (c) Rs. 16800
(d) Rs. 17800 (e) None of these

49. Rajan and Sajan started a business initially with Rs. 14200 and Rs. 15600, respectively. If total profits at the end of year is Rs. 74500, what is the Rajan's share in the profit?
(a) Rs. 39000 (b) Rs. 39600 (c) Rs. 35000
(d) Rs. 35500 (e) None of these

50. A starts a business with Rs. 4000 and B joins him after 3 months with Rs. 16000. Find the ratio of their profits at the end of year.
(a) 1 : 3 (b) 2 : 3 (c) 1 : 9
(d) 1 : 7 (e) None of these

Moderate

1. The difference between a two-digit number and the number obtained by interchanging the digits is 36. What is the difference between the sum and the difference of the digits of the number if the ratio between the digits of the number is 1 : 2 ?
(a) 4 (b) 8 (c) 16
(d) 20 (e) None of these

2. Seats for Mathematics, Physics and Biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?
(a) 2 : 3 : 4 (b) 6 : 7 : 8 (c) 6 : 8 : 9
(d) 4 : 8 : 9 (e) None of these

3. In a mixture 60 litres, the ratio of milk and water is 2 : 1. What quantity of water should be added so that the ratio becomes 1 : 3?
(a) 80 L (b) 100 L (c) 120 L
(d) 60 L (e) None of these

4. The ratio of the number of boys and girls in a college is 7 : 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio?

(a) 8 : 9 (b) 17 : 18 (c) 21 : 22
(d) Can't be determined (e) None of these

5. Salaries of Ravi and Sumit are in the ratio 2 : 3. If the salary of each is increased by Rs. 4000, the new ratio becomes 40 : 57. What is Sumit's salary?

(a) Rs. 17,000 (b) Rs. 20,000 (c) Rs. 25,500
(d) Rs. 34,000 (e) None of these

6. The salaries of A, B and C are in the ratio 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be new ratio of their salaries?

(a) 3 : 3 : 10 (b) 10 : 11 : 20 (c) 23 : 33 : 60
(d) 3 : 4 : 5 (e) None of these

7. In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 2 : 3 : 4. If there is Rs. 50 in all, how many 5 p coins are there?

(a) 50 (b) 100 (c) 50
(d) 200 (e) None of these

8. A sum of money is divided among C, A and B in ratio of 4 : 5 : 6 and another sum of money is divided between M and N equally if B got 2000 more than M then how much C get?

(a) Rs. 1000 (b) Rs. 500 (c) Rs. 4000
(d) Can't be determined (e) None of these

9. Three number A, B and C are in ratio of 12 : 15 : 25. If sum of these numbers be 364 find the ratio between difference of B and A and the difference of C and B?

(a) 3 : 2 (b) 3 : 10 (c) 3 : 5
(d) 4 : 2 (e) None of these

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10. $\frac{625}{x} = \frac{x}{1156}$ then what will be the value of x

(a) 800 (b) 850 (c) 900
(d) 950 (e) None of these

11. A mixture contains alcohol and water in the ratio 4 : 3. If 5 liters of water is added to the mixture, the ratio becomes 4 : 5. Find the quantity of alcohol in the given mixture.

(a) 5 Ltr. (b) 7.5 Ltr. (c) 10 Ltr.
(d) 12 Ltr. (e) 15 Ltr.

12. In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 1 : 2 : 3. If there are Rs. 30 in all, how many 5 p coins are there?

(a) 50 (b) 100 (c) 150
(d) 200 (e) None of these

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13. If Rs. 510 be divided among A, B, C in such a way that A gets $\frac{2}{3}$ of what B gets and B gets $\frac{1}{4}$ of what C gets, then their shares are respectively:

(a) Rs. 120, Rs. 240, Rs. 150
(b) Rs. 60, Rs. 90, Rs. 360
(c) Rs. 150, Rs. 300, Rs. 60
(d) Rs. 70, Rs. 90, Rs. 350
(e) None of these

14. Rs. 366 are divided among A, B and C so that A may get $\frac{1}{2}$ as much as B and C together, B may get $\frac{2}{3}$ as much as A and C together, then the share of A is :

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(a) Rs. 122 (b) Rs. 129.60 (c) Rs. 146. 60
(d) Rs. 183 (e) None of these

15. Ratio of the earnings of A and B is 4 : 7. If the earnings A increase by 50% and those of B decrease by 25%, the new ratio of their earnings becomes 8 : 7. What are A's earnings?

(a) Rs. 21,000 (b) Rs. 26,000 (c) Rs. 28,000
(d) Data inadequate (e) None of these

16. An amount of Rs. 735 was divided between A, B and C. If each of them had received Rs. 25 less, their shares would have been in the ratio of 1 : 3 : 2. The money received by C was :

(a) Rs. 195 (b) Rs. 200 (c) Rs. 225
(d) Rs. 245 (e) None of these

17. An amount of Rs. 2430 is divided among A, B and C such that if their shares be reduced by Rs. 5, Rs. 10 and Rs. 15 respectively, the remainders shall be in the ratio of 3 : 4 : 5. Then, B's share was :

(a) Rs. 605 (b) Rs. 790 (c) Rs. 800
(d) Rs. 810 (e) None of these

18. Gold is 19 times as heavy as water and copper is 9 times as heavy as water. In what ratio should these be mixed to get an alloy 15 times as heavy as water ?

(a) 1 : 1 (b) 2 : 3 (c) 1 : 2
(d) 3 : 2 (e) None of these

19. 15 litres of mixture contains 20% alcohol and the rest water. If 3 litres of water be mixed with it, the percentage of alcohol in the new mixture would be :

(a) 15% (b) $16\frac{2}{3}\%$ (c) 17%
(d) $18\frac{1}{2}\%$ (e) None of these

20. 85 L of a mixture contains milk and water in the ratio 27 : 7. How much more water is to be added to get a new mixture containing milk and water in the ratio 3 : 1 ?

(a) 5 L (b) 6.5 L (c) 7.25 L
(d) 8 L (e) None of these

21. The sides of a triangle are in the ratio $\frac{1}{2}:\frac{1}{3}:\frac{1}{4}$ and its perimeter is 104cm. The length of the longest side is :

(a) 52 cm (b) 48 cm (c) 32 cm
(d) 26 cm (e) None of these

22. The ratio of the number of boys and girls in a school is 3 : 2. If 20% of the boys and 25% of the girls are scholarship holders, what percentage of the students does not get the scholarship?

(a) 56 (b) 70 (c) 78
(d) 80 (e) None of these

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23. Three containers have volumes in the ratio 3 : 4 : 5. They are full of mixtures of milk and water. The mixtures contain milk and water in the ratio of 4 : 1, 3:1 and 5 : 2 respectively. The contents of all these three containers are poured into a fourth container. The ratio of milk and water in the fourth container is:

(a) 4 : 1 (b) 151 : 48 (c) 157 : 53
(d) 5 : 2 (e) None of these

24. x varies inversely as square of y. Given that y = 2 for x = 1. The value of x for y = 6 will be equal to :

(a) 3 (b) 9 (c) $\frac{1}{3}$
(d) $\frac{1}{9}$ (e) None of these

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25. The electricity bill of a certain establishment is partly fixed and partly varies as the number of units of electricity consumed. When in a certain month 540 units are consumed, the bill is Rs. 1800. In another month 620 units are consumed and the bill is Rs. 2040. In yet another month 500 units are consumed. The bill for that month would be :
(a) Rs. 1560 (b) Rs. 1680 (c) Rs. 1840
(d) Rs. 1950 (e) None of these

26. The ratio of the incomes of A and B is 5 : 4 and the ratio of their expenditures is 3 : 2. If at the end of the year, each saves Rs. 1600, then the income of A is :
(a) Rs. 3400 (b) Rs. 3600 (c) Rs. 4000
(d) Rs. 4400 (e) None of these

27. A and B are two alloys of gold and copper prepared by mixing metals in the ratio 7 : 2 and 7 : 11 respectively. If equal quantities of the alloys are melted to form a third alloy C, the ratio of gold and copper in C will be :
(a) 5 : 7 (b) 5 : 9 (c) 7 : 5
(d) 9 : 5 (e) None of these

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28. The ratio between the present ages of P and Q is 5 : 7 respectively. If the difference between Q's present age and P's age after 6 years is 2, what is the total of P's and Q's present ages?
(a) 48 years (b) 52 years (c) 56 years
(d) Cannot be determined (e) None of these

29. The ratio of the father's age to his son's age is 7 : 3. The product of their ages is 756. The ratio of their ages after 6 years will be :
(a) 5 : 2 (b) 2 : 1 (c) 11 : 7
(d) 13 : 9 (e) None of these

30. The present ages of three persons are in proportions 4 : 7 : 9. Eight years ago, the sum of their ages was 56. Find their present ages (in years).
(a) 8, 20, 28 (b) 16, 28, 36 (c) 20, 35, 45
(d) 13, 16, 25 (e) None of these

31. The ratio of the ages of a man and his wife is 4 : 3. After 4 years, this ratio will be 9 : 7. If at the time of marriage, the ratio was 5 : 3, then how many years ago were they married?
(a) 8 years (b) 10 years (c) 12 years
(d) 15 years (e) None of these

32. The ratio between the present ages of A and B is 5 : 3 respectively. The ratio between A's age 4 years ago and B's age 4 years hence is 1 : 1. What is the ratio between A's age 4 years hence and B's age 4 years ago ?
(a) 1 : 3 (b) 2 : 1 (c) 3 : 1
(d) 4 : 1 (e) None of these

33. A person's present age is two-fifth of the age of his mother. After 8 years, he will be one-half of the age of his mother. How old is the mother at present ?
(a) 32 years (b) 36 years (c) 40 years
(d) 48 years (e) None of these

34. Four years ago, the father's age was three times the age of his son. The total of the ages of the father and the son after four years, will be 64 years. What is the father's age at present?
(a) 32 years (b) 36 years (c) 44 years
(d) Data inadequate (e) None of these

35. The present ages of Reena and Usha are 24 and 36 yr, respectively. What was the ratio between the ages of Usha and Reena respectively 8 yr ago?
(a) 7 : 4 (b) 4 : 7 (c) 11 : 8
(d) 8 : 11 (e) None of the above

36. At present Anil is 1.5 times of Purvi's age. 8 yr hence, the respective ratio between Anil and Purvi's ages will be 25 : 18. What is Purvi's present age?
(a) 50 yr (b) 28 yr (c) 42 yr
(d) 36 yr (e) None of these

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37. The difference between the ages of Meena and Seema is 3 yr and the ratio between their ages is 7 : 8. What is the sum of their ages?
(a) 43 yr (b) 41 yr (c) 45 yr
(d) 48 yr (e) 47 yr

38. The ratio of the present age of Manoj to that of Wasim is 3 : 11. Wasim is 12 yr younger than Rehana. Rehana's age after 7 yr will be 85 yr. What is the present age of Manoj's father, who is 25 yr older than Manoj?
(a) 43 yr (b) 67 yr (c) 45 yr
(d) 69 yr (e) None of the above

39. The ratio between the present ages of Indira and Lizzy is 3 : 8, respectively. After 8 yr, Indira's age will be 20 yr. What was Lizzy's age 5 yr ago?
(a) 37 yr (b) 27 yr (c) 28 yr
(d) 38 yr (e) None of these

40. At present, Kavita is twice Sarita's age. 8 yr hence, the respective ratio between Kavita's and Sarita's ages will be 22 : 13. What is Kavita's present age?
(a) 26 yr (b) 18 yr (c) 42 yr
(d) 36 yr (e) None of the above

41. 10 yr before, the ratio of ages of A and B was 13 : 17. After 17 yr from now, the ratio of their ages will be 10 : 11. The present age B is
(a) 23 yr (b) 40 yr (c) 27 yr
(d) 44 yr (e) None of these

42. Ram, Rohan and Karn invested in business in the ratio of 3 : 2 : 5 respectively. If Ram earn 100% more profit than Rohan and Karn earns 40% more profit than Rohan. What will be the share of Rohan in profit?
(a) 2350 (b) 3640 (c) 1235
(d) Can't be Determined (e) None of these

43. Ram started a business by investing Rs. 45000. After 3 Months, Sanjay joined him with a capital of Rs. 60,000. After 6 Months, Aditya joined them with a capital of Rs. 90,000. At the end of the year they earned a profit of Rs. 16500. What is the Ram share in business?

(a) 6600 (b) 5900 (c) 5500
(d) 5000 (e) None of these

44. Ram and Anil enter into partnership for a year. Ram invests Rs. 1200 and Anil invests Rs. 1500. After 3 month, Aditya enters with Contribution of Rs. 900. If Anil withdraws his Money after 6 Months. What will be the share of Aditya, if the profit is Rs. 2450?

(a) Rs. 700 (b) Rs. 1820 (c) Rs. 630
(d) Rs. 1120 (e) None of these

45. A bag contains 10-paise and 25-paise coins in the ratio of 17 : 6. If the total money in the bag is Rs. 112, the number of 10-paise coins is

(a) 35 (b) 210 (c) 490
(d) 595 (e) None of these

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46. P & Q enter into a partnership. P puts in Rs. 50 and Q puts Rs. 45. At the end of the 4 months P withdraws half his capital and at the end of 5th month Q withdraws half of his capital. S then enter into with the capital of Rs. 70. At the end of 12 months they got profit of Rs. 1272.5 What was S share in the profit?

(a) 460 (b) 480 (c) 490
(d) Can't be determined (e) None of these

47. A and B enter into a partnership by investing Rs. 12000 and Rs. 16000 respectively. After 4 months B withdraws Rs. 6000 and A invest Rs. 5000 more. After 2 more months C joined with Rs. 20,000 capital. What will be A's share in profit if total profit of Rs. 30,100 is earned at the end of one year?

(a) 12360.5 (b) 12365 (c) 12362.5
(d) Can't be determined (e) None of these

48. P, Q and R invested their capital in the ratio of 8 : 6 : 5 at the end of the business they received the profit in the ratio of 1 : 3 : 5. Find the ratio of time for which they contributed their capital?

(a) 1 : 4 : 8 (b) 4 : 1 : 8 (c) 8 : 4 : 1
(d) Can't be determined (e) None of these

49. Aditya and Manish continued in a joint business for 36 months. Aditya contribute Rs. 300 for certain time and Manish invested Rs. 500 for remaining time. If out of total profit of Rs. 1020, Aditya gets Rs. 495, then for how long Aditya kept his money?

(a) 16 months (b) 14 months (c) 8 months
(d) Can't be determined (e) None of these

50. Aditya, Manish and Gaurav enter into partnership with shares in the ratio of 7/2 : 4/3 : 6/5. After 4 months, Aditya increase his share by 50%. If at the end of one year profit be Rs. 43200. Then what will be Manish share in profit?

(a) 8000 (b) 7200 (c) 28000
(d) 24400 (e) None of these

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Difficult

1. An alloy of copper and zinc is taken in the ratio 1 : 2, and another alloy of the same metal is taken in the ratio of 2 : 3. How many parts of the two alloys must be taken to obtain a new alloy consisting of copper and zinc that are in the ratio 3 : 5?

(a) 7 and 9 (b) 5 and 7 (c) 3 and 5
(d) 5 and 3 (e) None of these

2. In two alloys, gold and silver are in the ratios of 4 : 1 and 1 : 3. After alloying together 10 kg. of the first alloy, 16 kg. of the second and several kilograms of pure gold, an alloy was obtained in which the ratio of gold to silver was 3 : 2. Find the weight of the new alloy.

(a) 12 kg. (b) 19 kg. (c) 24 kg.
(d) 35 kg. (e) None of these

3. Rs. 5625 are divided among A, B and C so that A received half as much as B and C together and B received one fourth as much as A and C together. Find the sum of A's and B's share together.
   (a) Rs. 2500 (b) Rs. 3000 (c) Rs. 1500
   (d) Rs. 4000 (e) None of these
4. A man spends Rs. 2310 on an average during the first 8 month from the income. During next 4 months he spends Rs. 1800 on an average from his income but he had taken a loan of Rs. 1680 apart from his income to meet his both ends. If he spent all what he had then the ratio of average income and average expenditure?
   (a) 50 : 53 (b) 100 : 103 (c) 100 : 109
   (d) 100 : 107 (e) None of these
5. In a family the ratio of expenses to the savings is 5 : 3. But his expenses is increased by 60% and income is increased by only 25% thus there is decrease of Rs. 3500 in the saving. Find the increased income of the family.
   (a) Rs. 35000 (b) Rs. 28000 (c) Rs. 25000
   (d) Rs. 18,500 (e) None of these
6. Arti has coins of the denomination of Rs. 1, 50 paise and 25 paise in the ratio of 12 : 10 : 7. The total worth of the coins she has is Rs. 75. Find the number of 25 paise coins.
   (a) 28 (b) 36 (c) 42
   (d) 32 (e) None of these
7. Two horses cost as much as 5 dogs, 6 dogs as much as 8 oxen, 10 oxen as much as 50 sheep, 14 sheep as much as 9 goats. If the price of one goat is Rs. 700, find the cost of one horse .
   (a) Rs. 7900 (b) Rs. 6400 (c) Rs. 5200
   (d) Rs. 4800 (e) None of these
8. Rs. 2186 is distributed among A, B and C. If money given to them is decreased by Rs. 26, Rs. 28 and Rs. 32 respectively, then the ratio of their share become 9 : 13 : 8. What is the amount given to A ?

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(a) Rs. 696 (b) Rs. 626 (c) Rs. 656
(d) Rs. 956 (e) None of these

9. Sita and Gita invested the same capital in a business. At the year-end they share the profit in the ratio of 3 : 2. If Sita has invested her capital for the whole year, for how many months Gita has invested her capital?
(a) 8 months (b) 7 months (c) 5 months
(d) 9 months (e) None of these

10. A year ago, the cost of Maruti and Figo are in the ratio of 3 : 4. The ratio of present and past year costs of Maruti and Figo are 5 : 4 and 3 : 2. If the sum of their present cost is 7.8 lacs. Find the cost of Figo a year ago.
(a) 3.2 lac (b) 1.6 lac (c) 3.5 lac
(d) 4.0 lac (e) None of these

11. One year ago, the ratio between Ram's and Shyam's salaries was 3 : 5. The ratio of their individual salaries of last year and present year are 2 : 3 and 4 : 5 respectively. If their total salaries for the present year is Rs. 8600, find the present salary of Ram ?
(a) 3200 (b) 3600 (c) 4000
(d) 4400 (e) None of these

12. Two candles of the same height are lighted at the same time. The first is consumed in 8 hours and the second in 6 hours. Assuming that each candle burns at a constant rate, in how many hours after being lighted, the ratio between the height of first and second candles becomes 2 : 1?
(a) 4 h (b) 5 h (c) 4 h 30 m
(d) 4 h 48m (e) None of these

13. The total of the daily wages of Ram, Shyam and Mohan is Rs. 450. If they, respectively spend 25%, 20% and 50% of their incomes then the ratio of their savings becomes 9 : 8 : 4. What is the income of Ram?
(a) 180 (b) 190 (c) 200
(d) 175 (e) None of these

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14. There is 1000 litres milk in a pot. 100 litres of milk is taken out and same amount of water is poured into it. Again 200 litres of mixture is taken out and same amount of water is poured into it and finally 400 litres of mixture is taken out and same amount of water is poured into it then what is the amount of milk in the resulting mixture?
(a) 432 (b) 436 (c) 425
(d) 438 (e) None of these

15. On entire Earth the ratio between land and water is 1 : 2 and at northern hemisphere this ratio is 2 : 3. What will be the ratio of land with water at southern hemisphere?
(a) 11 : 4 (b) 4 : 11 (c) 15 : 4
(d) 4 : 15 (e) None of these

16. The ratio of the incomes of A, B and C is 3 : 7 : 4 and the ratio of their expenditures is 4 : 3 : 5. If in the income of Rs. 2400, A saves Rs. 300 then the savings of B and C is respectively are
(a) Rs. 4025 and Rs. 575 (b) Rs. 1575 and 2625
(c) Rs. 2750 and Rs. 1025 (d) Rs. 3725 and Rs. 1525
(e) None of these

17. The ratio of wine and water in a drum is 3 : 1. What part of the mixture is taken out and same amount of water is added to it so that the ratio of wine and water in the mixture become 1 : 1?
(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{3}{4}$
(d) $\frac{2}{3}$ (e) None of these

18. In a mixture of petrol and kerosene, petrol is only 99 litres. If this same quantity of petrol would be presented in another mixture of petrol and kerosene where total volume would be 198 litres less than the actual mixture then the concentration of petrol in the actual mixture would have been 13.33% less than that of the new mixture. What is the concentration of petrol in actual mixture?

(a) 20% (b) 16.66% (c) 26.66%
(d) 8.33% (e) None of these

19. The ratio of age between A and B is 6 : 5 and the age of each C and D is $\frac{9}{10}$ times that of B. Age of F is less than A but greater than B. The ratio of ages between B and E is 2 : 3. Also age of A is 3 years less than E. What is the ratio of ages of A and F if all the ages are in integers?
(a) 12 : 11 (b) 9 : 7 (c) 24 : 19
(d) 12 : 13 (e) None of these

20. Three vessels having volumes in the ratio of 2 : 3 : 5 are full of a mixture of water and milk. In the first vessel ratio of water and milk is 1 : 3, in second 2 : 3 and in third vessel, 2 : 5. If all the three vessels were poured out in a large container, what is the resulting ratio of milk and water?
(a) 43 : 96 (b) 438 : 962 (c) 348 : 962
(d) 481 : 219 (d) None of these

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Previous Year (Memory Based)

1. The prices of a refrigerator and a television set are in the ratio 5 : 3. If the refrigerator costs Rs. 5500 more than the television set. Then, the price of the refrigerator is :
(a) Rs. 27500 (b) Rs. 82500 (c) Rs. 13750
(d) Rs. 16500 (e) None of these

2. An amount of money is to be distributed among P, Q and R in the ratio of 2 : 7 : 9. The total P's and Q's share is equal to R's share. What is the difference between the shares of P and Q?
(a) Rs. 5000 (b) Rs. 7500 (c) Rs. 9000
(d) Information inadequate (e) None of these

3. If two-third of A is four-fifth of B, then A : B = ?
(a) 5 : 6 (b) 6 : 5 (c) 10 : 9
(d) 9 : 10 (e) None of these

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4. Three numbers are in the ratio of 3 : 4 : 5. The sum of the largest and the smallest equals the sum of the second and 52. The smallest number is :
(a) 20 (b) 27 (c) 39
(d) 52 (e) None of these

5. If x : y = 2 : 1, then $(x^2 - y^2) : (x^2 + y^2)$ is :
(a) 3 : 5 (b) 5 : 3 (c) 4 : 5
(d) 5 : 6 (e) None of these

6. If a : b : c = 3 : 4 : 7, then the ratio (a + b + c) : c is equal to :
(a) 2 : 1 (b) 14 : 3 (c) 7 : 2
(d) 1 : 2 (e) None of these

7. Three numbers are in the ratio $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$. The difference between the greatest and the smallest numbers is 36. The numbers are :
(a) 72, 84, 108 (b) 60, 72, 96 (c) 72, 84, 96
(d) 72, 96, 108 (e) None of these

8. If m : n = 3 : 2, then (4m + 5n) : (4m – 5n) is equal to :
(a) 4 : 9 (b) 9 : 4 (c) 11 : 1
(d) 9 : 1 (e) None of these

9. A milkman makes 20% profit by selling milk mixed with water at Rs. 9 per litre. If the cost price of 1 L pure milk is Rs. 10, then the ratio of milk and water in the given mixture is :
(a) 3 : 1 (b) 4 : 1 (c) 3 : 2
(d) 4 : 3 (e) None of these

10. If 78 is divided into three parts which are in the ratio of $1 : \frac{1}{3} : \frac{1}{6}$, the middle part is :
(a) $9\frac{1}{3}$ (b) 13 (c) $17\frac{1}{3}$
(d) $18\frac{1}{3}$ (e) None of these

11. The sum of two numbers is equal to 25 and their difference is 20. The ratio of the two numbers is:
(a) 9 : 1 (b) 7 : 9 (c) 3 : 5
(d) 2 : 7 (e) None of these

12. 94 is divided into two parts in such a way that the fifth part of the first and the eight part of the second are in the ratio 3 : 4. The first part is :
(a) 30 (b) 36 (c) 40
(d) 28 (e) None of these

13. Two numbers are such that the ratio between them is 4 : 7. If each is increased by 4, the ratio becomes 3 : 5. The larger number is :
(a) 36 (b) 48 (c) 56
(d) 64 (e) None of these

14. Three numbers are in the ratio 5 : 6 : 7. If the product of the numbers is 5670, then the greatest numbers is :
(a) 15 (b) 18 (c) 21
(d) 28 (e) None of these

15. Three numbers are in the ratio of 3 : 2 : 5 and the sum of their squares is 1862. The smallest of these numbers is :
(a) 24 (b) 21 (c) 14
(d) 35 (e) None of these

16. The ratio of two numbers is 10 : 7 and their difference is 105. The sum of these numbers is
(a) 595 (b) 805 (c) 1190
(d) 1610 (e) None of these

17. A, B, C and D purchase a gift worth Rs. 60. A pays $\frac{1}{2}$ of what others are paying, B pays 1/3rd of what others are paying and C pays 1/4th of what others are paying. What is the amount paid by D?
(a) 14 (b) 15 (c) 16
(d) 13 (e) None of these

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18. Annual incomes of Amit and Varun are in the ratio 3 : 2, while the ratio of their expenditures is 5 : 3. If at the end of the year each saves Rs. 1000, the annual income of Amit is :
(a) Rs. 9000 (b) Rs. 8000 (c) Rs. 7000
(d) Rs. 6000 (e) None of these

19. If the annual income of A, B and C is in the ratio 1 : 3 : 7 and the total annual income of A and C is Rs. 800000, then the monthly salary of B (in Rs.) is :
(a) 20000 (b) 25000 (c) 30000
(d) 15000 (e) None of these

20. The monthly salaries of A, B and C are in the ratio 2 : 3 : 5. If C's monthly salary is Rs. 12000 more than that of A, then B's annual salary is
(a) Rs. 120000 (b) Rs. 144000 (c) Rs. 180000
(d) Rs. 240000 (e) None of these

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21. The income of A, B and C are in the ratio 7 : 9 : 12 and their spendings are in the ratio 8 : 9 : 15. If A saves $\frac{1}{4}$th of his income, then the savings of A, B and C are in the ratio of :
(a) 69 : 56 : 48 (b) 47 : 74 : 99 (c) 37 : 72 : 49
(d) 56 : 99 : 69 (e) None of these

22. The ratio of the income to the expenditure of a family is 10 : 7. If the family's expenses are Rs. 10500, then savings of the family is :
(a) Rs. 4500 (b) Rs. 10000 (c) Rs. 4000
(d) Rs. 5000 (e) None of these

23. The ratio of incomes of P and Q is 3 : 4 and the ratio of their expenditures is 2 : 3. If both of them save Rs. 6000, the total income of P is :
(a) Rs. 20000 (b) Rs. 12000 (c) Rs. 18000
(d) Rs. 24000 (e) None of these

24. The students in three classes are in the ratio 2 : 3 : 5. If 20 students are increased in each class, the ratio changes to 4 : 5 : 7. The total number of students before the increase was :
(a) 160 (b) 120 (c) 100
(d) 10 (e) None of these

25. What number should be added to or subtracted from each term of the ratio 17 : 24, so that it becomes equal to 1 : 2?
(a) 5 is subtracted (b) 10 is added (c) 7 is added
(d) 10 is subtracted (e) None of these

26. The number of students in three classes are in the ratio 2 : 3 : 4. If 12 students are increased in each class, this ratio changes to 8 : 11 : 14. The total number of students in the three classes in the beginning was
(a) 162 (b) 108 (c) 96
(d) 54 (e) None of these

27. Two numbers are in the ratio 3 : 5. If 9 is subtracted from each, they are in the ratio 12 : 23. Find the smaller number?
(a) 27 (b) 33 (c) 49
(d) 55 (e) None of these

28. The ratio of the numbers of boys and girls of a school with 504 students is 13 : 11. What will be the new ratio if 12 more girls are admitted?
(a) 91 : 81 (b) 81 : 91 (c) 9 : 10
(d) 10 : 9 (e) None of these

29. A sum of Rs. 86700 is to be divided among A, B and C in such a manner that for every rupee that A gets, B gets 90 paise and for every rupee that B gets, C gets 110 paise. B's share will be :
(a) Rs. 26100 (b) Rs. 27000 (c) Rs. 28100
(d) Rs. 28090 (e) None of these

30. A sum of Rs. 340.68 is distributed among L, M and N such that L gets Rs. 5.72 more than N and M gets Rs. 2.24 more than L, then N gets :
(a) Rs. 109 (b) Rs. 110.90 (c) Rs. 113.56
(d) Rs. 114.72 (e) None of these

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31. A box has 210 coins of denominations Rs. 1 and fifty paise only. The ratio of their respective values is 13 : 11. The number of Rs. 1 coins is:
(a) 65 (b) 66 (c) 77
(d) 78 (e) None of these

32. If 378 coins consist of Rs. 1, 50 paise and 25 paise whose values are in the ratio of 13 : 11 : 7, the number of 50 paise coins will be :
(a) 132 (b) 128 (c) 136
(d) 133 (e) None of these

33. The ratio between Sumit's and Prakash's age at present is 2 : 3. Sumit is 6 yr younger than Prakash. The ratio of Sumit's age to Prakash's age after 6 yr will be :
(a) 2 : 3 (b) 1 : 2 (c) 4 : 3
(d) 3 : 4 (e) None of these

34. The ratio of the ages of Ram and Rahim 10 yr ago was 1 : 3. The ratio of their ages 5 yr hence will be 2 : 3. Then, the ratio of their present ages is :
(a) 1 : 2 (b) 3 : 5 (c) 3 : 4
(d) 2 : 5 (e) None of these

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35. A person distributes his pens among four friends A, B, C and D in the ratio $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}:\frac{1}{6}$. What is the minimum number of pens that the person should have?
(a) 75 (b) 45 (c) 57
(d) 65 (e) None of these

36. If A $=\frac{4}{5}$ of B and B $=\frac{5}{2}$ of C. Then, the ration of A : C is :
(a) 1 : 2 (b) 2 : 1 (c) 2 : 3
(d) 1 : 3 (e) None of these

37. If A and B are in the ratio 3 : 4 and B and C in the ratio 12 : 13. Then, A and C will be in the ratio :
(a) 3 : 13 (b) 9 : 13 (c) 36 : 13
(d) 13 : 9 (e) None of these

38. Two numbers are in the ratio 2 : 3. If 2 is subtracted from the first and 2 is added to the second, the ratio becomes 1 : 2. The sum of the numbers is :

(a) 30 (b) 28 (c) 24
(d) 10 (e) None of these

39. If $a = \frac{2}{9} : \frac{1}{3}, b : c = \frac{2}{7} : \frac{5}{14}$ and $d : c = \frac{7}{10} : \frac{3}{5}$. Then, a : b : c : d is :

(a) 4 : 6 : 7 : 9 (b) 16 : 24 : 30 : 35 (c) 8 : 12 : 15 : 7
(d) 30 : 35 : 24 : 16 (e) None of these

40. A man divides his property, so that his son's share to his wife's and wife's share to his daughter's are both as in the ratio 3 : 1. If the daughter gets Rs. 10000 less than son, then the value (in rupees) of the whole property is :

(a) Rs. 16250 (b) Rs. 16000 (c) Rs. 18250
(d) Rs. 17000 (e) None of these

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Foundation

Solutions

1. (d); Let present ages of Ramu and Somu be R and S respectively.

$$(R-1) : (S-1) \Leftrightarrow 6 : 7$$

One year ago → ↑ : ↑

R : S

↓ : ↓ Four years hence

$$(R+4) : (S+4) \Leftrightarrow 7 : 8$$

$\frac{R-1}{S-1} = \frac{6}{7}$	$\frac{R+4}{S+4} = \frac{7}{8}$
$7R - 7 = 6S - 6$	$8R + 32 = 7S + 28$
$7R - 6S = 1$	$8R - 7S = -4$

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$7R - 6S = 1$ ... (i)

$8R - 7S = -4$ ... (ii)

Multiplying equation (i) by 8 and equation (ii) by 7, we get $\rightarrow$

$56R - 48S = 8$ ... (iii)

$56R - 49S = -28$ ... (iv)

Subtract (iv) from (iii) : S = 36 years

Shortcut:

One year ago $\rightarrow$ R : S $\Leftrightarrow$ 6 : 7 $\Rightarrow$ S = 7

Only option (d) has a number from which, if we subtract '1', we get a number divisible by 7.

2. (b); 33% of A = $\frac{33 \times A}{100} = \frac{55 \times B}{100}$ = 55% of B

$= \frac{33 \times A}{100} = \frac{55 \times B}{100} \Rightarrow \frac{A}{B} = \frac{55}{33}$

A : B $\Leftrightarrow$ 5 : 3

3. (a); 68% of two fifth of 550

$= \frac{68 \times \left(\frac{2}{5} \times 550\right)}{100} = \frac{68 \times 220}{100} = \frac{748}{5} = 149.6$

4. (e); Let, number is 'n'

$\left(\frac{45n}{100}\right) - 24 = 48 \Rightarrow \frac{9n}{20} - 24 = 48$

$9n - 480 = 48 \times 20 \Rightarrow 9n = 960 + 480$

$n = \frac{1440}{9} = 160 \Rightarrow \frac{3}{8}n = \frac{3}{8} \times 160 = 60$

5. (a); 30% of the number = 190.8, 1% of that number = $\frac{190.8}{30}$

175% of the number = $\frac{1908}{300} \times 175 = 159 \times 7 = 1113$

6. (c); $\frac{3}{8} \times 1000 = 375 \Rightarrow 32\%$ of $\left(\frac{3}{8}\text{th of } 1000\right)$

$= 32\%$ of $375 = \frac{32 \times 375}{100} = 120$

7. (c); Let the third number be n.

20% more than n = $n + \frac{n}{5} = \frac{6n}{5}$

50% more than n = $n + \frac{n}{2} = \frac{3n}{2}$

Ratio of $\frac{6n}{5}$ and $\frac{3n}{2} \Rightarrow \frac{6n}{5} \times \frac{2}{3n} = 4 : 5$

Shortcut

Let the third number be 100

Then the two numbers are,

20% more and 50% more

$\Downarrow$ $\Downarrow$

120 150

Ratio = 120 : 150 = 4 : 5

8. (c); A : B : C : D $\Rightarrow$ 5 : 2 : 4 : 3

$\Rightarrow$ C gets 1 unit more than D.

Given, C gets Rs. 1000 more than D.

$\Rightarrow$ 1 unit = Rs, 1000 $\Rightarrow$ B's share = 2 units

= 2 × 1000 = Rs. 2000

9. (b); 0.75 : x :: 5 : 8

$\frac{0.75}{x} = \frac{5}{8} \Rightarrow 5x = 6.00 \Rightarrow x = 1.2$

10. (b); Three numbers = I, II, III

I + II + III = 98, I : II $\rightarrow$ 2 : 3, II : III $\rightarrow$ 5 : 8

10 : 15 $\Leftarrow$ (2 : 3) × 5 $\leftarrow$ (I : II) × 5

15 : 24 $\Leftarrow$ (5 : 8) × 3 $\leftarrow$ (II : III) × 3

I : II : III, 10 : 15 : 24, 10 + 15 + 24 = 49

Given I + II + III = 98, 98 ÷ 49= 2

$\Rightarrow$ 1 unit = 2 $\Rightarrow$ Second number = 15 × 2 = 30

11. (e); $\frac{1}{2}:\frac{2}{3}:\frac{3}{4}$

L.C.M. of 2, 3 and 4 = 12

On multiplying by a number throughout, the ratio r e m a i n s same. Here, we multiply by 12.

$\frac{1}{2}\times 12 : \frac{2}{3}\times 12 : \frac{3}{4}\times 12$

6 : 8 : 9 $\Rightarrow$ 6 + 8 + 9 = 23

23 units = 872 $\Rightarrow$ 1 unit = 37.91

$\Rightarrow$ 1st part = 6 units = 6 × 37.91= 227.46

12. (b); Fourth proportional to 5, 8, 15

5 : 8 :: 15 : ?

$\frac{5}{8} = \frac{15}{x} \Rightarrow x = 24$

13. (b); Let the two numbers be a and b

$\frac{a}{b} = \frac{3}{5} \Rightarrow 5a = 3b$ ... (i)

$\frac{a-9}{b-9} = \frac{12}{23} \Rightarrow 23a - 207 = 12b - 108$

$\Rightarrow$ 23a – 12b = 99 ... (ii)

$b = \frac{5a}{3}$ From (i) ... (iii)

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Using (ii) and (iii)

$$23a - 12 \times \frac{5a}{3} = 99 \Rightarrow 3a = 99 \Rightarrow a = 33$$

Shortcut

Given = Two numbers are in the ratio

= 3 : 5

↓

Smaller number must be a multiple of 3

Only options (a) and (b) have '3' as a factor.

Given : On subtracting 9 from each, the two numbers are in the ratio 12 : 23

On subtracting 9 from 27 → option (a),

We get 18, but the ratio becomes 12 : 23,

So, option (a) → discarded.

On subtracting 9 from 33 → option (b),

We get 24

↓

multiple of 12.

14. (e); Let the two numbers be a and b.

$$a - (40\% \text{ of } a) = \frac{2}{3}b$$

$$a - \frac{40a}{100} = \frac{2}{3}b \Rightarrow \frac{60a}{100} = \frac{2}{3}b \Rightarrow \frac{b}{a} = \frac{60 \times 3}{2 \times 100} = \frac{9}{10}$$

⇒ Ratio of the second number to the first number = 9 : 10

15. (e); $\frac{5a + 3b}{2a - 3b} = \frac{23}{5}$

Dividing numerator and denominator by 'b'

$$\frac{5\left(\frac{a}{b}\right)+3}{2\left(\frac{a}{b}\right)-3} = \frac{23}{5} \Rightarrow \text{Let } \frac{a}{b} = x \Rightarrow \frac{5x+3}{2x-3} = \frac{23}{5}$$

$25x + 15 = 46x - 69 \Rightarrow 21x = 84$

$x = 4 \Rightarrow \frac{a}{b} = 4 \Rightarrow a : b \Leftrightarrow 4 : 1$

16. (c); P : Q = 8 : 15

P : Q : R = ?

Q : R = 3 : 2) × 5 ⇒ Q : R = 15 : 10

P : Q = 8 : 15 ⇒ 15 : 10 = Q : R

P : Q : R = 8 : 15 : 10

17. (a); P : Q = 8 : 15 ... (i)

Q : R = 5 : 8) × 3 ⇒ Q : R = 15 : 24 ... (ii)

From (i) and (ii)

P : Q : R = 8 : 15 : 24 ... (iii)

R : S = 4 : 5) × 6 ⇒ R : S ⇔ 24 : 30 ... (iv)

P : Q : R = 8 : 15 : 24 ⇒ 24 : 30 = R : S

P : Q : R : S = 8 : 15 : 24 : 30 ⇒ P : S = 8 : 30 = 4 : 15

18. (a); Let the fourth proportional to 4, 16, 7 be x.

4 : 16 :: 7 : x

$\frac{4}{16} = \frac{7}{x} \Rightarrow 4x = 16 \times 7 \Rightarrow x = 4 \times 7 = 28$

19. (b); Let the mean proportion be = r.

$9 : r :: r : 64 \Rightarrow \frac{9}{r} = \frac{r}{64}$

$r^2 = 9 \times 64 \Rightarrow r = 3 \times 8 = 24$

20. (a); Duplicate ratio = ratio of squares

Duplicate ratio of $2 : 7 = 2^2 : 7^2 = 4 : 49$

21. (c); Sub-duplicate ratio = ratio of square roots

Sub-duplicate ratio of $81 : 64 = \sqrt{81} : \sqrt{64} = 9 : 8$

22. (b); Triplicate ratio = Ratio of cubes.

Triplicate ratio of $7 : 5 = 7^3 : 5^3 = 343 : 125$

23. (a); Inverse ratio of 17 : 19 = 19 : 17

24. (b); Compound ratio of = 2 : 7, 5 : 3 and 4 : 7 will be

$2 \times 5 \times 4 : 7 \times 3 \times 7 = 40 : 147$

25. (d); B : C = 8 : 9

A : B = 3 : 4) × 2 $\Rightarrow$ A : B = 6 : 8

8 : 9 = B : C $\Rightarrow$ A : B : C = 6 : 8 : 9

26. (d); a : b = 3 : 5) × 4 $\Rightarrow$ a : b = 12 : 20

b : c = 4 : 7) × 5 $\Rightarrow$ b : c = 20 : 35

$\Rightarrow$ a : b : c = 12 : 20 : 35 $\Rightarrow$ a : c = 12 : 35

27. (a); P : Q : R = 2 : 3 : 4

$P \to 2,\ Q \to 3,\ R \to 4$

$$\frac{P}{Q} = \frac{2}{3},\ \frac{Q}{R} = \frac{3}{4},\ \frac{R}{P} = \frac{4}{2}$$

$$\frac{P}{Q} : \frac{Q}{R} : \frac{R}{P} = \frac{2}{3} : \frac{3}{4} : \frac{4}{2} = \left(\frac{2}{3} : \frac{3}{4} : \frac{4}{2}\right) \times 12 = 8 : 9 : 24$$

28. (a); $\frac{a}{3} = \frac{b}{8} \Rightarrow \frac{a}{b} = \frac{3}{8}$

$a \to 3,\ b \to 8,\ a + 3 \to 6$

$$b + 8 \to 16 \Rightarrow \frac{a+3}{b+8} = \frac{6}{16} = \frac{3}{8}$$

29. (b); $4^{3.5} : 2^5 = ?$

$$4^{\frac{7}{2}} : 2^5 = (2^2)^{\frac{7}{2}} : 2^5 = 2^{2\times\frac{7}{2}} : 2^5$$

$$= 2^7 : 2^5 = \frac{2^7}{2^5} = 2^2 = 4 \Rightarrow 4 : 1$$

30. (b); 2 : x :: 5 : 7

$$\frac{2}{x} = \frac{5}{7}, x = \frac{2\times 7}{5} \Rightarrow x = 2.80$$

31. (c); Ratio of salaries $\rightarrow$ A : B : C = 2 : 3 : 5

$A \rightarrow 2x,\ B \rightarrow 3x,\ C \rightarrow 5x$

$$A + 15\% \text{ of } A = 2x + \frac{15\times 2x}{100} = \frac{46x}{20}$$

$$B + 10\% \text{ of } B = 3x + \frac{3x\times 10}{100} = \frac{33x}{10}$$

$$C + 20\% \text{ of } C = 5x + \frac{5x\times 20}{100} = 6x$$

New ratio of their salaries

$$A : B : C = \frac{46x}{20} : \frac{33x}{10} : 6x$$

$\downarrow$ Multiply by 20

$46x : 66x : 120x \Rightarrow 23x : 33x : 60x \Rightarrow 23 : 33 : 60$

Shortcut

Ratio of salaries of A, B and C $\rightarrow$ 2 : 3 : 5

Let the salaries be

200	300	500
$\downarrow$ 15% $\uparrow$	$\downarrow$ 10% $\uparrow$	$\downarrow$ 20% $\uparrow$
230	330	600

New ratio = 230 : 330 : 600 = 23 : 33 : 60

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32. (d);

$$\underline{782} \rightarrow \frac{1}{2} : \frac{2}{3} : \frac{3}{4}$$

L.C. M. of 2, 3 and 4 = 12

$$\left(\frac{1}{2} : \frac{2}{3} : \frac{3}{4}\right) \times 12 \Rightarrow 6 : 8 : 9 \Rightarrow 6 + 8 + 9 = 23$$

$$23 \text{ units} = 782 \Rightarrow 1 \text{ unit} = \frac{782}{23} = 34$$

First part = 6 units = 6 × 34 = 204

33. (c); Let the two numbers be a and b

a : b = 1 : 2

$$\frac{a}{b} = \frac{1}{2} \Rightarrow 2a = b \quad \text{... (i)}$$

$$\frac{a+7}{b+7} = \frac{3}{5} \Rightarrow 5a + 35 = 3b + 21 \quad \text{... (ii)}$$

From (i) and (ii)

5a + 35 = 3 × 2a + 21 ⇒ 5a + 35 = 6a + 21

a = 14

Greatest number = b = 2a = 28

Shortcut:

On adding 7 to both, ratio changes to 3 : 5

⇒ On adding 7 to the greatest number, the resulting number must be a multiple of 5

only option (c) has the number 28, in which, if we add 7, we get 35, which is a multiple of 5.

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3 : 5 :: ? : 35

↓

21

⇒ Smaller number = 21 – 7 = 14

14 : 28 = 1 : 2

34. (c); Ratio of 3 numbers is 3 : 4 : 5

Let the numbers be 3x, 4x, 5x

Sum of their squares = 1250

$9x^2 + 16x^2 + 25x^2 = 1250 \Rightarrow 50x^2 = 1250$

$x^2 = 25 \Rightarrow x = 5 \Rightarrow 3x + 4x + 5x = 12x = 60$

35. (c); Let age of Sachin = S

Age of Rahul= R

S = R – 4 ... (i)

$\frac{S}{R} = \frac{7}{9} \Rightarrow 9S = 7R$ ... (ii)

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From (i)

9S = 9R – 36 ⇒ 9S = 7R ⇒ 7R = 9R – 36

2R = 36 ⇒ R = 18

Age of Sachin = S = R – 4 = 18 – 4 = 14 years

Shortcut:

Sachin	:	Rahul
S	:	R
7	:	9

Difference = 2 units = 4 years

⇒ 1 unit = 2 years

Sachin's age = 7 units = 7 × 2 = 14 years

36. (b); Arun : Deepak

A : D = 4 : 3

Let A = 4x ⇒ D = 3x

After 6 years, Arun's age = 4x + 6

Deepak's age = 3x + 6

$4x + 6 = 26$ (given)

$4x = 20 \Rightarrow x = 5$

Deepak's present age = $3x = 3 \times 5 = 15$ years.

Shortcut

After 6 years, Arun's age will be 26 years.

$\Rightarrow$ Present age of Arun = 20 years

Ratio of present ages = Arun : Deepak

4 : 3

$\downarrow \times 5$ $\downarrow \times 5$

20 years 15 years

37. (a); Present Ages $\Rightarrow$ X : Y

5 : 6

Let the ages be 5x and 6x

$\downarrow$ $\downarrow$ 7 yrs. hence

$5x + 7$ $6x + 7$

$$\frac{5x+7}{6x+7} = \frac{6}{7}$$

$\Rightarrow 35x + 49 = 36x + 42 = 0 \Rightarrow x = 7$

X's present age = $5x = 5 \times 7 = 35$ years.

Shortcut

Present ages 5 : 6

$\downarrow + 1$ $\downarrow + 1 = 1$unit = 7

After 7 years 6 : 7

$\Rightarrow$ X's present age = $7 \times 5 = 35$ years

38. (a); Ratio of present ages $\rightarrow$ Sameer : Anand

5 : 4

Let present ages be 5x and 4x

Three years hence $\rightarrow$ (5x + 3) and (4x + 3)

$$\frac{5x+3}{4x+3} = \frac{11}{9} \Rightarrow 45x + 27 = 44x + 33 \Rightarrow x = 6$$

Anand's present age = $4x = 4 \times 6 = 24$

Shortcut

Ratio of present age S : A

5 : 4

Anand's present age must be a multiple of 4.

Check option (a) = 24

Sameer : Anand

↓ ↓

5 : 4

↓ ×6 ↓×6

30 24

↓+3 ↓+3

33 : 27

⇕

11 : 9 Satisfied

39. (d); Ten years ago, Ratio of ages of Jayant, Prem and Saransh → J : P : S

2 : 3 : 4

Let the ages be 2x 3x 4x

↓ ↓ ↓

Present ages → (2x +10) (3x + 10) (4x + 10)

Total of the present ages = 93 years.

⇒ 2x + 10 + 3x + 10 + 4x + 10 = 93

9x + 30 = 93 ⇒ x = 7

⇒ Present age of Saransh = 4x + 10 = 4 × 7 + 10 = 38 years.

Shortcut:

On subtracting 10 from the present age of Saransh, we must get a multiple of 4, because ten years ago, the ratio of ages of Jayant, Prem and Saransh was 2 : 3 : 4.

From the option → (a) and (d) can be discarded.

(a) 24 yrs $\xrightarrow{-10}$ $\boxed{14}$ yrs.

(not a multiple of 4.)

(b) 32 yrs. $\xrightarrow{-10}$ $\boxed{22}$ yrs.

(not a multiple of 4)

Check option (c) 34 yrs.

10 years ago 34 – 10 = 24 yrs.

J	:	P	:	S
2	:	3	:	4
↓×6		↓×6		↓×6
12		18		24
↓+10		↓+10		↓+10
22	+	28	+	34 ≠ 93

Check (d) 38 yrs.

38 – 10 = 28 yrs.

2	:	3	:	4
↓×7		↓×7		↓×7
14		21		28
↓+10		↓+10		↓+10
24	+	31	+	38 =93 yrs.

40. (b); Hitesh Ronnie

↓ ↓

40 yrs. 60 yrs.

It is clear from option (b) that 10 yrs. ago their ages were 30 yrs. and 50 yrs., i.e., in the ratio 3 : 5

41. (b); Ratio of profits = ratio of investments

= 45000 : 30000 = 45 : 30 = 3 : 2

42. (a); Since the investments were made for the same period of time, ratio of shares of profit = ratio of investments

= 60000 : 50000 = 6 : 5

Kishor's share = $\frac{5}{11} \times$ total profit = $\frac{5}{11} \times 33000 = 5 \times 3000 = 15000$

43. (d); Investments

↓

Anil Rs. → 3300

Nikhil Rs. → 5000

Ratio of profit shares = ratio of investments = 3300 : 5000

Ratio of profit shares = 33 : 50

↓ ↓

Anil Nikhil

Profit earned = 1660 Rs.

Anil's share = $\frac{33}{83} \times 1660$ = Rs. 660

44. (b); Rahul invested for one year i.e, 12 months.

6 months later, Sanjay joined him.

So, Sanjay invested for 6 months only.

	Rahul	Sanjay
(I) Investment →	45000	30000
(T) Time period→	12 months	6 months
	↓	↓
Product →	45000 × 12	30000 × 6

Ratio of profits = 45000×12 : 30000×6 = 3 : 1

45. (b); Ratio of investments = Ratio of profit shares

= 6 : 5 : 8

↓ ↓ ↓

Anil : Nikhil : Sourabh

Profit earned = Rs. 83,600

Saurabh's share = $\frac{8}{19} \times 83600$ = 35,200 Rs.

46. (e);

	Ram		Karan		Rohan
Ratio of capitals	2	:	3	:	4
Ratio of time	6	:	4	:	3
Ratio of profits	Ram		Karan		Rohan
	↓		↓		↓
	2 × 6	:	3 × 4	:	4 × 3
	12	:	12	:	12
	1	:	1	:	1

47. (d);

	Ravi		Kavi	
Investments	8000		72000	(Rs.)
(Ratio of Investments)	8	:	72	
	1	:	9	

Ratio of investments = Ratio of profits = 1 : 9

48. (b);

	Srikant		Vividh
Investments	185000		225000
Ratio	185	:	225
	37	:	45

Let the total profit be P

Vividh's share = $\frac{45}{45+37} \times P = 9000$, $\frac{45}{82} \times P = 9000$

P = $\frac{82 \times 9000}{45}$ = 82 × 200 = 16400

49. (d);

	Rajan		Sajan
Investments →	Rs. 14200		Rs. 15600
Ratio →	142	:	156
		⇕	
	71	:	78

Total profit = Rs. 74500

Rajan's share = $\frac{71}{149} \times 74500$ = 35500

50. (a);

	A		B
Investments →	Rs. 4000		Rs. 16000
		⇕	
Ratio of investments	1	:	4

Ratio of times periods 12 months : 9 months

⇕

4 : 3

Ratio of profits : (1 × 4) : (4 × 3)

= 4 : 12

⇕

1 : 3

Moderate

1. (b); Let the ten's digit and the unit's digit of the number be x and y respectively.

The number is → 10x + y

on interchanging digits → 10y + x

x : y = 1 : 2 → y = 2x

$$\left.\begin{array}{l}\Rightarrow 10x + y = 12x \\ 10y + x = 21x\end{array}\right] \rightarrow \left[\text{difference} = 36(\text{given})\right]$$

21x – 12x = 36

9x = 36 ⇒ x = 4

⇒ The number is 12x ⇒ 12x = 12 × 4 = 48

on interchanging → 21x = 21 × 4 = 84

Sum of digits = x + y = 12

difference of digits = y – x = 4

difference of sum and difference of digits = 12 – 4 = 8

2. (a);

Maths	Phy.	Bio.
↓	↓	↓
500	700	800
40%inc ↓	↓ 50%inc	↓ 75%inc
700	1050	1400

New ratio = 70 : 105 : 140 = 2 : 3 : 4

3. (b);

60 litres

milk → 40 L

water → 20 L

→ 3 units = 60 L

⇒ 1 unit = 20 L

1 : 3] × 2 (Multiply by 2, to keep milk constant)

↓

2 : 6

↓

6 units = 6 × 20 = 120 L

So, 120 – 20 = 100 L

↓

quantity of water to be added.

4. (c);

	Boys		Girls
	↓		↓
	7	:	8
Let →	700		800
	20%inc ↓		↓ 10%inc
	840		880

New ratio = 840 : 880 = 21 : 22

5. (d); Ravi : Sumit

2 : 3

Let → 2x , 3x

+4000 ↓ ↓ +4000

(2x+4000) (3x+4000)

$$\frac{2x+4000}{3x+4000} = \frac{40}{57}$$

114x + 228000 = 120x + 160000

$$6x = 68000 \Rightarrow x = \frac{68000}{6}$$

Sumits's salary = 3x = 3 × $\frac{68000}{6}$ = Rs. 34000

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6. (c);

	A		B		C
Ratio of salaries	2	:	3	:	5
Let the salaries be	200		300		500
	↓ 15%		↓ 10%		↓ 20%
	230		330		600

New ratio → 23 : 33 : 60

7. (d); 25p, 10p and 5p coins are in the ratio of 2 : 3 : 4.

So, number of 25p coins = 2 units

Its value = 25 × 2 = 50 units

number of 10 p coins = 3 units

Its value = 3 × 10 = 30 units

number of 5p coins = 4 units

Its value = 4 × 5 = 20 units

Total value = 50 + 30 + 20 = 100 units = 50 Rs.

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1 unit = $\frac{1}{2}$ Rs. $\Rightarrow$ 1 unit = 50p

value of 5p coins = 20 units = 20 × 50 p.

$\Rightarrow$ Number of 5p coins = $\frac{20 \times 50}{5} = 200$

8. (d);

sum 1 sum 2

C	:	A	:	B	M		N
4	:	5	:	6	1	:	1
4x	:	5x	:	6x	y		y

6x - y = 2000 4x = ?

↓

Can't determine x from this equation

9. (b); A : B : C $\Rightarrow$ 12 : 15 : 25

Let $\rightarrow$ 12x, 15x, 25x

Sum = 52x = 364

x = $\frac{364}{52}$ $\Rightarrow$ x = 7

A	B	C
12 × 7	15 × 7	25 × 7
84	105	175

diff diff

21 : 70 = 3 : 10

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10. (b); $\frac{625}{x} = \frac{x}{1156}$

$x^2 = 625 \times 1156 \Rightarrow x^2 = (25)^2 \times (34)^2$

$x = 25 \times 34 = 850$

11. (c);

	Alcohol	:	Water
Inital ratio →	4	:	3
New ratio →	4	:	5

2 unit increase = 5 L
1 unit = 2.5 L

Alcohol in initial mixture = 4 units

$= 4 \times 2.5 = 10$ L

12. (c);

25p		10p		5p
1	:	2	:	3
↓		↓		↓
1×25		2×10		3×5
25p		20p		15p

Total = 60 units

= 30 Rs = 3000 p

1 unit = 50p

value of 5p coins = 15 units = 750p

Number of 5p coins = $\frac{750}{5} = 150$

13. (b); Let C's share be → C

Then, B's share = $\frac{1}{4}$ C

A's share = $\frac{2}{3} \times \frac{1}{4}$ C = $\frac{1}{6}$ C

Total = Rs. 510 $\Rightarrow \frac{C}{6}+\frac{C}{4}+C = 510$

$\frac{2C+3C+12C}{12} = 510 \Rightarrow 17C = 12 \times 510$

C = 12 × 30 = 360

So, C's share = Rs. 360

B's share = Rs. 90

A's share = Rs. 60

Shortcut: only option (b) satisfies the given conditions.

14. (a); Let → A′s share be A

B′s share be B and C′s share be C

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A + B + C = 336 ... (i)

$A = \frac{1}{2}(B+C)$

2A = B + C ... (ii)

From (i) and (ii)

A + 2A = 366 ⇒ A = 122

A′ share = Rs. 122

15. (d); Data inadequate

16. (d); Ratio → 1 : 3 : 2

$x + 25 + 3x + 25 + 2x + 25 = 735$

$6x + 75 = 735 \Rightarrow 6x = 660 \Rightarrow x = 110$

Money received by C = $2x + 25 = 2 \times 110 + 25$ = Rs. 245

17. (d); Ratio of remainders

	A		B		C
	3	:	4	:	5
Let →	3x		4x		5x

Sum of original shares → $(3x + 5) + (4x + 10) + (5x + 15)$

$= 2430 \Rightarrow 12x + 30 = 2430$

$12x = 2400 \Rightarrow x = 200$

B's share = $4x + 10$ = 810 Rs.

18. (d);

= 3 : 2

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19. (b);

alcohol = $\frac{3}{18} \times 100 = \frac{50}{3}\% = 16\frac{2}{3}\%$

20. (a); 85 L

milk water

27 : 7 $\Rightarrow$ 34 units = 85 L

$\Rightarrow$ 1 unit = $\frac{85}{34}$ L = $\frac{5}{2}$ L

New ratio $\rightarrow$ [3 : 1] × 9 [because. water is added]

New ratio $\rightarrow$ 27 : 9

Milk		Water
27	:	7
27	:	9

2 units increase

$= 2 \times \frac{5}{2} = 5$ L water

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21. (b); Ratio of sides $\rightarrow \left(\frac{1}{2} : \frac{1}{3} : \frac{1}{4}\right) \times 12$ = 6 : 4 : 3

perimeter = 6 + 4 + 3 = 13 units = 104 cm

1 unit = 8 cm

Longest side $\rightarrow$ 6 units = 6 × 8 = 48 cm

22. (c);

	boys	girls
Let $\rightarrow$	300	200
scholarship holders $\rightarrow$	20%	25%
	60	50

Students who got scholarship $\rightarrow$ 60 + 50 = 110

students who did not get scholarship $\rightarrow$ 500 – 110 = 390

Percentage of student = $\frac{390}{500} \times 100 = 78\%$

23. (c); Change the ratios into fractions :

Containers	Milk	Water	Volume of containers
I	$\frac{4}{5}$	$\frac{1}{5}$	$\frac{3}{12} = \frac{1}{4}$
II	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{4}{12} = \frac{1}{3}$
III	$\frac{5}{7}$	$\frac{2}{7}$	$\frac{5}{12}$

Ratio of milk and water in the fourth container is:

$$\frac{4}{5} \times \frac{1}{4} + \frac{3}{4} \times \frac{1}{3} + \frac{5}{7} \times \frac{5}{12} : \frac{1}{5} \times \frac{1}{4} + \frac{1}{4} \times \frac{1}{3} + \frac{2}{7} \times \frac{5}{12}$$

$$= \frac{1}{5} + \frac{1}{4} + \frac{25}{84} : \frac{1}{20} + \frac{1}{12} + \frac{5}{42} = \frac{314}{420} : \frac{106}{420}$$

= 314 : 106 = 157 : 53

24. (d); Let, $x = \frac{K}{y^2} [K = \text{constant}]$

$$1 = \frac{K}{4} \Rightarrow K = 4 \Rightarrow x = \frac{4}{y^2} y = 6 \Rightarrow x = \frac{4}{36} = \boxed{\frac{1}{9}}$$

25. (b); Let the fixed amount be Rs. x and the cost of each unit be Rs. y

Then, 540y + x = 1800 ... (i)

620y + x = 2040 ... (ii)

Subtract (i) from (ii)

80y = 240 $\Rightarrow$ y = 3

Putting y = 3 in (i)

1620 + x = 1800 $\Rightarrow$ x = 1800 – 1620 = 180

So, fixed charges = Rs. 180

Charge per unit = Rs. 3.

Total chargers for Consuming 500 units

= 500 × 3 + 180 = 1500 + 180 = 1680

26. (c);

	A	B
Income →	5x	4x
Expenditure →	3y	2y
Saving →	(5x – 3y)	(4x – 2y)

5x – 3y = 1600) × 2 4x – 2y = 1600) × 3

10x – 6y = 3200 (1) 12x – 6y = 4800 (2)

From (1) and (2) 2x = 1600 $\Rightarrow$ x = 800

A's income = 5x = 5 × 800 = 4000 Rs.

27. (c); Gold : copper

A → 7 : 2] × 2

A → 14 : 4 → total = 14 + 4 = 18

B → 7 : 11 → total = 7 + 11 = 18

18 units of A and 18 units of B are melted to form C

Gold ↓ Copper ↓

C → (14 + 7) : (4 + 11)

21 : 15

Ratio → 7 : 5

28. (a); Let present ages be → P Q

→ 5x 7x

P's age after 6 yrs. = 5x + 6

7x– (5x + 6) = 2 $\Rightarrow$ 2x – 6 = 2

2x = 8 $\Rightarrow$ x = 4

So, present ages of P and Q are 20 years & 28 years respectively.

Total = 48 years

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29. (b); Let the present ages be → Father → 7x, Son → 3x

$7x \times 3x = 756 \Rightarrow 21x^2 = 756$

$x^2 = 36 \Rightarrow x = 6$

⇒ Present ages → father → 7 × 6 = 42 yrs.

son → 3 × 6 = 18 yrs.

After 6 years → father → 48 years.

son → 24 yrs.

Ratio → 48 : 24 = 2 : 1

30. (b); 8 years ago, the sum of their ages was 56 years.

So, sum of their present ages = 56 + 24 = 80 years

Proportion → 4 : 7 : 9

So, the present ages are → $\frac{4}{20} \times 80 = 16$ Years

$\frac{7}{20} \times 80 = 28$ Years

$\frac{9}{20} \times 80 = 36$ Years

31. (c); Ratio of present ages = 4 : 3

Let the ages be → man → 4x

wife → 3x

After 4 yrs → man → 4x + 4

wife → 3x + 4

$\frac{4x+4}{3x+4} = \frac{9}{7}$

$28x + 28 = 27x + 36 \Rightarrow x = 8$

Present ages → man → 32 yrs.

wife → 24 yrs.

From the option if we check option (c) $\rightarrow$ 12 yrs.

then 12 yrs. ago $\rightarrow$ man $\rightarrow$ 20 yrs.

wife $\rightarrow$ 12 yrs.

Ratio $\rightarrow$ 20 : 12 = 5 : 3

So, they were married 12 years. ago.

32. (c);

	A	B
Present ages $\rightarrow$	5x	3x

A's age 4 yrs. ago = 5x – 4

B's age 4 yrs. hence = 3x + 4

$5x - 4 = 3x + 4 \Rightarrow 2x = 8 \Rightarrow x = 4$

A's age 4 yrs. hence = 5 × 4 + 4 = 24 yrs.

B's age 4 yrs. ago = 3 × 4 – 4 = 8 yrs.

Ratio $\rightarrow$ 24 : 8 = 3 : 1

33. (c); Let mother's present age be 'M' years

present age of the person = $\frac{2}{5}M$

After 8 yrs. $\rightarrow$ mother's age = M + 8

person's age = $\frac{2}{5}M + 8$

$\frac{2}{5}M + 8 = \frac{M}{2} + 4, \quad \frac{M}{10} = 4 \Rightarrow M = 40$

34. (e); Let present ages of father and son be f and s respectively.

	Father	Son
Present ages	f	s
4 years ago	(f – 4)	(s – 4)
After 4 years	(f + 4)	(s + 4)

$f - 4 = 3(s - 4)$ $\quad$ $(f + 4) + (s + 4) = 64$

$f - 4 = 3s - 12$ $\quad$ $f + s = 64 - 8$

$f - 3s = -8$ ...(i) $\quad$ $f + s = 56$ ...(ii)

$3f + 3s = 168$

$f - 3s = -8$

On solving (i) and (ii)

$4f = 160 \Rightarrow f = 40$

So, father's age at present = 40 years.

35. (a);

	Usha	Reena
Present ages →	36 yrs.	24 yrs.
	↓ –8	↓ –8 (8 yrs. ago)
	28 yrs.	16 yrs.
Ratio →	28 : 16 (Usha : Reena) = 7 : 4	

36. (b); Ratio of present ages

↓

Anil	:	Poorvi
3	:	2
Let → 3x		2x
↓		↓
After 8 yrs. → (3x + 8)		(2x + 8)

$$\frac{3x+8}{2x+8} = \frac{25}{18} \Rightarrow 54x + 144 = 50x + 200$$

$4x = 56 \Rightarrow x = 14$

⇒ Poorvi's present age = 2x = 28 yrs.

Shortcut :

Check → option (b)

Poorvi's present age = 28 yrs.

⇒ Anil's present age = $\frac{3}{2} \times 28$ = 42 yrs.

After 8 yrs. →

Anil → 50 yrs.

Poorvi → 36 yrs.

ratio → Anil : Poorvi
50 : 36
25 : 18
Hence verified

37. (c); Ratio of ages →

Meena : Seema
7 : 8

↓

difference = 1 unit = 3 yrs.

Sum = 7 + 8 = 15 units = 15 × 3 = 45 years.

38. (a); Rehana's age after 7 yrs. = 85 yrs.
⇒ Rehana's present age = 85 – 7 = 78 yrs.
Wasim is → 12 younger than Rehana
⇒ Wasim's present age = 66 yrs

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Ratio of present ages →

Manoj : Wasim
3 : 11
↓×6 ↓×6
18 yrs. 66 yrs.

↓

Present age of Manoj's father = 18 + 25 = 43 yrs.

39. (b); Ratio of present ages →

Indira : Lizzy
3 : 8
Let → 3 x 8x

After 8 yrs. → ↓ ↓

$3x + 8$ $8x + 8$

$3x + 8 = 20 \Rightarrow 3x = 12 \Rightarrow x = 4$

⇒ Lizzy's present age ⇒ $8x = 8 \times 4 = 32$ yrs.

⇒ Lizzy's age 5 yrs. ago ⇒ $32 - 5 = 27$ yrs.

Shortcut :

Indira	:	Lizzy
3	:	8

Indira's age after 8 yrs. = 20 yrs.

⇒ Indira's present age = 12 yrs.

3 units → 12 years

⇒ 1 unit = 4 years

Lizzy's present age = 8 units = 8 × 4 = 32 yrs.

Lizzy's age 5 yrs. ago = 32 – 5 = 27 yrs.

40. (d); Let Sarita's present age = s

Kavita's present age = 2s

8 years. hence

Sarita's age = s + 8

Kavita's age = 2s + 8

$$\frac{2s+8}{s+8} = \frac{22}{13}$$

$26s + 104 = 22s + 176$

$4s = 72$

$s = 18 \Rightarrow$ Kavita's present age = 2s = 36 years

Shortcut

Check option (d)

Kavita's present age = 36 yr.

Sarita's present age = 18 yrs.

Sarita	Kavita
18	36
↓ + 8	↓ + 8
26	44

Ratio = 13 : 22

Hence verified

41. (c); Age of A and B 10 years ago

A	B
13x	17x

Ratio of ages of A and B after 17 years

$$\frac{13x+27}{17x+27}=\frac{10}{11}$$

143x + 297 = 170x + 270 $\Rightarrow$ 27x = 27, x = 1

Present age of B = 17x + 10 = 17 × 1 + 10 = 27 years

42. (d); Can't be determined.

43. (c);

Ram	Sanjay	Aditya
↓	↓	↓
45000	60000	90,000
12 months	9 months	6 months

Ram	Sanjay	Aditya
↓	↓	↓

Ratio of Profits → 45000×12 : 60000×9 : 90000×6

5400 : 5400 : 5400

1 : 1 : 1

Net profit = Rs. 16500

Ram's share = $\frac{1}{3}\times 16500$ = Rs. 5500

44. (c);

Ram	Anil	Aditya
↓	↓	↓
1200	1500	900

	12 months	6 months	9 months
	Ram	Anil	Aditya
	↓	↓	↓
Ratio of profits	14400 :	9000 :	8100
	144 :	90 :	81
	16 :	10 :	9

Total profit = Rs. 2450

Aditya's share = $\frac{9}{35} \times 2450$ = Rs. 630

45. (d); Let number of 10-paise coins be 17 k
and number of 25-paise coins be 6 k.

$17\,k \times 0.10 + 6\,k \times 0.25 = 112$

$\Rightarrow 1.7\,k + 1.5\,k = 112 \quad \Rightarrow 3.2\,k = 112 \quad \Rightarrow k = 35$

$\therefore$ Number of 10-paise coins = 17 × 35 = 595

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46. (c);

P	Q	S
↓	↓	↓
(50, 4 months)	(45, 5 months)	(70, 7 months)
(25, 8 months)	(22.5, 7 months)	

	P	Q	S
	↓	↓	↓
Ratio	(50 × 4+ 25 × 8) :	(45 × 5 + 22.5 × 7) :	(70 × 7)
of profits	400 :	382.5 :	490
	160 :	153 :	196

Profit at the end of 12 months = Rs 1272.5

S's share = $\frac{196}{160+153+196} \times 1272.5$

$= \frac{196}{509} \times 1272.5 = \frac{196 \times 12725}{5090}$ = Rs. 490

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47. (c); A invests Rs. 12000 for 4 months and Rs. 17000 for 8 months B invests Rs. 16000 for 4 months and Rs. 10000 for 8 months. C invests Rs. 20000 for 6 months.

A $\rightarrow$ 12000 × 4 + 17000 × 8 = 1, 84000

B $\rightarrow$ 16000 × 4 + 10000 × 8 = 1, 44000

C $\rightarrow$ 20000 × 6 = 1,20,000

$\therefore$ Ratio of profits = 23 : 18 : 15

Total profit = Rs. 30,100

As share = $\frac{23}{(23+18+15)} \times 30{,}100$ = Rs. 12362.5

48. (a);

	P		Q		R
Ratio of investments	8	:	6	:	5
Ratio of profits	1	:	3	:	5

Check option (a) $\rightarrow$ Ratio of time periods

$\rightarrow$ 1 : 4 : 8

Ratio of profits = Ratio of products of corresponding values of investments and time periods

8 × 1 : 6 × 4 : 5 × 8

= 8 : 24 : 40

= 1 : 3 : 5 = Ratio of profits.

49. (e); Total time = 36 months

Let Aditya's time of contribution = t_A

Manish's time = t_M

300 × t_A : 500 × t_M = Ratio of their profit shares.

Total profit = Rs 1020

Aditya's share = 495

Manish's share = 1020 – 495 = 525

Ratio of profits = 495 : 525 = 33 : 35 ... (ii)

From (i) and (ii)

$$\frac{300\times t_A}{500\times t_M} = \frac{33}{35} \Rightarrow \frac{t_A}{t_M} = \frac{33\times 500}{35\times 300} = \frac{11}{7}$$

Time period for which Aditya invested = $\frac{11}{18}\times 36$ = 22 months

50. (a);

	Aditya		Manish		Gaurav
Ratio of shares	$\frac{7}{2}$	:	$\frac{4}{3}$	:	$\frac{6}{5}$
	$\frac{7}{2}\times 30$	:	$\frac{4}{3}\times 30$	:	$\frac{6}{5}\times 30$
	(105	:	40	:	36) × 2
	210	:	80	:	72

Let their shares be → 210, 80, 72

	Aditya	Manish	Gaurav
Shares →	210	(210+105)	80	72
	For 4 months	For 8 months	For 12 months	For 12 months

	Aditya	Manish	Gaurav
Ratio of profit shares →	(210×4+315×8)	(80×12)	(72×12)
Ratio of profit →	(840+2520)	960	864
	3360	960	864

Profit at the end of one year = Rs. 43200

Manish's share = $\frac{960}{5184}\times 43200$ = Rs. 8000

Difficult

1. (c); Alloy 1 Alloy 2

$$\frac{1}{3} \qquad \frac{2}{5}$$

$$\frac{3}{8}$$

$$\frac{2}{5} - \frac{3}{8} = \frac{1}{40} \qquad \frac{3}{8} - \frac{1}{3} = \frac{1}{24}$$

Required Ratio $= \frac{1}{40} : \frac{1}{24}$ = 24 : 40 = 3 : 5

3 and 5 parts of the two alloys must be taken.

2. (d); Quantity of gold and silver in first alloy,
Gold = 8 kg, silver = 2kg
In second alloy
Gold = 4 kg, silver = 12 kg
Total amount of gold in new alloy = 8 + 4 + pure gold added
Total amount of silver in new alloy = 12 + 2 = 14 kg
Ratio given = 3 : 2
2x = 14 kg $\Rightarrow$ x = 7 kg
Total weight of new alloy = 5 × x = 5 × 7 = 35 kg

3. (b); A = $\frac{B+C}{2}$, $\frac{B+C}{A} = \frac{2}{1} \Rightarrow \frac{A+C}{4}$ = B, $\frac{A+C}{B} = \frac{4}{1}$

$$\frac{B+C}{A} = \frac{2\times5}{1\times5} = \frac{10}{5} \Rightarrow \frac{A+C}{B} = \frac{12}{3}$$

B = 3, A = 5, C = 7 $\Rightarrow$ A : B : C = 5 : 3 : 7

(A + B)'s share = $\frac{8}{15} \times 5625$ = Rs. 3000

4. (d); Average income $= \frac{8 \times 2310 + 4 \times 1800 - 1680}{12} = \frac{24000}{12} = 2000$

Avg. Expenditure $= \frac{8 \times 2310 + 4 \times 1800}{12} = \frac{25680}{12} = 2140$

$\frac{\text{Average Income}}{\text{Average Expenditure}} = \frac{2000}{2140} = \frac{100}{107} = 100 : 107$

5. (a); Given, $\frac{\text{Expense}}{\text{Saving}} = \frac{5}{3}$

Let Income = 8 units

Increased income $= 8 \times \frac{5}{4} = 10$ units

Expense is increased by 60%

Increased expense $= 5 \times \frac{8}{5} = 8$ unit

New saving = 10 – 8 = 2 units

Difference between saving = 3 – 2 = 1 unit

1 unit = Rs. 3500

10 units = Rs. 35000

6. (a); Let the numbers of Rs. 1, 50 paise & 25 paise coins are 12x, 10x and 7x.

According to question

$$12x + \frac{10x}{2} + 7\left(\frac{x}{4}\right) = 75 \Rightarrow 12x + 5x + \frac{7x}{4} = 75$$

$$17x + \frac{7x}{4} = 75 \Rightarrow \frac{75x}{4} = 75, x = 4$$

Number of 25 paise coins = 7 × 4 = 28 coins

7. (e); Given, 2 Horses = 5 Dogs
6 Dogs = 8 Oxens
10 Oxens = 50 Sheep
14 Sheep = 9 Goats

Cost of one horse $= \frac{9 \times 50 \times 8 \times 5}{14 \times 10 \times 6 \times 2} \times 700$ = Rs. 7500

8. (c); Let their share after decrease in money = 9x, 13x and 8x
(9x + 26) + (13x + 28) + (8x + 32) = 2186
30x = 2186 – 26 – 28 – 32 $\Rightarrow$ x = 70
Amount given to A = 9 × 70 + 26
= 630 + 26 = Rs. 656

9. (a); $\frac{\text{Sita's Profit}}{\text{Gita's Profit}} = \frac{3}{2}$

Let Gita invested capital for x months and Sita invested her capital for 12 months.

$\frac{3}{2} = \frac{12}{x} \Rightarrow x = \frac{12}{3} \times 2 = 8 \Rightarrow x = 8$ months

10. (a); Last year, ratio of cost of Maruti and Figo, $\frac{LM}{LF} = \frac{3}{4}$

Present year & last year ratio of maruti, $\frac{PM}{LM} = \frac{5}{4}$

$PM = \frac{5}{4} LM$, $PM = \frac{5}{4} \times 3 = \frac{15}{4} \Rightarrow \frac{PF}{LF} = \frac{3}{2}$

$PF = \frac{3}{2} LF \Rightarrow PF = \frac{3}{2} \times 4 = 6$

PF : PM = 6 : $\frac{15}{4}$ = 24 : 15 = 8 : 5

PF = $\frac{8}{13} \times 7.8 = 4.8$ lacks

$\frac{LF}{PF} = \frac{2}{3}$, LF $= \frac{2}{3} \times 4.8 = 3.2$ lacs

11. (b); Ratio of Ram's salary for last and present year = 2 : 3
Ratio of Shyam's salary for last and present year = 4 : 5
Ratio of their salary during last year = 3 : 5
Now, we change the first two ratio

$$2 : 3 = \frac{2 \times 3}{2} : \frac{3 \times 3}{2} = 3 : \frac{9}{2}$$

and $4 : 5 = 4\left(\frac{5}{4}\right) : 5\left(\frac{5}{4}\right) = 5 : \frac{25}{4}$

Now the ratio of salary of present year $= \frac{9}{2} : \frac{25}{4} = 18 : 25$

The Present salary of Ram $= \frac{18}{18+25} \times 8600 =$ Rs. 3600

12. (d); Let the candle height be x
Let time required = T hour

In one hour first candle lighted $= \frac{x}{8}$

In T hour, first candle lighted $= \frac{T}{8}x$

After T hour, remaining candle $= x\left(1 - \frac{T}{8}\right)$

Similarly for second candle $= x\left(1 - \frac{T}{6}\right)$

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$$\frac{x\left(1-\frac{T}{8}\right)}{x\left(1-\frac{T}{6}\right)}=\frac{2}{1}, \qquad \frac{\left(1-\frac{T}{8}\right)}{\left(1-\frac{T}{6}\right)}=\frac{2}{1}$$

$$1-\frac{T}{8}=2-\frac{T}{3}, \qquad \frac{T}{3}-\frac{T}{8}=1$$

$$T=\frac{24}{5}=4 \text{ h } 48 \text{ min}$$

13. (a); Income of Ram, Shyam and Mohan be x, y and z respectively.

Ram's Saving = 75% of x $=\frac{3}{4}x$

Shyam's Saving = 80% of y $=\frac{4}{5}y$

Mohan Saving = 50% of z = $\frac{1}{2}z$

Let their saving be 9k, 8k and 4k then

$\frac{3}{4}x = 9k$, $x = 12k$ $\Rightarrow$ $\frac{4}{5}y = 8k$, $y = 10k$ $\Rightarrow$ $\frac{1}{2}z = 4k$, $z = 8k$

According to question

$x + y + z = 450$ $\Rightarrow$ $12k + 10k + 8k = 450$ $\Rightarrow$ $k=\frac{450}{30}=15$

Ram's income = 12 × 15 = Rs. 180

14. (a); After taking out 100 litres of milk and adding same amount of water.

Ratio of milk and water $=\frac{900}{100}=9:1$

After taking out 200 litres of mixtures, then the Quantity of milk

$= 800\left(\frac{9}{9+1}\right)$ = 720 litres

The new ratio $= \frac{720}{280} = \frac{18}{7}$ = 18 : 7

After taking out 400 litres of mixture the rest amount of mixture will be 600.

Quantity of pure milk $= 600\left(\frac{18}{25}\right)$ = 24 × 18 = 432 litre

The amount of pure milk will be 432 litres.

15. (b); Let the land and water part on earth be x and 2x.

Total area = 3x

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Total area of northern hemisphere $= \frac{3}{2}x$

Land part of northern hemisphere $= \frac{2}{2+3} \times \frac{3x}{2} = \frac{3x}{5}$

Land part of southern hemisphere $= x - \frac{3x}{5} = \frac{2x}{5}$

Water part of northern hemisphere $= \frac{3}{2+3} \times \frac{3x}{2} = \frac{9x}{10}$

Water part of southern hemisphere $= 2x - \frac{9x}{10} = \frac{11x}{10}$

Required ratio $= \frac{\frac{2x}{5}}{\frac{11x}{10}} = 2 : \frac{11}{2}$ = 4 :11

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16. (a); Income of A = Rs. 2400

Income of B $= \frac{7}{3} \times 2400$ = Rs. 5600

Income of C $= \frac{4}{3} \times 2400$ = Rs. 3200

Expenditure of A = 2400 – 300 = Rs. 2100

Expenditure of B = $\frac{3}{4} \times 2100$ = Rs. 1575

Expenditure of C $= \frac{5}{4} \times 2100$ = Rs. 2625

Saving of B = Rs. (5600 – 1575) = Rs. 4025

Saving of C = Rs. (3200 – 2625) = Rs. 575

17. (b); Let the quantity of wine and water in drum are 3x and x respectively.

and let y litre of mixture is taken out and y litres water is mixed.

In y litre of mixture,

wine $= \frac{3}{4}$ y litre, water $= \frac{1}{4}$ y litre

amount of wine in new mixture $= 3x - \frac{3y}{4}$ litre

and amount of water $= x - \frac{y}{4} + y = x + \frac{3y}{4}$

According to question

$$3x - \frac{3y}{4} = x + \frac{3y}{4} \Rightarrow 2x = \frac{3y}{2}, \quad y = \frac{4x}{3}$$

Which is $\frac{1}{3}$ of the total mixture.

18. (a);

Petrol	Kerosene	Total mixture
99	a	99 + a
99	a – 198	a – 99

$$\frac{99}{a-99}\times 100-\frac{99}{a+99}\times 100=13.33$$

$$9900\left(\frac{198}{a^2-99^2}\right)=13.33$$

$a^2 - 99^2 = 99^2 \times 15 \Rightarrow a^2 = 99^2 \times 16 \Rightarrow a = 396$ litres

Actual concentration $=\frac{99}{(396+99)}\times 100 = 20\%$

19. (a); Here, $B=\frac{5}{6}A$, $C = D = \frac{9}{10}B$

$B=\frac{2}{3}E$ and $E - A = 3 \Rightarrow B=\frac{5}{6}A=\frac{2}{3}E$

$\frac{A}{E}=\frac{4}{5}$ or $E=\frac{5}{4}A \Rightarrow E-A=\frac{5}{4}A-A$

$3 = \frac{1}{4}A$, $A = 12$

E = 15 and B = 10, C = D = 9 and B = 10

C = D = 9 and F = 11, A : F = 12 : 11

20. (d); In first Vessel $\frac{W_1}{M_1}=\frac{1}{3}$, In second Vessel $\frac{W_2}{M_2}=\frac{2}{3}$

In third Vessel $\frac{W_3}{M_3}=\frac{2}{5}$, Proportion of water $=\frac{1}{4}:\frac{2}{5}:\frac{2}{7}$

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$$\frac{1}{4}\times\frac{5\times7}{5\times7}:\frac{2}{5}\times\frac{4\times7}{4\times7}:\frac{2}{7}\times\frac{4\times5}{4\times5},\qquad \frac{35}{140}:\frac{56}{140}:\frac{40}{140}$$

Now, since all these mixtures are mixed in ratio of 2 : 3 : 5.

Therefore new ratio $=\frac{70}{280}:\frac{168}{420}:\frac{200}{700}$

Amount of water = 70 + 168 + 200 = 438

Amount of milk = (280 + 420 + 700) – 438 = 962

Ratio of milk to water $\frac{962}{438}=\frac{481}{219}$ = 481 : 219

Previous Year (Memory Based)

1. (c); Let the price of referigerator and television set be 5x and 3x respectively.
According to question
5x – 3x = 5500, 2x = 5500, x = 2750
Price of refrigerator = 5 × 2750 = Rs. 13750

2. (d); Here, no amount is given Therefore the information given is inadequate.

3. (b); $A\times\frac{2}{3}=\frac{4}{5}\times B \Rightarrow \frac{A}{B}=\frac{4}{5}\times\frac{3}{2}=\frac{6}{5}\Rightarrow$ A : B = 6 : 5

4. (c); According to question
3x + 5x = 4x + 52 $\Rightarrow$ 4x = 52, x = 13
Smallest number = 3 × 13 = 39

5. (a); $\frac{x}{y}=\frac{2}{1}$

On squaring both sides

$$\frac{x^2}{y^2}=\frac{4}{1},\ \frac{x^2-y^2}{x^2+y^2}=\frac{4-1}{4+1}=\frac{3}{5}$$

6. (a); Let $\frac{a}{3}=\frac{b}{4}=\frac{c}{7}=k \Rightarrow a = 3k, b = 4k, c = 7k$

$$\frac{a+b+c}{c}=\frac{3k+4k+7k}{7k}=\frac{14k}{7k} = 2 : 1$$

7. (d); Given Ratio of numbers are $=\frac{1}{2}:\frac{2}{3}:\frac{3}{4}$

$$=\frac{1}{2}\times 12:\frac{2}{3}\times 12:\frac{3}{4}\times 12 = 6 : 8 : 9$$

Number are 6x, 8x, and 9x

$9x - 6x = 36 \Rightarrow x = 12$

$\therefore$ Number are 72, 96, 108

8. (c); Given $\frac{m}{n}=\frac{3}{2} \Rightarrow \frac{4m}{5n}=\frac{12}{10}=\frac{6}{5}$

By using componendo & Dividendo

$$\frac{4m+5m}{4m-5n}=\frac{6+5}{6-5}=\frac{11}{1}=11:1$$

9. (a); Let, Milk : Water = K : 1

Selling price of mixture = (K + 1) 9

Cost price of mixture = 10K

Gain = 9K + 9 - 10k = 9 - K

$$\text{Gain\%} = \frac{\text{Gain}\times 100}{\text{CP}} \Rightarrow 20=\frac{9-K}{10K}\times 100$$

$2K = 9 - K \Rightarrow 3K = 9, K : 1 = 3 : 1$

10. (c); Ratio = $1:\frac{1}{3}:\frac{1}{6}=1\times 6:\frac{1}{3}\times 6:\frac{1}{6}\times 6 = 6 : 2 : 1$

$$\text{Middle part} =\frac{2}{9}\times 78=\frac{2\times 26}{3}=\frac{52}{3}=17\frac{1}{3}$$

11. (a); Let the number be x and y respectively.

$x + y = 25 \Rightarrow x - y = 20$

On solving above equations

$2x = 45, x = \frac{45}{2} \Rightarrow 2y = 5, \quad y = \frac{5}{2}$

$\frac{x}{y} = \frac{45}{2} : \frac{5}{2} = 9 : 1$

12. (a); Let the first part be x

Second part = $94 - x$

$\frac{\frac{x}{5}}{\frac{94-x}{8}} = \frac{3}{4} \Rightarrow \frac{x}{94-x} = \frac{3 \times 5}{4 \times 8} = 32x = 15\,(94 - x)$

$47x = 15 \times 94, x = \frac{15 \times 94}{47} = 30$

13. (c); Let the number be 4x and 7x.

$\frac{4x+4}{7x+4} = \frac{3}{5}, 20x + 20 = 21x + 12 \Rightarrow x = 8$

Larger number = 8 × 7 = 56

14. (c); Numbers are 5x, 6x and 7x respectively, According to question

5x. 6x. 7x = 5670

$x^3 = \frac{5670}{5 \times 6 \times 7} = 27 \Rightarrow x = 3$

The greatest number = 7 × 3 = 21

15. (c); Let the number be 3x, 2x & 5x respectively

$(3x)^2+(2x)^2+(5x)^2 = 1862 \Rightarrow 9x^2 + 4x^2 + 25x^2 = 1862$

$38x^2 = 1862 \Rightarrow x^2 = 49, x = 7$

The smallest number = 7 × 2 = 14

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16. (a); Ratio = 10 : 7

Let the number be 10x and 7x respectively.

Difference of ratio = 3x

3x = 105, x = 35

17x = 17 × 35 = 595

17. (d); (A + B + C + D) = 60 ... (i)

$A = \frac{1}{2}(B + C + D)$ ... (ii)

$B = \frac{1}{3}(A + C + D)$ ... (iii)

$C = \frac{1}{4}(A + B + D)$ ... (iv)

Putting this value in equation (i)

$4C + C = 60 \Rightarrow C = \frac{60}{5} = 12$

Similarly we get,

B = 15, A = 20

Therefore D = 60 – 12 – 15 – 20 ⇒ D = 13

D pays Rs. 13

18. (d); Income of Amit and Varun be 3x and 2x respectively

Expenditure of Amit and Varun be 5y and 3y respectively

3x – 5y = 2x – 3y ⇒ x = 2y

3x –5y = 1000, y = 1000 ⇒ x = 2000

Income of amit = 3 × 2000 = Rs. 6000

19. (b); Let the annual income of A, B and C be x, 3x and 7x respectively.

x + 7x = 800000 ⇒ 8x = 800000, x = 100000

B's monthly Income $= \frac{3 \times 100000}{12}$ = Rs. 25000

20. (b); Let monthly Salaries of A, B and C are 2x, 3x & 5x respectively.

$5x - 2x = 12000$

$x = 4000$

B's monthly salary = 3 × 4000 = 12000

Annual salary of B = 12 × 12000 = 144000

21. (d); According to question;

$$7x - 8y = \frac{7x}{4} \quad \Rightarrow \quad 28x - 32y = 7x$$

$$21x = 32y, \quad y = \frac{21x}{32}, \quad \text{A's saving} = \frac{7x}{4}$$

$$\text{B's saving} = 9x - 9y = 9x - 9\left(\frac{21x}{32}\right) = \frac{99x}{32}$$

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$$\text{C's saving} = 12x - 15y = 12x - 15\left(\frac{21x}{32}\right) = \frac{69x}{32}$$

$$\text{Ratio of savings} = \frac{7x}{4} : \frac{99x}{32} : \frac{69x}{32} = 56 : 99 : 69$$

22. (a); Let the income and expenditure be 10x and 7x respectively.

$7x = 10500 \quad \Rightarrow \quad x = 1500$

Saving of the family = 10x – 7x = 3x = 3 × 1500

= Rs. 4500

23. (c); Let the income of P and Q be 3x and 4x and their expenditure be 2y and 3y

$3x - 2y = 4x - 3y \quad \Rightarrow \quad x = y$

$3x - 2y = 6000 \quad \Rightarrow \quad 3x - 2x = 6000, x = 6000$

Income of P = 3x = 3 × 6000 = 18000

24. (c); Let the number of students in three classes be 2x, 3x and 5x respectively.

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$$\frac{2x+20}{3x+20}=\frac{4}{5}$$

10x + 100 = 12x + 80 $\Rightarrow$ 2x = 20, x = 10

Number of students before increase = 10 × 10 = 100

25. (d); Let the number added be x

$\frac{17+x}{24+x}=\frac{1}{2}$, 34 + 2x = 24 + x – 2x + x = 34 – 24 $\Rightarrow$ x = – 10

There fore, 10 should be subtracted.

26. (a); $\frac{2x+12}{3x+12}=\frac{8}{11}$

22x + 132 = 24x + 96 $\Rightarrow$ 2x = 36 $\Rightarrow$ x = 18

Total no of students = 18 × 9 = 162

27. (b); $\frac{3x-9}{5x-9}=\frac{12}{23}$

69x – 207 = 60x – 108 $\Rightarrow$ 9x = 99 $\Rightarrow$ x = 11

Smaller number = 11 × 3 = 33

28. (a); Total number of girls in school = $\frac{11}{24}\times 504$ = 231

Total number of boys in school $=\frac{13}{24}\times 504$ = 273

Total number of girl after increase = 231 + 12 = 243

Required ratio $=\frac{273}{243}=\frac{91}{81}$ = 91 : 81

29. (b); The ratio for A : B : C = 100 : 90 : 99

Sum of ratio = 100 + 90 + 99 = 289

B's share $=\frac{90}{289}\times 86700$ = 27000

30. (a); L = N + 5.72

M = L + 2.24 = N + 5.72 + 2.24

i.e M = N + 7.96

L + M + N = 340.68

N + 5.72 + N + 7.96 + N = 340.68

$3N = 327 \Rightarrow N = \frac{327}{3}$ = Rs. 109

31. (d); Ratio of number of coins = 13 : 11 × 2 = 13 : 22

Number of 1 rupee coins $= \frac{13}{35} \times 210 = 78$

32. (a); Ratio of number of coins = 13 : 11 × 2 : 7 × 4 = 13 : 22 : 28

Number of 50 paise coins $= \frac{22}{63} \times 378 = 22 \times 6 = 132$

33. (d); Let the present age of Sumit and Prakash be 2x and 3x respectively.

3x – 2x = 6, x = 6

Required ratio $= \frac{2 \times 6 + 6}{3 \times 6 + 6} = \frac{18}{24} = 3 : 4$

34. (b); Let the ages of Ram and Rahim 10 year ago be x and 3x yr respectively.

After 5 year from now

$\frac{x + 15}{3x + 15} = \frac{2}{3}$

6x + 30 = 3x + 45 ⇒ 3x = 15, x = 5

Ratio of present ages = (x + 10) : (3x + 10) = 15 : 25 = 3 : 5

35. (c); Ratio of pens $= \frac{1}{3} : \frac{1}{4} : \frac{1}{5} : \frac{1}{6} = \frac{60}{3} : \frac{60}{4} : \frac{60}{5} : \frac{60}{6}$ = 20 : 15 : 12 : 10

Minimum number of pens = 20 + 15 + 12 + 10 = 57

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36. (b); $\frac{A}{B} = \frac{4}{5}$, $\frac{B}{C} = \frac{5}{2}$

A : B : C = 4 : 5 : 2

A : C = 4 : 2 = 2 : 1

37. (b); $\frac{A}{B} = \frac{3}{4}$, $\frac{B}{C} = \frac{12}{13}$

A : B : C = 3 × 3 : 4 × 3 : 13

A : B : C = 9 : 12 : 13

A : C = 9 : 13

38. (a); $\frac{2x-2}{3x+2} = \frac{1}{2}$ $\Rightarrow$ 4x – 4 = 3x + 2 $\Rightarrow$ x = 6

Sum of number = 6 × 5 = 30

39. (b); a : b = $\frac{2}{9} : \frac{1}{3}$ = 2 : 3 $\Rightarrow$ b : c = $\frac{2}{7} : \frac{5}{14}$ = 4 : 5

c : d = $\frac{3}{5} : \frac{7}{10}$ = 6 : 7

a : b : c : d = 2 × 4 × 6 : 3 × 4 × 6 : 3 × 5 × 6 : 3 × 5 × 7

= 48 : 72 : 90 : 105 = 16 : 24 : 30 : 35

40. (a); Ratio of son's share : wife's share: daughter's share

= 3 × 3 : 3 × 1 : 1 × 1 = 9 : 3 : 1

According to question

9x – x = 10000 $\Rightarrow$ 8x = 10000, x = 1250

The value of whole property = 13 × 1250 = Rs. 16250

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Chapter 3

Percentage

Percent: The term 'percent' is derived from the Latin word 'Per centum'. It implies "out of every hundred".

The symbol '%' is used to denote percentage. For example, 15% means 15 out of 100. Each ratio can be expressed as a percentage.

For example, $\frac{1}{2}$ can be expressed as a percentage by multiplying by 100;

$$\frac{1}{2} \times 100 = 50\%$$

A given percentage value can be converted to corresponding fraction by dividing by 100.

Example: 75% = 75 out of hundred $= \frac{75}{100} = \frac{3}{4}$

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Percentage fraction conversion chart:

$\frac{1}{2} = 50\%$	$\frac{5}{6} = 83\frac{1}{3}\%$	$\frac{2}{9} = 22\frac{2}{9}\%$
$\frac{1}{3} = 33\frac{1}{3}\%$	$\frac{1}{7} = 14\frac{2}{7}\%$	$\frac{1}{10} = 10\%$
$\frac{2}{3} = 66\frac{2}{3}\%$	$\frac{2}{7} = 28\frac{4}{7}\%$	$\frac{1}{11} = 9\frac{1}{11}\%$
$\frac{1}{4} = 25\%$	$\frac{3}{7} = 42\frac{6}{7}\%$	$\frac{2}{11} = 18\frac{2}{11}\%$
$\frac{3}{4} = 75\%$	$\frac{1}{8} = 12\frac{1}{2}\%$	$\frac{1}{12} = 8\frac{1}{3}\%$
$\frac{1}{5} = 20\%$	$\frac{3}{8} = 37\frac{1}{2}\%$	$\frac{5}{12} = 41\frac{2}{3}\%$

$\frac{2}{5} = 40\%$ $\frac{5}{8} = 62\frac{1}{2}\%$ $\frac{1}{15} = 6\frac{2}{3}\%$

$\frac{3}{5} = 60\%$ $\frac{7}{8} = 87\frac{1}{2}\%$ $\frac{1}{20} = 5\%$

$\frac{4}{5} = 80\%$ $\frac{1}{9} = 11\frac{1}{9}\%$ $\frac{1}{25} = 4\%$

$\frac{1}{6} = 16\frac{2}{3}\%$

Formula to calculate percentage value: y% of x = $\left(\frac{y}{100}\right) \times x$

From the above formula, we have the following result: x% of y = y% of x.

whenever we have two numbers a and b, one number can be expressed as a percentage of the other as follows:

x as a percent of y = $\frac{x}{y} \times 100$, y as a percent of x = $\frac{y}{x} \times 100$.

Percentage increase or decrease:

$$\text{Percentage increase} = \frac{\text{increase in the quantity}}{\text{original quantity}} \times 100$$

$$\text{Percentage decrease} = \frac{\text{decrease in the quantity}}{\text{original quantity}} \times 100$$

For example, if the net profit of a company grew from 50 crore in 2003 to 75 crore in 2004, then the percentage increase in the net profit from 2003 to 2004 is calculated as follows:

increase in the net profit = (75 – 50) crore = 25 crore

This increase is on Rs. 50 crore.

So, Percentage increase $= \dfrac{\text{increase in profit from 2003 to 2004}}{\text{Net profit in 2003}} \times 100$

$$= \frac{25}{50} \times 100 = 50\%$$

When a quantity increases or decreases by some percent, the new value of the quantity can be directly calculated as follows:

If the original quantity is 120 and it increases by 25% , then the new quantity is: 1.25 × 120 = 150

(Here, 1.25 = 1 + 0.25, where 0.25 is equivalent to 25%)

Similarly, if there is a decrease by 25% on 120, then the new quantity is: 0.75 × 120 = 90

(Here, 0.75 = 1 – 0.25, where 0.25 is equivalent to 25%)

Some important conclusions:

(i) If x is a% more than y, then y is $\left(\dfrac{a}{100+a} \times 100\right)\%$ less than x.

(ii) If x is a% less than y, then y is $\left(\dfrac{a}{100-a} \times 100\right)\%$ more than x.

Example: If in an examination, the marks secured by Prerna are 20% less than that of Vinita, then marks secured by Vinita are how much percent more than prerna's marks?

Solution: a = 20%

According to the above formula; Required percentage

$$= \left(\frac{a}{100-a} \times 100\right)\% = \frac{20}{80} \times 100 = 25\%$$

(iii) If a number is first increased by a% and then decreased by a% then the net effect is always a decrease which is equal to 'a% of a' i.e., $\dfrac{a^2}{100}\%$

Example: The salary of a worker is first increased by 5% and then it is decreased by 5%. What is the change in his salary?

Solution: Here a = 5%

There will be a net decrease; Percent decrease

$$= \frac{a^2}{100}\% = \frac{5^2}{100}\% = 0.25\%$$

(iv) If a quantity is first changed (increased or decreased) by a% and then changed (increased or decreased) by b%, then

$$\text{Net change} = \left[\pm a \pm b + \frac{(\pm a)(\pm b)}{100}\right]\%$$

Net change is an increase or a decrease according to the positive or negative sign, respectively of the final result.

Example: The price of an article is first increased by 20% and then decreased by 25% due to reduction in sales. Find the net percent change in the final price of the article.

Solution: a = 20%, b = 25%

$$\text{Required percentage change} = \left(20 - 25 + \frac{20 \times (-25)}{100}\right)\%$$

$$= (-5 - 5)\% = -10\%$$

So, there is a net decrease of 10% in the final price of the article as the final result is negative.

(v) If the price of a commodity increases or decreases by a%, then the decrease or increase in consumption, so as not to increase or decrease the expenditure is equal to $\left(\frac{a}{100 \pm a}\right) \times 100\%$

(vi) If the population of a town is P and it increases (or decreases) at the rate of R% per annum, then

(i) Population after n years $= P\left(1 \pm \frac{R}{100}\right)^n$

(ii) Population n years ago $= \frac{P}{\left(1 \pm \frac{R}{100}\right)^n}$

('+' sign for increment; '–' sign for decrement).

Some tricks to calculate faster:

(i) Splitting the percentage into parts

Example: Find 51% of 128.

Soltion: 51% of 128 = (50 + 1)% of 128 = 50% of 128 + 1% of 128 = 64 + 1.28 = 65.28

(ii) Interchanging the percentage value and the number

Example: Find 39% of 12.5

Solution: 39% of 12.5 = 12.5% of 39 $= \frac{1}{8} \times 39 = 4.875$

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Types of Questions

1. Nikhil spent 20% of his monthly income on food and 15% on house rent. 40% of the remaining he spent on transport and 30% on entertainment. He is left with an amount of Rs. 8775 after all the expenditures. What is Nikhil's monthly income?

Sol. Let the income be Rs. 100

Final Saving = 100 – 20 – 15 – 26 – 19.5 = Rs. 19.5; But his final saving is Rs. 8775

$$19.5 \xrightarrow[(\times 450)]{} 8775$$

So, Income = Rs. 100 × 450 = Rs. 45000.

2. If the price of a Commodity be raised by 40%, by how much percent must a householder reduce his consumption of that commodity, so as not to increase his expenditure?

Sol. Here, a = 40%; According to the formula,

$$\text{Reduction in Consumption} = \left(\frac{40}{(100+40)} \times 100\right)\% = \frac{40}{140} \times 100$$

$$= \frac{200}{7}\% = 28\frac{4}{7}\%$$

3. The population of a town is 352800. If it increases at the rate of 5% per annum, then what will be its population 2 years hence. Also, find the population 2 years ago.

Sol. P = 352800, R = 5%, n = 2

Population after 2 years = $P\left(1+\frac{R}{100}\right)^n = 352800 \times \left(1+\frac{5}{100}\right)^2$

$$= 352800 \times \frac{21}{20} \times \frac{21}{20} = 388962$$

Population 2 years ago $= \frac{P}{\left(1+\frac{R}{100}\right)^n} = \frac{352800}{\left(1+\frac{5}{100}\right)^2}$

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$$= 352800 \times \frac{20}{21} \times \frac{20}{21} = 320000$$

4. There are 3 contestants P, Q and R in an election. P secured 20% of the votes and Q secured 70% of the remaining votes. If R secured 4800 votes, by how many votes has the winner won the election?

Sol. Let the total number of votes be 100.

P secured 20% = 20 votes.

Remaining votes = 100 – 20 = 80

Q secured 70% of 80 = 56 votes.

R secured (80 – 56) = 24 votes.

But R secured 4800 votes.

$$24 \xrightarrow[(\times 200)]{} 4800$$

So, winner Q won the election by 56 – 24 = 32 votes

$$32 \xrightarrow[(\times 200)]{} 6400 \quad \Rightarrow \quad 6400 \text{ votes}$$

5. Rahul answered 40% of the first 75 questions correctly in an examination consisting of 150 questions. Find the percentage of the remaining 75 questions that he needs to answer corrrectly in order to answer 60% of the total number of questions correctly?

Sol. 60% of total number of question = 60% of 150 = 90 questions

Number of questions that Rahul answered correctly in the first 75 questions = $\frac{40 \times 75}{100} = 30$

Number of questions from the remaining 75 questions that he should answer correctly = 90 – 30 = 60

Required percentage $= \frac{60}{75} \times 100 = 60 \times \frac{4}{3} = 80\%$

Foundation

1. 3.5 can be expressed in terms of percentage as:
   (a) 0.35% (b) 3.5% (c) 35%
   (d) 350% (e) None of these
2. What is 15 percent of Rs. 34.?
   (a) Rs. 3.40 (b) Rs. 3.75 (c) Rs. 4.50
   (d) Rs. 5.10 (e) None of these
3. 88% of 370+24% of 210-? = 118
   (a) 256 (b) 258 (c) 268
   (d) 358 (e) None of these
4. 860% of 50+50% of 860 = ?
   (a) 430 (b) 516 (c) 860
   (d) 960 (e) None of these
5. 60% of 264 is the same as:
   (a) 10% of 44 (b) 15% of 1056 (c) 30% of 132
   (d) 17% of 544 (e) None of these

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6. 270 candidates appeared for an examination, of which 252 passed. The pass percentage is?

(a) 80% (b) $83\frac{1}{2}\%$ (c) $90\frac{1}{3}\%$

(d) $93\frac{1}{3}\%$ (e) None of these

7. What percent of Rs. 2650 is Rs. 1987.50?

(a) 60% (b) 75% (c) 80%

(d) 85% (e) None of these

8. What percent of a day is 3 hours?

(a) $12\frac{1}{2}\%$ (b) $16\frac{1}{3}\%$ (c) $18\frac{2}{3}\%$

(d) $22\frac{1}{2}\%$ (e) None of these

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9. How many litres of pure acid are there in 8 litres of a 20% solution?

(a) 1.4 (b) 1.5 (c) 1.6

(d) 2.4 (e) None of these

10. Which one of the following shows the best percentage?

(a) $\frac{384}{540}$ (b) $\frac{425}{500}$ (c) $\frac{570}{700}$

(d) $\frac{480}{660}$ (e) None of these

11. 0.15% of $33\frac{1}{3}\%$ of Rs. 10,000 is?

(a) Rs. 0.05 (b) Rs. 5 (c) Rs. 105

(d) Rs. 150 (e) None of these

12. 45% of 1500+35% of 1700 = ?% of 3175
(a) 30 (b) 35 (c) 45
(d) 50 (e) None of these

13. An agent gets a commission of 2.5% on the sales of cloth. If on a certain day, he gets Rs. 12.50 as commission, the cloth sold through him on that day is worth?
(a) Rs. 250 (b) Rs. 500 (c) Rs. 750
(d) Rs. 1250 (e) None of these

14. If Rs. 2800 is $\frac{2}{7}$ th of the value of a house, the worth of the house (in Rs.) is?
(a) 8,00,000 (b) 9,80,000 (c) 10,00, 000
(d) 12,00,000 (e) None of these

15. If 35% of a number is 175, then what percent of 175 is that number?
(a) 35% (b) 65% (c) 280%
(d) 420% (e) None of these

16. If 35% of a number is 12 less than 50% of that number, then the number is:
(a) 40 (b) 50 (c) 60
(d) 80 (e) None of these

17. What percentage of numbers from 1 to 70 have squares that end in the digit 1?
(a) 1% (b) 14% (c) 20%
(d) 21% (e) None of these

18. If 75% of a number is added to 75, then the result is the number itself. The number is:
(a) 50 (b) 60 (c) 300
(d) 400 (e) None of these

19. The sum of two numbers is 2490. If 6.5% of one number is equal to 8.5% of the other, then the numbers are:
(a) 989, 1501 (b) 1011, 1479 (c) 1401, 1089
(d) 1411, 1079 (e) None of these

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20. When any number is divided by 12, then dividend comes $\frac{1}{4}$ th of the other number. By how much percent first number is greater than the second number?

(a) 150 (b) 200 (c) 300
(d) Data inadequate (e) None of these

21. If one number is 80% of the other and the sum of their square is 656, then the numbers are:

(a) 4, 5 (b) 8, 10 (c) 16, 20
(d) 14, 12 (e) None of these

22. A person's salary has increased from Rs. 7200 to Rs. 8100. What is the percentage increase in his salary?

(a) 25% (b) 18% (c) $16\frac{2}{3}\%$
(d) $12\frac{1}{2}\%$ (e) None of these

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23. A's salary is 20% less than B's salary. Then B's salary is more than A's salary by:

(a) $33\frac{1}{2}\%$ (b) $16\frac{2}{3}\%$ (c) 20%
(d) 25% (e) None of these

24. If the price of petrol is increased by 20%, by what percentage should the consumption be decreased by the consumer, if the expenditure on petrol remains unchanged?

(a) $16\frac{2}{3}\%$ (b) $6\frac{2}{3}\%$ (c) 8%
(d) 15% (e) None of these

25. The price of an article of Rs. 100 Its price is increased by 10%, then again its price is increased by 10%. How much is increased in total price?

(a) 20 (b) 21 (c) 110
(d) 121 (e) None of these

26. An agent sells goods of value of Rs. 15000. The commission which he receives is $12\frac{1}{2}\%$, is what amount ?

(a) Rs. 1875 (b) Rs. 2125 (c) Rs. 2000
(d) Rs. 2700 (e) None of these

27. The monthly income of a person is Rs. 5000. If his income is increased by 30%, then what is his monthly income now?

(a) Rs. 7000 (b) Rs. 5500 (c) Rs. 4500
(d) Rs. 6500 (e) None of the above

28. The price of a certain article is Rs. 15000. But due to slump in the market, its price decrease by 8%. Find the new price of the article?

(a) Rs. 14000 (b) Rs. 13800 (c) Rs. 16500
(d) Rs. 12600 (e) None of these

29. A man losses 20% of his money. After spending 25% of the remainder, he has Rs. 480 left. What is the amount of money he originally had?

(a) Rs. 600 (b) Rs. 720 (c) Rs. 720
(d) Rs. 840 (e) None of these

30. 15% of 10% of 20% of 1000 is?

(a) 1.50 (b) 67 (c) 150
(d) 3 (e) None of these

31. If the numerator of a fraction is increased by 120% and denominator is also increased by 350% then the fraction become $\frac{11}{27}$ what was fraction ?

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(a) $\frac{4}{5}$ (b) $\frac{5}{6}$ (c) $\frac{6}{5}$

(d) $\frac{5}{4}$ (e) None of these

32. If 40% of a number is equal to two-third of another number, what is the ratio of first number to the second number?

(a) 2 : 5 (b) 3 : 7 (c) 5 : 3

(d) 7 : 3 (e) None of these

33. A batsman scored 110 runs which included 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets?

(a) 45% (b) $45\frac{5}{11}\%$ (c) $54\frac{6}{11}\%$

(d) 55% (e) None of these

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34. If 50% of (x-y)=30% of (x+y), then what percent of x is y?

(a) 20% (b) 25% (b) 30%

(d) 40% (e) None of these

35. In expressing a length 81.472 km as nearly as possible with three significant digits, find the percentage error?

(a) 0.1% (b) 0.034% (c) 0.0020%

(d) 0.4% (e) None of these

36. Difference of two numbers is 1600. If 7.5% of one number is 12.5% of the other number, find the two numbers?

(a) 2490, 4000 (b) 2400, 4150 (c) 2490, 4150

(d) 2500, 4200 (e) None of these

37. Sixty-five percent of a number is 21 less than four-fifth of that number. What is the number?

(a) 100 (b) 120 (c) 140

(d) 160 (e) 180

38. An inspector rejects 0.08% of the meters as defective. How many will he examine to reject 2?

(a) 2000 (b) 2200 (c) 2500
(d) 2800 (e) None of these

39. Which is greatest number?

(a) $16\frac{2}{3}\%$ (b) $\frac{2}{15}$ (c) $\frac{1}{11}$
(d) 0.17 (e) $\frac{2}{5}\%$

40. $16\frac{2}{3}\%$ of 600 gm $-33\frac{1}{3}\%$ of 180 gm

(a) 20 gm (b) 30 gm (c) 40 gm
(d) 60 gm (e) None of these

Moderate

1. In an examination it is required to get 35% of the aggregate marks to pass Rishu got 216 marks and declared failed by 5% marks then what was the total marks?

(a) 620 (b) 720 (c) 820
(d) 710 (e) None of these

2. The price of Petrol went up 20%. In order to keep expenses same Ram must reduce travel by:

(a) 25% (b) 30% (c) 33.33%
(d) 16.67% (e) None of these

3. If the length and breadth of a rectangle field are increased. The area increased by 50%. If the length increased by 20%, by what percentage was breadth increased?

(a) 25% (b) 30% (c) 20%
(d) Data inadequate (e) None of these

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4. Aditya's salary is 80% of Amit's salary and 120% of Rajiv's salary. What is Amit's salary if Rajiv's salary is 30,000?

(a) 40000 (b) 45000 (c) 50000
(d) 55000 (e) None of these

5. In a class 60% of the students pass in Hindi and 45% pass in Sanskrit. If 25% of them pass in both subjects, what percentage of the students fails in both subjects?

(a) 80% (b) 20% (c) 25%
(d) 75% (e) None of these

6. An arc contains 23% copper. To get 69% of copper the quantity of the arc required is:

(a) 200 (b) 250 (c) 300
(d) 400 (e) None of these

7. Rice is now being sold at Rs. 30 per kg. During last month its rate was Rs. 26 per kg. Find by how much percentage must a family reduce its consumption to keep the expenditure fixed?

(a) $12\frac{1}{2}\%$ (b) $13\frac{1}{3}\%$ (c) 14%
(d) 15% (e) None of these

8. Aditya salary was increased by 40% and then decreased by 25%. Find out net effect in Aditya's salary.?

(a) 4% increase (b) 3% increase (c) 5% increase
(d) 6% increase (e) None of these

9. In a certain school, 20% of students are below 8 years of age. The number of students above 8 years of age is 2/3 of the number of students of 8 years age which is 48. What is the total number of students in the school?

(a) 72 (b) 80 (c) 120
(d) 150 (e) 100

10. A student multiplied a number by $\frac{3}{5}$ instead of $\frac{5}{3}$. What is the percentage error in the calculation?
(a) 34% (b) 44% (c) 54%
(d) 64% (e) None of these

11. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was?
(a) 2700 (b) 2900 (c) 3000
(d) 3100 (e) None of these

12. Three candidates contested an election and received 1136, 7636 and 11628 votes respectively. What percentage of the total votes did the winning candidate get?
(a) 57% (b) 60% (c) 65%
(d) 90% (e) None of these

13. Rajeev buys good worth Rs. 6650. He gets a rebate of 6% on it. After getting the rebate, he pay sales tax @ 10%. Find the amount he will have to pay for the goods?
(a) Rs. 6876.10 (b) Rs. 6999.20 (c) Rs. 6654
(d) Rs. 7000 (e) None of these

14. The population of a town increased from 1,75,000 to 2,62,500 in a decade. The average percent increase of population per year is?
(a) 4.37% (b) 5% (c) 6%
(d) 8.75% (e) None of these

15. In an examination, A candidate obtains 25% marks and and fails by 45 marks while another candidate obtains 46% marks and passed by 15% marks. What are the passing marks?
(a) 600 (b) 675 (c) 700
(d) 750 (e) None of these

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16. Aditya has some amount out of which 25% is stolen in bus, 10% he gave to his friend, 50% of remainder is spent in party and rest Rs. 26 gave to his mother. What was his initial amount?
(a) 1230 (b) 80 (c) 160
(d) 90 (e) None of these

17. If A's salary is 20% higher than B then how much B salary is less than A's salary?
(a) 20% (b) 25% (c) 16.67%
(d) $33\frac{1}{3}\%$ (e) None of these

18. If a number is increased by 20% and then reduced by 20%. After this operation the number?
(a) does not change (b) increase by 1% (c) 4% increase
(d) 4% decrease (e) 1% decrease

CAREER POWER

19. If $\frac{3}{5}$ of a number is 23 more than 50% of the same number, then what will be 80% of the number?
(a) 230 (b) 174 (c) 23
(d) 184 (e) None of these

20. Two numbers are respectively 20% and 30% less than third number. What is the second number as a percentage of the first?
(a) 87.5% (b) 88% (c) 77.5%
(d) 87% (e) 97.5%

21. The sum of two number is $\frac{23}{20}$ of the first number. The second number is what percent of the first?
(a) 5% (b) 10% (c) 15%
(d) 20% (e) None of these

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22. In an examination it is required to multiply a number with 7 but by mistake a Student divide it by 7 then what is error percent?
(a) 7% (b) 97.96% (c) 91%
(d) 49% (e) None of these

23. 405 toffees were distributed equally among children in such a way that the number of toffees received by each child is 20% of total number of children. How many toffees did each child got?
(a) 40 (b) 30 (c) 42
(d) 55 (e) None of these

24. Ram scored 30% marks and failed by 15 marks. Aditya score 40% marks and obtained 35 marks more than those required to pass. The pass percentage is?
(a) 33% (b) 38% (c) 43%
(d) 46% (e) None of these

25. The price of sugar is reduced by 2%. How many kg of sugar can now be bought for the money which was sufficient to buy 49 kg of sugar earlier?
(a) 1 kg less (b) 1 kg more (c) 2 kg more
(d) 2 kg less (e) None of these

26. Aditya's salary is 125% of Ram's salary. Sanjay's salary is 80% of Ram's salary. If the total of all the three salaries is Rs. 61000. What is Sanjay's salary?
(a) 10000 (b) 12000 (c) 15000
(d) 16000 (e) None of these

27. If A is 150% of B then B is what percent of A+B?
(a) 30% (b) 35% (c) 40%
(d) 45% (e) None of these

28. If in the examination 20% failed in Hindi, 25% failed in English and 7% failed in both subject then the percentage of student who failed in atleast one of the subjects?
(a) 50% (b) 45% (c) 55%
(d) 38% (e) None of these

29. If 30% students failed in English, 45% failed in Math and 25% failed in both then the student who pass in both subject is?
(a) 38% (b) 55% (c) 70%
(d) 50% (e) None of these

30. Population of Delhi increases by 10% every year. If the current population of Delhi is 1,331,000 then what was its population 3 years ago?
(a) 1000000 (b) 25000 (c) 10000000
(d) 1543200 (e) None of these

31. A, B, C shared Rs. 18500 so that A received 25% more than B and B received 20% more than C then what amount did A received?
(a) 7000 (b) 5000 (c) 7500
(d) 8000 (e) None of these

32. If the price of a shirt is increased by 25% and then decreased by 30% then what will be net effect?
(a) 12% increase (b) 12% decrease (c) 12.5% increase
(d) 12.5% decrease (e) None of these

33. Nutan got 456 marks in an exam. Aditya got 54% marks in same exam which is 24 less than Nutan. The minimum passing marks in exam is 35%. Then how much marks did nutan get more than passing marks ?
(a) 280 (b) 456 (c) 180
(d) 176 (e) None of these

34. 1200 boy and 650 girls appeared in examination. If 70% of boy and 40% of girls failed. Find the approximate percentage of passed students?
(a) 30% (b) 41% (c) 50%
(d) Can't determine (e) None of these

35. Aditya's monthly salary is 15% more than Sanjay's Monthly salary. If Aditya's monthly salary is 17250 than what is Sanjay's annual salary?
(a) 150000 (b) 170000 (c) 180000
(d) 250000 (e) None of these

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36. The population of Delhi two years ago was 55000. It increased by 12% in the first year and decreased by 15% in the second year. What was the population of town at the end of 2 years?
(a) 7084 (b) 70804 (c) 70840
(d) Can't determine (e) None of these

37. If the length of rectangle is increased by 20% and breadth is decreased by 10% then what will be impact on area?
(a) 5% increase (b) 10% increase (c) 20% decrease
(d) 8% increase (e) None of these

38. If the length of rectangle is increased by 20% and breadth is decreased by 10% then what will be impact on perimeter?
(a) 10% increrase (b) 20% decrease (c) 5% increase
(d) 8% increase (e) Cannot be determined

39. Ram gets 20% marks more than Girish. Girish get 20% more than Sanjay. Sanjay gets 20% less than Aditya. If Ram got 576 marks and total marks were 800 then what marks did Aditya get?
(a) 600 (b) 480 (c) 500
(d) 600 (e) None of these

40. The product of one third of a number and 150% of another number is what percent of product of the given numbers?
(a) 30% (b) 35% (c) 39%
(d) 45% (e) None of these

Difficult

1. Ram borrowed Rs. 725 from Shyam at the beginning of a year at interest. After 8 months, he again borrowedRs. 362.50 at a rate of interest double that the former sum bears. At the end of the year, the sum of interest on both loans is Rs. 43.50. Find the first rate of interest per annum?
(a) 4.5% (b) 4.75% (c) 6.25%
(d) 7.2% (e) None of these

2. The cost price of goods with a bankrupt is Rs. 25500 and if the goods had realised in their full value, his creditiors would have received 85 paise in the rupee. But 2/5 of the goods were sold at 17% and the remainder at 22% below their cost price. How many paise in a rupee was received by the creditors?
(a) 72 paise (b) 68 paise (c) 55 paise
(d) 52 paise (e) None of these

3. A Shopkeeper undertakes to supply 2000 tables at Rs. 1725 each. He estimates that if 10% are defective which will be sold at 50%, then the profit will be 15% on his whole outlay. When the tables were supplied, 70% of the tables were found defective. What loss did the Shopkeeper incur?
(a) Rs. 607500 (b) Rs. 557500 (c) Rs. 550500
(d) Rs. 80680 (e) None of these

4. Sweta invested Rs. 10,000 in a scheme exactly three years ago. The value of the investment increased by 10% during the first year, increased by 5% during the second year, and decreased by 10% during the third year. What is the value of the investment today?
(a) Rs. 10,500 (b) Rs. 10,395 (c) Rs. 10,342
(d) Rs. 10,230 (e) None of these

5. In Mumbai, 60% of the registered voters are BJP-supporters and the rest are Congress-supporters. In a mayoral race, if 75% of the registered voters who are BJP-supporters and 20% of the registered voters who are Congress-supporters are expected to vote for candidate X, what percent of the registered voters are expected to vote for candidate X?
(a) 53% (b) 55% (c) 57%
(d) 59% (e) None of these

6. A pharmaceutical company received Rs. 3 million in royalties on the first Rs. 20 million in sales of the generic equivalent of one of its products and then Rs.9 million in royalties on the next Rs. 108 million in sales. By approximately what percent did the ratio of royalties to sales decrease from the first Rs. 20 million in sales to the next Rs. 108 million in sales?

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(a) 10.27% (b) 20.63% (c) 38.6%
(d) 44.44% (e) None of these

7. In Jamshedpur, only two newspapers Dainik Jagran and Prabhat Khabar are published. It is known that 25% of the city population reads Dainik Jagran and 20% reads Prabhat Khabar while 8% reads both the newspapers. It is also known that 30% of those who read Dainik Jagran but not Prabhat Khabar look into advertisement and 40% of those who read Prabhat Khabar but not Dainik Jagran look into advertisement while 50% of those who read both the newspapers look into advertisements. What is the percentage of the population who read an advertisement?
(a) 13.9% (b) 15.8% (c) 17.2%
(d) 21.4% (e) None of these

8. In my office, at least 50% of the people read an e-newspaper. Among those who read an e-newspaper, at most 25% read more than one e-paper. Only one of the following statements follows from the statements given below. Which one is it?
(a) At the most 37.5% read exactly one e-paper.
(b) At least 37.5% read exactly one e-paper.
(c) At the most 19.8% read exactly one e-paper.
(d) At least 19.8% read exactly one e-paper.
(e) none of these

9. In Convent Model School, 60% of the students are boys. In an aptitude test, 80% of the girls scored more than 40 marks (out of a maximum possible 150 marks). If 60% of the total students scored more than 40 marks in the same test, find the fraction of the boys who scored 40 marks or less?

(a) $\frac{3}{5}$ (b) $\frac{6}{7}$ (c) $\frac{5}{7}$

(d) $\frac{7}{15}$ (e) None of these

10. In a recent opinion poll held during April, 60% of the respondents favoured India Against Corruption (IAC) while the rest favoured Indian political parties (IPP). It was found in May polls that 10% of IAC supporters switched their preference to IPP, while the same percentage of IPP's supporters also switched their preference to IAC. What percentage of the electorate should now switch their preference from IAC to IPP so that they are at par?

(a) 14% (b) 19% (c) 24%
(d) 29% (e) None of these

11. Suman's project report on 'Development with dignity', consists of 25 pages each of 60 lines with 75 characters on each line. In case the number of lines is reduced to 55 but the number of characters is increased to 90 per lines, what is the percentage change in the number of pages. (Assume the number of pages to be a whole number.)

(a) – 8% (b) + 8% (c) + 12%
(d) 80% (e) None of these

12. Visions Pvt. Ltd. Appoints a sales representative on the basic salary of Rs. 1200 per month and the condition that for every sales of Rs. 10000 above Rs.10000, he will get 50% of basic salary and 10% of the sales as a reward. There is no incentive for the first Rs. 10000 of sales. What should be the value of sales if the sales representative wants to earn Rs. 7600 in a particular month?

(a) Rs. 120000 (b) Rs. 50000 (c) Rs. 80000
(d) Rs. 45000 (e) None of these

13. Neha has a watch which gain 2% per hour when the temperature is in the range of 40°C-50°C and it loses at the same rate when the temperature is in the range of 20° – C30°C. The watch runs on time in all other temperature ranges. On a sunny day, the temperature started soaring up from 8 a.m. in the morning at the uniform rate of 2°C per hour and during the afternoon it stated coming down at the same rate. Find what time will it be by the watch at 7 p.m. if at 8 a.m. the temperature was 32°C and at 4 p.m, it was 40°C?

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(a) 5 : 12 : 42 p.m. (b) 6 : 28 : 33 p.m. (c) 7 : 04 ; 48 p.m.
(d) None of these (e) None of these

14. In laptop market, only three competitors (Lenovo, Apple and Samsung) exist. Last year the sales of apple laptops were 10% more than Lenovo. In year, both the firms Lenovo and Apple increased their respective sales by 20%. This year, the sales of the firm Apple are five times that of Samsung. How much were the sales of the firm (approx.) Samsung last year, if the total sales remained constant over the two years period?
(a) 25% (b) 32% (c) 38%
(d) 41% (e) None of these

15. Two jars contain equal quantities of 40% alcohol. Swati changed the concentration of the first jar to 50% by adding extra quantity of pure alcohol. Sonali changed the concentration of the second jar to 50% replacing a certain quantity of the solution with pure alcohol. By what percentage is the quantity of alcohol added by Swati more than that replaced by Sonali?
(a) 10% (b) 20% (c) 30%
(d) 40% (e) None of these

16. For admission in a post graduate program of Calcutta University, 90% of the candidates who appeared for the written test were males and the rest were females, 60% of the males and 80% of the females passed in the written test. What is the total number of students who appeared for the written test, if the total number of passed candidates was 1240?
(a) 1380 (b) 1560 (c) 2000
(d) 2500 (e) None of these

17. In a gram panchyat meeting, 1000 people voted on a resolution with 10% of the votes being invalid. After some discussion 1000 people voted again. This time there were 20% invalid votes. The opponents were increased by 50% while the motion was now rejected by a majority, which is 300% more than it was formerly passed by. How many people voted against the resolution before the discussion?
(a) 700 (b) 600 (c) 500
(d) 400 (e) None of these

18. An index of 12 shares contains, among others, the shares of Vision Power, Vision Infra and Vision Communication with weightage of 7%, 13% and 15% respectively. What is the increase in the prices of other shares, if these three rise by 9%, 10% and 4% respectively, while the index rises by 6%?
(a) 5.34% (b) 5.94% (c) 6.23%
(d) Can't be determine (e) None of these

19. A, B and C start a business by investing Rs. 70000 that earns them a profit of Rs. 42000 at the end of the year. A invests his share in the profit in a scheme that gives her 10% interest compounded annually and B invests his share in a scheme that gives her 20% interest compounded annually. A gets Rs. 2520 as interest at the end of 2 years and B gets an interest of Rs. 4200 at the end of one year. Find C's investment in the business?
(a) Rs. 10000 (b) Rs. 15000 (c) Rs. 20000
(d) Rs. 25000 (e) None of these

20. Sashi has Rs. 90000 with him. He purchases a mobile, an i-pad and a laptop for Rs. 15000, Rs. 13000 and Rs. 35000 respectively and puts the remaining money in his bank account which pays 15% per annum compound interest. After 2 years he sells off the three items at 80% of their original price and also withdraws his entire money from the bank by closing the account. What is the total change in his asset?
(a) 5.31% (b) 4.31% (c) 4.32%
(d) – 4.32% (e) None of these

Previous Year (Memory Based)

1. What is the 40% of 50% of $\frac{3}{4}$ th of 3200?
(a) 480 (b) 560 (c) 420
(d) 600 (e) None of these

2. One-fifth of a number is 62. What will 73% of that number be?

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(a) 198.7 (b) 212.5 (c) 226.3
(d) 234.8 (e) None of these

3. Two-thirds of three-fourths of one-fifth of a number is 15. What is 30 per cent of that number?
(a) 45 (b) 60 (c) 75
(d) 30 (e) None of these

4. $\frac{3}{4}$ th of $\frac{2}{3}$ rd of $\frac{1}{5}$ th of a number is 249.6. What is 50% of that number?
(a) 3794 (b) 3749 (c) 3734
(d) 3739 (e) None of these

5. Ishan spent Rs. 35645 on buying a bike Rs. 24355 on buying a television and the remaining 20% of the total amount he had as cash with him. What was the amount?
(a) Rs. 60000 (b) Rs. 72000 (c) Rs. 75000
(d) Rs. 80000 (e) None of these

6. Sonal spent Rs. 45760 on the interior decoration for her home, Rs. 27896 on buying air conditioner and the remaining 28% of the total amount she had as cash with her. What was the total amount?
(a) Rs. 98540 (b) Rs. 102300 (c) Rs. 134560
(d) Cannot be determined (e) None of these

7. Rajesh spent Rs. 44620 on Deepawali shopping, Rs. 32764 on buying computer and the remaining 32% of the total amount he had as cash with him. What was the total amount?
(a) Rs. 36416 (b) Rs. 113800 (c) Rs. 77384
(d) Cannot be determined (e) None of these

8. Harjeet spends 50% of his monthly income on household items, 20% of his monthly income on buying clothes, 5% of his monthly income on medicines and the remaining amount of Rs. 11250 he saves. What is Harjeet's monthly income?
(a) Rs. 38200 (b) Rs. 34000 (c) Rs. 41600
(d) Rs. 45000 (e) None of these

9. Mr. Giridhar spends 50% of his monthly income on household items and out of the remaining he spends 50% on transport, 25% on entertainment, 10% on sports and remaining amount of Rs. 900 is saved. What is Mr. Giridhar's monthly income?
(a) Rs. 6000 (b) Rs. 12000 (c) Rs. 9000
(d) Cannot be determined (e) None of these

10. Shruti decided to donate 12% of her salary to an orphanage. On the day of donation, she changed her mind and donated Rs. 3150 which was 75% of what she had decided earlier. How much is Shruti's salary?
(a) Rs. 35000 (b) Rs. 42500 (c) Rs. 39100 (d) Cannot be determined (e) None of these

11. Asha's monthly income is 60% of Deepak's monthly income, 120% of Maya's monthly income. What is Maya's monthly income, if Deepak's monthly income is Rs. 78000?
(a) Rs. 39000 (b) Rs. 42000 (c) Rs. 36000
(d) Cannot be determined (e) None of these

12. A sum of Rs. 2236 is divided among A, B and C such that A receives 25% more than C and C receives 25% less than B. What is A's share in the amount?
(a) Rs. 460 (b) Rs. 890 (c) Rs. 780
(d) Rs. 1280 (e) None of these

13. Pooja invests 13% of her monthly salary, i.e., Rs. 8554 in Mediclaim Policies. Later she invest 23% of her montly salary on Child Education Policies, she also invests another 8% of her monthly salary on Mutual Funds. What is the total annual amount invested by Pooja?
(a) Rs. 28952 (b) Rs. 43428 (c) Rs. 347424
(d) Rs. 173712 (e) None of these

14. Mr. Sarang invests 6% of his monthly salary, i.e., Rs. 2,100 on insurance policies. He also invests 8% of his monthly salary on Family Mediclaim Policies and another 9% of his salary on NSCs. What is the total annual amount invested by Mr. Sarang?

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(a) Rs. 11400 (b) Rs. 96600 (c) Rs. 8050
(d) Rs. 9500 (e) None of these

15. Mrs. Jain invests 14% of her monthly salary, i.e., Rs. 7014 in Insurance Policies. Later she invests 21% of her monthly salary on Family Mediclaim Policies; also she invests another 6.5% of her salary on Mutual Funds. What is the total annual amount invested by Mrs. Jain?
(a) Rs. 25050 (b) Rs. 50100 (c) Rs. 242550
(d) Rs. 249498 (e) None of these

16. Rita invested 25% more than Sunil. Sunil invested 30% less than Abhinav who invested Rs. 6000. What is the respective ratio between the amount that Rita invested and the total amount invested by all of them together?
(a) 35 : 104 (b) 13 : 29 (c) 101 : 36
(d) 35 : 103 (e) None of these

17. Deepti invests 11% of her monthly salary, i.e., Rs. 5236 in Fixed Deposits. Later she invests 19% of her monthly salary on Life Insurance Policies; also she invests another 7% of her monthly salary on Mutual Funds. What is the total annual amount invested by Deepti?
(a) Rs. 211344 (b) Rs. 17612 (c) Rs. 105672
(d) Rs. 35224 (e) None of these

18. In a class of 80 students, each student got sweets that are 15% of the total number of students. How many sweets were there?
(a) 1200 (b) 850 (c) 900
(d) Cannot be determined (e) None of these

19. In a class of 50 students and 5 teachers, each student got sweets that are 12% of the total number of students and each teacher got sweets that are 20% of the total number of students. How many sweets were there?
(a) 345 (b) 365 (c) 330
(d) 350 (e) None of these

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20. In a class of 80 students and 5 teachers, each student got sweets that are 15% of the total number of students and each teacher got sweets that are 25% of the total number of students. How many sweets were there?
(a) 1030 (b) 1040 (c) 1050
(d) 1060 (e) None of these

21. A candidate appearing for an examination has to secure 35% marks to pass. But he secured only 40 marks and failed by 30 marks. What would be the maximum marks of test?
(a) 280 (b) 180 (c) 200
(d) 150 (e) 210

22. Raja got 76 per cent marks and Seema got 480 marks in a test. The maximum marks of the test is equal to the marks obtained by Raja and Seema together. How many marks did Raja score in the test?
(a) 1450 (b) 1520 (c) 1540
(d) 2000 (e) None of these

23. On a test consisting of 150 questions, Rita answered 40% of the first 75 questions correctly. What per cent of the other 75 questions does she need to answer correctly for her grade on the entire exam to be 60%?
(a) 80 (b) 70 (c) 40
(d) 50 (e) None of these

24. In an election between two candidates, one got 52% of the total valid votes. 25% of the total votes were invalid. The total number of votes were 8400. How many valid votes did the other person get?
(a) 3276 (b) 3196 (c) 3024
(d) Cannot be determined (e) None of these

25. In a college-election between two candidates, one candidate got 55% of the total valid votes 15% of the votes were invalid. If the total votes were 15,200, what is the number of valid votes the other candidates got?

(a) 7106 (b) 6840 (c) 8360

(d) 5814 (e) None of these

26. The population of a town was 48600. It increased by 25% in the first year and decreased by 8% in the second year. What will be the population of the town at the end of 2 years?

(a) 65610 (b) 55580 (c) 60750

(d) 64850 (e) None of these

27. In a mixture of milk and water the proportion of water by weight was 75%. If in the 60 gm mixture 15 gm water was added, what would be the percentage of water? (weight in gm)?

(a) 75% (b) 88% (c) 90%

(d) 100% (e) None of these

28. Find a single equivalent increase, if a number is successivley increased by 10%, 20% and 25%?

(a) 55% (b) 65% (c) 75%

(d) 80% (e) None of these

29. The price of rice has been increased by 20%. By what per cent should Sanjay reduce the consumption of rice in the family so that the expenditure on rice remains the same as before in increase in the price of rice?

(a) $15\frac{2}{3}\%$ (b) $16\frac{2}{3}\%$ (b) 20%

(d) 18% (e) None of these

30. An article is sold at a discount of 20% on the marked price. In order to gain 60% on marked price at how much more per cent of the discounted price it should be sold?

(a) 75% (b) 25% (c) 65%

(d) 200% (e) None of these

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31. In an examination, it is required to get 256 of the total maximum aggregate marks to pass. A student gets 192 marks and is declared failed. The difference of marks obtained by the student and that required to pass is 10%. What are the maximum aggregate marks a student can get?
(a) 690 (b) 670 (c) 640
(d) 680 (e) None of these

32. In an election between two candidates, 60% of the voters cast their vote out of which 4% of the votes were declared invalid. A candidate got 7344 votes which were 75% of the total valid votes. Find the total no. of votes enrolled in the election?
(a) 1700 (b) 17659 (c) 17000
(d) 15000 (e) None of these

33. Samar spends 52% of his monthly salary on household expenditure and 23% on miscellaneous expenditure. If he is left with Rs. 4500, what is his monthly salary?
(a) Rs. 16000 (b) Rs. 17500 (c) Rs. 17000
(d) Rs. 18500 (e) None of these

34. In a class of 60 students, 40% can speak only Hindi, 25% can speak only English and rest of the students can speak both the languages. How many students can speak English?
(a) 32 (b) 28 (c) 36
(d) 15 (e) None of these

35. A, B and C invested in a business in the ratio of 3 : 2 : 5 respectively. If A earns 100% more profit than B and C earns 40% more profit than B, then what is the share of B in the profit?
(a) Rs. 2420 (b) Rs. 1560 (c) Rs. 1135
(d) Cannot be determined (e) None of these

36. Rajiv spends 20% of his salary on food, 15% on conveyance, 10% on education and 35% on house rent. If he spends Rs. 1950 on education, how much does he spend on conveyance?

(a) Rs. 2925 (b) Rs. 2242.50 (c) Rs. 1300
(d) Rs. 3000 (e) None of these

37. In 2009, the food production was 5.5 million tonnes and in 2010, the production was 4.4 million tonnes. Find out the percentage decrease in food production in these two years?
(a) 18 (b) 20 (c) 16
(d) 22 (e) None of these

38. After giving 25% discount on the entry ticket, the number of visitors increased by 30%. What will be its impact on the entry with respect to other days?
(a) $2\frac{1}{2}$% decrease (b) $2\frac{1}{2}$% increase (c) 2% decrease
(d) 2% increase (e) None of these

39. A man spends 75% of his income. His income is increased by 20% and he increases his expenditure by 10%. His saving is increased by.
(a) 10% (b) 25% (c) 27%
(d) 50% (e) None of these

40. At an election, a candidate got elected by fetching 63% of the total votes. If 54982 voters did not vote in favour of elected candidate, what was the total number of votes polled?
(a) 87273 (b) 88680 (c) 148600
(d) 203600 (e) None of these

Foundation

1. (d); 3.5 can be expressed as (3.5 × 100)% = 350%

2. (d); $\frac{15}{100} \times 34$ = 5.10 Rs.

3. (b); $\frac{88}{100} \times 370 + \frac{24}{100} \times 210 - x = 118$

x = 325.6 + 50.4 - 118 = 376 - 118 = 258

4. (c); $\frac{860}{100}\times 50+\frac{50}{100}\times 860 = \frac{860}{100}(50+50) = 860$

5. (b); $\frac{60}{100}\times 264 = 158.40 \Rightarrow \frac{15}{100}\times 1056 = 158.40$

6. (d); Passing percentage = $\frac{252}{270}\times 100 = 93\frac{1}{3}\%$

7. (b); Required percentage = $\frac{1987.50}{2650}\times 100 = 75\%$

8. (a); Percentage = $\frac{3}{24}\times 100 = 12\frac{1}{2}\%$

9. (c); Litres of pure acid = $\frac{20}{100}\times 8$ = 1.6 litres

10. (b); Best percentage = $\frac{425}{500}$

11. (b); $\frac{15}{100\times 100}\times\frac{100}{300}\times 10000$ = Rs. 5

12. (e); $\frac{45}{100}\times 1500+\frac{35}{100}\times 1700 = \frac{x}{100}\times 3175$

$\Rightarrow x = \frac{1270\times 100}{3175} = 40$

13. (b); Let the worth of cloth be x

$x\times\frac{2.5}{100} = 12.50 \Rightarrow x = \frac{12500}{25} \Rightarrow x = 500$ Rs.

14. (e); Worth of the house = $2800\times\frac{7}{2}$ = 9800 Rs.

15. (e); 35% is = 175 $\Rightarrow$ 100% = $\frac{175}{35}\times 100$ = 500

Required percentage = $\frac{500}{175}\times 100$ = 285. 71%

16. (d); Let the number is x

$\frac{50}{100}x-\frac{35}{100}x=12 \Rightarrow \frac{15x}{100}=12 \Rightarrow x = \frac{12\times 100}{15} \Rightarrow x = 80$

17. (c); Total such numbers = 14

Required percentage = $\frac{14}{70}\times 100$ = 20%

18. (c); Let the number be x.

$\frac{75}{100}x+75=x \Rightarrow x-\frac{3}{4}x = 75 \Rightarrow \frac{x}{4}=75 \Rightarrow x = 300$

19. (d); Let the two numbers be x and y.

x + y = 2490 $\Rightarrow \frac{65}{1000}x = \frac{85}{1000}y$

$x = \frac{17}{13}y \Rightarrow \frac{17}{13}y+y=2490$

$\frac{30y}{13}=2490 \Rightarrow y = \frac{2490\times 13}{30}$

y = 1079 $\Rightarrow$ x = 2490 – 1079 $\Rightarrow$ x = 1411

20. (b); Let the First and Second number be x and y

$\frac{x}{12}=\frac{y}{4} \Rightarrow \frac{x}{y}=\frac{3}{1}$

Required percentage = $\frac{3-1}{1}\times 100$ = 200%

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21. (c); Let the Numbers be x and y.

$$x \times \frac{80}{100} = y \quad \Rightarrow \quad \frac{4x}{5} = y$$

$$\frac{x}{y} = \frac{5}{4} \qquad \begin{bmatrix} x = 5k \\ y = 4k \end{bmatrix}$$

$x^2 + y^2 = 656 \Rightarrow 25k^2 + 16k^2 = 656$

$k^2 = \frac{656}{41} \Rightarrow k = 4 \Rightarrow x = 4 \times 5 = 20$

$y = 4 \times 4 = 16$

Numbers are 16 and 20

22. (d); Percentage increase in salary = $\frac{900}{7200} \times 100 = \frac{100}{8} = 12\frac{1}{2}\%$

23. (d); Let B's salary be = 100, A's salary be = 80

Required percentage = $\frac{20}{80} \times 100 = 25\%$

24. (a); Let the price of petrol be 100

Increase Price = 120

Required percentage = $\frac{120 - 100}{120} \times 100 = \frac{100}{6} = 16\frac{2}{3}\%$

25. (d); Increase Price = $\frac{110}{100} \times \frac{110}{100} \times 100 = 121$

26. (a); Commission = $15000 \times \frac{25}{200} = \frac{15000}{8} = 1875$ Rs.

27. (d); Increase Monthly income = $5000 \times \frac{130}{100} = 6500$ Rs.

28. (b); New Price of the article = $15000 \times \frac{92}{100}$ = 13800 Rs.

29. (e); Money left = 100% - 20% - [100% - 20%] $\frac{25}{100}$%

= 100% – 20% – 20% = 60%

$\therefore$ 60% = 480 $\Rightarrow$ 100% = $\frac{480}{60} \times 100$ = Rs. 800

30. (d); $\frac{15}{100} \times \frac{10}{100} \times \frac{20}{100} \times 1000 = 3$

31. (b); Let the number will be $\frac{x}{y}$

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Increased number = $\frac{x + \frac{120}{100}x}{y + \frac{350}{100}y} = \frac{11}{27} \Rightarrow \frac{\frac{220x}{100}}{\frac{450y}{100}} \Rightarrow \frac{x}{y} = \frac{11}{27} \times \frac{45}{22}$

Original Fraction $\Rightarrow \frac{x}{y} = \frac{5}{6}$

32. (c); Let the Numbers be x and y.

$\frac{40}{100}x = \frac{2}{3}y \Rightarrow \frac{2}{5}x = \frac{2}{3}y \Rightarrow \frac{x}{y} = \frac{5}{3} \Rightarrow$ x : y = 5 : 3

33. (b); Run scores from boundaries and sixes

= 3 × 4 + 8 × 6 = 60

Required pecentage by Running between the wickets

= $\frac{110 - 60}{110} \times 100 = \frac{500}{11}$ = $45\frac{5}{11}$%

34. (b); $\frac{50}{100}(x - y) = \frac{30}{100}(x+y)$

$5x - 5y = 3x + 3y \Rightarrow 2x = 8y \Rightarrow \frac{y}{x} = \frac{1}{4}$

Required Percentage = $\frac{1}{4} \times 100 = 25\%$

35. (b); Error = (81.5 - 81.472) = 0.028

Required percentage = $\frac{0.028}{81.472} \times 100 = 0.034\%$

36. (e); Let the number be x and y

$x - y = 1600 \Rightarrow \frac{75}{1000}x = \frac{125}{1000}y$

$x = \frac{5}{3}y \Rightarrow \frac{5}{3}y - y = 1600$

$\frac{2y}{3} = 1600 \Rightarrow y = 2400$

x = 1600 + 2400 = 4000

37. (c); Let the number be x

$\frac{65}{100}x + 21 = \frac{4}{5}x \Rightarrow \frac{4x}{5} - \frac{13x}{20} = 21$

$\frac{16x - 13x}{20} = 21 \Rightarrow \frac{3x}{20} = 21 \Rightarrow x = 140$

38. (c); It means that 0.08% of x = 2

$\frac{8}{100 \times 100} \times x = 2 \Rightarrow x = \frac{2 \times 100 \times 100}{8}$

Required Number = 2500

39. (d); Greatest Number = 0.17

40. (c); $16\frac{2}{3}\times\frac{1}{100}\times 600-33\frac{1}{3}\times\frac{1}{100}\times 180$

$\Rightarrow \frac{1}{6}\times 600-\frac{1}{3}\times 180$ = 100 – 60 = 40 gm

Moderate

1. (b); If Rishu failed by 5% marks which means he got 30% marks.

30% marks = 216 $\Rightarrow$ 100% marks = $\frac{216}{30}\times 100$

Total marks = 720

2. (d); If the price of petrol has increase by 20%, it has gone up $\frac{1}{5}$th of its earlier price.

$\therefore$ The % of reduction in petrol that will maintain the amount of money spent on petrol = $\frac{1}{1+5}=\frac{1}{6}=16.67\%$

Reduction in travel = 16.67%

3. (a); Let the increased breath be x

$20 + x + \frac{20x}{100} = 50$ [% increase = $m + n + \frac{mn}{100}$]

$x + \frac{x}{5} = 30 \Rightarrow \frac{6x}{5} = 30$

$x = \frac{30\times 5}{6} \Rightarrow x = 25\%$

4. (b); Let amit's salary be x

Aditya salary = $\frac{120}{100}\times 30,000$ = 36,000 Rs.

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$$\frac{x \times 80}{100} = 36000 \Rightarrow x = \frac{36000 \times 100}{80} = \text{Rs. } 45{,}000$$

5. (b); The percentage of students fails in both subjects
= 100 - [(60 + 45) - 25] = 20%

6. (c); Required quantity of arc = $69 \times \frac{100}{23} = 300$

7. (b); Percentage consumption Reduced = $\frac{4}{30} \times 100 = \frac{40}{3} = 13\frac{1}{3}\%$

8. (c); Let Aditya's a salary was 100 Rs.
Increased salary = 140 Rs.

Decreased salary = $140 \times \frac{75}{100} = 105$ Rs.

Net effect = 105 –100 = 5% increase

9. (e); Student of 8 years = 48
Total number of Student of age more than 8 years

$= 48 \times \frac{2}{3} = 32$

Total student of 8 years old or above
= 32 + 48 = 80
Now 20% of student is below 8 years old so 80% of student = 80
So total student = 100

10. (d); Let number is 15

Original result = $15 \times \frac{5}{3} = 25$

Wrong result = $15 \times \frac{3}{5} = 9$

Percentage error = $\frac{25-9}{25} \times 100 = 64\%$

11. (a); No of valid votes = $7500 \times \frac{80}{100} = 6000$

No. of votes that other candidate got = $6000 \times \frac{45}{100} = 2700$

12. (a); Total no of votes = 1136 + 7636 + 11628 = 20400

required percentage = $\frac{11628}{20400} \times 100 = 57\%$

13. (a); Rebate = $6650 \times \frac{6}{100} = 399$ Rs.

Amount after Rebate = 6650 – 399 = Rs. 6251

Amount paid for the goods = $6251 \times \frac{110}{100} = 6876.10$ Rs.

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14. (b); Percentage increase in decade = $\frac{87500}{175000} \times 100 = 50\%$

$\therefore$ 50% increase in 10 years.

$\therefore$ Per year % increase = 5%

15. (d); Passing percentage = 46% – 15% = 31%

$\therefore$ 6% = 45 $\Rightarrow$ 100 % = $\frac{45}{6} \times 100$

$\therefore$ Total marks = 750

16. (b); Let the initial amount be 100%

Total amount stolen and gave to friend = 35%

Remaining amount = 65%

Amount spend on party = $\frac{65}{2} = 32.5\%$

32.5% = 26 $\Rightarrow$ 100 % = $\frac{26}{32.5} \times 100$ $\Rightarrow$ Initial amount = Rs. 80

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17. (c); Let B's salary be 100, A's salary be 120

Required pecentage = $\frac{20}{120} \times 100 = \frac{100}{6}$ = 16.67%

18. (d); Let the number be 100, Increased number = 120

Decreased number = $120 \times \frac{80}{100} = 96$

After this number is decreased by 4%.

19. (d); Let the number be x

$\therefore \quad \frac{3}{5}x = 23 + \frac{50x}{100} \quad \Rightarrow \quad \frac{3}{5}x - \frac{1}{2}x = 23 \quad \Rightarrow$ x = 230

$\frac{80}{100} \times 230 = 184$

20. (a); Let the third number be 100

Second number = 70, First number = 80

Required percentage = $\frac{70}{80} \times 100$ = 87.5%

21. (c); Let the two number be x and y

x + y = $\frac{23}{20}$ of x $\Rightarrow$ y = $\frac{23x}{20} - x \quad \Rightarrow$ y = $\frac{3x}{20}$

Required percentage = $\frac{\frac{3x}{20}}{x} \times 100$ = 15%

22. (b); Let the Number = 7

So, correct answer = 7 × 7 = 49

But answer obtained = $\frac{7}{7}$ =1

% error = $\frac{48}{49} \times 100$ = 97.96%

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23. (e); Let the total number of children be x then

$$\frac{405}{x} = x \times \frac{20}{100} \Rightarrow \frac{405}{x} = \frac{x}{5} \Rightarrow x^2 = 2025$$

x = 45

$\therefore$ number of toffies each students get = $\frac{405}{45} = 9$

24. (a); 10% marks = 35 + 15 = 50, 100 % marks = 50 × 10

$\therefore$ Total marks = 500

Passing marks = $500 \times \frac{30}{100} + 15 = 165$

Required percentage = $\frac{165}{500} \times 100 = 33\%$

25. (b); Let the price per kg is 100 rs.

The total money used for 49 kg = 4900 Rs.

After Price decrease = $\frac{4900}{98} = 50\text{kg}$

Means 1 kg is the answer.

26. (d); Let Ram's salary is 100

Sanjay's salary is 80 and Aditya's salary is 125

Total of all salary = 305

$\therefore$ Sanjay's salary = $\frac{61000}{305} \times 80 = 16000$ Rs.

27. (c); let B = 100, then A = 150

Required pecentage = $\frac{100}{250} \times 100 = 40\%$

28. (d); Required percentage = 20 + 25 – 7 = 38%

29. (d); percentage of students passed in both the subjects

= 100 –(30 + 45 – 25) = 50%

30. (a); Population x years ago = $\dfrac{A}{\left[1+\dfrac{r}{100}\right]^n}$

$$= \frac{1331000}{\left[1+\dfrac{10}{100}\right]^3} = \frac{1331000}{\dfrac{1331}{1000}} = 1000000$$

31. (c); Let C received = 100

∴ B received = 120

A received = 120 × $\dfrac{125}{100}$ = 150

Amount A received = $\dfrac{18500}{370} \times 150$ = Rs. 7500

32. (d); Let the price of a shirt be 100

25% increase = 125

30 % decrease = 125 × $\dfrac{70}{100}$ = 87.5%

∴ % decrease = 100 – 87.5 = 12.5%

33. (d); Marks of Aditya = 456 – 24 = 432

∴ 54% = 432

100% = $\dfrac{432}{54} \times 100$ = 800

Passing marks = 800 × $\dfrac{35}{100}$ = 280

Required marks = 456 – 280 = 176

34. (b); Total no of boy and girl appered in the examination

= 1200 + 650 = 1850

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No. of boy passed = $1200 \times \frac{30}{100} = 360$

No. of girl passed = $650 \times \frac{60}{100} = 390$

Total no. of boys and girl passed = 750

Required % = $\frac{750}{1850} \times 100 = 40.54\% \cong 41\%$

35. (c); Sanjay's monthly salary = $\frac{17250}{115} \times 100$ = Rs. 15000

Sanjay's Annual salary = 15000 × 12 = Rs. 180000

36. (e); Population at the end of 2 years.

$55000 \times \frac{112}{100} \times \frac{85}{100} = 52360$

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37. (d); Impact on area = $20 + (-10) + \frac{20 \times (-10)}{100}$ $\left[\text{Using formula } m + n + \frac{mn}{100}\right]$

= 10 – 2 = 8% increased

38. (e); Impact on perimeter can't be determined as changes in different length and breadth give different net effect on perimeter

39. (c); Let Sanjay gets 100 marks

∴ Girish gets 120 marks

∴ Ram gets = $120 \times \frac{120}{100} = 144$ marks

Sanjay marks = $\frac{576}{144} \times 100 = 400$

Aditya marks = $\frac{400 \times 100}{80} = 500$ marks

40. (e); Let the numbers be x and y

So product = xy

given, $\frac{1}{3}x \times \frac{150y}{100} \Rightarrow \frac{1}{3}x \times \frac{3y}{2} \Rightarrow \frac{xy}{2}$

Required percentage = $\frac{\frac{xy}{2}}{xy} \times 100 = 50\%$

Difficult

1. (a); $43.5 = \frac{725 \times R \times 1}{100} + \frac{362.5 \times 4 \times 2R}{12 \times 100}$

43.5 × 300 = 2175R + 362.5 × 2R = 2900 R

R = 4.5

2. (b); Total debt = $22500 \times \frac{100}{85}$ = Rs. 30000

Money received by selling the goods

$= 25500 \left(\frac{2}{5} \times \frac{83}{100} + \frac{3}{5} \times \frac{78}{100}\right) = \frac{25500}{500}$ (166 + 234)

= 51 × 400 = Rs. 20400

Therefore, money received by the creditors for a rupee

= Rs. $\left(\frac{20400}{30000}\right)$ = Rs. 0.68 = 68 paise

Hence, the creditor received 68 paise in a rupee.

3. (a); 10% of 2000=200

Selling price of 200 tables at 50% = Rs.$\left(200 \times \frac{1725}{2}\right)$ = Rs. 172500

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Selling price of remaining 1800 tables = Rs. (1800 × 1725)
= Rs. 3105000

Total revenue from selling 2000 tables= Rs. (172500 + 3105000)
= Rs. 3277500

Now, Rs. 3277500 includes 15% profit. Therefore, cost price of 2000 tables = $\frac{100}{115} \times 3277500$ = Rs. 2850000

Now the actual selling price

$= 2000 \times \frac{30}{100} \times 1725 + 2000 \times \frac{70}{100} \times \frac{1725}{2} = 2000 \times 1725 \left(\frac{30}{100} + \frac{35}{100}\right)$

= 20 ×1725 × 65 = Rs. 2242500

∴ Loss = Cost Price – Selling Price

Hence, the Shopkeeper incurs a loss of = Rs. 607500.

4. (b); The first year's increase of 10% can be expressed as 1.10; the second year's increase of 5% can be expressed as 1.05; and the third year's decrease of 10% can be expressed as 0.90. Now, multiply the original value of the investment account by each of these yearly changes.

10,000 × 1.10 × 1.05 × 0.90 = 10395 Rs.

Hence, the value of the investment today is = Rs. 10,395.

5. (a); Let y be the number of registered voters in Mumbai. Then, the information that 60% of the registered voters are from BJP can be expressed as 0.60y. From this, it can be stated that 1.00y – 0.60y = 0.40y are from Congress. The percentage of BJP-supporters and the percentage of Congress-supporters who are expected to vote for candidate X can then be expressed as:

0.75 × 0.60y + 0.20 × 0.40y

Simplify the expression to determine the total percentage of voters expected to vote for candidate X= 0.75 × 0.60y + 0.20 × 0.40y

= 0.45y + 0.08y = 0.53y

Hence, 53% of the registered voters are expected to vote for candidate X.

6. (d); The ratio of royalties to sales for the first Rs. 20 million in sales is $\frac{3}{20}$, and the ratio of royalties to sales for the next Rs. 108 million in sales is $\frac{9}{108} = \frac{1}{12}$. The percent decrease in the royalties to sales ratios is 100 times the quotient of the difference in the ratios divided by the ratio of royalties to sales for the first Rs. 20 million in sales, i.e.,

$$\frac{\frac{1}{12}-\frac{3}{20}}{\frac{3}{20}}\times 100 = \left(\frac{1}{12}-\frac{3}{20}\right)\times\frac{20}{3}\times 100$$

$$= \left(\frac{5-9}{60}\right)\times\frac{20}{3}\times 100 = \frac{-4}{60}\times\frac{20}{3}\times 100 = \frac{-4}{9}\times 100$$

= – 0.4444 × 100 = – 44.44 = 44.44% decrease

7. (a); Let the population of the city be 100. Then,
People reading Dainik Jagran = 25
People reading Prabhat Khabar = 20
People reading both = 8
People reading only Dainik Jagran = 17
People reading only Prabhat Khabar = 12
Therefore, required percentage of people who read an advertisement

$$= \left(17\times\frac{30}{100}+\frac{12\times 40}{100}+\frac{8\times 50}{100}\right) = 13.9\%$$

8. (b); Let the number of people in my office = 100
At least 50 people read an e-newspaper.
At most 12.5 people read more than one e-newspaper.
Therefore, at least 37.5 people read only one e-newspaper.
Hence, at least 37.5% read exactly one e-newspaper.

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9. (d); Let the total number of students by y. Then,

Number of boys = $\frac{3y}{5}$, Number of girls = $\frac{2y}{5}$

Number of girls scoring more than 40 marks = $\frac{4}{5} \times \frac{2y}{5} = \frac{8y}{25}$

Total number of students scoring more than 40 marks = $\frac{3y}{5}$

$\therefore$ Required fraction = $\frac{7}{25} \times \frac{5}{3} = \frac{7}{15}$

Hence, the fraction of the boys who scored 40 marks or less is $\frac{7}{15}$.

10. (a); Let the total number of respondents = 100
People favoured IAC = 60
People favoured IPP = 40
New no. of people facouring IAC = 58
New no. of people favouring IPP = 42
Required percentage = 14%

11. (a); Total characters in the report = 25 × 60 × 75
Let the new number of pages be n. Then,
n × 55 × 90 = 25 × 60 × 75

$\therefore$ n = $\frac{25 \times 60 \times 75}{55 \times 90}$ = 22.72 $\approx$ 23

This means that Suman would need 23 pages for writing his report, which is a drop of 8% in terms of the pages.

12. (b); Income of the sales representative = 1200 + 1600 × y
Where y is the number of Rs. 10000 sales he achieves over the initial Rs. 10000.

Therefore,

1200 + 1600 × y = 7600

Or, y = $\frac{(7600-1200)}{1600}$ $\Rightarrow$ Or, y = $\frac{6400}{1600} = 4$

Thus, the total sales value must be Rs. 50000.

13. (c); At 12 noon, the watch would show the correct time, because till then the temperature range is below 40°C. The watch would gain 2% every hour between 12 noon and 4 p.m. An hour having 3600 seconds, it would gain 72 seconds in each of these hours. Thus, at 7 p.m. the watch would be 72 × 4 = 288 seconds ahead. The time exhibited by the watch would be 7 : 04 : 48 p.m.

14. (a); For last year; Lenovo = 100, Apple = 110

For this year; Lenovo = 120, Apple = 132

Samsung = 26.4

Last year, Samsung = 68.4

Required percentage = $\frac{68.4}{278.4} \times 100 = 25\%$

Hence, last year the sales of Samsung laptops were 25% of the total market for the laptops.

15. (b); Let solutions =100 ml and therefore, alcohol = 40 ml.

For first jar; $\frac{40+y}{100+y} = \frac{1}{2}$

$\therefore$ 80 + 2y = 100 + y $\Rightarrow$ y = 100 – 80 = 20 ml

For second jar; $\frac{40-\frac{2}{5}y+y}{60-\frac{3}{5}y} = \frac{1}{1}$, $y = \frac{100}{6}$

Hence, required percentage = $\frac{20-\frac{100}{6}}{\frac{100}{6}} \times 100 = 20\%$

16. (c); Let the total number of students appeared for the test be y. Then,

The number of male students appeared = $\frac{9y}{10}$

And the number of female students = $\frac{y}{10}$

Now, according to question = $\frac{3}{5}\times\frac{9y}{10}+\frac{4}{5}\times\frac{y}{10}$ = 1240

$\frac{27y+4y}{50}=1240 \Rightarrow 31y=1240\times 50 = 62000$

$\therefore \quad y = \frac{62000}{31} = 2000$

Hence, the total number of candidates who appeared for the test is 2000.

17. (d); The best way of solving this question is through the method of elimination, i.e., going through the options.

Obviously, options (A), (B) and (C) cannot be the answer, because if 500 or more then 500 people are voting in against the resolution, then the motion cannot be passed.

Now, let us check the option (D). If 400 people are voting against the resolution for the first time, then 500 are voting in favour. Now, in the second voting, persons voting against the resolution would be 600, so persons voting in favour=200.

In the first voting, resolution was passed by 100 votes and in the second voting, resolution was defeated by 400 votes. And it is 300% more than 100.

18. (a); Let the value of index = 100

Value of Vision Power share = 7

Value of Vision Infra = 13

Value of Vision Communication = 15

Value of remaining = 65
New value of Vision Power = 7.63
New value of Vision Infra = 14.3
New value of Vision Communication = 15.6
New value of remaining = 68.47

Hence, required percentage = $\frac{68.47-65}{65}\times 100 = \frac{3.47}{65}\times 100 = 5.34\%$

Hence, the price of other shares have increased by 5.34%

19. (b); Let x be A's profit and y be B's profit. Then,

$x + 2520 = x\left(1+\frac{10}{100}\right)^2 \Rightarrow x + 2520 = x\times\frac{121}{100}$

$100x + 252000 = 121x \Rightarrow 121x - 100x = 252000$

$\therefore x = \frac{252000}{21} = 12000$

Also, $4200 = \frac{y\times 20\times 1}{100}$

$20y = 4200 \times 100$

$\therefore y = \frac{420000}{20} = 21000$

C's profit = Rs. 9000
Ratio of their profit = 12000 : 21000 : 9000 = 12 : 21 : 9 = 4 : 7 : 3

Therefore,C's share = $\frac{3}{14}\times 70000 = 3\times 5000$ = Rs.15000

20. (d); Total money spent in buying goods = Rs. 63000
Total money kept in the bank = Rs. 27000
Total money received after selling the goods = Rs. 50400
Total money received from bank after 2 years = Rs. 35707.5

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Therefore,

Loss = Rs. 90000 – Rs. (50400 + 35707.5)

= Rs. 90000 – Rs. 86107.5 = Rs. 3892.5

Hence, percentage loss = $\frac{3892.5}{90000} \times 100$ = 4.325%

Hence, the total assets Sashi decreases by 4.325%

Previous Year (Memory Based)

1. (a); $\frac{40}{100} \times \frac{50}{100} \times \frac{3}{4} \times 3200 = 480$

2. (c); Let the number be x

$\frac{1}{5}x = 62 \Rightarrow x = 310 \Rightarrow$ 73% of x = $310 \times \frac{73}{100} = 226.3$

3. (a); Let the number be x

$\frac{2}{3} \times \frac{3}{4} \times \frac{1}{5} \times x = 15 \Rightarrow x = 150 \Rightarrow$ 30% of x = $150 \times \frac{30}{100} = 45$

4. (e); Let the number be x

$\frac{3}{4} \times \frac{2}{3} \times \frac{1}{5} \times x = 249.6 \Rightarrow x = \frac{249.6 \times 4 \times 3 \times 5}{3 \times 2}$

$x = 2496 \Rightarrow$ 50% of x = $\frac{2496}{2}$

Total amount = 1248

5. (c); Ishan's total spent on bike and television = 35645 + 24355

= Rs. 60000

$\therefore$ 80% = Rs. 60,000

100% = $\frac{60,000}{80} \times 100$ = Rs. 75000

6. (b); Sonal's total spent = 45760 + 27896 = Rs. 73656

$\therefore$ 72% = Rs. 73656

$$100\% = \frac{73656}{72} \times 100 = \text{Rs. } 102300$$

7. (b); Rajesh's total spent = 44620 + 32764 = 77384

$\therefore$ 68% = 77384

$$100\% = \frac{77384}{68} \times 100 \text{ Rs.} = 113800$$

8. (d); Harjeet total monthly, expenditure = 50 + 20 + 5 = 75%

$$\therefore \quad 25\% = 11250 \Rightarrow 100\ \% = \frac{11250}{25} \times 100 = 45000$$

Harjeet total monthly income = 45000

9. (b); Mr. Giridhar's total expenditure

$$= 50\% + 50 \times \frac{(50+25+10)}{100}\% = 50\% + 50 \times \frac{85}{100}\%$$

= 50 + 42.5% = 92.5%

Saving = 100 – 92.5% = 7.5% $\Rightarrow$ 7.5% = 900

$$100\ \% = \frac{900}{7.5} \times 100 = 12000$$

10. (a); Shruti's donation = $\left(12 \times \frac{75}{100}\right)\% = 9\%$

$$\therefore \quad 9\% = 3150 \Rightarrow 100\ \% = \frac{3150}{9} \times 100 = 35{,}000$$

11. (a); Asha's monthly income = $78000 \times \frac{60}{100}$ = Rs. 46800

$$\text{Maya's monthly income} = \frac{46800 \times 100}{120} = \text{Rs. } 39000$$

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12. (c); Let the share of B be x Rs.

According to the question

$\therefore$ share of C = $x\left(\frac{100-25}{100}\right)=\frac{3}{4}x$

share of A = $\frac{3}{4}x\left(\frac{125}{100}\right)=\frac{3}{4}x\times\frac{5}{4}=\frac{15}{16}x$

$\therefore$ $\frac{15}{16}x+x+\frac{3}{4}x=2236$

$\frac{15x+16x+12x}{16}=2236 \Rightarrow x=\frac{2236\times16}{43}=832$

$\therefore$ Share of A = $\frac{15}{16}\times832=780$ Rs.

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13. (c); Pooja's total investment = 13 + 23 + 8 = 44%

$\therefore$ 13% = 8554

Then 44% = $\frac{8554}{13}\times44$ = Rs. 28952

Annual investment = 28952 × 12 = 347424

14. (b); Total investment by Mr Sanang = (6 + 8 + 9)% = 23%

$\therefore$ 6% = 2100 $\Rightarrow$ 23% = $\frac{2100}{6}\times23$ = 8050

$\therefore$ Annual investment by Mr. Sanang = 8050 × 12 = 96600

15. (d); Total investment by Mr. Jain = (14 + 21+6.5)% = 41.5%

$\therefore$ 14% = 7014 $\Rightarrow$ 41.5% = $\frac{7014}{14}\times41.5$ = 20791.5

$\therefore$ Annual investment by Mr. Jain = 20791.5 × 12 = 249498

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16. (d); Abhinav invested Rs 6000.

Sunil's investment = $6000 \times \frac{70}{100} = 4200$

Rita's investment = $4200 \times \frac{125}{100} = 1050 \times 5 = 5250$

Total investment = 6000 + 4200 + 5250 = 15450

Required ratio = $\frac{5250}{15450} = 35 : 103$

17. (a); Deepti's total investment = (11 + 19 + 7)% = 37%

$\therefore$ 11% = 5236 $\Rightarrow$ 37% = $\frac{5236}{11} \times 37$ = Rs. 17612

Total Annual investment by Depti = 17612 × 12 = Rs. 211344

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18. (e); Sweets that each student got = $80 \times \frac{15}{100} = 12$

Total no of sweets = 80 × 12 = 960

19. (d); Sweets that each student got = $50 \times \frac{12}{100} = 6$

Sweets that each teacher got = $50 \times \frac{20}{100} = 10$

Total no. of sweets = 50 × 6 + 5 × 10 = 350

20. (d); Sweets that each student got = $80 \times \frac{15}{100} = 12$

Sweets that each teacher got = $80 \times \frac{25}{100} = 20$

Total no of sweets = 80 ×12 + 5 × 20 = 1060

21. (c); Total marks to pass = 40 + 30 = 70

35% of marks = 70 $\Rightarrow$ 100% = $\frac{70}{35} \times 100 = 200$

$\therefore$ Maximum marks of test = 200

22. (b); Seema got marks in pertcentage = 100 – 76 = 24%

24% of marks = 480 $\Rightarrow$ 100% = $\frac{480}{24} \times 100 = 2000$

$\therefore$ Marks got by Raja = 2000 – 480 = 1520

23. (a); Total correct answer required = 150 × $\frac{60}{100} = 90$

Correct answer from first 75 question = 75 × $\frac{40}{100} = 30$

Required percentage = $\frac{90-30}{75} \times 100 = \frac{60}{75} \times 100 = 80\%$

24. (c); Total valid voter = 8400 × $\frac{75}{100} = 6300$

No. of valid votes other perosn got = $6300 \times \frac{48}{100} = 3024$

25. (d); Total no of valid voter = $15200 \times \frac{85}{100} = 12920$

$\therefore$ No. of valid votes other person got = $12920 \times \frac{45}{100} = 5814$

26. (e); Population of the town at the end of second year

= 48600 × $\frac{125}{100} \times \frac{92}{100} = 55890$

27. (e); Weight of water in 60 gm mixtime $= 60 \times \frac{75}{100} = 45$ gm

Total weight of water = 45 + 15 = 60 gm

Required percentage = $\frac{60}{75} \times 100 = 80\%$

28. (b); Let the No is 100;
First increase = 110

Second increase $= 110 \times \frac{120}{100} = 132$

Third increase $= 132 \times \frac{125}{100} = 165$

Single equivalent increase = 65%

29. (b); Required percentage = $\left(\frac{x}{100+x} \times 100\right)$

[$\therefore$ Where x is % increase]

$$= \frac{20}{120} \times 100 = 16\frac{2}{3}\%$$

30. (e); Let the marked price of the article be x Rs.

Selling price at a discount of 20% = $x - \frac{20x}{100} = \frac{4x}{5}$ Rs.

In order to give 60% on market price, selling price

$= x\left(\frac{100+60}{100}\right) = \frac{8x}{5}$ Rs.

$\therefore$ Required percent = $\frac{\frac{8x}{5} - \frac{4x}{5}}{\frac{4x}{5}} \times 100 = 100\%$

31. (c); Let maximum marks be x.
According to the question

10% of x = 256 – 192 $\Rightarrow \frac{10}{100}x = 64 \Rightarrow x = 640$

32. (c); Let the total votes = 100 x.
Given, Total votes cast = 60x

Total valid votes $= 60x - \frac{60 \times 4}{100} = 57.6x$

According to the question

$57.6x \times \frac{75}{100} = 7344 \Rightarrow x = 170$

$\therefore$ Total votes = 100x = 170 × 100 = 17000

33. (e); Total % of money left = 100 – (52 + 23)% = 25%
$\therefore$ 25 % = 4500

$100\% = \frac{4500 \times 100}{25}$ = Rs. 18000

34. (c); No. of students speak only Hindi = $60 \times \frac{40}{100} = 24$

No. of students speak only English = $60 \times \frac{25}{100} = 15$

No. of students speak both languages = 60 – (24 + 15) = 21
No. of students speak English = 15 + 21 = 36

35 (d); In this question profit is not given.
$\therefore$ The answer is cannot be determined

36. (a); 10% = 1950 $\Rightarrow$ $15\% = \frac{1950}{10} \times 15 = 2925$

37. (b); % drop = $\frac{5.5 - 4.4}{5.5} \times 100 = \frac{1.1}{5.5} \times 100$ = 20% decrease

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38. (a); Net effect = $-25+30-\frac{25\times30}{100} = 2\frac{1}{2}\%$ decrease

39. (d); Let the income of the man be 100 Rs.
Expenditure = 75 and saving = 25
Then, from the question new income = 120

and expenditure = $75\times\frac{110}{100} = 82.50$

Saving = 120 – 82.50 = 37.50

% increase in the saving = $\frac{37.50-25}{25}\times100 = 50\%$

40. (c); Percentage of votes not fetched by the elected candidate = 100 – 63 = 37%

$\therefore$ 37% = 54982

$\therefore$ 100%= $\frac{54982}{37}\times100$

Required votes = 148600 votes

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Chapter 4

Profit and Loss

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Chapter 4

Profit and Loss

Theory:

Cost Price (CP): The money paid by the shopkeeper to the manufacturer or whole -seller to buy goods is called the cost price (cp) of the goods purchased by the shopkeeper.

Selling Price (SP): The price at which the shopkeeper sells the goods is called selling price (s.p) of the goods sold by the shopkeeper to the customer.

Profit: If the selling price of an article is more than its cost price, then the dealer (or shopkeeper) makes a profit (or gain)

i.e., Profit = SP – CP; SP > CP

Loss: If the selling price of an article is less than its cost price, the dealer suffers a loss

i.e., Loss = CP – SP; CP > SP

Some Important Formulae:

(i) Profit = SP – CP

(ii) Loss = CP – SP

(iii) Profit percentage = $\left(\frac{\text{Profit}}{\text{CP}} \times 100\right)\%$

(iv) Loss percentage = $\left(\frac{\text{Loss}}{\text{CP}} \times 100\right)\%$

(v) S.P = $\left(\frac{(100 + \text{Profit}\%) \times \text{CP}}{100}\right) = \left(\frac{(100 - \text{Loss}\%) \times \text{CP}}{100}\right)$

(vi) C.P = $\left(\frac{100 \times \text{SP}}{100 + \text{Profit}\%}\right) = \left(\frac{100 \times \text{SP}}{100 - \text{Loss}\%}\right)$

(vii) SP = (100 + x)% of CP; when Profit = x% of CP

(viii) SP = (100 – x)% of CP; when Loss = x% of CP

Example 1: A man purchases an item for Rs. 120 and he sells it at a 20 percent profit, find his selling price

Sol. $$SP = \left(\frac{100+\text{Profit\%}}{100}\right)\times CP$$

$$= \frac{100+20}{100}\times 120 = \frac{120}{100}\times 120 = \text{Rs. } 144$$

Note: Profit /Loss percentage is always calcualated on C.P. unless otherwise stated.

Example 2: Find the cost price of an article which is sold for Rs. 200 at a loss of 20%

Sol. $$CP = \frac{100}{100-\text{Loss\%}}\times SP = \frac{100}{100-20}\times 200 = \text{Rs. } 250$$

Concept 1:

MARK UP AND DISCOUNT

Marked Price: To avoid loss due to bargaining by the customer and to get profit over the cost price, the trader increases the cost price. This increase is known as markup and the increased price (i.e., cp+markup) is called the marked price or printed price or list price of the goods.

Marked Price = CP + markup

$$\text{Marked Price} = CP + \frac{(\text{\% marked})\times CP}{100}$$

Generally goods are sold at marked price, if there is no further discount, then in this case selling price equals marked price.

Discount: Discount means reduction of marked price to sell at a lower rate or literally discount means concession.

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Basically, it is calculated on the basis of marked price.

Selling price = Marked price – Discount

$$\text{Selling price} = \text{MP} - \frac{(\%\ \text{Discount}) \times \text{MP}}{100}$$

Example: If the cost price of an articale is Rs. 300 and the percent markup is 30%. What is the marked price?

Sol. MP = CP + (%markup on CP) $= 300 + \frac{30}{100} \times 300$ = Rs. 390

Concept 2:

Dishonest Dealer Case: If a trader professes to sell his goods at cost price, but uses false weights, then

$$\%\ \text{gain} = \frac{\text{Error}}{\text{True value} - \text{Error}} \times 100 \Rightarrow \%\text{gain}$$

$$= \frac{\text{True weight} - \text{False weight}}{\text{False weight}} \times 100$$

Example: A shopkeeper sold an article at cost price but use the weight of 960 gm in place of 1 kg weight. Find his profit%?

Sol. $$\text{Profit\%} = \frac{\text{True weight} - \text{False weight}}{\text{False weight}} \times 100 = \frac{1000 - 960}{960} \times 100$$

$$= \frac{40}{960} \times 100 = \frac{25}{6} = 4\frac{1}{6}\%$$

Concept 3:

Where two articles are sold at same price but one of them at a profit and another at a loss and the percentage profit is the same as the percentage loss, In this case there is always a loss.

$$\text{Loss\%} = \left(\frac{\text{Common Profit or Loss\%}}{10}\right)^2 = \left(\frac{\%\text{value}}{10}\right)^2$$

Example: Each of two car is sold for Rs. 1000. The first one is sold at 25% profit and the other one at 25% loss. What is the percentage loss or gain in the deal?

Sol. Total s.p = $1000 \times 2 =$ Rs. 2000

CP of 1st car = $\frac{100 \times 1000}{125}$ $[\because \text{Profit} = 25\%]$ = Rs. 800

CP of 2nd car = $\frac{100 \times 1000}{75}$ $[\because \text{Loss} = 25\%]$ = Rs. $1333\frac{1}{3}$

Total CP = Rs. $2133\frac{1}{3}$ $\Rightarrow$ Loss% = $\frac{CP - SP}{CP} \times 100$

$$= \frac{2133\frac{1}{3} - 2000}{2133\frac{1}{3}} \times 100 = 6.25\%$$

or, Using Shortcut Formula

$$\text{Loss\%} = \left(\frac{\text{\%value}}{10}\right)^2 = \left(\frac{25}{10}\right)^2 = 6.25\ \%$$

Concept 4:

When two successive discounts on an article are x% and y% resp. then net discount: $\left(x + y - \frac{xy}{100}\right)\%$

Example: A shopkeeper given two sucessive discount of 50% and 50% find the real (equivalent) discount?

Sol. Let MP = Rs. 100

Cost after 1st discount of 50% = 100 – 50% of 100 = Rs. 50

Cost after 2nd discount of 50% = 50 – 50% of 50 = Rs. 25

Price after both discount = Rs. 25

% discount = $\frac{100 - 25}{100} \times 100 = 75\%$

or, Using Shortcut Formula

% discount = $x + y - \frac{xy}{100}$ [where x = 50%, y = 50%]

$$= 50 + 50 - \frac{50 \times 50}{100} = 100 - 25 = 75\%$$

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Types of Questions

1. There is a profit of 20% on the cost price of an article. Find the profit percent when calculated on selling price?

Sol. Let the cost price of an article be Rs. 100
then, Profit = 20% of 100 = Rs. 20
Selling price = Cost price + profit = 100 + 20 = Rs. 120

Profit% when calculated on SP $= \frac{20}{120} \times 100 = \frac{100}{6} = 16\frac{2}{3}\%$

2. By selling a bicycle for Rs. 2850, a shopkeeper gains 14%. If the profit is reduced to 8%, find the selling price of bicycle?

Sol. $CP = \frac{SP \times 100}{100 + Profit\%} = \frac{2850 \times 100}{100 + 14} = \frac{2850 \times 100}{114}$ = Rs. 2500

SP of article for 8% Profit

$SP = \frac{CP \times (100 + Profit\%)}{100} = \frac{2500 \times 108}{100}$ = 25 × 108 = Rs. 2700

3. The selling price of 12 articles is equal to the cost price of 15 articles. Find the gain percent?

Sol. Let the CP of 1 article = Rs. x
Cost Price of 15 article = Rs. 15x
Selling Price of 12 article = Rs. 15x

SP of 1 article $= \text{Rs. } \frac{15}{12}x$

$Gain = \frac{15x}{12} - x = \frac{3x}{12} = \frac{x}{4}$

$Gain\% = \frac{Gain \times 100}{CP} = \frac{\frac{x}{4} \times 100}{x} = 25\%$

4. A fruit seller buys some fruits at the rate of 11 for Rs. 10 and the same number at the rate of 9 for Rs. 10. If all the fruits are sold for Rs. 1 each. Find the gain or loss percent?

Sol. In these types of question, we have to take the LCM of number of individual things.

Number of fruits of each type he bought = LCM of 11 and 9 = 99

Total number of fruits = 99 × 2 = 198

$$\text{CP of 198 fruits} = \frac{10}{11} \times 99 + \frac{10}{9} \times 99 = 90 + 110 = \text{Rs. } 200$$

SP = 198 × 1 = Rs. 198

$$\text{Loss\%} = \frac{CP - SP}{CP} \times 100 = \frac{200 - 198}{200} \times 100 = \frac{2}{200} \times 100 = 1\%$$

5. A book vendor sold a book at a loss of 10%. Had he sold it for Rs. 108 more, he would have earned a profit of 10%. Find the cost of the book.

Sol. Let the CP article = x

$$SP = \frac{x(100 - 10)}{100} = \frac{90x}{100} = \frac{9x}{10} \quad [\text{Loss of } 10\%]$$

$$\frac{9x}{10} + 108 = \frac{110x}{100} \quad [\text{If vendor sold for Rs. } 108 \text{ more}]$$

$$\frac{110x}{100} - \frac{9x}{10} = 108 \quad \Rightarrow \quad \frac{11x}{10} - \frac{9x}{10} = 108$$

$$2x = 1080 \quad \Rightarrow \quad x = \text{Rs. } 540$$

6. A person bought some article at the rate of 5 per rupee and the same number at the rate of 4 per rupee. He mixed both the types and sold at the rate of 9 for Rs. 2. In this business he suffered a loss of Rs. 3. Find th total no. of articles bought by him?

Sol. Let the person buys 10 articles

$$\text{Total CP} = \text{Rs.}\left(5 \times \frac{1}{5} + \frac{5 \times 1}{4}\right) = \text{Rs.}\left(1 + \frac{5}{4}\right) = \text{Rs.}\frac{9}{4}$$

$$\text{SP of 10 articles} = \frac{2}{9} \times 10 = \text{Rs.}\frac{20}{9}$$

$$\text{Loss} = \text{Rs.}\left(\frac{9}{4} - \frac{20}{9}\right) = \left(\frac{81-80}{36}\right) = \text{Rs.}\frac{1}{36}$$

If loss is Rs. $\frac{1}{36}$, then number of articles = 10

If loss is Rs. 3, number of articles = 36 × 10 × 3 = 1080

7. A man buys a field of agricultural land for Rs. 360000. He sells $\frac{1}{3}$rd at a loss of 20% and $\frac{2}{5}$th at a gain of 25%. At what price must he sell the remaining field so as to make an overall profit of 10%?

Sol. SP of total agricultural field $= \text{Rs.}\left(360000 \times \frac{110}{100}\right)$ = Rs. 396000

[overall profit of 10%]

SP of $\frac{1}{3}$rd of the field

$$= \frac{1}{3} \times 360000 \times \frac{80}{100} \left[\text{Loss of } 20\%\right] \Rightarrow \text{Rs. } 96000$$

SP of $\frac{2}{5}$th of the field

$$= \frac{2}{5} \times 360000 \times \frac{125}{100} [\text{Gain of } 25\%] \Rightarrow \text{Rs. } 180000$$

SP of the remaining field = Rs. (396000 – 96000 – 180000) = Rs. 120000

8. One trader calculates the prcentage of profit on the buying price and another calculates on the selling price. When their selling price are the same, then difference of their actual profit is Rs. 85 and both claim to have made 20% profit. What is the selling price of each?

Sol. For first trader,

Let the CP of the article of Rs. 100, SP = Rs. 120

For second trader, SP of the article = Rs. 120

Gain = 20% [For both the traders]

Let the CP be x

$$\frac{120-x}{120}\times 100 = 20 \quad \Rightarrow \quad 120 - x = \frac{20}{5}\times 6$$

$\Rightarrow$ 120 – x = 24 $\Rightarrow$ x = 120 – 24 = Rs. 96

Gain = Rs. 24 [SP – CP]

Difference of gain = 24 – 20 = Rs. 4

If the difference of gain be Rs. 4, then

SP = Rs. 120

When the difference be Rs. 85, then

$$SP = \frac{120}{4}\times 85 = \text{Rs. } 2550$$

9. If the sales tax be reduced from $3\frac{1}{2}\%$ to $3\frac{1}{3}\%$. What difference does it make to person who purchases an article whose marked price is Rs. 8400?

Sol. Initial sales tax $= 3\frac{1}{2}\%$, Final sales tax $= 3\frac{1}{3}\%$

Difference in percentage of sales tax

$$= \left(3\frac{1}{2} - 3\frac{1}{3}\right)\% = \frac{1}{6}\%$$

Req. diff. $= \frac{1}{6}\% \times 8400 = \frac{1}{6}\times\frac{1}{100}\times 8400$ = Rs. 14

10. A man sells two cycle for Rs. 1710. The cost price of the first is equal to the selling price of the second. If the first is sold at 10% loss and the second at 25% gain, what is his total gain or loss?

Sol.

	1st Cycle	2nd Cycle	Total
CP	100	$100\left(\frac{100}{125}\right) = 80$	180
SP	$100\left(\frac{90}{100}\right) = 90$	100	190

Total CP = (CP of 1st Cycle) + (CP of 2nd Cycle)
= 100 + 80 = Rs. 180
Total SP = (SP of 1st Cycle) + (SP of 2nd Cycle)
= 90 + 100 = Rs. 190
CP : SP = 180 : 190 = 18 : 19

$$\text{Profit} = \frac{19-18}{19} \times 1710 = \text{Rs. } 90$$

11. Ashish bought an article with 20% discount on the labelled price. He sold the article with 30% profit on the labelled price. What was his percent profit on the price he bought?

Sol. Let the labelled price of the article be Rs. x

$$\text{Cost Price} = x\left(\frac{100-20}{100}\right) = \text{Rs.}\frac{4x}{5}$$

$$\text{Selling Price} = x\left(\frac{100+30}{100}\right) = \text{Rs.}\frac{13}{10}x$$

$$\text{Profit} = \frac{13}{10}x - \frac{4}{5}x = \frac{13x-8x}{10} = \frac{x}{2} \quad [\text{SP} - \text{CP}]$$

$$\%\text{Profit} = \frac{x/2}{4x/5} \times 100 = \frac{5}{8} \times 100 = \frac{125}{2} = 62.5\%$$

12. A shopkeeper sold an article for Rs. 400 after giving 20% discount on the labelled price and made 20% profit on cost price. What was the percentage profit, had he not given the discount?

Sol. $\text{Labelled Price} = \frac{400 \times 100}{80}$ = Rs. 500 [Before discount of 20%]

$$\text{Cost Price of article} = \frac{400 \times 100}{120} = \text{Rs. } \frac{1000}{3} \quad [20\% \text{ profit on CP}]$$

$$\text{Profit}\% = \frac{500 - \frac{1000}{3}}{\frac{1000}{3}} \times 100 = \frac{\frac{1500-1000}{3}}{\frac{1000}{3}} \times 100 = \frac{500}{1000} \times 100 = 50\%$$

13. A reduction of 20% in the price of mangoes enables a person to purchase 12 more for Rs. 15. Find the price of 16 mangoes before reduction?

Sol. Let the price of 1 mango be x paise

Number of mangoes for Rs. 15 $= \frac{1500}{x}$ [Rs. 1 = 100 paise]

New price of one mango $= (80\% \text{ of } x)$ paise $= \frac{80}{100} \times x = \frac{4}{5}x$ paise

Number of mangoes for Rs. 15 $= \left(\frac{1500 \times 5}{4x}\right)$

$\frac{7500}{4x} - \frac{1500}{x} = 12$ [Diff. as mentioned in the Ques.]

x = 31.25

Cost of 16 mangoes before reduction $= \frac{31.25 \times 16}{100} =$ Rs. 5

14. A garment company declared 15% discount for wholesale buyers. Mr. Hemant bought garments from the company for Rs. 8500 after getting discount. The fixed up selling price of garments in such a way that he earned a profit of 10% on original company price. What is the total selling price?

Sol. Original Company price $= \frac{8500 \times 100}{100 - 15}$ = Rs. 10000

Let the total selling price be Rs. x.

Now, according to the question, $\frac{x - 10000}{10000} \times 100 = 10$ [Profit of 10%]

100x – 1000000 = 100000 $\Rightarrow$ x = Rs. 11000

Total selling price = Rs. 11000

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15. A publisher published 5000 books in 5 lakh rupees. If he gives 500 books in free, $\frac{2}{3}$ rd of the rest he sell on 20% discount and remaining $\frac{1}{3}$ rd on M.P. He also gives 20% commission of the total selling. Find the profit% of the publisher if market price of each book is Rs. 200?

Sol. Total number of books = 5000

he gives free book = 500

SP of Ist part = $3000 \times 200 \times \frac{4}{5}$ = Rs. 480000

[20% Discount on $\frac{2}{3}$rd of rest]

SP or IInd part = 1500 × 200 = Rs. 300000

[Price is MP of $\frac{1}{3}$rd of the rest]

Total SP = 480000 + 300000 = Rs. 780000

Total SP after Commission $= \frac{80}{100} \times 780000$

[20% Commission] = Rs. 624000

Total CP = Rs. 5,00,000, Total SP = Rs. 6,24,000

Net profit = 6,24,000 – 5,00,000 = 1,24,000

Profit% $= \frac{124000}{500000} \times 100$ = 24.8%

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Foundation

1. A man buys an article for Rs. 27.50 and sells it for Rs. 28.60. Find the gain percent?
   (a) 4% (b) 3% (c) 5%
   (d) 10% (e) None of these
2. If a radio is purchased for Rs. 490 and sold for Rs. 465.50. Find the loss%?
   (a) 6% (b) 5% (c) 4%
   (d) 3% (e) None of these
3. Find SP when CP = Rs. 56.25 and Gain = 20%?
   (a) Rs. 72 (b) Rs. 67.5 (c) Rs. 50
   (d) Rs. 75 (e) None of these
4. Find SP when CP = Rs. 80.40, loss = 5%?
   (a) Rs. 81 (b) Rs. 84.72 (c) Rs. 76.38
   (d) Rs. 82.9 (e) None of these
5. Find CP when SP = Rs. 40.60, gain = 16%?
   (a) Rs. 35 (b) Rs. 50 (c) Rs. 75
   (d) Rs. 89 (e) None of these
6. Find CP when SP = Rs. 51.70, loss = 12%?
   (a) Rs. 58.75 (b) Rs. 62.25 (c) Rs. 65
   (d) Rs. 69.27 (e) None of these
7. A person incurs 5% loss by selling a watch for Rs. 1140. At what price should the watch be sold to earn 5% profit?
   (a) Rs. 1380 (b) Rs. 1160 (c) Rs. 1260
   (d) Rs. 1400 (e) None of these
8. If the cost price is 96% of the selling price, then what is the profit percent?
   (a) 5.72% (b) 3.72% (c) 8.92%
   (d) 2.8% (e) None of these
9. A discount dealer professes to sell his goods at cost price but uses a weight of 960 gms instead of a Kg weight. Find his gain%?

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(a) $\frac{27}{4}\%$ (b) $\frac{8}{3}\%$ (c) $\frac{25}{6}\%$

(d) $\frac{21}{4}\%$ (e) None of these

10. A man sold two cows at Rs. 1995 each. On one he lost 10% and on the other he gained 10%. What his gain or loss percent?
(a) 4% (b) 2% (c) 0.5%
(d) 1% (e) None of these

11. Two discounts of 40% and 20% equal to a single discount of?
(a) 48% (b) 53% (c) 52%
(d) 60% (e) None of these

12. Amit buys 5 watches for Rs. 9450 and later sells them for Rs. 9700. How much profit does Amit make per watch?
(a) Rs. 75 (b) Rs. 80 (c) Rs. 60
(d) Rs. 95 (e) None of these

13. The price of 12 chair and 8 table is Rs. 676. What is the price of 21 chair and 14 table?
(a) Rs. 1183 (b) Rs. 4732 (c) Rs. 1180
(d) Cannot be determine (e) None of these

14. Aditya sold TV to Sanjay at 12% more than the CP. If Sanjay paid Rs. 17696 for that TV then what was the original price of the TV?
(a) Rs. 15,500 (b) Rs. 15,820 (c) Rs. 15,520
(d) Rs. 15,800 (e) None of these

15. Amit purchased 13 chair of Rs. 115 each and sold all at Rs. 1220. Then find the profit or Loss on the transaction
(a) Rs. 280 Loss (b) Rs. 275 Loss (c) Rs. 325 Profit
(d) Rs. 350 Profit (e) None of these

16. Aditya purchase a book with a 20% discount on the marked price. How much did he pay if the book marked was Rs. 500?
(a) Rs. 400 (b) Rs. 300 (c) Rs. 200
(d) Rs. 500 (e) None of these

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17. By selling a book for Rs. 360, 20% profit was earned. What is the CP of the book?
(a) Rs. 300 (b) Rs. 200 (c) Rs. 250
(d) Cannot be determined (e) None of these

18. Profit earned by selling an article of Rs. 1630 is same as the loss incurred by selling the article for Rs. 1320. What is the CP?
(a) Rs. 1475 (b) Rs. 1300 (c) Rs. 1350
(d) Rs. 1275 (e) None of these

19. If the CP of 50 items is equal SP of 40 items then what is the profit or loss%?
(a) 20% (b) 15% (c) 25%
(d) 35% (e) None of these

20. If a banana cost is Rs. 1.25 and apple cost is Rs. 1.75 the what will be the cost of 2 Dozen of Banana and 3 Dozen of apple?
(a) Rs. 93 (b) Rs. 83 (c) Rs. 85
(d) Rs. 70 (e) Rs. 40

21. Nutan bought a watch with 24% discount. If she pays Rs. 779 for that watch then what is the marked price of watch?
(a) Rs. 950 (b) Rs. 975 (c) Rs. 1000
(d) Rs. 1025 (e) None of these

22. Nutan pays Rs. 2140 for 3 calculator and 4 Pen while he pay Rs. 1355 for an additional calculator and 5 Pen. Then what he paid for Calculator only?
(a) Rs. 175 (b) Rs. 480 (c) Rs. 655
(d) Can't be determined (e) None of these

23. A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20%?
(a) 3 (b) 4 (c) 5
(d) 6 (e) None of these

24. A man sold his two horses for Rs. 770 each, on one he gained 10% & on the other he lost 10%. The average gain or loss percentage is

(a) 100% (b) 0.96% (c) 4%
(d) 1% (e) None of these

25. If the selling price of an article is $\frac{4}{3}$rd of its cost price the profit in the transaction is

(a) $16\frac{2}{3}\%$ (b) $20\frac{1}{2}\%$ (c) $25\frac{1}{2}\%$

(d) $33\frac{1}{3}\%$ (e) None of these

26. A sells his house worth Rs. 10 lakh to B at a loss of 10%. Later B sells it back to A at 10% profit. The result of the two transactions is
(a) A neither loses nor gains (b) A loses Rs. 90,000
(c) A loses Rs. 2,00,000 (d) B gains Rs. 1,10,000
(e) None of these

27. A fair price shopkeeper takes 10% profit on his goods. He lost 20% goods during theft his loss% is
(a) 8% (b) 10% (c) 11%
(d) 12% (e) None of these

28. Aditya bought 200 dozen orange at Rs. 10 per dozen and he spent Rs. 500 on transportation. He sold each orange at Rs. 1 each. What was his profit or loss%?
(a) 5% (b) 6% (c) 4%
(d) Can't be determine (d) None of these

29. If 11 Mango are bought for Rs. 10 and sold at 10 for Rs. 11. What was Gain or Loss%?
(a) 24% (b) 21% (c) 26%
(d) 25% (e) None of these

30. The cost price of 20 articles is the same as the selling price of x articles. If the profit is 25%, then the value of x is:
(a) Rs. 15 (b) Rs. 16 (c) Rs. 18
(d) Rs. 25 (e) None of these

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31. If selling price is doubled, the profit triples. Find the profit percent:

(a) $66\frac{2}{3}\%$ (b) 100% (c) $105\frac{1}{3}\%$

(d) 120% (e) None of these

32. Some articles were bought at 6 articles for Rs. 5 and sold at 5 articles for Rs. 6. Gain percent is:

(a) 30% (b) $33\frac{1}{3}\%$ (c) 35%

(d) 44% (e) None of these

33. The cost price of 12 tables is equal to the selling price of 16 tables. The loss percent is

(a) 15% (b) 20% (c) 25%

(d) 30% (e) None of these

34. Two continuous discounts of 4% on any thing should be equal to

(a) 8% (b) 7.92% (c) 7.84%

(d) 8.08% (e) None of these

35. A sells a bicycle to B at a profit of 20% and B sells it to C at a profit of 25%. If C pays Rs. 1500, what did A pay for it?

(a) Rs. 825 (b) Rs. 1000 (c) Rs. 1100

(d) Rs. 1125 (e) None of these

36. Ram purchases a chair at Rs. 70 and spent Rs. 17 on its repair and 50 paise on cartage. If he sold the chair at Rs. 100 then his approximate margin of profit will be?

(a) 13.30% (b) 11.25% (c) 12.5%

(d) 14.3% (e) None of these

37. A shopkeeper marks his goods 20% above CP but allows 30% discount for cash. His net loss is?

(a) 8% (b) 20% (c) 10%

(d) 16% (e) None of these

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38. A single discount, equivalent to a successive discount of 40% and 30% is?
(a) 55% (b) 56% (c) 57%
(d) 58% (e) None of these

39. If the CP of 13 bats is Rs. 390. What is the price when it is sold at 10% loss?
(a) Rs. 200 (b) Rs. 300 (c) Rs. 350
(d) Rs. 400 (e) None of these

40. If an item is sold for Rs. 924 then there is a profit of 10% then what is the cost price?
(a) Rs. 840 (b) Rs. 860 (c) Rs. 880
(d) Rs. 900 (e) None of these

Moderate

1. The cost of an article including the sales tax is Rs. 616. The rate of sales tax is 10%, if the shopkeeper has made a profit of 12%, then the cost price of the article is?
(a) Rs. 350 (b) Rs. 500 (c) Rs. 650
(d) Rs. 800 (e) None of these

2. Two third of consignment was sold at a profit of 5% and the remainder at a loss of 2%. If the total profit was Rs. 400, the value of the consignment was?
(a) Rs. 12000 (b) Rs. 14000 (c) Rs. 15000
(d) Cannot be determined (e) None of these

3. A tradesman gives 4% discount on the marked price and gives one article free for buying every 15 articles and thus gains 35%. The marked price is appox. how much percent above the CP?
(a) 20% (b) 30% (c) 40%
(d) 50% (e) 70%

4. When a producer allows 36% concession on the retail price of his product, he earns a profit of 8.8%. What would be his profit percent if the commission is reduced by 24%?

(a) 48.2% (b) 49% (c) 49.6%
(d) 51% (e) 54.5%

5. A person earns 15% on investment but loses 10% on another investment. If the ratio of the two investments be 3 : 5, what is the gain or loss on the two investments taken together?
(a) 0.625% (b) 0.8% (c) 0.9%
(d) 1.2% (e) 1.45%

6. The profit earned by selling an article for Rs. 900 is double the loss incurred when the same article is sold for Rs. 450. At what price should the article be sold to make 25% profit?
(a) Rs. 400 (b) Rs. 500 (c) Rs. 700
(d) Rs. 750 (e) Rs. 900

7. A shopkeeper sold some article at the rate of Rs. 35 per article and earned profit of 40%. At what price each article should have been sold so that profit of 60% was earned.
(a) Rs. 45 (b) Rs. 42 (c) Rs. 39
(d) Rs. 40 (e) None of these

8. Due to a 20% rise in price of sugar, a bachelor is able to buy 1.5 kg less for Rs. 135. What is the increased price of sugar per kg?
(a) Rs. 15 (b) Rs. 21 (c) Rs. 18
(d) Rs. 24 (e) None of these

9. A trader mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. His profit percent is:
(a) No profit, no loss (b) 5%
(c) 8% (d) 10% (e) None of these

10. A TV set is being sold for Rs. x in Chandigarh. A dealer went to Delhi and bought the TV at 20% discount (from the price of Chandigarh). He spent Rs. 600 on transport. Thus he sold the set in Chandigarh for Rs. x making $14\frac{2}{7}\%$ profit. What was x?
(a) Rs. 9600 (b) Rs. 8800 (c) Rs. 8000
(d) Rs. 7200 (e) None of these

11. Sanjay purchased a chair marked at Rs. 800 at 2 successive discount of 10% and 15% respectively. He spent Rs. 28 on transportation and sold the chair for Rs. 800. How much is his gain percentage?
(a) 14% (b) 30% (c) 25%
(d) 40% (e) None of these

12. When a book is sold at its Marked Price it gives a profit of 40%. What will happen if it is sold at half the marked Price?
(a) 30% profit (b) 25% loss (c) 30% loss
(d) 40% profit (e) None of these

13. Aditya purchased 14 shirt & 25 pants at Rs. 45 and Rs. 55 respectively what should be the approximate overall average selling price of shirt and pant so that 40% profit is earned?
(a) Rs. 72.5 (b) Rs. 71 (c) Rs. 72
(d) Rs. 70 (e) None of these

14. A person sells 36 apple per rupee and suffers a loss of 4%. Find how many apple per rupees to be sold to have a gain of 8%.
(a) 32 (b) 16 (c) 4
(d) 15 (e) None of these

15. Ram sells an article to Girish at a gain 20%, Girish sells it to Sanjay at a gain of 10% and Sanjay sells it to Aditya at a gain of $12\frac{1}{2}\%$. If aditya pay Rs. 59.40. What did it cost Ram?
(a) Rs. 40 (b) Rs. 22 (c) Rs. 24
(d) Rs. 18 (e) None of these

16. A fruit seller sells $\frac{3}{5}$th part of fruit at a profit of 10% and remaining at a loss of 5%. If the total profit is Rs. 1500 then what is the total cost price of fruit?
(a) Rs. 37500 (b) Rs. 37000 (c) Rs. 36500
(d) Rs. 36000 (e) None of these

17. A shopkeeper buys a toy at Rs. 100 and sells it at Rs. 125. Another shopkeeper buys the same toy at Rs. 125 but sells it at Rs. 100. What are the respective profit and loss percentages for the two shopkeepers.

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(a) 20%, 20% (b) 25%, 20% (c) 25%, 25%

(d) 25%, $16\frac{2}{3}\%$ (e) None of these

18. The marked price of a bed is Rs. 2400. The shopkeeper gives successive discounts of 10% and X% to customer. If the customer pays Rs. 1836 for the bed then find the value of X?

(a) 15% (b) 18% (c) 12%

(d) 10% (e) None of these

19. Three successive discounts of 10%, 12% and 15% will amount to a single discount of?

(a) 36.28% (b) 32.68% (c) 34.68%

(d) 37% (e) None of these

20. A loss of 19% gets converted into profit of 17% when the selling price is increased by Rs. 162. Find the cost price of the article.

(a) Rs. 300 (b) Rs. 350 (c) Rs. 400

(d) Rs. 450 (e) None of these

21. A shopkeeper sold an article offering discount of 5% and earn a profit of 23.5%. What would have been the percentage of profit earned if no discount has been offered?

(a) 23% (b) 30% (c) 33%

(d) Cannot be determined (e) None of these

22. If Aditya sells an article to Nutan at 10% gain, while Nutan sells it to Manish at 20% gain at Rs. 1914 then what is the Cost Price?

(a) Rs. 1450 (b) Rs. 1340 (c) Rs. 1560

(d) Rs. 1780 (e) None of these

23. Rita buys an article for Rs. 9600. She sold it at 12% loss and get some money and from that money she again buys an article and this time she got 12% profit. What was profit or loss she got form this transaction?

(a) Rs. 130 (b) Rs. 138 (c) Rs. 138.24

(d) Rs. 138.42 (e) None of these

24. Nutan bought 30 dozens of oranges for her juice stall in the school fair. She paid Rs. 8 per dozen of oranges. She also had to pay Rs. 500 as the stall fee to the school authorities. She calculated that each glass of juice would need 3 oranges. How much should she charge per glass of juice so as to make 20% profit?
(a) Rs. 7.20 (b) Rs. 7.40 (c) Rs. 7.60
(d) Rs. 7.80 (e) None of these

25. Aditya bought a scooter for a certain sum of Money. He spend 15% of cost price on repair and sold it for a profit on Rs. 1104. What will he spend on repair if profit he got was 20%?
(a) Rs. 600 (b) Rs. 700 (c) Rs. 800
(d) Rs. 900 (e) None of these

26. In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling price remains constant, approximately what percentage of the selling price is the profit?
(a) 30% (b) 70% (c) 100%
(d) 250% (e) None of these

27. A shopkeeper sells one transistor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. His total gain or loss percent is:
(a) $5\frac{15}{17}$% loss (b) $5\frac{15}{17}$% gain (c) $6\frac{2}{3}$% gain
(d) $6\frac{1}{2}$% Loss (e) None of these

28. A dealer buys a table listed at Rs. 600 and gets successive discount of 10% and 20%. What is his profit or loss percent if he sells at Rs. 540?
(a) 25% (b) 20% (c) 15%
(d) $17\frac{1}{2}$% (e) None of these

29. Sonal buys mangoes at the rate of 3 kgs for Rs. 21 and sells them at 5 kgs for Rs. 50. To earn a profit of Rs. 102, he must sell how many mangoes?

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(a) 34 kgs (b) 52 kgs (c) 26 kgs
(d) 32 kgs (e) None of these

30. An electric pump was sold at a profit of 15%. Had it been sold for Rs. 600, the profit would have been 20%. The former selling price is
(a) Rs. 500 (b) Rs. 540 (c) Rs. 575
(d) Rs. 600 (e) None of these

31. On a Rs. 10,000 payment order, a person has a choice between three successive discounts of 10%, 10% and 30% and three successive discounts of 40%, 5% and 5%. By choosing the better offer, he can save?
(a) Rs. 200 (b) Rs. 225 (c) Rs. 400
(d) Rs. 433 (e) None of these

32. A man sells each of his 2 articles for Rs. 99. On one he gains 10% and on the other he incurred a loss of 1% in the entire transaction. What is his total gain?
(a) 9% (b) $4\frac{4}{19}\%$ (c) 4.5%
(d) 5.5% (e) None of these

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33. The market price of an article is Rs. 100. If the article is sold at a discount of 10%, then 35% profit is realised. How much loss or profit will be made if it is sold for Rs. 30 less than market price?
(a) 5% loss (b) 8% gain (c) 5% gain
(d) 8% loss (e) None of these

34. A shopkeeper sold an article offering discount of 24% and earn a profit of 23.5%. What would have been the percentage of profit earned if no discount has been offered?
(a) 63% (b) 62.50% (c) 60%
(d) Cannot be determined (e) None of these

35. On selling an article for Rs. 500 the loss incurred is 20%. To make a profit of 20% the article must be sold at?
(a) Rs. 700 (b) Rs. 750 (c) Rs. 800
(d) Rs. 900 (e) None of these

36. The CP of 19 article is equal to the selling price of 15 article. Gain % is?

(a) 26% (b) $26\frac{1}{3}\%$ (c) 12%

(d) $26\frac{2}{3}\%$ (e) None of these

37. The cash difference between the selling price of an article at a profit of 4% and 6% is Rs. 3. The ratio of the 2 selling price is?

(a) 50 : 53 (b) 51 : 52 (c) 51 : 53
(d) Cannot be determined (e) None of these

38. A shopkeeper has to sell 24 Kg of sugar. He sells a part of these at a gain of 20% and the rest at a loss of 5%. If on the whole he earns a profit of 10%, the amount of Sugar sold at a loss is?

(a) Rs. 7.5 (b) Rs. 9.6 (c) Rs. 10
(d) Cannot be determined (e) None of these

39. If a shopkeeper sells 25 articles at Rs. 45 per article after giving 10% discount and earns 50% profit. If the discount is not given the profit gained is?

(a) 30% (b) 32% (c) 35%
(d) Cannot be determined (e) None of these

40. The price of a TV is Rs. 10,000. If successive discount of 15%, 10% and 5% allowed. Then at what price does a customer buy?

(a) Rs. 7267.50 (b) Rs. 7000 (c) Rs. 7200
(d) Cannot be determined (e) None of these

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Difficult

1. Sarita sells a Phone at a profit of 20%. If she had bought it at 20% less and sold it for Rs. 180 less, she would have gained 25%. Find the cost price of the Phone.
   (a) Rs. 800 (b) Rs. 850 (c) Rs. 900
   (d) Rs. 1000 (e) None of these
2. Ravi purchases 90 pens and sells 40 pens at a gain of 10% and 50 pens at a gain of 20%. Had he sold all of them at a uniform profit of 15% he would have got Rs. 40 less. Find the cost price of each pen.
   (a) Rs. 80 (b) Rs. 75 (c) Rs. 90
   (d) Rs. 100 (e) None of these
3. Savita buys 5 shirts and 10 pants for Rs. 1600. She sells shirts at a profit of 15% and pants at a loss of 10%. If her over all profit was Rs. 90, what was the cost price of a shirt and a pant?
   (a) Rs. 175, Rs. 50 (b) Rs. 200, Rs. 50 (c) Rs. 200, Rs. 60
   (d) Cannot be determined (e) None of these
4. At a cost of 60 paise per article, Sarika produces 750 articles. She puts the selling price such that if only 600 articles are sold, she would have made a profit of 40% on the outlay. However, 120 articles got spoilt and she was able to sell 630 articles at this price. Find her actual profit or loss percent as the percentage of total outlay assuming that the unsold articles are useless.
   (a) 47% profit (b) 51% profit (c) 36% loss
   (d) 28% loss (e) None of these
5. Kritika bought 25 i-pads and i-phones for Rs. 205000. She sold 80% of the i-pads and 12 i-phones for a profit of Rs. 40000. Each i-pad was marked up by 20% over cost and each i-phone was sold at a profit of Rs. 2000. The remaining i-pads and 3 i-phones could not be sold. What is Kritika's overall profit / loss?
   (a) Rs. 500 profit (b) Rs. 1000 loss (c) Rs. 1500 profit
   (d) no profit, no loss (e) None of these

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6. Sasha goes to a shop to buy a sofa set and a center table. She bargins for a 10% discount on the center table and and 25% discount on sofa set. However, the manager, by mistake, interchanged the discount percentage figures while making the bill and Sasha paid accordingly. When compared to what she should pay for her purchases, what percentage did Sasha pay extra given that the center table costs 40% as much as the sofa set.
(a) 7.1% (b) 7.5% (c) 7.9%
(d) 8.1% (e) None of these

7. Paras Health Care made 3000 strips of vitamin tablets at a cost of Rs. 4800. The company gave away 1000 strips of tablets to doctors as free samples. A discount of 25% is given on the printed price. Find the ratio of profit if the price is raised from Rs. 3.25 to Rs. 4.25 per strip and if at the latter price, samples to doctors were done away with.
(a) Rs. 36.7 (b) Rs. 49.3 (c) Rs. 63.5
(c) Rs. 71.7 (e) None of these

8. APD printed 3000 copies of 'Career Power' at a cost of Rs. 240000. It gave 500 copies free to different philanthropic institutions. It allowed a discount of 25% on the published price and gave one copy free for every 25 copies bought at a time. It was able to sell all the copies in this manner. If the published price is Rs. 325, then what is its overall gain or loss percentage in the whole transaction?
(a) 89% gain (b) 120% loss (c) 140% loss
(d) 143.75% gain (e) None of these

9. Surbhi bought a combined total of 25 i-pads and i-phones. She marked up the i-pad by 20% on the cost price, while each i-phone was marked up by Rs. 2000. She was able to sell 75% of the i-pads and 2 i-phones and make a profit of Rs. 49000. The remaining i-pads and 3 i-phones could not be sold by her. Find her overall profit or loss if she gets no return on unsold items and it is known that an i-phone costs 50% of an i-pad.
(a) Gain of Rs. 48500 (b) Loss of Rs. 48500 (c) Gain of Rs. 51400
(d) no profit, no loss (e) None of these

10. A merchant buys 4000 kg of wheat, one-fifth of which he sells at a gain of 5 per cent, one-fourth at a gain of 10%, one-half at a gain of12 percent, and the remainder at a gain of 16 percent. If he had sold the whole at a gain of 11 percent, he would have made Rs. 72.80 more. What was the cost price of the crop per kg?

(a) Rs. 2 (b) Rs. 2.60 (c) Rs. 2.50
(d) Rs. 2.80 (e) None of these

11. Ajit caculates his profit percentage on the selling price whereas Rohit calculates his on the cost price. They find that the difference of their profits is Rs. 100. If the selling price of both of them are the same and both of them get 25% profit, find their selling price?

(a) Rs. 1200 (b) Rs. 1500 (c) Rs. 1800
(d) Rs. 2000 (e) None of these

12. A pen was sold for a certain sum and there was a loss of 20%. Had it been sold for Rs. 12 more, there would have been a gain of 30%. What would be the profit if the pen was sold for Rs. 4.80 more than what it was sold for?

(a) 15% (b) 23% (c) 29%
(d) no profit, no loss (e) None of these

13. A white goods dealer pays 10% custom duty on an i-phone that costs Rs. 25000 in UK. For how much should he mark it, if he desires to make a profit of 20% after giving a discount of 25% to the buyer?

(a) Rs. 32000 (b) Rs. 38000 (c) Rs. 44000
(d) Cannot be determined (e) None of these

14. A cab driver makes a profit of 20% on every trip when he carries 3 passengers and the price of petrol is Rs.30 a litre. Find the percentage profit for the same journey if he goes with four passengers per trip and the price of petrol reduces to Rs. 24 a litre?

(Assume that revenue per passenger is the same in both the cases.)

(a) 100% (b) 76% (c) 54%
(d) 43% (e) None of these

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15. Anil bought an item with $12\frac{1}{2}\%$ discount on the labelled price. He sold the item with $17\frac{1}{2}\%$ profit on the labelled price. What was his percent profit on the price he bought?

(a) 35% (b) $34\frac{1}{7}\%$ (c) $34\frac{2}{7}\%$

(d) $35\frac{2}{7}\%$ (e) None of these

16. Divyam bougth an article with 15% discount on the labelled price. He sold the article with 10% profit on the labelled price. What was his percent profit on the price he bought?

(a) $28\frac{7}{17}\%$ (b) $29\frac{7}{17}\%$ (c) $29\frac{5}{17}\%$

(d) Data inadequate (e) None of these

17. A shopkeeper sold Chairs at Rs. 2139 each after giving 7% discount on labelled price. Had he not given the discount, he would have earned a profit of 15% on the cost price. What was the cost price of each chairs?

(a) Rs. 2500 (b) Rs. 2100 (c) Rs. 2000

(d) Rs. 1900 (e) None of these

18. A shopkeeper sold decks at Rs. 166 each after giving 17% discount on labelled price. Had he not given the discount, he would have earned a profit of 25% on the cost price. What was the cost price of each deck?

(a) Rs. 165 (b) Rs. 155 (c) Rs. 160

(d) Rs. 164 (e) None of these

19. A garment company declared 15% discount for wholesale buyers. Mr. Ashish bought garments from the company for Rs. 25000 after getting discount. He fixed up the selling price of garments in such a way that he earned a profit of 8% on original company price. What is the approximate total selling price?

(a) Rs. 28000 (b) Rs. 29000 (c) Rs. 31700
(d) Rs. 28500 (e) None of these

20. A garment company declared 14% discount for wholesale buyers. Mr. Swami bought garments from the company for Rs. 860 after getting discount. He fixed up the selling price of garments in such a way that he earned a profit of 6% on original company price. What is the approximate total selling price?
(a) Rs. 1060 (b) Rs. 1160 (c) Rs. 960
(d) Cannot be determined (e) None of these

Previous Year Memory Based

1. Abhishek makes a profit of Rs.110, if he sells a certain number of pens he has at the price of Rs. 2.5 per pen and incurs a loss of Rs. 55, if he sells the same number of pens for Rs. 1.75 per pen. How many pens does Abhishek have?
(a) 220 (b) 240 (c) 200
(d) Cannot be determined (e) None of these

2. Ram purchased a Computer set of Rs. 12500 and spent Rs.300 on transportation and Rs. 800 on installation. At what price should he sell it so as to earn an overall profit of 15%?
(a) Rs. 14560 (b) Rs. 14375 (c) Rs. 15460
(d) Rs. 15375 (e) None of these

3. Mahesh purchased 25 kg of rice @ 32 per kg and 15 kg of rice @ Rs. 36 per kg. He mixed the two varieties of rice and sold it @ Rs. 40.20 per kg. What is the per cent profit earned?
(a) 25 (b) 40 (c) 30
(d) 20 (e) None of these

4. While selling a watch, a shopkeeper gives a discount of 15%. If he gives a discount of 20%, he earns Rs. 51 less as profit. What is the original price of the watch?
(a) Rs. 920 (b) Rs. 985 (c) Rs. 1125
(d) Rs. 1020 (e) None of these

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5. A shopkeeper purchased 245 pieces of an article at Rs. 30 per piece. He spent Rs. 980 on transport and Rs. 1470 on packing the articles. He sold the articles at the rate of Rs. 50 per piece. What is the percent profit earned?

(a) 25% (b) 20% (c) 28%
(d) 22.5% (e) None of these

6. An article is marked for sale at Rs. 504. The shopkeeper gives a discount of 5% on the sale price and still earns a profit of 20%. What could be the purchase price of the article?

(a) Rs. 399 (b) Rs. 405 (c) Rs. 403
(d) Rs. 400 (e) None of these

7. A shopkeeper sold an article for Rs. 400 after giving 20% discount on the labelled price and made 30% profit on the cost price. What would have been the percentage profit, had he not given the discount?

(a) 25% (b) 35% (c) 50%
(d) 62.5% (e) None of these

8. Suresh purchased a TV set for Rs. 11250. He spent Rs. 800 on installation and Rs. 150 on transportation. At what price should it be sold so that the profit earned would have been 15%, if no discount was offered?

(a) Rs. 12938 (b) Rs. 14030 (c) Rs. 13450
(d) Rs. 15467 (e) None of these

9. Mr A sold a goods, to Mr. B at 10% discounted value of printed rate. The discounted value is Rs. 1242. If 15% profit is earned on purchase rate by selling the goods at printed rate, what is the purchase rate?

(a) Rs. 1242 (b) Rs. 1380 (c) Rs. 1280
(d) Rs. 1200 (e) None of these

10. Rajesh purchased a mobile phone and a refrigerator for Rs. 12000 and Rs. 10000 respectively. She sold the refrigerator at a loss of 12 per cent and mobile phone at a profit of 8 per cent. What is her overall loss / profit?

(a) Loss of Rs. 280 (b) Profit of Rs. 2160 (c) Loss of Rs. 240
(d) Profit of Rs. 2060 (e) None of these

11. Abhishek purchased 140 shirts and 250 trousers @ Rs. 450 and @ Rs. 550 respectively. What should be the overall average selling price of shirts and trousers so that 40% profit is earned? (rounded off to next integer)

(a) Rs. 725 (b) Rs. 710 (c) Rs. 720
(d) Rs. 700 (e) None of these

12. A trader marks his goods 40% above the cost price and allows a discount of 25%. The profit he makes, is

(a) 15% (b) 10% (c) 5%
(d) 2% (e) None of these

13. A man sold his two cars for Rs. 4.5 lakh each. In the sale of first car, he incurred 20% profit and in the sale of the second, he incurred 20% loss. The total amount of profit or loss is?

(a) profit of Rs. 20250 (b) loss of Rs. 20250 (c) profit of Rs. 37500
(d) loss of Rs. 37500 (e) None of these

14. By selling an article at 80% of its marked price, a shopkeeper makes a loss of 10%. What will be the profit percentage if he sells it at 95% of its marked price?

(a) 6.9% (b) 5% (c) 5.9%
(d) 12.5% (e) None of these

15. A trader purchase a wrist watch and a pendulum for Rs.390. He sells them making a profit of 10% on the watch and 15% on the pendulum. He earns a profit of Rs. 51.50. The difference between the original prices of the pendulum and the watch is equal to?

(a) Rs. 80 (b) Rs. 120 (c) Rs. 110
(d) Rs. 100 (e) None of these

16. A tradesman gives 4% discount on the marked price and gives 1 book free for buying every 15 books and thus gains 35%. The marked price is increased above the cost price by (appx.)

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(a) 40% (b) 35% (c) 50%
(d) 20% (e) None of these

17. A shopkeeper purchased 150 identical pieces of furniture at the rate of Rs. 250 each. He spent an amount of Rs. 2500 on packing. He fixed the price of each each furniture at Rs. 320. However, he decided to give a discount of 5% on the labeled price. What is the percent profit earned by him?
(a) 16% (b) 15% (c) 14%
(d) 20% (e) None of these

18. An Ox and a carriage together cost Rs. 8000. The ox is sold at profit of 10% and carriage is sold at loss of 10%. If total profit made is 2.5%, then what is the cost price of the ox?
(a) Rs. 3000 (b) Rs. 3500 (c) Rs. 4000
(d) Rs. 5000 (e) None of these

19. With a 5% discount on the cost of sugar, a buyer could purchase 2 kg more sugar for Rs. 608. Selling price of sugar is?
(a) Rs. 15.50 (b) Rs. 15 (c) Rs. 16.50
(d) Rs. 16 (e) None of these

20. A trader marked his goods at 20% above the cost price. He sold half the stock at the marked price, one quarter at a discount of 20% on the marked price and the rest at a discount of 40% on the marked price. His total gain is?
(a) 2% (b) 4.5% (c) 13.5%
(d) 15% (e) None of these

21. A shopkeeper marks his goods at 25% above his cost price and allows customers a discount of $12\frac{1}{2}\%$ for cash. Find his % profit?
(a) $12\frac{4}{5}\%$ (b) $9\frac{3}{7}\%$ (c) $7\frac{5}{8}\%$
(d) $9\frac{3}{8}\%$ (e) None of these

22. A trader put the price of his goods 25% above cost price but allows 12.5% discount for cash payment. If he sells the goods for Rs. 875, find the cost price of the goods?

(a) Rs. 800 (b) Rs. 875 (c) Rs. 925
(d) Rs. 975 (e) None of these

23. Harkesh bought a certain quantity of tomato at the rate of Rs. 1500 per quintal. 10% of the tomato was spoiled. At what price should he sell the remaining to gain 20% of his outlay?

(a) Rs. 1800 per quintal (b) Rs. 2000 per quintal
(c) Rs. 2200 per quintal (d) Rs. 2400 per quintal
(e) None of these

24. Aman buys 5 laptops and 7 computers for Rs. 58500. He sells the laptops at a profit of 10% and computers at a profit of 16% and his whole gain is Rs. 7110. What price does he pay for a laptop?

(a) Rs. 7500 (b) Rs. 8200 (c) Rs. 9100
(d) Rs. 10500 (e) None of these

25. A reduction of 10% in the price of rice enables to obtain 25 kg more for Rs. 2250. Find the reduced price per kg of the rice.

(a) Rs. 8.50 (b) Rs. 9 (c) Rs. 10.50
(d) Rs. 11 (e) None of these

26. A shopkeeper mixes 26 kg of wheat which cost Rs. 20 a kg with 30 kg of wheat which cost Rs. 36 a kg and sells the mixture at Rs. 30 a kg. Find the profit percent.

(a) 5% (b) 9% (c) 12%
(d) 15% (e) None of these

27. A sold a pen to B at a profit of 20%, B sold the same pen to C for Rs. 75 thereby making a profit of 25%. Find the price at which A bought the pen?

(a) Rs. 20 (b) Rs. 42 (c) Rs. 50
(d) Rs. 64 (e) None of these

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28. Seema sells a pen to Sapna at a profit of 25%. Sapna sells it to Asha at a profit of 10% and Asha sells it to Kavita at a profit of 5%. If Asha sells it for Rs. 231, find the cost price at which Seema bought the pen?
(a) Rs. 195 (b) Rs. 160 (c) Rs. 145
(d) Rs. 135 (e) None of these

29. Mohit purchased 40 kg of wheat at Rs. 12.50 per kg and 25 kg of wheat at Rs. 15.10 per kg. He mixed the two qualities of wheat for selling. At what rate should it be sold to gain 10%?
(a) Rs. 13.25 (b) Rs. 13.50 (c) Rs. 14.75
(d) Rs. 14.85 (e) None of these

30. If the cost price of 20 articles is equal to the selling price of 15 articles, find the profit percent?
(a) $33\frac{1}{2}\%$ (b) $33\frac{1}{3}\%$ (c) $33\frac{1}{5}\%$
(d) $33\frac{1}{7}\%$ (e) None of these

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Foundation

1. (a); CP = Rs. 27.50, SP = Rs. 28.60
Then Gain = SP – CP = 28.60 – 27.50 = Rs. 1.10

Since, $\text{Gain\%} = \frac{\text{gain} \times 100}{\text{CP}}\%$

$\Rightarrow \quad \text{Gain\%} = \frac{1.10 \times 100}{27.50} = 4\%$

2. (b); CP = Rs. 490, SP = Rs. 465.50
Loss = CP – SP = 490 – 465.50 = Rs. 24.50

$\text{Loss\%} = \frac{\text{loss} \times 100}{\text{CP}}\% = \frac{24.50 \times 100}{490} = 5\%$

3. (b); $\text{SP} = \left[\frac{100 + \text{gain\%}}{100}\right] \times \text{CP}$

$$\Rightarrow SP = \left[\frac{100+20}{100}\right]56.25 = \text{Rs. } 67.50$$

4. (c); $SP = \left[\frac{100-\text{loss}\%}{100}\right] \times CP \Rightarrow SP = \left[\frac{100-5}{100}\right] \times 80.40 = \text{Rs. } 76.38$

5. (a); $CP = \frac{100 \times SP}{100+\text{gain}\%} \Rightarrow CP = \frac{100 \times 40.60}{100+16} = \text{Rs. } 35$

6. (a); $CP = \frac{100 \times SP}{100-\text{loss}\%} \Rightarrow CP = \frac{100 \times 51.70}{100-12} = \text{Rs. } 58.75$

7. (c); Let the new SP be Rs. x then

$$\frac{100-\text{loss}\%}{\text{1st SP}} = \frac{100+\text{gain}\%}{\text{2nd SP}}$$ (CP is same in both case)

$$\frac{100-5}{1140} = \frac{100+5}{x}, \quad x = \frac{105 \times 1140}{95} = \text{Rs. } 1260$$

8. (e); Let SP = Rs. 100 then CP = Rs. 96
Profit = SP – CP = 100 – 96 = Rs. 4

$$\text{Profit}\% = \frac{\text{profit}}{CP} \times 100\% = \frac{4}{96} \times 100 = 4.17\%$$

9. (c); Here, True weight = 1000g.
False weight = 960g.
Error change = (1000 – 960)g. = 40g.

$$\Rightarrow \text{Gain}\% = \frac{\text{Error change}}{\text{True weight} - \text{Error}} \times 100\%$$

$$= \frac{40}{1000-40} \times 100\% = \frac{25}{6}\%$$

10. (d); Here, since both gain and loss percent is same, hence the resultant value would be loss percent only.

$$\Rightarrow \text{Loss}\% = \frac{a^2}{100} \quad [\text{where } a = 10\%] = 1\%$$

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11. (c); Using net discount formula

$$\Rightarrow \quad \left[a+b-\frac{ab}{100}\right]\%$$

Here, a = 40%, b = 20%

Applying both values in above formula:

$$\Rightarrow \quad \left[40+20-\frac{40\times 20}{100}\right]\% = 52\%$$

12. (e); Using simple formula of

Profit = SP – CP = 9700 – 9450 = Rs. 250 [Total 5 watches]

$$\text{Profit of 1 watch} = \frac{\text{Rs. } 250}{5} = \text{Rs. } 50$$

13. (a); Here, cost of 12 chairs and 8 tables = Rs. 676

On dividing above equation by 4

$$\Rightarrow \text{Cost of 3 chairs and 2 tables} = \text{Rs. } 676 \times \frac{1}{4}$$

Now multiply it by 7

$$\Rightarrow \quad \text{Cost of 21 chairs and 14 tables} = \text{Rs. } 676 \times \frac{7}{4} = \text{Rs. } 1183$$

14. (d); Let CP be Rs. 100

Then SP = Rs. 112. (12% more than CP)

$\Rightarrow$ Now if SP = Rs. 17696

Then by unitary method:

$$\Rightarrow \text{CP} = \frac{100}{112} \times 17696 = \text{Rs. } 15800$$

15. (b); Total SP given = Rs. 1220

Total CP of 13 chairs = Rs. 13 × 115 = Rs. 1495

$\Rightarrow$ Hence, CP > SP

$\Rightarrow$ Loss = CP – SP = Rs. 1495 – 1220 = Rs. 275

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16. (a); Here, MP = Rs. 500
Now since we need discount of 20%

$$\Rightarrow \text{Amount paid} = \text{Rs.}\left[500 - 500 \times \frac{20}{100}\right] = \text{Rs. } 400$$

17. (a); Here, profit% = 20%

$$\Rightarrow \quad P\% = \left[\frac{SP - CP}{CP}\right] \times 100\% \quad \Rightarrow \frac{20}{100} = \frac{360 - CP}{CP}$$

$\Rightarrow$ CP = Rs. 300

18. (a); Here, profit = loss ... (i)
$\Rightarrow$ Here, profit = $(SP)_1 - (CP)$ and, Loss = $(CP) - (SP)_2$
Now putting these values in (i)
$(SP)_1 - (CP) = (CP) - (SP)_2$

$$CP = \frac{(SP)_1 + (SP)_2}{2} = \text{Rs.}\frac{1630 + 1320}{2} = \text{Rs. } 1475$$

19. (c); As, CP of 50 items = SP of 40 items
$\Rightarrow$ 50 × (CP of 1 item) = 40 × (SP of 1 item)

$$\Rightarrow \quad \frac{\text{CP of 1 item}}{\text{SP of 1 item}} = \frac{40}{50} = \frac{4}{5}$$

$$\text{Profit\%} = \frac{SP - CP}{CP} = \frac{5 - 4}{4} \times 100 = 25\%$$

20. (a); Cost of 1 banana = Rs. 1.25
Cos of 1 apple = Rs. 1.75
Cost of 2 dozen banana = Rs. 24 × 1.25 = Rs. 30
Cost of 3 dozen apple = Rs. 36 × 1.75 = Rs. 63
Total cost = Rs. (30 + 63) = Rs. 93

21. (d); The formula to determine MP of watch if we are given SP and discount% is:

$$\Rightarrow \quad \left[\frac{SP}{100 - D\%} \times 100 = MP\right]$$

$$MP = \frac{779}{76} \times 100 = \text{Rs. } 1025$$

22. (b); Let cost of 1 calculator be Rs. 'C'
and cost of 1 pen be Rs. 'P'
According to question:
3C + 4P = 2140 ... (i)
1C + 5P = 1355 ... (ii)
Solving (i) and (ii)
We get C = Rs. 480 [cost of 1 calculator]

23. (c); CP of 6 toffees = Rs. 1, CP of 1 toffee = Rs. $\frac{1}{6}$

SP of x toffees = Rs. 1 (where x is no. of toffees to sell)

SP of 1 toffee = Rs. $\frac{1}{x}$

$$\text{Gain\%} = \frac{20}{100} = \frac{\frac{1}{x} - \frac{1}{6}}{\frac{1}{6}} \Rightarrow \frac{1}{5} \times \frac{1}{6} = \frac{1}{x} - \frac{1}{6} \Rightarrow x = 5$$

24. (d); Using Net Loss formula $= \frac{a^2}{100}\%$ [when P% = L%]

$$= \frac{(10)^2}{100}\% = 1\% \text{ Loss}$$

25. (d); Let CP = Rs. 1

$$\text{SP} = \text{Rs.}\frac{4}{3}\text{(Given)}, \quad \text{Profit} = \frac{4}{3} - 1 = \frac{1}{3}$$

$$\text{Profit\%} = \frac{1}{3} \times 100 = 33\frac{1}{3}\%$$

26. (e); Here, Net Loss% $= \left(\frac{a}{10}\right)^2\% = 1\%$ Loss

$\Rightarrow$ So, Loss of 1% on Rs. 10 lakh = Rs. 10,000

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27. (d); Using net effective formula,

$$\Rightarrow \quad 10 - 20 - \frac{10 \times 20}{100} = 12\% \text{ Loss}$$

Hence, 12% Loss

28. (c); Total CP = 200 × 10 + 500 = Rs. 2500

Total SP = 1 × 200 × 12 = Rs. 2400

$$\%\text{loss} = \frac{100}{2500} \times 100 = 4\%$$

29. (b); CP of 11 Mangoes = Rs. 10

$$\Rightarrow \quad \text{CP of 10 Mangoes} = \text{Rs. } \left[10 \times \frac{10}{11}\right] = \text{Rs. } \frac{100}{11}$$

SP of 10 Mangoes = Rs. 11

$$\%\text{profit} = \frac{11 - \frac{100}{11}}{\frac{100}{11}} \times 100\% = 21\%$$

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30. (b); CP of 20 articles = SP of x articles

20 × CP of 1 article = x × SP of 1 article

$$\Rightarrow \quad \frac{\text{CP of 1 article}}{\text{SP of 1 article}} = \frac{x}{20} \qquad \text{Profit\%} = \frac{25}{100} = \frac{\text{SP} - \text{CP}}{\text{CP}}$$

$$\Rightarrow \quad \frac{1}{4} = \frac{20 - x}{x}$$

x = Rs. 16

31. (b); Let profit be P

Now, SP – CP = P ...(i)

In given question, when SP is doubled, P get tripled

2SP – CP = 3P ...(ii)

On solving (i) and (ii)

We get CP = P and SP = 2P

$$\text{Profit\%} = \frac{2P - P}{P} \times 100 = 100\%$$

32. (d); CP of 6 articles = Rs. 5, CP of 5 articles $= \text{Rs. } \frac{25}{6}$

SP of 5 articles = Rs. 6

$$\%\text{gain} = \frac{6 - \frac{25}{6}}{\frac{25}{6}} \times 100 = \frac{11}{25} \times 100 = 44\%$$

33. (c); CP of 12 tables = SP of 16 tables

$$\frac{\text{CP of 1 table}}{\text{SP of 1 table}} = \frac{16}{12} = \frac{4}{3}$$

$$\%\text{Loss} = \frac{4-3}{4} \times 100 = 25\%$$

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34. (c); Using net discount formula $= \left[a + b - \frac{ab}{100}\right]\%$

where a = b = 4%

$$\Rightarrow \quad \left[4 + 4 - \frac{4 \times 4}{100}\right]\% = 7.84\%$$

35. (b); Let CP for A be Rs. 100

A sells it to B at 20% profit

Rs. [100 + 20% of 100] = Rs. 120

Now B sells it to C at 25% profit

Rs. [120 + 25% of 120] = Rs. 150

If C buys at Rs. 150, A bought at Rs. 100

Hence, by unitary method,

If C bought at Rs. 1500, A paid $= \text{Rs. } \left[\frac{100}{150} \times 1500\right]$ = Rs. 1000

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36. (d); Total CP = Rs. [70 + 17 + 0.5] = Rs. 87.50

SP = Rs. 100

$$\text{Profit\%} = \frac{12.50}{87.50} \times 100 = 14.3\%$$

37. (d); Let CP = Rs. 100, MP = Rs. 120

The SP after discount $= 120 \times \frac{70}{100} = 84$ Rs. [30% discount]

So loss = 16% [CP – SP]

38. (d); Using net discount formula

$$\left[40 + 30 - \frac{40 \times 30}{100}\right] = 58\%$$

39. (e); Given Loss% = 10%

$$\Rightarrow 10\% = \left(\frac{CP - SP}{CP}\right) \times 100$$

$$\frac{10}{100} = \frac{390 - SP}{390}, \quad SP = \text{Rs. } 351$$

40. (a); Here, Profit% = 10%

$$\Rightarrow \frac{10}{100} = \frac{SP - CP}{CP} \quad \Rightarrow \quad \frac{1}{10} = \frac{924 - CP}{CP}$$

11CP = 9240 $\Rightarrow$ CP = Rs. 840

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Moderate

1. (b); 110% of SP = 616 (Rate of sales tax = 10%)

$$SP = \frac{616 \times 100}{110} = \text{Rs. } 560 \text{ , } CP = \frac{100 \times SP}{100 + \text{gain\%}}$$

$$CP = \frac{100 \times 560}{100 + 12} = \text{Rs. } 500$$

2. (c); Let the total value be Rs x

then value of $\frac{2}{3}$rd $= \text{Rs. } \frac{2x}{3}$,

value of $\frac{1}{3}$rd $= \text{Rs. } \frac{x}{3}$

According to question

$$\frac{2}{3}x\left(\frac{5}{100}\right) - \frac{1}{3}x\left(\frac{2}{100}\right) = 400$$

$$\frac{x}{30} - \frac{x}{150} = 400 \Rightarrow \frac{5x - x}{150} = 400$$

$\Rightarrow$ x = Rs. 15000

3. (c); Let the CP of each article be Rs. 100

Then CP of 16 articles = Rs. (100 × 16) = 1600

SP of 16 articles $= 1600 \times \frac{135}{100} = \text{Rs. } 2160$ (1 article free)

SP of each article $= \frac{2160}{16} = \text{Rs. } 135$

If SP is Rs. 96, marked price = Rs. 100

If SP is Rs. 135, marked price

$$= \frac{100}{96} \times 135 = \text{Rs. } 140.625$$

Therefore marked price $\approx$ 40% above CP

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4. (c); Let retail price = Rs. 100
then, Commission = Rs. 36
SP = retail price – concession = 100 – 36 = Rs. 64
But profit = 8.8%

$$CP = \frac{100 \times SP}{100 + gain\%} = \frac{100 \times 64}{100 + 8.8} = Rs.\ \frac{1000}{17}$$

New commission = Rs. 12 then
New SP = 100 – 12 = Rs. 88

$$Gain = 88 - \frac{1000}{17} = Rs.\ \frac{496}{17}$$

$$Gain\% = gain \times \frac{100}{CP} = \frac{\frac{496}{17}}{\frac{1000}{17}} \times 100 = 49.6\%$$

5. (a); Let the investments be Rs. 3x and Rs. 5x
Then total investment = 8x
Total receipt = 115% of 3x + 90%of 5x

$$= 115 \times \frac{3x}{100} + 90 \times \frac{5x}{100} = 7.95x$$

Loss = CP – SP = 8x – 7.95x = 0.05x

$$loss\% = 0.05x \times \frac{100}{8x} = 0.625\%$$

6. (d); Let CP be Rs. x
then, 900 – x = 2 (x – 450) [Profit = 2 Loss]
3x = 1800 $\Rightarrow$ x = Rs. 600
CP = Rs. 600, gain required = 25%

$$SP = (100 + gain\%) \times \frac{CP}{100}$$

$$SP = (100 + 25) \times \frac{600}{100} = Rs.\ 750$$

7. (d); Here initially SP of some article = Rs. 35

Profit% = 40%

Now, finally SP of articles = Rs. x

Profit% = 60%

Here, CP is same in each case

$\Rightarrow \quad (CP)_1 = (CP)_2$

$$\Rightarrow \frac{(SP)_1}{100+P_1\%} = \frac{(SP)_2}{100+P_2\%}, \quad \frac{35}{140} = \frac{x}{160}, \quad x = \text{Rs. } 40$$

8. (c); Let price of sugar per kg is x so

$$\frac{135}{x} - \frac{135}{1.2x} = 1.5 \qquad \text{[as given in question]}$$

$$135\left(\frac{0.2}{1.2x}\right) = 1.5, \quad x = \frac{135 \times 0.2}{1.2 \times 1.5} = \text{Rs. 15 per kg}$$

Increased price = 15 × 1.2 = Rs. 18 per kg

9. (b); Total CP of mixture = 26 × 20 + 30 × 36

520 + 1080 = Rs. 1600, SP = 30 × 56 = Rs. 1680

$$\%\text{profit} = \frac{80}{1600} \times 100 = 5\%$$

10. (c); The SP of TV in chandigarh = Rs. x

The dealer bought it at delhi at = Rs. 0.8x [Discount of 20%]

Total CP of TV set (including transportation cost)

Rs. 0.8x + 600

$$\text{Given Profit\%} = 14\frac{2}{7}\%$$

$$\frac{100}{7} = \left(\frac{(x)-(0.8x+600)}{(0.8x+600)}\right) \times 100$$

$$\frac{1}{7} = \left(\frac{0.2x-600}{0.8x+600}\right), \quad \text{On solving, } x = \text{Rs. } 8000$$

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11. (c); MP of chair = Rs. 800
After getting successive discount of 10% and 15% respectively

$$\Rightarrow \text{CP of chair} = \text{Rs.}\left[800 \times \frac{90}{100} \times \frac{85}{100}\right] = \text{Rs. } 612$$

Total CP (including transportation cost)
612 + 28 = Rs. 640

$$\text{Profit\%} = \frac{800-640}{640} \times 100 = 25\%$$

12. (c); Let us assume that cost of the book is Rs. 100
and Market Price is Rs. 140
If we sell the book at half of MP

$$\text{then selling Price} = \frac{140}{2} = \text{Rs. } 70$$

So percent loss = (100 – 70) = 30% loss

13. (c); Price of 14 shirt = 14 × 45 = Rs. 630
25 pant = 25 × 55 = Rs. 1375
Total price of 39 items = Rs. 2005

$$\text{Price} = \frac{2005}{39} \times 1.40 \quad \text{[Overall profit = 40\%]}$$

= 71.97 = Rs. 72 (Approx)

14. (a); Here, CP is same in both transactions $(CP)_1 = (CP)_2$

$$\frac{(SP)_1}{100-x} = \frac{(SP)_2}{100+y} \qquad \left[\begin{array}{r}\text{Where } x = 4\% \text{ Loss} \\ y = 8\% \text{ Gain}\end{array}\right]$$

$$(SP)_1 \text{ of 1 apple} = \text{Rs. } \frac{1}{36}$$

$$\Rightarrow \frac{\frac{1}{36}}{100-4} = \frac{(SP)_2}{100+8}, \quad (SP)_2 = \frac{108}{96} \times \frac{1}{36} = \text{Rs. } \frac{1}{32}$$

Hence, in a rupee, the person can sell 32 apples.

15. (a); Here, Aditya paid Rs. 59.40 for article

But before that there were 3 transactions of gain 20%, 10% and 12.5%

So, initially Ram would have bought article at Rs. x

$$\Rightarrow \quad x \times \frac{100+20}{100} \times \frac{100+10}{100} \times \frac{100+12.5}{100} = \text{Rs. } 59.40$$

$$x = \frac{59.40 \times 100 \times 100 \times 100}{120 \times 110 \times 112.5} = \text{Rs. } 40$$

16. (a); Let CP of whole fruit = Rs. A

He sold $\frac{3}{5}$th part at 10% profit and remaining $\frac{2}{5}$th part at 5% loss

Total profit = Rs. 1500

$$1500 = \left[\frac{3}{5} \times A \times \frac{10}{100} - \frac{2}{5} \times A \times \frac{5}{100}\right]$$

On solving above equation we get:

Total CP = A = Rs. 37,500

17. (b); Case – 1: Here, CP = Rs. 100, SP = Rs. 125

Profit of 1st shopkeeper = 25%

Case – 2 Here, CP = Rs. 125, SP = Rs. 100

$$\text{Loss of 2nd shopkeeper} = \left(\frac{125-100}{125}\right) \times 100\% = 20\%$$

18. (a); Here, the successive discounts given are 10% and x%

$$2400 \times \frac{90}{100} \times \frac{(100-x)}{100} = 1836$$

$$(100-x) = \frac{1836 \times 100 \times 100}{2400 \times 90} = 85$$

So discount = 100 – 85 = 15%

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19. (b); Three successful discount equivalent to

$$\left[x+y+z-\frac{xy+yz+zx}{100}+\frac{xyz}{(100)^2}\right]\%$$

(where x = 10%, y = 12%, z = 15%)

$$\left[10+12+15-\frac{10\times12+12\times15+15\times10}{100}+\frac{10\times12\times15}{(100)^2}\right]\%$$

37 – 4.50 + 0.18 = 32.68%

20. (d); Let the original price be Rs. x

$\Rightarrow$ Loss of 19% = Rs. (x – 0.19x) = Rs. 0.81x (old price)

$\Rightarrow$ Profit of 17% = Rs. (x + 0.17x) = Rs. 1.17x (new price)

(New price) – (Old price) = Rs. 162

[According to given question]

$$1.17x - 0.81x = 162,\quad x=\frac{162}{0.36}=\text{Rs. } 450$$

21. (b); Let CP = Rs. 100, Then SP = Rs. 123.5

Here discount of 5% is given

Let Mark Price be x Rs. then

$$x=\frac{123.50}{95}\times100=\text{Rs. } 130$$

So profit on Marked Price = 130 – 100 = 30%

22. (a); Let the original price bought by Aditya = Rs. 100

Aditya		Nutan		Manish
100	$\xrightarrow{10\%\text{ gain}}$	110	$\xrightarrow{20\%\text{ gain}}$	132

If Manish bought goods at Rs. 132

Initial CP = Rs. 100

Now, Manish bought goods at Rs. 1914

$$\text{Initial CP} = \text{Rs.}\left[\frac{100}{132}\times1914\right] = \text{Rs. } 1450$$

23. (c); Initial CP = Rs. 9600

SP after selling it at 12% Loss = Rs. $9600 \times \frac{88}{100}$

New CP = Rs. 8448

Final SP after selling new CP price at 12% gain

$\Rightarrow$ Rs. $8448 \times \frac{112}{100}$ = Rs. 9461.76

So, Total Loss = Initial CP – Final SP

= Rs. [9600 – 9461.76] = Rs. 138.24

24. (b); Total CP

= [CP of 30 dozen orange] + [CP of stall fee]

$\Rightarrow$ 8 × 30 + 500 = Rs. 740

Here, Nutan calculated that each glass needs 3 oranges and she wants to make 20% profit

Per glass price $= \frac{740}{30 \times 12} \times 3 \times 1.20$ = Rs. 7.40

25. (c); Let CP = Rs. 100

then total CP after repair = 100 + 15 = Rs. 115

after getting 20% profit

SP = 115 × 1.20 = 138 Rs.

but SP given is Rs. 1104

so CP $= \frac{100}{138} \times 1104 =$ Rs. 800

26. (b); Let CP = Rs. 100

After 320% profit SP = Rs. 420

After increasing cost the,

CP = Rs. 125 [25% cost increase]

Profit = 420 – 125 = Rs. 295

$\frac{295}{420} \times 100 = 70\%$ (Appx.)

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27. (b); CP of 1st item $= \frac{840}{1.2} =$ Rs. 700 [gain of 20%]

CP of 2nd item $= \frac{960}{0.96} =$ Rs. 1000 [loss of 4%]

Total CP = 700 + 1000 = Rs. 1700

SP = 840 + 960 = Rs. 1800

$$\%\text{profit} = \frac{100}{1700} \times 100 = 5\frac{15}{17}\%$$

28. (a); Given MP = Rs. 600

Hence on giving successive discounts of 10% and 20%,

$$\text{CP} = 600 \times \frac{90}{100} \times \frac{80}{100} = \text{Rs. } 432$$

$$\%\text{profit} = \frac{108}{432} \times 100 = 25\%$$

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29. (a); CP of each kg mango $= \text{Rs. } \frac{21}{3} = \text{Rs. } 7$

SP of each kg mango $= \text{Rs. } \frac{50}{5} = \text{Rs. } 10$

Profit = SP – CP = Rs. 3

Here, Rs. 3 is profit earned for 1 kg

Similarly, Rs. 102 is profit earned for:

$$= \frac{1}{3} \times 102 = 34 \text{ kg}$$

30. (c); $\text{Old Profit}\% = \frac{15}{100} = \frac{(\text{SP})_1 - \text{CP}}{\text{CP}}$ ...(i)

$\text{New Profit}\% = \frac{20}{100} = \frac{(\text{SP})_2 - \text{CP}}{\text{CP}}$ ...(ii)

[Here, $(\text{SP})_2$ = Rs. 600]

= From (ii), we get CP = Rs. 500

Divide (i) and (ii):

$$\frac{3}{4} = \frac{(SP)_1 - 500}{600 - 500}$$

Hence, $(SP)_1$ = Former Selling price = Rs. 575

31. (e); Let us assume payment order be Rs. 100

Case – 1: Successive discount of 10%, 10%, 30%

$$\Rightarrow \quad 100 \times \frac{90}{100} \times \frac{90}{100} \times \frac{70}{100} = \text{Rs. } 56.7$$

Case – 2: Successive discount of 40%, 5%, 5%

$$\Rightarrow \quad 100 \times \frac{60}{100} \times \frac{95}{100} \times \frac{95}{100} = \text{Rs. } 54.15$$

For Rs. 100, person can save Rs. (56.7 – 54.15)
= Rs. 2.55

Hence, for Rs. 10000, he can save

$$= \text{Rs. } \frac{2.55}{100} \times 10000 = \text{Rs. } 255$$

32. (b); CP of 1st article $= \frac{99}{1.10} = \text{Rs. } 90$ [Profit of 10%]

CP of 2nd article $= \frac{99}{0.99} = \text{Rs. } 100$ [Loss of 1%]

CP of both article together = 100 + 90 = Rs. 190

SP of both article together = 99 + 99 = Rs. 198

$$\%\text{profit} = \frac{198 - 190}{190} \times 100 = 4\frac{4}{19}\%$$

33. (c); Here, (100 + Profit)% of CP
= Rs. (MP – 10% of MP)
(100 + 35)% CP = Rs. (100 – 10)

(135%) CP = Rs. 90 $\Rightarrow$ CP = Rs. $\frac{200}{3}$

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SP of article (at Rs. 30 less than MP) = Rs. 70

$$\text{Profit\%} = \frac{70 - \frac{200}{3}}{\frac{200}{3}} \times 100 = 5\%$$

34. (b); Let CP = Rs. 100
Then SP = Rs. 123.5

Let Marked Price be x Rs., then $x = \frac{123.50}{76} \times 100$ = Rs. 162.50

[on discount of 24%]

So profit on Marked Price = 162.50 – 100 = 62.50%

35. (b); $\text{Loss} = \frac{20}{100} = \frac{CP - 500}{CP}$

CP = Rs. 625

$$\text{Now Profit} = \frac{20}{100} = \frac{SP - 625}{625}, \quad SP = \text{Rs. } 750$$

36. (d); Here, CP of 19 article = SP of 15 article

$$\frac{\text{CP of 1 article}}{\text{SP of 1 article}} = \frac{15}{19}$$

$$\text{\%gain} = \frac{19 - 15}{15} \times 100 = 26\frac{2}{3}\%$$

37. (e); Here, we need to determine only ratio of selling price only.
SP is directly proportional to profit%

$$= \frac{(SP)_1}{(SP)_2} = \frac{x + 0.04x}{x + 0.06x} = \frac{1.04x}{1.06x} = 52 : 53$$

38. (b); Let quantity sold at loss be x kg and let CP per kg be Rs. 1. Total CP = Rs. 24

Total SP = Rs. [120% of (24 – x) + 95% of x]

$$= \text{Rs.}\left[\frac{6}{5}(24-x)+\frac{19x}{20}\right] = \text{Rs.}\left[\frac{576-5x}{20}\right]$$

$$\frac{576-5x}{20} = 110\% \text{ of } 24, \quad 576-5x = 528$$

$5x = 48 \Rightarrow x = \text{Rs. } 9.6$

39. (e); Let Mark Price is Rs. 100

Selling Price = Rs. 90

Cost Price is $\frac{90}{1.5} = \text{Rs. } 60$

[on earning profit of 50%]

If discount is not given, Percentage Profit

will be $= \frac{100-60}{60} \times 100 \Rightarrow$ So, Profit = 66.67%

40. (a); If we are given 3 successive discounts of 15%, 10% and 5%, So, the new reduced price after applying above discount on Rs. 10000

$$= 10000 \times \frac{85}{100} \times \frac{90}{100} \times \frac{95}{100} = \text{Rs. } 7267.50$$

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Difficult

1. (c); Let us assume the cost price of the phone to be Rs. 100. Then,

$$\text{Rs. } 100 \xrightarrow[\text{20\% profit}]{\text{sells at}} 100 \times 1.2 = \text{Rs. } 120 = (SP)_1$$

If she bought the phone at 20% less, i.e. at Rs. 80 then,

$$\text{Rs. } 80 \xrightarrow[\text{25\% profit}]{\text{sells at}} 80 \times 1.25 = \text{Rs. } 100 = (SP)_2$$

So, $(SP)_1 - (SP)_2$ = Rs. (120 – 100)
= Rs. 20 when cost price is Rs. 100.
But, $(SP)_1 - (SP)_2$ = Rs. 180

$$\therefore \quad \text{Cost price} = \frac{100}{20} \times 180 = \text{Rs. } 900$$

Hence, the cost price of the book is Rs. 900

2. (a); Let the CP of each pen be Rs. 100
At the profit of 10%, SP of 40 pens = (100 + 10) × 40 = Rs. 4400
At the profit of 20%, SP of 50 pens = (100 + 20) × 50 = Rs. 6000
SP of 90 pens = Rs. (4400 + 6000) = Rs. 10400
CP of 90 pens = Rs. (90 × 100) = Rs. 9000
At the profit of 15%, SP of 90 pens = Rs. (90 × 115) = Rs. 10350
Difference in SP = Rs. (10400 – 10350) = Rs. 50
If the difference is Rs. 50, then CP = Rs. 100
If the difference is Rs. 40, then CP

$$= \frac{100 \times 40}{50} = \text{Rs. } 80$$

Hence, the cost price of each pen is Rs. 80.

3. (c); Let Rs. p be the cost price of a shirt and Rs. q be the cost price of a pant. Then,
CP of 5 shirts = Rs. 5p
CP of 10 pants = Rs. 10q
∴ 5p + 10q = 1600 ...(i)

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Profit on the sale of 5 shirts $= \frac{15 \times 5p}{100} = \text{Rs. } \frac{3p}{4}$

Loss on the sale of 10 pants $= \frac{10q \times 10}{100} = \text{Rs. } q$

Given,

Profit on the shirts – Loss on pants = Rs. 90

$\Rightarrow \quad \frac{3p}{4} - q = 90$

$\therefore \quad 3p - 4q = 360$ ...(ii)

Multiplying (i) by 3 and (ii) by 5 and then subtracting (ii) from (i), we get

$50q = 3000 \quad \Rightarrow \quad q = \frac{3000}{50} = \text{Rs. } 60$

Puting the value of q in (i) we get

$5p = 1000 \quad \Rightarrow \quad p = \frac{1000}{5} = \text{Rs. } 200$

Hence, the cost price of shirt is Rs. 200 each and the cost price of pant is Rs. 60 each.

4. (a); Total CP of articles = 750 × 0.6 = Rs. 450

[CP of 1 article = Rs. 0.6]

By selling 600 articles, Sarika should make a 40% profit on the outlay. This means that the selling price for 600 articles should be 1.4 × 450 = Rs. 630

Thus, selling price per article

$= \frac{630}{600} = \frac{63}{60} = \text{Rs. } 1.05$ [SP of 1 article]

Since, Sarika sells only 630 articles at this price, her total recovery = 1.05 × 630 = Rs. 661.5

Hence, actual profit percent

$$= \frac{661.5 - 450}{450} \times 100 = 47\%$$

Thus, Sarika earns 47% profit on her total investment.

5. (b); Total number of i-phones = 15

∴ Total number of i-pads = 25 – 15 = 10

Total CP = Rs. 205000

Since, Kritika sells 80% of both goods at a profit of Rs. 40000, therefore, cost of 80% of the goods

= 0.8 × 205000 = Rs. 164000

Total amount recovered (or SP)

= Rs. (164000 + 40000) = Rs. 204000

Hence, loss = Rs. (205000 – 204000) = Rs. 1000

Hence, Kritika's overall loss is Rs. 1000

6. (d); Let the cost of sofa set be Rs. 100. Then, the cost of centre table is Rs. 40 [40% of sofa set given]

According to Sasha, cost of centre table

$$= \frac{90}{100} \times 40 = \text{Rs. } 36$$ [10% discount on center table]

and cost of sofa set $= \frac{75}{100} \times 100 = \text{Rs. } 75$ [25% discount on sofa set]

According to manager, He inter changed discount % so, cost of centre table $= \frac{75}{100} \times 40 = \text{Rs. } 30$

and cost of sofa set $= \frac{90}{100} \times 100 = \text{Rs. } 90$

Extra money = Rs. (90 + 30) – Rs. (36 + 75) = Rs. 120 – Rs. 111 = Rs. 9

$$\% \text{ extra} = \frac{9}{111} \times 100 = 8.1\%$$

Hence, Sasha paid 8.1% extra price.

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7. (c); Case 1: If Rate is Rs. 3.25

Total sales revenue = 2000 × 3.25 × 0.75 = Rs. 4875

[Here 1000 strips are given free of cost]

Profit = Total sales revenue – Rs. 4800

= Rs. 4875 – Rs. 4800 = Rs. 75

Case 2: If rate is Rs. 4.25

Total sales revenue = 3000 × 4.25 × 0.75 = Rs. 9562.5

[Total 3000 strips]

Profit = Total sales revenue – Rs. 4800

= Rs. 9562.5 – Rs. 4800 = Rs. 4762.5

Hence, the ratio of profit is

$$\frac{\text{New profit}}{\text{Old profit}} = \frac{4762.5}{75} = 63.5$$

8. (d); Cost price = Rs. 240000 [Total 3000 copies]

Published price = Rs. 325 [Published price]

$$\text{Selling price} = \frac{75}{100} \times 325 = \text{Rs. } 243.75$$

$$\text{No. of free copies} = 500 + \frac{2500}{25} = 500 + 100 = 600$$

So, total selling price = 2400 × 243.75 = Rs. 585000

$$\text{Hence, percentage gain} = \frac{585000 - 240000}{240000} \times 100$$

$$= \frac{345000}{240000} \times 100 = 143.75\%$$

Hence, the overall gain is 143.75%.

9. (a); There were 5 i-phones (2 + 3) and 20 i-pads.

Surbhi sells 2 i-phones for a profit of Rs. 2000 each. Hence, profit from i-phone sales = Rs. 4000

Then, profit from i-pads sales = Rs. 45000

Thus, profit per i-pad $= \frac{45000}{15} =$ Rs. 3000

(Since, 15 i-pads were sold in all.)
Hence, CP of i-pad = Rs. 15000
CP of i-phone = Rs. 7500
Total cost = Rs. 15000 × 20 + Rs. 7500 × 5
= Rs. 300000 + Rs. 37500 = Rs. 337500
[If only 75% of i-pads and 2 i-phones were sold]
Total revenue = Rs. 18000 × 15 + Rs. 9500 × 2
= Rs. 270000 + Rs. 19000 = Rs. 289000
Since, total revenue is less than total cost, there is a loss.
Hence, loss = Rs. 337500 – Rs. 289000 = Rs. 48500
Thus, Surbhi has an overall loss of Rs. 48500.

10. (b); In the given question, let the total profit% be p%

$$\Rightarrow \text{Total Profit } p\% = \frac{1}{5}\times 5 + \frac{1}{4}\times 10 + \frac{1}{2}\times 12 + \left[1 - \left(\frac{1}{5}+\frac{1}{4}+\frac{1}{2}\right)\right]\times 16$$

$$\Rightarrow 1 + \frac{5}{2} + 6 + \left(\frac{1}{20}\times 16\right) \Rightarrow \frac{103}{10}\%$$

Now if he would have sold whole wheat at 11%, he would had made Rs. 72.80 more

$$11\% - \frac{103}{10}\% = \text{Rs. } 72.80, \quad \frac{7}{10}\% = \text{Rs. } 72.80$$

$$1\% = \text{Rs. } \frac{72.80\times 10}{7}$$ [Unitary method]

100% = Rs. 10,400 [Total CP of 4000 kg wheat]

$$\text{CP of crop / kg} = \text{Rs. } \frac{10400}{4000} = \text{Rs. } 2.60$$

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11. (d); Suppose selling price of both of then be Rs. P.

CP of Ajit = Rs. $p\left[\frac{100-25}{100}\right] = \text{Rs. } \frac{3}{4}p$ (% Profit on SP)

CP of Rohit = Rs. $p\left[\frac{100}{100+25}\right] = \text{Rs. } \frac{4}{5}p$ (% Profit on CP)

So, Ajit profit = SP – CP = $p - \frac{3}{4}p = \text{Rs. } \frac{p}{4}$

Rohit profit = SP – CP $= p - \frac{4}{5}p = \text{Rs. } \frac{p}{5}$

Difference of profit $= \frac{p}{4} - \frac{p}{5} = \text{Rs. } 100$ (given)

$= \frac{p}{20} = 100 \Rightarrow$ SP = p = Rs. 2000

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12. (d); Let CP of pen be Rs. x
and SP be Rs. y
Initially at loss of 20%,

$\Rightarrow \frac{20}{100} = \frac{x-y}{x} \Rightarrow \frac{1}{5}x = x - y \Rightarrow y = \frac{4}{5}x$ ...(i)

Now if y would change to Rs. (y + 12), then profit becomes 30%

$\Rightarrow \frac{30}{100} = \frac{y+12-x}{x} \Rightarrow \frac{3}{10} = \frac{\frac{4}{5}x+12-x}{x}$

$\Rightarrow$ x = Rs. 24 ... (ii)

$y = \text{Rs. } \frac{96}{5}$ or Rs. 19.2 ...(iii)

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%profit now if y becomes Rs. (y + 4.8)

$$\Rightarrow \quad \%\text{profit} = \frac{SP - CP}{CP} \times 100 = \frac{Rs.(y + 4.8) - 24}{24} \times 100$$

$$= \frac{Rs.(19.2 + 4.8) - 24}{24} \times 100 = 0\%$$

13. (c); CP of i-phone to dealer (on inclusion of 10% custom duty)
= Rs. (25000 + 10% of 25000) = Rs. 27500

The SP of i-phone at 20% profit $= Rs.\left[27500 \times \frac{120}{100}\right]$ = Rs. 33000

But Here, Rs. 33000 is price after 25% discount on MP
Hence, MP × (1 – 0.25) = 33000

$$MP = \frac{33000}{0.75} = Rs.\ 44000$$

14. (a); Let CP of cab driver be price of petrol = Rs. 30 per liter
His, SP would be to carry 3 passengers
Let cost of 1 passenger be Rs. x
Initially he made profit of 20%

$$\Rightarrow p\% = \frac{20}{100} = \frac{SP - CP}{CP} = \frac{20}{100} = \frac{3x - 30}{30}$$

x = Rs. 12
Now, CP of petrol = Rs. 24 per litre
SP = 4 (cost of 1 passenger) = Rs. 48

$$= Profit\% = \frac{48 - 24}{24} \times 100 = 100\%$$

15. (c); Let the labelled price of article be Rs y.

$$\text{CP of article} = y\left(\frac{100 - 12.5}{100}\right) = Rs.\ \frac{7}{8}y$$

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$$\text{SP of article} = y\left(\frac{100+17.5}{100}\right) = \text{Rs. } \frac{117.5}{100}y \text{ or } = \text{Rs. } \frac{47}{40}y$$

$$\text{Profit} = \text{Rs. } \left[\frac{47}{40}y - \frac{7}{8}y\right] = \text{Rs. } \frac{12}{40}y$$

$$\%\text{profit} = \frac{\frac{12}{40}y}{\frac{7}{8}y} \times 100 = \frac{12}{35} \times 100 = 34\frac{2}{7}\%$$

16. (b); Let the labelled price of article be Rs. a

$$\text{CP of article} = \text{Rs. } a\left(\frac{100-15}{100}\right)$$

$$= \text{Rs. } \left[\frac{85}{100}\right]a \text{ or Rs. } \frac{17}{20}a$$

$$\text{SP of article} = \text{Rs. } a\left(\frac{100+10}{100}\right)$$

$$= \text{Rs. } \left[\frac{110}{100}\right]a \text{ or Rs. } \frac{11}{10}a$$

$$\text{Profit} = \text{Rs. } \left[\frac{11}{10}a - \frac{17}{20}a\right] = \text{Rs. } \frac{5a}{20}$$

$$\%\text{ profit} = \frac{\frac{5a}{20}}{\frac{17a}{20}} \times 100 = \frac{5}{17} \times 100 = 29\frac{7}{17}\%$$

17. (c); Here, the labelled price of chair is

$$= \frac{SP \times 100}{(100-D)\%} = \frac{2139 \times 100}{93} = \text{Rs. } 2300$$

Let the CP of chair be Rs. p

Now according to question:

$$\frac{15}{100} = \frac{2300 - p}{p} \Rightarrow 15p = 230000 - 100p$$

p = Rs. 2000

18. (c); Here, the labelled price of decks is defined as:

$$\Rightarrow \frac{SP \times 100}{(100 - D)\%} = \frac{166 \times 100}{100 - 17} = \text{Rs. } 200$$

Let CP of deck be p

According to the question:

$$\frac{25}{100} = \frac{200 - p}{p} \Rightarrow P = \text{Rs. } 160$$

19. (c); The original company price

$$= \text{Rs.}\left[\frac{25000 \times 100}{100 - 15}\right] = \text{Rs.}\left[\frac{25000 \times 100}{85}\right]$$

= Rs. 29,411.76

Let the total SP be Rs. p

Now according to question:

$$= \frac{p - 29411.76}{29411.76} \times 100 = 8 \quad \Rightarrow \quad p = \text{Rs. } 31,764.70$$

20. (a); The original company price $= \text{Rs.}\left[\frac{SP \times 100}{(100 - D)\%}\right]$

$$= \text{Rs.}\left[\frac{860 \times 100}{(100 - 14)\%}\right] = \text{Rs. } 1000$$

Let the total SP be Rs. q

Now according to equation:

$$= \frac{SP - CP}{CP} \times 100 = (\text{profit})\%$$

$$\Rightarrow \frac{q - 1000}{1000} \times 100 = 6 \quad \Rightarrow q = \text{Rs. } 1060$$

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Previous Year Memory Based

1. (a); Let the no. of pens be x.
The CP of pens is same in both transaction cases.

$(CP)_1 = (CP)_2$

$(SP)_1$ – Profit = $(SP)_2$ + Loss ... (i)
Given $(SP)_1$ = Rs. 2.5 (For 1 pen) = Rs. 2.5x (For x pens)
Profit = Rs. 110
Similarly, $(SP)_2$ = Rs. 1.75x
Loss = Rs. 55
Applying values in (i)
2.5x – 110 = 1.75x + 55
On solving, x = 220 pens.

2. (e); Total CP of Computer set (including transportation and installation)
= Rs. (12500 + 300 + 800) = Rs. 13600

$$\text{Profit\%} \Rightarrow \frac{15}{100} = \frac{SP - 13600}{13600} \Rightarrow SP = \text{Rs. } 15640$$

3. (d); Total CP of mixture = Rs. [25 × 32 + 15 × 36]
= Rs. [800 + 540] = Rs. 1340

$$\text{CP of 1 kg mixture} = \text{Rs.}\left[\frac{1340}{25+15}\right] = \text{Rs. } 33.5$$

SP of 1 kg mixture (given) = Rs. 40.20

$$\text{Profit\%} = \frac{SP - CP}{CP} \times 100 = \frac{40.20 - 33.5}{33.5} \times 100 = 20\%$$

4. (d); Let the original price of watch be Rs. x
Now in earlier situation,
He gave discount of 15%

$$\text{So, selling price of watch} = \text{Rs. } x\left(\frac{100 - D\%}{100}\right) = \text{Rs. } x\left(\frac{85}{100}\right)$$

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Now if he would have gave 20% discount,

Selling price of watch $= \text{Rs. } x\left(\frac{80}{100}\right)$

According to question

$$\Rightarrow \quad x\left(\frac{85}{100}\right) - x\left(\frac{80}{100}\right) = 51$$

$$\Rightarrow \quad x = \frac{51 \times 100}{85 - 80} = \text{Rs. } 1020$$

5. (a); CP of 245 pieces of article = Rs. (245 × 30) = Rs. 7350
Total CP (including transport and packing)
= Rs. (7350 + 980 + 1470) = Rs. 9800

Hence, CP of 1 piece = $\frac{9800}{245}$ = Rs. 40

SP of 1 piece = Rs. 50

Gain% $= \frac{10}{40} \times 100 = 25\%$

6. (a); Let the original price of article be Rs. 100
After 5% discount, its SP = Rs. [100 – 5% of 100] = Rs. 95
= For original price = Rs. 100, SP = Rs. 95
Hence, for original price = Rs. 504 (given)

$= \text{SP} = \frac{95}{100} \times 504 = \text{Rs. } 478.80$

Given, Profit% = 20%

$$\frac{20}{100} = \frac{478.8 - \text{CP}}{\text{CP}} \quad \Rightarrow \quad \text{CP} = \text{Rs. } 399$$

7. (d); In this question, you don't need to solve in multiple steps to first find MP, then CP etc.
In such questions if we need to find profit % if no discount is given, then formula is:

$$\text{Profit\%} = \frac{(\text{Discount\%}) + (\text{Profit\% earlier})}{(100 - \text{Discount\%})} \times 100$$

$$= \frac{20 + 30}{100 - 20} \times 100 = 62.5\%$$

8. (b); CP of TV for Suresh (including transportation and installation)
= Rs. [11250 + 150 + 800] = Rs. 12200
Req. Selling price (if no discount given)

$$\Rightarrow \quad \text{Rs.}\left[12200 \times \frac{115}{100}\right] = \text{Rs. } 14030$$

9. (d); We can determine CP (cost price) / purchase rate by below formula:

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

$$= 1242 \times \frac{100}{90} \times \frac{100}{115} = \text{Rs. } 1200$$

10. (c); $(\text{Loss\% on refrigerator}) = \frac{12}{100} = \frac{10000 - \text{SP}}{10000}$
SP of refrigerator = Rs. 8800

$(\text{Profit\% on phone}) = \frac{8}{100} = \frac{\text{SP} - 12000}{12000}$

SP of phone = Rs. 12960
Hence, Profit / Loss = (Total SP) – (Total CP)
= 12960 + 8800 – 12000 – 10000
= Rs. – 240 (Loss of Rs. 240)

11. (c); Total CP of 140 shirts and 250 trousers
Rs. (140 × 450 + 250 × 550)
Rs. 200500

$$\text{Total SP} = \frac{200500 \times 140}{100} = \text{Rs. } 280700$$

$$\text{Avg. SP} = \frac{280700}{390} = \text{Rs. } 720 \text{ (appx.)}$$

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12. (c); Let CP be Rs. x
Then MP (after marking 40% above CP) = Rs. 1.4x
SP (after discount of 25%)
Rs. [1.4x] [1 – 0.25] $\Rightarrow$ Rs. 1.05x

$$\%\text{Profit} = \text{Rs.}\left[\frac{1.05x - x}{x}\right] \times 100\% = 5\%$$

13. (d); Here, net loss% $= \frac{a^2}{100}$ = 4%

$$\text{Loss\%} = \frac{4}{100} = \frac{CP - \left[4.5 \times 2 \text{ lakh}\right]}{CP} = CP = \text{Rs. } 9{,}37{,}500$$

Hence loss = CP – SP = 9,37,500 – 9,00,000 = Rs. 37500

14. (a); Let MP be Rs. 100
SP = 80% of MP = Rs. 80

$$CP \text{ (after 10\% loss)} = \frac{80 \times 100}{100 - 10} = \text{Rs. } \frac{800}{9}$$

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

$$= \frac{(95\% \text{ of MP}) - CP}{CP} \times 100 = \frac{95 - \frac{800}{9}}{\frac{800}{9}} \times 100 = 6.9\%$$

15. (c); Let CP of wrist watch be Rs. x
Then CP of pendulum = Rs. (390 – x)

$$\text{SP of wrist watch} = \frac{110x}{100} = \frac{11x}{10} \text{ Rs.}$$

$$\text{SP of pendulum} = \frac{115}{100}(390 - x)$$

$$= \frac{23}{20}(390 - x) = 448.5 - \frac{23}{20}x$$

Total SP $= \frac{11x}{10} + 448.5 - \frac{23}{20}x = \frac{8970 - x}{20}$

Total CP = Rs. 390

Net profit = Total SP – Total CP

$51.50 = \frac{8970 - x}{20} - 390$

1030 = 8970 – x – 7800 $\Rightarrow$ x = 140

So, price of wrist watch = Rs. 140

price of pendulum = Rs. 250

difference between original prices

= Rs. (250 – 140) = Rs. 110

16. (a); Let CP of each book = Rs. 100

So, CP of 16 books = Rs. 1600

SP of 16 books = Rs. $1600 \times \frac{135}{100}$ = Rs. 2160

SP of 1 book = Rs. $\frac{2160}{16}$ = Rs. 135

96% of MP = Rs. 135, MP = Rs. 140.625

So, MP is increased above the CP by 40.625% $\approx$ 40%

17. (c); Cost Price of each furniture (including packeging)

$= \text{Rs.}\left[250 + \frac{2500}{150}\right] = \text{Rs.}\frac{800}{3}$

Marked price (given) = Rs. 320

SP (5% discount on MP) = Rs. [320 – 16] = Rs. 304

$\Rightarrow \%\text{Profit} = \frac{304 - \frac{800}{3}}{\frac{800}{3}} \times 100 = 14\%$

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18. (d); Let the CP of ox be Rs. x

CP of carriage = Rs. (8000 – x)

SP of ox (after 10% profit) = Rs. 1.1x

SP of carriage (after 10% loss) = Rs. 0.9 (8000 – x)

Given total profit = 2.5%

1.1x + 0.9 (8000 – x) = 8000 × 1.025

1.1x + 7200 – 0.9x = 8200

0.2x = 1000 or x = Rs. 5000

19. (d); Discount% in initial cost of sugar = 5%

Now to keep Rs. 608 price constant,

% increase in initial consumption

$$=\left(\frac{5}{100-5}\right)\times 100\% = \frac{100}{19}\%$$

Here, $=\frac{100}{19}\%$ is increase in consumption,

So, $\left(\frac{100}{19}\% = 2\text{kg}\right)$

So initial consumption i.e. (100%)

= (19 × 2) = 38 kg

Initial SP of Sugar $=$ Rs. $\frac{608}{38}$ = Rs. 16 / kg

20. (a); Here, Total discount on MP

$$=\left[\frac{1}{2}\times 0+\frac{1}{4}\times 20+\frac{1}{4}\times 40\right]\%$$

[where half is sold at MP, one-fourth 20% discount, one-fourth 40% discount] = 15%

Now, If CP (assume) = Rs. x

then MP = 20% above CP = Rs. 1.2x

MP after 15% discount = 85% of 1.2x = Rs. 1.02x

$$\text{Gain\%} = \frac{1.02x - x}{x} \times 100 = 2\%$$

21. (d); Let us assume CP be Rs. 100
MP (after 25% above CP) = Rs. 125

$$\text{Discount} = 12\frac{1}{2}\% \text{ of } 125 = \text{Rs. } 15\frac{5}{8}$$

$$\text{Reduced price} = \text{Rs.}\left[125 - 15\frac{5}{8}\right] = \text{Rs. } 109\frac{3}{8}$$

$$\Rightarrow \quad \text{\%profit} = \frac{109\frac{3}{8} - 100}{100} \times 100 = 9\frac{3}{8}\%$$

22. (a); MP of goods (before 12.5% discount)

$$= \text{Rs. } 875\left[\frac{100}{100 - 12.5}\right] = \text{Rs. } 1000$$

$$\text{CP of goods} = \text{Rs. } 1000\left(\frac{100}{100 + 25}\right) = \text{Rs. } 800$$

23. (b); In given question, 10% of tomato is spoiled

$$\text{Hence, CP of remaining 90\% tomato} = \text{Rs. } 1500\left(\frac{100}{90}\right)$$

Hence, SP per quintal of tomato if gain is 20%

$$1500 \times \frac{100}{90} \times \left(\frac{100 + 20}{100}\right) = \text{Rs. } 2000 \text{ per quintal}$$

24. (a); Let Aman pays Rs. y for a laptop
Rate of 5 laptops = Rs. 5y
Rate of 7 computers = Rs. (58500 – 5y)

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Total gain = (10% of 5 laptops + 16% of 7 computer sets)

$$\Rightarrow 7110 = \frac{10 \times 5y}{100} + \frac{16}{100}(58500 - 5y)$$

$$\Rightarrow 7110 = \frac{y}{2} + \frac{4}{25}(58500 - 5y)$$

$$y = \frac{22500}{3} = \text{Rs. } 7500 \text{ (cost of one laptop)}$$

25. (b); Here, reduction of 10% enables the person to get 25 kg more rice.
So, saving of 10% on Rs. 2250 = Rs. 225
At Rs. 225, person purchases 25 kg rice

$$\text{So, reduced price / kg} = \text{Rs.}\left(\frac{225}{25}\right) = \text{Rs.}9$$

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26. (a); Total CP of 26 kg wheat of one kind
= Rs. [26 × 20] = Rs. 520
Total CP of 30 kg another variety of wheat
= Rs. [30 × 36] = Rs. 1080
Total SP of 56 kg mixture = [56 × 30] = Rs. 1680

$$\Rightarrow \%\text{profit} = \frac{1680 - (1080 + 520)}{1600} \times 100 = 5\%$$

27. (c); Here, B sold pen to C at 25% profit for Rs. 75

$$\text{Thus, (CP for B)} = \text{Rs. } \frac{75}{1.25} = \text{Rs. } 60$$

Now since A sold to B at 20% profit,
A's cost price × (1 + 0.2) = 60

$$\text{A's cost price} = \frac{60}{1.2} = \text{Rs. } 50$$

28. (b); Let CP of pen for Seema be Rs. 100

Seema $\xrightarrow{25\%}$ Sapna $\xrightarrow{10\%}$ Asha $\xrightarrow{5\%}$ Kavita

(100) (125) (137.5) (144.375)

Here, Asha sold her pen at Rs. 144.375 if seema bought it at Rs. 100

If Asha sold pen for Rs. 231, Seema bought it at

$$= \text{Rs.}\left[\frac{100}{144.375} \times 231\right] = \text{Rs. } 160$$

29. (d); Total CP of mixture (40 + 25 = 65) kg

would be = Rs. (40 × 12.5 + 25 × 15.10) = Rs. 877.50

$$= \text{CP of 1kg} = \text{Rs.}\left[\frac{877.50}{65}\right] = \text{Rs. } 13.5 = \text{Gain\%} = \frac{10}{100} = \frac{\text{SP} - 13.5}{13.5}$$

SP of 1 kg mixture = Rs. 14.85

30. (b); CP of 20 articles = SP of 15 articles

$$\Rightarrow \frac{\text{CP of 1 article}}{\text{SP of 1 article}} = \frac{15}{20} = \frac{3}{4}$$

$$\text{Profit\%} = \frac{4-3}{3} \times 100 = 33.33\%$$

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Chapter 5

Simple Interest and Compound Interest

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Chapter 5

Simple Interest and Compound Interest

Simple Interest

If Principal = Rs. 'P', Time = 'T' years, Rate = 'R%' per annum,

$$\text{Simple Interest (SI)} = \frac{P \times R \times T}{100}$$

Amount = Principal + Simple Interest

$$A = P + \frac{P \times R \times T}{100} = P\left[1 + \frac{RT}{100}\right]$$

Example: Find the simple interest on Rs. 200 for 5 years at 6% per annum?

Sol. Here, P = Rs. 200, T = 5 years, R = 6%

$$\therefore \quad SI = \frac{P \times R \times T}{100} = \frac{200 \times 5 \times 6}{100} = \text{Rs. } 60$$

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(i) If rate of interest is half-yearly, Rate $= \left(\frac{R}{2}\right)\%$ and Time = 2T

(ii) If rate of interest is quarterly, Rate $= \left(\frac{R}{4}\right)\%$ and Time = 4T

(iii) If rate of interest is monthly, Rate $= \left(\frac{R}{12}\right)\%$ and Time = 12T

Installments

When the borrower paid total money in some equal parts, then we can say that he is paying in installments.

For simple interest,

$$A = \left[x + \left(x + \frac{x \times R \times 1}{100}\right) + \left(x + \frac{x \times R \times 2}{100}\right) + \ldots\ldots\ldots\right]$$

where A = Total amount paid

x = value of each installment

Example: A scooty is sold by an automobile agency for Rs. 19200 cash or for Rs. 4800 cash down payment together with five equal monthly instalments. If the rate of interest charged by the company is 12% per annum, then find each instalment?

Sol. Balance of the price to be paid through instalments

P = 19200 – 4800 = 14400

Now, according to the formula,

$$A = \left[x + \left(x + \frac{x \times R \times 1}{100}\right) + \left(x + \frac{x \times R \times 2}{100}\right) + \ldots + \left(x + \frac{x \times R \times 4}{100}\right)\right]$$

where, $A = P + \frac{P \times n \times R}{100} \Rightarrow \left(14400 + \frac{14400 \times 12 \times 5}{100 \times 12}\right)$

$$= \left[x + \left(x + \frac{12x}{12 \times 100}\right) + \left(x + \frac{12x \times 2}{12 \times 100}\right) + \ldots + \left(x + \frac{12x \times 4}{12 \times 100}\right)\right]$$

$$\Rightarrow \quad 15120 = 5x + \frac{x}{10} \Rightarrow x = \frac{151200}{51} \Rightarrow x = \text{Rs. } 2964.70$$

Compound Interest

If Principal = Rs. P, Time = n years, Rate = r% per annum and interest compounded annually

(i) When interest compounded annually

$$\Rightarrow \text{Amount} = P\left[1 + \frac{r}{100}\right]^n$$

(ii) When interest compounded half yearly

$$\Rightarrow \text{Amount} = P\left[1 + \frac{\left(r/2\right)}{100}\right]^{2n}$$

(iii) When interest compounded quarterly

$$\Rightarrow \text{Amount} = P\left[1+\frac{\left(r/4\right)}{100}\right]^{4n}$$

(iv) When interest compounded monthly

$$\Rightarrow \text{Amount} = P\left[1+\frac{\left(r/12\right)}{100}\right]^{12n}$$

(v) When time is in fraction of a year, say $3\frac{4}{5}$ years

$$\Rightarrow \text{Amount} = P\left[1+\frac{r}{100}\right]^{3}\left[1+\frac{\left(4/5\,r\right)}{100}\right]$$

(vi) When rate of interest is r_1% durring first year, r_2% durring 2nd year, r_3% durring 3rd year.

$$\text{Amount} = P\left[1+\frac{r_1}{100}\right]\left[1+\frac{r_2}{100}\right]\left[1+\frac{r_3}{100}\right]$$

Concept 2: $A = P\left(1+\frac{r}{100}\right)^{n}$, $CI = A - P = P\left(1+\frac{r}{100}\right)^{n} - P$,

$$CI = P\left[\left(1+\frac{r}{100}\right)^{n} - 1\right]$$

Concept 3: A sum of money, placed at compound interest, becomes n times in t years and m times in x years

then, $n^{1/t} = m^{1/x}$

Example: A sum of money at compound interest amounts to thrice itself in 3 years, in how money years will it be 9 times it self?

Sol. $3^{1/3} = 9^{1/x}$, $3^{1/3} = 3^{2/x}$, $\frac{1}{3} = \frac{2}{x}$, x = 6 years

Concept 4: Relationship between CI and SI for two years

$$\frac{CI}{SI} = \frac{200 + r}{200}$$

Example: The SI on a certain sum of money for 2 years at 10% per anuum is Rs. 400, find CI at the same rate and for the same time.

Sol. $$CI = \frac{210}{200} \times 400 = \text{Rs. } 420$$

Concept 5: When difference between the CI and SI on a certain sum of money for 2 years at r%, is given by,

$$\text{Difference} = P\left(\frac{r}{100}\right)^2$$

Example: The difference between the CI and SI on a certain sum of money at 5% per annum for 2 years is Rs. 1.50, Find the sum

Sol. $$1.5 = \frac{P(5)^2}{100^2}, \quad P = \text{Rs. } 600$$

Concept 6: The difference between CI and SI on a certain sum for 3 years is given by,

$$\text{Difference} = \frac{Pr^2(300 + r)}{100^3}$$

Example: If the difference between CI and SI on a certain sum of money for 3 years at 5% per annum is Rs. 122 find the sum.

Sol. $$122 = \frac{P(5)^2(300 + 5)}{100^3}, \quad P = \text{Rs. } 16000$$

Concept 7: If a sum 'A' becomes 'B' in t_1 years at compound rate of interest, then after t_2 years the sum becomes

$$\frac{(B)^{\frac{t_2}{t_1}}}{(A)^{\frac{t_2}{t_1} - 1}}$$

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Example: Rs. 4800 becomes Rs. 6000 in 4 years at a certain rate of CI. What will be the sum after 12 years.

$$\text{Required Amount} = \frac{(6000)^{\frac{12}{4}}}{(4800)^{\frac{12}{4}-1}} = \frac{(6000)^3}{(4800)^2} = \text{Rs. } 9375$$

Concept 8: If a sum of money Rs. x is divided among 'n' parts in such a manner that when placed at CI, amount obtained in each case remains equal while the rate of interest on each part is $r_1, r_2, r_3 \ldots\ldots r_n$ respectively and time period for each part is $t_1, t_2, t_3 \ldots\ldots t_n$ respectively. Then the divided parts of sum will be in the ratio of:

$$\frac{1}{\left(1+\frac{r_1}{100}\right)^{t_1}} : \frac{1}{\left(1+\frac{r_2}{100}\right)^{t_2}} : \frac{1}{\left(1+\frac{r_3}{100}\right)^{t_3}} : \ldots\ldots\ldots : \frac{1}{\left(1+\frac{r_n}{100}\right)^{t_n}}$$

Example: A sum of Rs. 3903 is divided between A and B, so that A's share at the end of the 7 years be equal to B's share at the end of 9 years, CI being 4%. Find A's share.

$$A\text{'s share} : B\text{'s share} = \frac{1}{\left(1+\frac{4}{100}\right)^7} : \frac{1}{\left(1+\frac{4}{100}\right)^9} = 1 : \frac{1}{\left(1+\frac{4}{100}\right)^2}$$

$$= 1 : \frac{625}{676} = 676 : 625$$

$$A\text{'share} = \frac{676}{(676+625)} \times 3903 = \text{Rs. } 2028$$

Types of Questions

1. A sum of money becomes four times in 20 years at SI. Find the rate of interest.

Sol. Given, T = 20 years,

Let sum = P

Then, the sum after 20 years = 4P

$\therefore$ SI = 4P – P = 3P

Now, $3P = \frac{PRT}{100} = \frac{P \times R \times 20}{100} \Rightarrow 3 = \frac{20R}{100} = \frac{R}{5}$

$\therefore$ R = 15%

2. A sum becomes two times in 5 years at a certain rate of interest. Find the time in which the same amount will be 8 times at the same rate of interest.

Sol. Let sum = P

Then, for 5 years,

SI = 2P – P = P

$$SI = \frac{P \times R \times T}{100}$$

$\therefore$ $P = \frac{P \times R \times 5}{100} = \frac{PR}{20} \Rightarrow$ R = 20%

Again, for another time (T),

SI = 8P – P = 7P

$\therefore$ $7P = \frac{P \times 20 \times T}{100} = \frac{20TP}{100} = \frac{TP}{5}$

$\therefore$ T = 7 × 5 = 35 years

3. Ravi lent out a certain sum. He lent $\frac{1}{3}$ part of his sum at 7% SI, $\frac{1}{4}$ part at 8% SI and remaining part at 10% SI. If Rs. 510 is his annual total interest, then find the money lent out.

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Sol. Let entire sum = P

Now, according to the question,

$$\frac{1}{3}P \times 7\% + \frac{1}{4}P \times 8\% + \left[1 - \left(\frac{1}{3} + \frac{1}{4}\right)\right] \times P \times 10\% = 510$$

$$\Rightarrow \frac{\frac{1}{3}P \times 7}{100} + \frac{\frac{1}{4}P \times 8}{100} + \frac{\frac{5}{12}P \times 10}{100} = 510$$

$$\Rightarrow \frac{7P}{3} + 2P + \frac{25P}{6} = 510 \times 100$$

$$\therefore \quad P = \frac{510 \times 100 \times 6}{51} = \text{Rs. } 6000$$

4. A sum of Rs. 7700 is lent out in two parts in such a way that the interest on one part at 20% for 5 years is equal to that on another part at 9% for 6 years. Find the two sums.

Sol. Let the first sum be Rs. x. Then, second sum = Rs. (7700 – x)

Now, according to the question,

$$\frac{x \times 20 \times 5}{100} = \frac{(7700 - x) \times 9 \times 6}{100}$$

$\Rightarrow$ 50x = (7700 – x) × 27

$\Rightarrow$ 50x = 7700 × 27 – 27x

$\Rightarrow$ 77x = 7700 × 27

$\Rightarrow$ x = Rs. 2700

$\therefore$ The second part = (7700 – x) = 7700 – 2700

= Rs. 5000

5. What annual payment will discharge a debt of Rs. 848 in 8 years at 8% per annum?

Sol. Here, P = Rs. 848, T = 8 years, R = 8%

According to the formula,

$$\text{Annual payment} = \frac{100P}{100T + \frac{RT(T-1)}{2}}$$

$$= \frac{100 \times 848}{100 \times 8 + \frac{8 \times 8(8-1)}{2}} = \frac{848 \times 100}{800 + 32 \times 7} = \frac{84800}{1024} = \text{Rs. } 82.8125$$

6. Raviraj invested an amount of Rs. 10000 at compound interest rate of 10% per annum for a period of three years. How much amount will Raviraj get after 3 years?

Sol. $\text{Amount} = P\left[1 + \frac{r}{100}\right]^n$

where P $\rightarrow$ Principal, r $\rightarrow$ Rate, n $\rightarrow$ time

$$\text{Amount} = 10000\left(1 + \frac{10}{100}\right)^3 = \text{Rs. } 13310$$

7. Seema invested an amount of Rs. 16000 for two years at compound interest and received an amount of Rs. 17640 on maturity. What is the rate of interest?

Sol. $\frac{A}{P} = \left(1 + \frac{r}{100}\right)^n$

$$\frac{17640}{16000} = \left(1 + \frac{r}{100}\right)^2 = \frac{1764}{1600}$$

$$\left(\frac{42}{40}\right)^2 = \left(1 + \frac{r}{100}\right)^2, \quad r = 5\%$$

8. Rs. 7500 is borrowed at CI at the rate of 4% per annum. What will be the amount to be paid after 1 year, if interest is compounded half-yearly?

Sol. $A = P\left[1 + \frac{\frac{r}{2}}{100}\right]^{2t} = 7500\left[1 + \frac{4/2}{100}\right]^{2\times 1} = \text{Rs. } 7803$

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9. Rs. 7500 is borrowed at CI at the rate of 4% per annum. What will be the amount to be paid after 6 months, if interest is compounded quarterly?

Sol. $A = P\left[1+\frac{r/4}{100}\right]^{4t} = 7500\left[1+\frac{4/4}{100}\right]^{4\times\frac{6}{12}}$ = Rs. 7650.75

10. Find the compound interest on Rs. 2000 at 5% per annum, compounded yearly for $2\frac{1}{2}$ years?

Sol. $A = P\left[1+\frac{r}{100}\right]^{2}\left[1+\frac{r/2}{100}\right]$

$= 2000\left[1+\frac{5}{100}\right]^{2}\left[1+\frac{5}{200}\right]$ = 2260.125

CI = 2260.12 – 2000 = Rs. 260.125

11. An amount of money grows upto Rs. 4840 in 2 years and upto Rs. 5324 in 3 years on compound interest. Find the rate per cent.

Sol. P + CI of 3 years = Rs. 5324

P + CI of 2 years = Rs. 4840

CI for 3rd year = 5324 – 4840 = Rs. 484

$\text{Required } r\% = \frac{484\times 100}{4840} = 10\%$

12. Find the ratio of CI to SI on a certain sum at 10% per annum for 2 years?

Sol. $\frac{CI}{SI} = \frac{200+r}{200} = \frac{210}{200} = 21:20$

13. Rs. 1600 becomes Rs. 2000 in 2 years at a certain rate of compound interest. What will be the sum after 4 years?

Sol. If a sum 'A' becomes 'B' in t_1 years at CI, then after t_2 years, the sum becomes $\frac{(B)^{\frac{t_2}{t_1}}}{(A)^{\frac{t_2}{t_1}-1}}$

$$\text{Required Amount} = \frac{(2000)^{\frac{4}{2}}}{(1600)^{\frac{4}{2}-1}} = \frac{(2000)^2}{(1600)^1} = \text{Rs. } 2500$$

14. What sum of money at compound interest will amount to Rs. 2249.52 in 3 years, if the rate of interest is 3% for the first year, 4% for the second year and 5% for the third year?

Sol. $A = P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right)\left(1+\frac{r_3}{100}\right)$

$$2249.52 = P\left(1+\frac{3}{100}\right)\left(1+\frac{4}{100}\right)\left(1+\frac{5}{100}\right)$$

P = Rs. 2000

15. Find the difference between CI and SI on Rs. 8000 for 3 years at 2.5% pa.

Sol. $\text{Difference} = \frac{Pr^2(300+r)}{100^3}$ [only possible for 3 years]

$$= \frac{8000(2.5)^2(300+2.5)}{100^3} = \text{Rs. } 15.125$$

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Foundation

1. What is S.I. of Rs. 800 on 5% per annum for 3 years?
   (a) 120 (b) 140 (c) 210
   (d) 230 (e) None of these
2. How many years will it take for amount of Rs. 600 to yield Rs. 120 as interest at 10% per annum of S.I.?
   (a) 1 year (b) 3 year (c) 2 year
   (d) 4 year (e) None of these
3. A sum of Rs. 15000 amount gave Rs. 4500 as interest in 5 year. What is rate of interest?
   (a) 3% (b) 4% (c) 5%
   (d) 6% (e) None of these
4. A sum of money becomes Rs. 1100 in 2 years and Rs. 1400 in 6 years at S.I. Find the rate percent.
   (a) $7\frac{17}{19}$ (b) $1\frac{7}{13}$ (c) $2\frac{4}{3}$
   (d) $5\frac{2}{3}$ (e) None of these
5. What would be the C.I. on Rs. 17500 at the rate of 12 p.c.p.a. after 2 years?
   (a) Rs. 4442 (b) Rs. 4452 (c) Rs. 4462
   (d) Rs. 4482 (e) None of these
6. What would be the C.I. obtained on an amount of Rs. 12000 at the rate of 9 p.c.p.a for 3 years?
   (a) Rs. 3840 (b) Rs. 3740.75 (c) Rs. 3540
   (d) Rs. 3640 (e) None of these
7. What would would be the C.I. obtained on an amount of Rs. 4800 at the rate of 5 p.c.p.a for 3 years?
   (a) Rs. 448.7 (b) Rs. 817.8 (c) Rs. 623.5
   (d) Rs. 756.6 (e) None of these

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8. What would be the C.I. obtained on an amount of 12500 at the rate of 12 p.c.p.a. after 2 years?
(a) Rs. 3180 (b) Rs. 3360 (c) Rs. 3540
(d) Rs. 3720 (e) None of these

9. The difference between simple and compound interest on sum of 10000 is 64 for 2 years. Find the rate of interest.
(a) 8 (b) 64 (c) 4
(d) 2 (e) None of these

10. The difference between simple and compound interest compounded annually on a certain sum of money for 2 years at 4% per annum is Rs. 1. The sum (in Rs.) is:
(a) 625 (b) 630 (c) 640
(d) 650 (e) None of these

11. Find the compound interest on Rs. 12500 at 8% per annum for 9 months compounded quarterly.
(a) Rs. 1020 (b) Rs. 1428 (c) Rs. 510
(d) Rs. 550 (e) None of these

12. Find the compound Interest on Rs. 32000 at 20% per annum for 1 year, compounded half yearly.
(a) Rs. 6320 (b) Rs. 6720 (c) Rs. 6400
(d) Rs. 6500 (e) None of these

13. The difference between C.I. & S.I. on Rs. 700 in 2 years at 5% per annum is:
(a) Rs. 10 (b) Rs. 5 (c) Rs. 1
(d) Rs. 2.5 (e) Rs. 1.75

14. The difference between the compound and simple interest on a sum of money for 2 years at $6\frac{1}{4}$% per annum is Rs. 10. The sum is
(a) Rs. 2000 (b) Rs. 2200 (c) Rs. 2560
(d) Rs. 2600 (e) None of these

15. If a sum of money doubles itself in 8 years at S.I. then the rate of interest per annum is:
(a) Rs. 10.5 (b) Rs. 12.5 (c) Rs. 11.5
(d) Rs. 13.5 (d) None of these

16. What sum lent at 10% per year on S.I. will amount to Rs. 450 in 2 years?
(a) Rs. 350 (b) Rs. 375 (c) Rs. 240
(d) Rs. 280 (e) None of these

17. Nutan invest Rs. 22400 on S.I. at rate 12 p.c.p.a. How much amount she will get after seven year.
(a) 41,116 (b) 41,216 (c) 42,116
(d) 42, 216 (e) None of these

18. What time taken by sum of Rs. 7000 to became 10500 at the rate of 5% per annum?
(a) 8 years (b) 10 years (c) 5 years
(d) 15 years (e) None of these

19. A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9% p.a. in 5 years. What is the sum?
(a) Rs. 4462.50 (b) Rs. 8032.50 (c) Rs. 8900
(d) Rs. 8925 (e) None of these

20. If the difference between the C.I. compounded half yearly and simple interest on a sum at 10% per annum for one year is Rs. 25, the sum is:
(a) Rs. 9000 (b) Rs. 9500 (c) Rs. 10,000
(d) Rs. 10,500 (e) None of these

21. The difference between compound and simple interest at a certain rate on Rs. 2000 at the end of two years is Rs. 12.8. The rate of interest per annum is
(a) 6.8% (b) 8% (c) 12.8%
(d) 16.8% (e) None of these

22. If a sum of money at simple interest doubles itself in 6 years, it will become four times in:
(a) 14 years (b) 12 years (c) 18 years
(d) 16 years (e) None of these

23. A sum of money doubles in 3 years at compound interest, compounded annually. It will become 4 times of itself in:
(a) 12 years (b) 9 years (c) 8 years
(d) 6 years (e) None of these

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24. If the amount is $6\frac{1}{4}$ times the sum after 2 years at compound interest, the rate of interest per annum is:
(a) 130% (b) 140% (c) 125%
(d) 150% (e) None of these

25. Amit invested an amount of Rs. 25000 in fixed deposit @ C.I. 8% per annum for 2 years. What amount Amit will get
(a) Rs. 28240 (b) Rs. 28540 (c) Rs. 29240
(d) Rs. 29160 (e) None of these

26. Find the ratio of S.I. & C.I. on a certain sum of money at 5% per annum for 2 years
(a) 50 : 51 (b) 40 : 41 (c) 30 : 31
(d) 45 : 46 (e) None the these

27. A sum of money invested at S.I. accured to Rs. 800 in 3 years and to Rs. 840 in 4 years. The rate of interest per annum is.
(a) $2\frac{1}{2}$ (b) 4% (c) 5%
(d) $6\frac{2}{3}$% (e) None of these

28. What is difference between C.I. and S.I. of Rs. 12000 on 5% per annum for 2 years?
(a) 35 (b) 25 (c) 30
(d) 40 (e) None of these

29. Find the difference between C.I. & S.I. on Rs. 15000 at 3% per annum for 3 years?
(a) 40.91 (b) 73.91 (c) 39.91
(d) 30 (e) 35

30. Find the difference between C.I. & S.I. on Rs. 13000 at 4% per annum for 3 years?
(a) Rs. 63.23 (b) Rs. 73.25 (c) Rs. 68.25
(d) Rs. 70.29 (e) Rs. 59.25

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31. A certain sum of money gives Rs. 500 at 5% S.I. for 1 year. What is the C.I. at the same rate at the end of 2 years?
(a) Rs. 1050 (b) Rs. 1015 (c) Rs. 1035
(d) Rs. 1025 (e) None of these

32. The difference between the S.I. and C.I. obtained on principal amount at 5 p.c.p.a. after 2 years is Rs. 35. What is principal amount.
(a) Rs. 15000 (b) Rs. 10000 (c) Rs. 14000
(d) Rs. 13000 (e) None of these

33. The C.I. on Rs. 10000 at 20% per annum at the end of 1 year 6 month, if the interest is calculated half yearly will be
(a) 4340 (b) 5320 (c) 3310
(d) 4590 (e) None of these

34. The S.I. is 7200 on 12 p.c.p.a. for 6 years on a sum. What is C.I. on 5 p.c.p.a for 2 years?
(a) Rs. 1020 (b) Rs. 1055 (c) Rs. 1050
(d) Rs. 1025 (e) None of these

35. If the difference between S.I. and C.I. is Rs. 25 on 10000 for 2 years then what is rate of interest?
(a) 6 (b) 4 (c) 5
(d) 3 (e) None of these

36. If the ratio of CI & SI interest for the same principal and rate of interest for 2 years is 1.2, find the rate of interest.
(a) 300% (b) 15% (c) 140%
(d) 3% (e) None of these

37. What is CI on Rs. 7500 for 4 years if the rate of interest is 10% p.a. for the first 2 year and 20% p.a. for the next 2 year?
(a) Rs. 5273 (b) Rs. 5568 (c) Rs. 5724
(d) Rs. 5325 (e) None of these

38. What will be CI on an amount of Rs. 10000 at the rate of 20 p.c.p.a. in two years if the interest rate is compounded half yearly?
(a) Rs. 4525 (b) Rs. 4232 (c) Rs. 4641
(d) Rs. 4461 (e) None of these

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39. Find the difference between SI and CI at 12% for 2 year on Rs. 10000.
(a) Rs. 169 (b) Rs. 12 (c) Rs. 144
(d) Rs. 24 (e) None of these

40. Find the difference between SI and CI at 14% for 2 years on Rs. 10000.
(a) Rs. 144 (b) Rs. 169 (c) Rs. 124
(d) Rs. 196 (e) None of these

Moderate

1. Prabhat took a certain amount as a loan from bank at the rate of 8% Simple interest per annum and gave the same amount to Ashish as a loan at the rate of 12% p.a. on S.I. If at the end of 12 yrs, he made a profit of Rs. 320 in the deal, What was the original amount?
(a) Rs. 500 (b) Rs. 600 (c) Rs. 666.67
(d) Rs. 750.27 (e) None of above

2. What annual instalment will discharge a debt of Rs. 1092 due in 3 years at 12% Simple interest?
(a) Rs. 250 (b) Rs. 275 (c) Rs. 300
(d) Rs. 325 (e) Rs. 350

3. A Man invests a certain sum of money at 6% p.a. Simple interest and another sum at 7% p.a. Simple interest. His income from interest after 2 years was Rs. 354. One fourth of the first sum is equal to one fifth of the second sum. Find the total sum he invested?
(a) Rs. 1500 (b) Rs. 1200 (c) Rs. 2700
(d) Rs. 5400 (e) None of these

4. Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme B?
(a) Rs. 6400 (b) Rs. 6500 (c) Rs. 7200
(d) Rs. 7500 (e) None of these

5. An automobile financier claims to be lending money at simple interest, but he includes the interest every six months for calculating the

principal. If he is charging an interest of 10%, the effective rate of interest becomes:

(a) 10% (b) 10.25% (c) 10.5%
(d) 15% (e) None of these

6. A sum of Rs. 725 is lent in the beginning of a year at a certain rate of interest. After 8 months, a sum of Rs. 362.50 more is lent but at the rate twice the former. At the end of the year, Rs. 33.50 is earned as interest from both the loans. What was the original rate of interest?

(a) 3.6% (b) 4.5% (c) 5%
(d) 6% (e) None of these

7. Aditya invest Rs. 50,000 in a fixed deposit at 10% C.I. for 2 years. At the end of 2 years she put the money in another deposit at 12% S.I. for 3 years. What was the final value of the initial Investment?

(a) Rs. 80000 (b) Rs. 81280 (c) Rs. 82280
(d) Rs. 83280 (e) None of these

8. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate?

(a) Rs. 2160 (b) Rs. 3120 (c) Rs. 3972
(d) Rs. 6240 (e) None of these

9. A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs. 1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is:

(a) Rs. 120 (b) Rs. 121 (c) Rs. 122
(d) Rs. 123 (e) None of these

10. Aditya invested certain amount in two different schemes A and B. Scheme A offer S.I @ 12 p.c.p.a. and scheme B offer C.I. @ 10 p.c.p.a. Interest accured on the amount invested in scheme A in 2 years was Rs. 3600 and the total amount invested was Rs. 35000. What was the interest accured on the amount invested in scheme B?

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(a) Rs. 4500 (b) Rs. 4200 (c) Rs. 4000
(d) Cannot be determine (e) None of these

11. The population of a town in 2009 was 125000. It increase 10% per year. What is the population after 3 years?
(a) 166375 (b) 170000 (c) 125000
(d) 10000 (e) None of these

12. A sum of Rs. 1500 amounts to Rs. 3000 in five years at a certain rate of simple interest. If the rate of interest is increased by 1% the same sum in the same time would amount to:
(a) Rs. 3,288 (b) Rs. 3,312 (c) Rs. 3,340
(d) Rs. 3075 (e) None of these

13. Abhinav invested a certain amount at the rate of 8 p.c.p.a. for 5 years and obtained a SI of Rs. 3800. Had he invested the same amount at the same interest for 2 years, how much amount would she have obtained as CI at the end of 2 years?
(a) Rs. 1520 (b) Rs. 1550.5 (c) Rs. 1550
(d) Rs. 1580.8 (e) None of these

14. Nutan borrowed some money at rate of 4 p.c.p.a. for the first three year, at the rate of 8 p.c.p.a. for the next 2 years and at the rate of 9 p.c.p.a. for the period beyond 5 years. If she pay a total SI of Rs. 19550 at the end of 7 years. How much money did she borrow?
(a) Rs. 41500 (b) Rs. 42500 (c) Rs. 39500
(d) Rs. 40500 (e) None of these

15. Girish invested some money in a bank. After eight years his amount became triple. How many times of the original sum will the money become in 20 years at Simple Interest?
(a) 5 times (b) 6 times (c) 7 times
(d) 8 times (e) None of these

16. Ram divided 2189 in three parts such that interest on them after 1, 2 and 3 years respectively be equal. The rate of SI is 4% per annum in all cases. The smallest part is
(a) Rs. 702 (b) Rs. 398 (c) Rs. 425
(d) Rs. 756 (e) Rs. 1093

17. Ravi invested a total amount of Rs. 65000 in three different schemes A, B, C with rate of interest 12 p.c.p.a., 16 p.c.p.a. and 18 p.c.p.a. respectively and earned a total interest of Rs. 10,180 in one year. If the amount invested in A is 72% of the amount invested in C then what was the amount invested in scheme B.
(a) Rs. 15000 (b) Rs. 25000 (c) Rs. 22000
(d) Rs. 18000 (e) cannot determine

18. The population of Mumbai increase 5% per annum. It's population was 100000 in 2004. What was it's population after 3 year?
(a) 115760 (b) 123575 (c) 132557
(d) 11000 (e) None of these

19. Which of the statement given below are sufficient to answer the following question.
What is the rate of interest p.c.p.a. on the amount of Rs. 15000 taking loan?
(1) The difference between C.I. & S.I. is Rs. 170
(2) The S.I. of 2 years is Rs. 2500
(a) Only I (b) Only II
(c) Either I or II (d) neither I or II
(e) both I and II together

20. Which of the statement given below are sufficient to answer the following question.
What is the rate of interest per annum on an investment of Rs. 800?
(1) The income from S.I. at the end of 3 years at the same rate of interest is 19
(2) C.I. is 15.76 more than S.I. on same sum & same rate in 2 years
(a) Only I (b) Only II (c) Either I or II
(d) neither I nor II (e) Both I and II together

21. Which information given below is sufficient to know the amount if the difference between the C.I. & S.I. for 2 years is 18?
(1) The rate is same at which an amount of Rs. 1000 become 1120 for 2 years in S.I.

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(2) The principal given is Rs. 2000.

(a) Only I (b) Only II (c) Either I or II
(d) Neither I nor II (e) Both I and II together

22. A sum of Rs. 1521 is lent out in two parts in such a way that the simple interest on one part at 10% for 5 yr is equal to that of another part at 8% for 10 yr. What will be the two parts of sum?

(a) Rs. 926 and Rs. 595 (b) Rs. 906 and Rs. 615
(c) Rs. 916 and Rs. 605 (d) Rs. 936 and Rs. 585
(e) None of the above

23. Rashmi lent Rs. 600 to Geeta for 2 yr and Rs. 150 to Seeta for 4 yr at same rate of interest and received altogether Rs. 80 as simple interest from both. Find the rate of interest.

(a) $3\frac{4}{9}\%$ (b) $2\frac{4}{9}\%$ (c) $5\frac{4}{9}\%$
(d) $4\frac{4}{9}\%$ (e) None the these

24. Hemant makes a fixed deposit of Rs. 20000 in Bank of India for a period of 3 yr. If the rate of interest be 13% SI per annum charged half-yearly, what amount will he get after 42 months?

(a) Rs. 27800 (b) Rs. 28100 (c) Rs. 29100
(d) Rs. 30000 (e) None of these

25. Gaurav borrowed Rs. 800 at 6% and Naresh borrowed Rs. 600 at 10%. After how much time, will they both have equal debts?

(a) $15\frac{1}{3}$ yr (b) $14\frac{1}{2}$ yr (c) $18\frac{1}{3}$ yr
(d) $16\frac{2}{3}$ yr (e) None of these

26. What annual payment will discharge a debt of Rs. 1092 due in 2 yr at 12% simple interest?

(a) Rs. 725 (b) Rs. 325 (c) Rs. 515
(d) Rs. 900 (e) Rs. 400

27. The annual payment of Rs. 160 in 5 yr at 5% per annum simple interest will discharge a debt of
(a) Rs. 980 (b) Rs. 880 (c) Rs. 440
(d) Rs. 220 (e) None of the above

28. The population of a city increase at the rate of 5% pa. If the present population of the city is 370440, then what was its population 3 yr ago?
(a) 3 lakh (b) 3.2 lakh (c) 3.4 lakh
(d) 3.6 lakh (e) None of these

29. The population of a particular area of a city is 5000. It increases by 10% in 1st yr. It decreases by 20% in the 2nd yr because of some reason. In the 3rd yr, the population increases by 30%. What will be the population of area at the end of 3 years?
(a) 5120 (b) 5300 (c) 5400
(d) 5620 (e) None of these

30. The cost price of a car is Rs. 400000. If its price decreases by 10% every year, then what will be the cost of car after 3 years?
(a) Rs. 3,00,000 (b) Rs. 2,91,700 (c) Rs. 2,91,600
(d) Rs. 2,50,000 (e) None of these

31. Suneeta borrowed certain sum from Reena for 2 yr at simple interest. Suneeta lent this sum to Venu at the same rate for 2 yr at compound interest. At the end of 2 yr, she received Rs. 110 as compound interest but paid Rs. 100 as simple interest. Find the sum and the rate of interest?
(a) Rs. 250, rate 10% pa (b) Rs. 250, rate 20% pa
(c) Rs. 250, rate 25% pa (d) Rs. 250, rate 30% pa
(e) None of these

32. Find the least number of complete years in which a sum of money put out at 20% compound interest will be more than double?
(a) 3 yr (b) 4 yr (c) 5 yr
(d) 8 yr (e) None of these

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33. The population of a country is 10 crore and it is the possibility that the population will become 13.31 crore in 3 years. What will be the annual rate per cent of this growth?
(a) 8% (b) 12.7% (c) 10%
(d) 15% (e) None of these

34. Income of Hemant was Rs. 4000. In the first 2 years, his income decreased by 10% and 5% respectively but in the third year, the income increased by 15%. What was his income at the end of third year?
(a) Rs. 3933 (b) Rs. 4000 (c) Rs. 3500
(d) Rs. 3540 (e) None of the above

35. A man borrows Rs. 5100 to be paid back with compound interest at the rate of 4% pa by the end of 2 years in two equal yearly instalments. How much will be each instalment?
(a) Rs. 2704 (b) Rs. 2800 (c) Rs. 3000 (d) Rs. 2500 (e) None of above

36. Divide Rs. 2602 between X and Y, so that the amount of X after 7 yr is equal to the amount of Y after 9 yr, the interest being compounded at 4% pa.
(a) Rs. 1352, Rs. 1250 (b) Rs. 1400, Rs. 1350
(c) Rs. 1215, Rs. 1300 (d) Rs. 1500, Rs. 1450
(e) None of these

37. If Rs. 3000 amounts to Rs. 4320 at compound interest in a certain time, then Rs. 3000 amount to what in half of the time?
(a) Rs. 3400 (b) Rs. 3600 (c) Rs. 38000
(d) Rs. 3520 (e) None of these

38. A sum of money lent at compound interest for 2 yr at 20% pa would fetch Rs. 964 more, if the interest was payable half-yearly than if it was payable annually. What is the sum?
(a) Rs. 40000 (b) Rs. 60000 (c) Rs. 90000
(d) Rs. 500000 (e) None of the above

39. A sum of Rs. 8448 is to be divided between X and Y who are respectively 18 and 19 yr old, in such a way that if their shares be

invested at 6.25% per annum at compound interest, they will receive equal amounts on attaining the age of 21 yr. The present share of X is

(a) Rs. 4225 (b) Rs. 4352 (c) Rs. 4096
(d) Rs. 4000 (e) None of these

40. During the first year, the population of a village is increased by 5% and in second year it is diminished by 5%. At the end of the second year, its population was 47880. What was the population at the beginning of the first year?

(a) 45500 (b) 48000 (c) 43500
(d) 53000 (e) None of these

Difficult

1. According to a census report, the population growth rate of Faridabad is going to be an increasing A.P. with first year's rate as 5% and common difference as 5%, but simultaneously the migration rate is an increasing G.P. with first term as 1% and common ratio of 2. If population on 31 December 2010 is 1 million, then find in which year will Faridabad witness its first fall in population?

(a) 2016 (b) 2014 (c) 2013
(d) 2019 (e) None of these

2. Monica deposited a total of Rs. 10500 with a bank in two different deposit schemes at 10% p.a., interest being compounded annually. As per the schemes, she gets the same amount after 2 years on the first deposit as she gets after 3 years on the second deposit. How much money did she deposit for 3 years?

(a) Rs. 4500 (b) Rs. 5000 (c) Rs. 6500
(d) Rs. 7200 (e) None of these

3. A sum of money invested at simple interest for two years at 5% p.a. amounted to Rs. 2750. The rate at which the sum should have been invested to get Rs. 300 as interest after two years would be?

(a) 6% (b) 6.9% (c) 7.6%
(d) 8.1% (e) None of these

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4. A sum of Rs. 1000 after 3 years at compound interest becomes a certain amount that is equal to the amount that is the result of a 3 year depreciation from Rs. 1728. Find the difference between the rates of C.I. and depreciation? (Given C.I. is 10% p.a.)
(a) 1.7% (b) 2.9% (c) 4%
(d) 7.6% (e) None of these
5. When the rate of interest in a bank is reduced from 5% p.a. to 4.5% p.a., Bani deposited Rs. 4000 in her saving account. She found that the new interest income remained the same as before. Find her original deposit?
(a) Rs. 3600 (b) Rs. 3150 (c) Rs. 2980
(d) Rs. 2768 (e) None of these
6. Two equal sums were lent at simple interest for 4 years and for 3 years respectively. The rate of interest in the latter case was 3% higher than that of the former case, but the amount in each was Rs. 1088. Find the rate of interest of the former case?
(a) 7% (b) 9% (c) 11%
(d) 13% (e) None of these
7. Kavita invested $\frac{1}{3}$rd of her money at 4% p.a., $\frac{1}{4}$th at 3% p.a. and the rest at 5% p.a. She received an annual interest of Rs. 500 on her money. Find the total money invested.
(a) Rs. 21500 (b) Rs. 16480 (c) Rs. 12000
(d) Rs. 11200 (e) None of these
8. Shruti borrowed Rs. 2500 from her two friends. For one loan she paid 8% p.a. and for the other 6% p.a. simple interest. If she paid Rs. 180 as total interest for one year, how much did she borrow at 8% p.a.?
(a) Rs. 1500 (b) Rs. 1700 (c) Rs. 1950
(d) Rs. 2120 (e) None of these
9. A sum of Rs. 2540 is lent out in two parts, one at 12% and the other at $12\frac{1}{2}\%$. If the total annual return on the total money invested is Rs. 312.42, find the money lent at 12% p.a?

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(a) Rs. 996 (b) Rs. 1016 (c) Rs. 1265
(d) Rs. 1295 (e) None of these

10. A part of Rs. 38800 is lent out at 72% for six months. The rest of the amount is lent out at 5% p.a. after one year. The ratio of interest after 3 years from the time when first amount was lent out is 5 : 4. Find the second part that was lent out at 5%.
(a) Rs. 28800 (b) Rs. 29586 (c) Rs. 31776
(d) Rs. 32846 (e) None of these

11. A certain sum of money invested at compound interest becomes 1.44 times of itself in 2 years. If twice this sum were lent at simple interest, in how many years would it double itself?
(a) 2 years (b) 2.5 years (c) 3 years
(d) 5 years (e) None of these

12. Arun gives his wife Asha a birthday gift, giving her each year a number of rupees equal to the number of years of her age. If her birthday falls on August 8, what sum must be placed at simple interest at 7% on January 1, before she is 42, in order to raise the required sum?
(a) Rs. 1000 (b) Rs. 1200 (c) Rs. 1500
(d) Rs. 1900 (e) None of these

13. Bindu lends Rs. 10000 in four parts to her friends. If she gets 8% on Rs. 2000, 7.5% on Rs. 4000 and 8.5 % on Rs. 1400, what percent must she get for the remainder, if the average interest is 8.13% ?
(a) 6.3% (b) 8.6% (c) 9%
(d) 9.2% (e) None of these

14. A sum of money at compound interest amounts in two years to Rs. 2809, and in three years to Rs. 2977.54. Find the rate of interest and the original sum.
(a) 4%, Rs. 2500 (b) 6%, Rs. 1800 (c) 4%, Rs. 1800
(d) 6%, Rs. 2500 (e) None of these

15. Sapna borrowed a certain sum of money from Kavita under the following repayment scheme based on simple interest. 8% p.a. for the initial 2 years, 9.5% p.a. for the next 4 years, 11% p.a. for the next

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2 years, 12% p.a. after the first 8 years. Find the amount which a sum of Rs. 9000 taken for 12 years becomes at the end of 12 years.

(a) Rs. 20160 (b) Rs. 22350 (c) Rs. 23470
(d) Rs. 24567 (e) None of these

16. If Rs. 1200 amounts to Rs. 1323 in 2 years at compound interest compounded annually, what will Rs. 1600 amount to in 3 years at the same rate?

(a) Rs. 1780.45 (b) Rs. 1852.50 (c) Rs. 1945.55
(d) Rs. 2166.76 (e) None of these

17. If the compound interest on a certain sum for 3 years at 5% p.a exceeds the simple interest on the same sum and for the same time and at the same rate by Rs. 183, find the sum.

(a) Rs. 17560 (b) Rs. 21680 (c) Rs. 24000
(d) Rs. 26780 (e) None of these

18. If the compound interest on a certain sum of money for 3 years at 5% p.a. is Rs. 504.40, find the corresponding simple interest.

(a) Rs. 329.24 (b) Rs. 384.78 (c) Rs. 435.45
(d) Rs. 480.00 (e) None of these

19. Find the least number of complete years in which a sum of Rs. 1500 at 25% compound interest will be more than double.

(a) 4 years (b) 5 years (c) 6 years
(d) 7 years (e) None of these

20. If the compound interest on a certain sum of money for 2 years is Rs. 164 whereas the simple interest for 3 years at the same rate is Rs. 240 on the same sum, find the sum.

(a) Rs. 1200 (b) Rs. 1400 (c) Rs. 1600
(d) Rs. 1800 (e) None of these

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Previous Year Memory Based

1. What amount a man would have received on a principal of Rs. 4000 after 2 years simple interest @ 5 p.c.p.a.?
(a) Rs. 4161 (b) Rs. 5200 (c) Rs. 4400
(d) Rs. 4100 (e) None of these
2. The simple interest accrued on an amount of Rs. 2500 at the end of six years is Rs. 1875. What would be the simple interest accrued on an amount of Rs. 6875 at the same rate and same period?
(a) Rs. 4556.5 (b) Rs. 5025.25 (c) Rs. 4895.25
(d) Rs. 5245.5 (e) None of these
3. Manish borrowed a sum of Rs. 1150 from Anil at the simple rate of 6 p.c.p.a. for 3 years. He then added some more money to the borrowed sum and lent it to Sunil for the same time at 9 p.c.p.a. at simple interest. If Manish gains Rs. 274.95 by way of interest on borrowed sum as well as his own amount from the whole transaction, then what is the sum lent by him to Sunil?
(a) Rs. 1290 (b) Rs. 1785 (c) Rs. 1285
(d) Rs. 1200 (e) None of these
4. Suhit borrowed a sum of Rs. 6300 from Vikas at the rate of 14% for 3 years, He then added some more money to the borrowed sum and lent it to Mohit at the rate of 16% of simple interest for the same time. If Suhit gained Rs. 618 in the whole transaction, then what sum did he lend to Mohit?
(a) Rs. 7000 (b) Rs. 6800 (c) Rs. 7200
(d) Cannot be determined (e) None of these
5. Arun invested a sum of money at a certain rate of simple interest for a period of 4 years. Had he invested the same sum for a period of 6 years the total interest earned by him would have been 50 per cent more than the earlier interest amount. What was the rate of interest per cent per annum?
(a) 4 (b) 8 (c) 5
(d) Cannot be determined (e) None of these

6. Mayuri took a loan at simple interest rate of 6 p.c.p.a. in the first year and it increased by 1.5 p.c.p.a. every year. If she pays Rs. 8190 as interest at the end of 3 years, what was her loan amount?
(a) Rs. 36000 (b) Rs. 35400 (c) Rs. 36800
(d) Cannot be determined (e) None of these

7. Heena invests an amount of 10250 @ 4 p.c.p.a. to obtain a total amount of Rs. 12710 on simple interest after a certain period. For how many years did she invest the amount to obtain the total sum?
(a) 6 years (b) 8 years (c) 5 years
(d) 4 years (e) None of these

8. Rs. 600 becomes Rs. 720 in 4 years when the interest is simple. If the rate of interest is increased by 2%, then what will be total amount?
(a) Rs. 642 (b) Rs. 724 (c) Rs. 725
(d) Rs. 768 (e) None of these

9. Anil invested an amount for 3 years at a simple interest rate of 9 p.c.p.a. He got an amount of Rs. 19050 at the end of 3 years. What principal amount did he invest?
(a) Rs. 14500 (b) Rs. 11050 (c) Rs, 15000
(d) Rs. 10950 (e) None of these

10. What is the interest received on a principal of Rs. 450 for 2 years, if the interest received on Re. 1 after 4 years at the same rate of simple interest is Rs. 0.40?
(a) Rs. 90 (b) Rs. 180 (c) Rs. 36
(d) Rs. 200 (e) None of these

11. Asmita invests an amount of Rs, 9535 at the rate of 4 per cent per annum to obtain a total amount of Rs. 11442 on simple interest after a certain period. For how many years did she invest the amount to obtain the total sum?
(a) 10 years (b) 2 years (c) 5 years
(d) 4 years (e) None of these

12. Mrs. Sushma lent out an amount of Rs. 3000 at 4% p.a. and some other amount at 5% p.a. If at the end of the year she received Rs. 138 as total interest, what amount she lent out at 5% p.a.?

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(a) Rs. 200 (b) Rs. 160 (c) Rs. 120
(d) Rs. 140 (e) None of these

13. A person invests Rs. 2 lakhs at 12% p.a. for 1 year. If he invests Rs. 500 more, he is eligible for 13% p.a. interest. How much more interest would he receive, if he accepted the second option?
(a) Rs. 2155 (b) Rs. 2045 (c) Rs. 2165
(d) Rs. 2065 (e) None of these

14. A certain sum of money amounts to Rs. 756 in 2 years and to Rs. 873 in 3.5 years. Find the rate of interest?
(a) 8% (b) 10% (c) 13%
(d) 15% (e) 18%

15. What annual payment will discharge a debt of Rs. 770 due in 5 years, the rate of interest being 5% per annum?
(a) Rs. 100 (b) Rs. 110 (c) Rs. 120
(d) Rs. 130 (e) Rs. 140

16. The rate of interest for the first 2 years is 3% per annum, for the next 3 years is 8% per annum and for the period beyond 5 years 10% per annum, If a man gets Rs. 1520 as a simple interest for 6 years, how much money did he deposit?
(a) Rs. 2500 (b) Rs. 2800 (c) Rs. 3500
(d) Rs. 3800 (e) Rs. 4200

17. Divide Rs. 4758 into three parts so that their amounts after 2, 3 and 4 years respectively may be equal, the rate of interest being 5% per annum. Find amount of 1st part?
(a) Rs. 1600 (b) Rs. 1656 (c) Rs. 1624
(d) Rs. 1680 (e) None of these

18. With a given rate of simple interest, the ratio of principal and amount of a certain period of time is 4 : 5. After 3 years, with the same rate of interest, the ratio of the principal and amount becomes 5 : 7. The rate of interest per annum is:
(a) 4% (b) 5% (c) 6%
(d) 7% (e) None of these

19. What would be the compound interest accrued on an amount of Rs. 7850 at the rate of 14 p.c.p.a. in 2 years?
(a) Rs. 2351.86 (b) Rs. 2880.37 (c) Rs. 2518.22
(d) Rs. 2290.23 (e) None of these

20. The compound interest accrued on an amount at the end of 3 years @ 15 p.c.p.a. is Rs. 6500.52. What is the amount?
(a) Rs. 12480 (b) Rs. 10500 (c) Rs. 14800
(d) Rs. 13620 (e) None of these

21. What would be the compound interest accrued on amount of Rs. 7400 @ 13.5 p.c.p.a. at the end of 2 years? (rounded off to two digits after decimal)
(a) Rs. 2136.87 (b) Rs. 2306.81 (c) Rs. 2032.18
(d) Rs. 2132.87 (e) None of these

22. The compound interest earned by Shivam on a certain amount at the end of 2 years at the rate of 8 p.c.p.a. was Rs. 1414.4. What was the total amount that Shivam got back at the end of 2 years in the form of principal plus interest earned?
(a) Rs. 9414.4 (b) Rs. 9914.4 (c) Rs. 9014.4
(d) Rs. 8914.4 (e) None of these

23. What sum of money at compound interest will amount to Rs. 5305.53 in 3 years, if the rate of interest is 1% for the first year, 2% for second year and 3% for the third year?
(a) Rs. 4800 (b) Rs. 5000 (c) Rs. 5200
(d) Rs. 5400 (e) None of these

24. If the difference between the simple interest and compound interest earned on an amount @ 15 p.c.p.a. at the end of 3 years is Rs. 595.35, what is the amount?
(a) Rs. 8400 (b) Rs. 9200 (c) Rs. 6800
(d) Cannot be determined (e) None of these

25. A man gets a simple interest of Rs. 1000 on a certain principal at the rate of 5 p.c.p.a. in 4 years. What compound interest will the man get on twice the principal in two years at the same rate?

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(a) Rs. 1050 (b) Rs. 1005 (c) Rs. 1025
(d) Rs. 125 (e) None of these

26. The simple interest accrued on an amount of Rs. 20000 at the end of 3 years is Rs. 7200. What would be the compound interest accrued on the same amount at the same rate in the same period?
(a) Rs. 8342.36 (b) Rs. 8098.56 (c) Rs. 8246.16
(d) Rs. 8112.86 (e) None of these

27. The population of a state increases by 10% every year. If its population in the year 2003 was 15 lakhs, what was its population in the year 2005 (in lakhs)?
(a) 16.5 lakhs (b) 15.5 lakhs (c) 17.25 lakhs
(d) 18.25 lakhs (e) None of these

28. The value of a machine depreciates at the rate of 12 per cent per annum. It was purchased 3 years ago. Its present value is Rs. 29644.032, what was the purchase price of the machine?
(a) Rs. 48700 (b) Rs. 43500 (c) Rs. 38900
(d) Rs. 39000 (e) None of these

29. In year 2008, 5000 students were admitted in a college. It is found that the number of students admitted is constantly increasing by 24 per cent per year. How many students will be admitted in the college in the year 2010?
(a) Rs. 7688 (b) Rs. 7868 (c) Rs. 7400
(d) Rs. 7480 (e) None of these

30. The simple interest accrued on an amount of Rs. 19800 at the end of 3 years is Rs. 7128. What would be the compound interest accrued on the same amount at the same rate in the same period?
(a) Rs. 8934.6784 (b) Rs. 8017.5744 (c) Rs. 7861.8754
(d) Rs. 6871.6734 (e) None of these

31. If the difference between the simple and the compound interest earned on a sum of money at the rate of 5 p.c.p.a. for 2 years is Rs. 16, find the principal?

(a) Rs. 6200 (b) Rs. 6400 (c) Rs. 6250
(d) Rs. 6750 (e) None of these

32. The population of a town is 11200. It increases by 25% in the first year and decreases by 15% in the second year. What is the population of the town at the end of 2 years?
(a) 14000 (b) 11900 (c) 16100
(d) 13500 (e) None of these

33. The production of a factory grows at a 8% p.a. What will be its production for the year 2010, if its production in 2008 was 70 lakh tonnes?
(a) 63.48 lakh tonnes (b) 81.648 lakh tonnes (c) 81 lakh tonnes
(d) 80.68 lakh tonnes (e) None of these

34. A deposited Rs. 6000 in a bank at 5% per annum simple interest. B deposited Rs. 5000 at 8% p.a. compound interest. After 2 years, the difference between their interests will be:
(a) Rs. 230 (b) Rs. 232 (c) Rs. 600
(d) Rs. 832 (e) None of these

35. If the rate of interest be 4% per annum for first year, 5% per annum for second year and 6% per annum for third year, then the compound interest of Rs. 10000 for 3 years will be:
(a) Rs. 1575.20 (b) Rs. 1600 (c) Rs. 1625.80
(d) Rs. 2000 (d) None of these

36. Sita deposited Rs. 5000 at 10% simple interest for 2 years. How much more money will Sita have in her account at the end of 2 years, if it is compounded semi-annually?
(a) Rs. 50 (b) Rs. 40 (c) Rs. 77.50
(d) Rs. 85.50 (e) None of these

37. If the compound interest on a certain sum for 2 years at 3% per annum is Rs. 101.50, then the simple interest on the same sum at the same rate and for the same time will be:
(a) Rs. 90.00 (b) Rs. 95.50 (c) Rs. 100.00
(d) Rs. 98.25 (e) None of these

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38. The compound interest on a certain sum for 2 years at 12% per annum, compounded annually is Rs. 1272. The simple interest for that sum at the same rate and for the same period will be?
(a) Rs. 1296 (b) Rs. 1196 (c) Rs. 1220
(d) Rs. 1200 (e) None of these

39. An amount of money at compound interest grows up to Rs. 3840 in 4 years and up to Rs. 3936 in 5 years. Find the rate of interest?
(a) 2.5% (b) 2% (c) 3.5%
(d) 2.05% (e) None of these

40. The difference between the simple and compound interest on a certain sum of money for 2 years at 4% per annum is Rs. 4. Find the sum?
(a) Rs. 2500 (b) Rs. 2400 (c) Rs. 2600
(d) Rs. 2000 (e) None of these

Foundation

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1. (a); $SI = \frac{PRT}{100} = \frac{800 \times 5 \times 3}{100} = \text{Rs. } 120$

2. (c); $T = \frac{SI \times 100}{PR} = \frac{120 \times 100}{600 \times 10} = 2 \text{ years}$

3. (d); $R = \frac{SI \times 100}{PT} = \frac{4500 \times 100}{15000 \times 5} = 6\%$

4. (a); Total SI difference = 1400 – 1100 = Rs. 300
Total Time = 6 – 2 = 4 years

$SI = \frac{300}{4} = \text{Rs. } 75$

For 2 year SI = 75 × 2 = Rs. 150
So, P = 1100 – 150 = Rs. 950

$R = \frac{75}{950} \times 100 = 7\frac{17}{19}\%$

5. (b); $CI = P\left[\left(1+\frac{R}{100}\right)^n - 1\right] = 17500\left[\left(1+\frac{12}{100}\right)^2 - 1\right]$ = Rs. 4452

6. (c); $CI = P\left[\left(1+\frac{R}{100}\right)^n - 1\right]$

Here, P = Rs. 12000, R = 9% p.a, n = 3 years

$$= 12000\left[\left(\frac{109}{100}\right)^3 - 1\right] = \text{Rs. } 3540 \text{ (Appx.)}$$

7. (d); $CI = P\left[\left(1+\frac{R}{100}\right)^n - 1\right] = 4800\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$ = Rs. 756.6

8. (a); $CI = P\left[\left(1+\frac{R}{100}\right)^n - 1\right] = 12500\left[\left(1+\frac{12}{100}\right)^2 - 1\right]$ = Rs. 3180

9. (a); Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$

$$64 = \frac{10000 \times R^2}{100 \times 100} \Rightarrow R^2 = 64 \Rightarrow R = 8\%$$

10. (a); Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$

$$\Rightarrow \frac{P \times 16}{100^2} = 1 \qquad \Rightarrow P = \text{Rs. } 625$$

11. (e); Because amount compound quarterly

So, Year = year × 4, Rate $= \frac{\text{rate}}{4}$

$\therefore$ year $= \frac{9}{12} \times 4 = 3$ years, rate $= \frac{8}{4} = 2\%$

$\therefore$ CI $= 12500\left[\left(1+\frac{2}{100}\right)^3 - 1\right]$ = Rs. 765

12. (b); Because the amount is compounded half–yearly

So, year = year × 2, rate = $\frac{\text{rate}}{2}$

$\therefore$ year = 2 years, rate = 10%

$\Rightarrow$ CI $= P\left[\left(1+\frac{R}{100}\right)^n - 1\right] = 32000\left[\left(1+\frac{10}{100}\right)^2 - 1\right]$ = Rs. 6720

13. (e); Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$

$= \frac{700 \times 5 \times 5}{100 \times 100}$ = Rs. 1.75

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14. (c); Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$

Here, Difference = Rs. 10, R = $\frac{25}{4}$% per annum

$\Rightarrow 10 = P \times \left[\frac{25}{4 \times 100}\right]^2 \Rightarrow$ P = Rs. 2560

15. (b); Here, amount = 2P (Where P = Principal)

Hence, SI = P, Rate $= \frac{100 \times SI}{P \times T} = \frac{P \times 100}{P \times 8} = 12.5\%$

16. (b); Amount = P + $\frac{P \times R \times T}{100}$

450 = P + $\frac{P \times 2 \times 10}{100}$ $\Rightarrow$ P = Rs. 375

17. (b); Amount = P + $\frac{P \times R \times T}{100}$ $= 22400 + \frac{22400 \times 12 \times 7}{100}$ = Rs. 41216

18. (b); Amount = P + $\frac{P \times R \times T}{100}$

$$10500 = 7000 + \frac{7000 \times 5 \times T}{100} \Rightarrow T = 10 \text{ years}$$

19. (d); $SI = \frac{PRT}{100} \Rightarrow 4016.25 = \frac{P \times 9 \times 5}{100} \Rightarrow P = \text{Rs. } 8925$

20. (c); Year = 2 years,

$R = \frac{10}{2} = 5\%$ [$\because$ CI is compounded half-yearly]

Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$

$25 = \frac{P \times 25}{100 \times 100}$; $P = \text{Rs. } 10000$

21. (b); Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$

$12.8 = \frac{2000 \times R^2}{(100)^2} \Rightarrow R = 8\%$ per annum

22. (c); Here, Amount = Principal + SI
Now, since amount is given as 2P, hence SI must be equal to P

$\Rightarrow P = \frac{P \times R \times 6}{100}$ [Using SI formula]

$\Rightarrow R = \frac{50}{3}\%$ per annum

Now, Amount = 4P (Need to find)

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Hence, SI = 3P

$$3P = \frac{P \times \frac{50}{3} \times T}{100} \Rightarrow 300 = \frac{50}{3} \times T \quad \text{or} \quad T = 18 \text{ years}$$

23. (d); Let the sum of money be Rs. 100

$$\text{Rs. } 100 \xrightarrow{3 \text{ years}} \text{Rs. } 200 \xrightarrow{3 \text{ years}} \text{Rs. } 400$$

Here, Rs. 100 becomes 4 times i.e. Rs. 400 in total 6 years

24. (d); Let amount be 100

Then $100 \times \frac{25}{4} = \text{Rs. } 625$ (Final amount)

So, $625 = 100\left[\left(1 + \frac{r}{100}\right)^2\right]$

$$\Rightarrow \frac{25}{10} = \left(\frac{100 + r}{100}\right) \Rightarrow \frac{5}{2} = \frac{100 + r}{100} \Rightarrow r = 150\%$$

25. (d); Here, $\text{Amount} = P\left[\left(1 + \frac{R}{100}\right)^2\right]$

$$= 25000\left[\left(1 + \frac{8}{100}\right)^2\right]$$

$$= 25000\left[\left(\frac{27}{25}\right)^2\right] = \text{Rs. } 29160$$

26. (b); Here, $\frac{SI}{CI} = \frac{\frac{P \times R \times T}{100}}{P\left[\left(1 + \frac{R}{100}\right)^2 - 1\right]}$

$$= \frac{\frac{100 \times 5 \times 2}{100}}{100\left[\left(1+\frac{5}{100}\right)^2 - 1\right]} = \frac{\frac{10}{100}}{\frac{41}{400}} = 40 : 41$$

27. (c); SI becomes Rs. 800 in 3 years and becomes Rs. 840 in 4 years

$\Rightarrow$ Hence, SI of 1 year = Rs. (840 – 800) = Rs. 40

$\Rightarrow$ Rate $= \frac{40 \times 100}{800 \times 1}$ [Here, P = Rs. 800] = 5% per annum

28. (c); Here, difference between SI and CI for 2 years

$$= \frac{PR^2}{(100)^2} = \frac{12000 \times (5)^2}{(100)^2} = \text{Rs. } 30$$

29. (a); Difference between CI and SI for 3 years

$$\Rightarrow \text{Difference} = \frac{PR^2(300+R)}{(100)^3}$$

$$= \frac{(15000)(3)^2(303)}{(100)^3} = \text{Rs. } 40.91 \text{ (appx.)}$$

30. (a); The difference between CI and SI for 3 years

$$\Rightarrow \text{Difference} = \frac{PR^2(300+R)}{(100)^3}$$

$$= \frac{13000 \times (4)^2(304)}{(100)^3} = \text{Rs. } 63.23 \text{ (appx.)}$$

31. (d); Principal $= \frac{SI \times 100}{\text{Rate} \times \text{Time}} = \frac{500 \times 100}{5 \times 1} = \text{Rs. } 10000$

$\Rightarrow$ Now CI at 5% rate $= 10000\left[\left(1+\frac{5}{100}\right)^2 - 1\right] = \text{Rs. } 1025$

32. (c); Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$

$$\Rightarrow \quad 35 = \frac{P(5)^2}{(100)^2} \quad \Rightarrow \quad P = \text{Rs. } 14000$$

33. (c); Rate $= \frac{20}{2} = 10\%$, Time $= \frac{3}{2} \times 2 = 3$ years

[$\therefore$ CI is calculated half yearly]

$$CI = 10000\left[\left(1+\frac{10}{100}\right)^3 - 1\right] = 10000\left[\left(\frac{11}{10}\right)^3 - 1\right] = \text{Rs. } 3310$$

34. (d); $P = \frac{SI \times 100}{R \times T} = \frac{7200 \times 100}{12 \times 6} = \text{Rs. } 10000$

$$\Rightarrow CI = P\left[\left(1+\frac{R}{100}\right)^2 - 1\right] = 10000\left[\left(1+\frac{5}{100}\right)^2 - 1\right] = \text{Rs. } 1025$$

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35. (c); Difference between CI and SI for 2 years $= \frac{PR^2}{(100)^2}$

$$\Rightarrow \quad 25 = \frac{(10000)R^2}{(100)^2} \quad \Rightarrow \quad R = 5\% \text{ per annum}$$

36. (e); Here, $CI = P\left[\left(1+\frac{R}{100}\right)^2 - 1\right]$

$$= P\left[\left(1+\frac{R^2}{(100)^2}+\frac{2R}{100}\right) - 1\right] = \frac{PR}{100}\left[\frac{R}{100}+2\right]$$

$$\Rightarrow SI = \frac{P \times 2 \times R}{100} \quad \Rightarrow \frac{CI}{SI} = 1.2 = \frac{\frac{PR}{100}\left[\frac{R+200}{100}\right]}{\frac{2PR}{100}}$$

$$\Rightarrow \frac{CI}{SI} = \frac{200+R}{200} \Rightarrow 1.2 = \frac{200+R}{200} \Rightarrow R = 40\%$$

37. (b); $CI = 7500\left[\left(1+\frac{10}{100}\right)^2 \times \left(1+\frac{20}{100}\right)^2 - 1\right]$

[Here, R = 10% per annum for first 2 years and R = 20% per annum for next 2 years]

$$= 7500\left[\left(\frac{11}{10}\right)^2 \times \left(\frac{12}{10}\right)^2 - 1\right] = 5568$$

38. (c); Here, the amount is compounded half-yearly

Hence, $\text{Rate} = \frac{R}{2}\% = 10\%$ per annum

Time = 2T = 2 × 2 = 4 years

$$\Rightarrow CI = P\left[\left(1+\frac{R}{100}\right)^n - 1\right]$$

$$= 10000\left[\left(1+\frac{10}{100}\right)^4 - 1\right] = \text{Rs. } 4641$$

39. (c); Difference between SI and CI for 2 years $= \frac{PR^2}{(100)^2}$

$$\Rightarrow \text{Difference} = \frac{(10000)(12)^2}{(100)^2} = \text{Rs. } 144$$

40. (d); Difference between SI and CI for 2 years $= \frac{Pr^2}{100^2}$

$$\text{Difference} = \frac{10000 \times 14^2}{10000} = \text{Rs. } 196$$

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Moderate

1. (c); Let the original amount be Rs. P.

T = 12, R_1 = 8%, R_2 = 12%, Profit = 320

$$\frac{P \times T \times R_2}{100} - \frac{P \times T \times R_1}{100} = 320$$

$$\frac{P \times 12 \times 12}{100} - \frac{P \times 8 \times 12}{100} = 320$$

$$P = \frac{2000}{3}$$

P = Rs. 666.67

2. (d); Let each instalment be Rs. A

$$A = \frac{100P}{100T + \frac{RT(T-1)}{2}}$$

$$= \frac{100 \times 1092}{100 \times 3 + 36}$$

= Rs. 325

3. (c); Let the sums be A and B

R_1 = 6, R_2 = 7, T = 2

$$\frac{P_1 \times R_1 \times T}{100} + \frac{P_2 \times R_2 \times T}{100} = 354$$

$$\Rightarrow \frac{A \times 6 \times 2}{100} + \frac{B \times 7 \times 2}{100} = 354 \Rightarrow 6A + 7B = 17700$$

also one fourth of the first sum is equal to one fifth of the second sum

$$\frac{A}{4} = \frac{B}{5} = 5A - 4B = 0$$

By solving the equations we get,

A = 1200, B = 1500

Total sum = Rs. (1200 + 1500) = Rs. 2700

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4. (a); Let 14% amount = Rs. x

11% amount = Rs. (13900 – x)

$$\frac{x \times 2 \times 14}{100} + \frac{(13900 - x) \times 11 \times 2}{100} = 3508$$

6x = 350800 – 13900 × 22 $\Rightarrow$ x = 7500

Scheme B = 13900 – 7500 = Rs. 6400

5. (b); Let the sum be Rs. 100 and interest is calculated half-yearly.

$\Rightarrow$ Then, Rate $= \frac{10}{2} = 5\%$, Time = 2 years

Effective rate of interest $= 5 + 5 + \frac{5 \times 5}{100}$ = 10.25%

6. (e); Let the original rate = R%

New rate = (2R)%

$$\frac{725 \times R \times 1}{100} + \frac{362.50 \times 2R \times 1}{3 \times 100} = 33.50$$

$\Rightarrow$ (2175 + 725) R = 33.50 × 100 × 3

$\Rightarrow$ (2900) R = 10050 $\Rightarrow$ R = 3.46%

7. (c); CI for first 2 years

$$= 50000\left[\left(1 + \frac{10}{100}\right)^2 - 1\right] = \text{Rs. } 10500$$

Amount = P + CI = 50000 + 10500 = Rs. 60500

$$SI = \frac{P \times R \times T}{100} = \frac{60500 \times 12 \times 3}{100} = \text{Rs. } 21780$$

Total amount = Rs. 82280

8. (c); Let P = 100, $A = 100 \times \frac{60}{100} + 100 = \text{Rs. } 160$

I = 160 – 100 = Rs. 60, $R = \frac{60 \times 100}{100 \times 6} = 10\%$

$$CI = \frac{331}{1000} \times 12000 = \text{Rs. } 3972$$

9. (b); Here, CI is calculated on half-yearly basis

Hence, Amount would be defined as:

$$A = \left[1600\left(1+\frac{5}{2\times 100}\right)^2 + 1600\left(1+\frac{5}{2\times 100}\right)\right]$$

$$\left(\text{Where Rate} = \frac{\text{Rate}}{2} = \frac{5}{2}\%\right)$$

$$A = \text{Rs.}\left[1600\times\frac{41}{40}\left(\frac{41}{40}+1\right)\right] = \text{Rs. } 3321$$

CI = A – P = Rs. (3321 – 3200) = Rs. 121

10. (b); Let the money in first installment = Rs. x

Second installment = Rs. (35000 – x)

The principal is defined as:

$$\Rightarrow \quad P = \frac{3600\times 100}{12\times 2} = \text{Rs. } 15000 \qquad \text{(Using SI in scheme A)}$$

The money in first installment = Rs. x = Rs. 15000

Scheme B = Rs. (35000 – 15000) = Rs. 20000

$$\Rightarrow \quad CI = P\left[\left(1+\frac{R}{100}\right)^2 - 1\right]$$

$$= 20000\left[\left(1+\frac{10}{100}\right)^2 - 1\right] = \text{Rs. } 4200$$

11. (a); Let population P be 100

$$100 \xrightarrow{+10\%\uparrow} 110 \xrightarrow{+10\%\uparrow} 121 \xrightarrow{+10\%\uparrow} 133.1$$

For P = 100, increase in 3 years = 133.1

For P = 125000, increase in 3 years

$$= \frac{133.1}{100} \times 125000 = 166375$$

12. (d); Here, diference = SI = 3000 – 1500 = Rs. 1500

$$\Rightarrow \text{Rate} = \frac{1500 \times 100}{1500 \times 5} = 20\%, \ (P = \text{Rs. } 1500)$$

$\Rightarrow$ Now, Rate of interest = (20 + 1)% = 21%

$$\Rightarrow \text{Hence, new SI} = \frac{1500 \times 5 \times 21}{100} = \text{Rs. } 1575$$

$\Rightarrow$ Amount = Principal + SI

= Rs. [1500 + 1575] = Rs. 3075

13. (d); $\text{Principal} = \frac{3800 \times 100}{8 \times 5} = \text{Rs. } 9500$

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$$\Rightarrow CI = P\left[\left(1 + \frac{R}{100}\right)^n - 1\right]$$

$$= 9500\left[\left(1 + \frac{8}{100}\right)^2 - 1\right] = \text{Rs. } 1580.8$$

14. (b); Total SI = Rs. 19550

$$19550 = \frac{P \times R_1 \times T_1}{100} + \frac{P \times R_2 \times T_2}{100} + \frac{P \times R_3 \times T_3}{100}$$

$$19550 = P\left[\frac{4 \times 3}{100} + \frac{8 \times 2}{100} + \frac{9 \times 2}{100}\right]$$

$$19550 = P\left[\frac{12}{100} + \frac{16}{100} + \frac{18}{100}\right] \Rightarrow P = \text{Rs. } 42500$$

15. (b); Let his money be 100 Rs.

After eight year it becomes 300

$\therefore$ interest = 200

So, Rate $= \frac{200 \times 100}{100 \times 8} = 25\%$

In 20 year, $SI = \frac{100 \times 25 \times 20}{100} = 500$

So, amount = 500 + 100 = Rs. 600

Hence, from Rs. 100 to Rs. 600, it becomes 6 times

16. (b); Let amount be a, b, c respectively then,

$$\frac{a \times 4 \times 1}{100} = \frac{b \times 4 \times 2}{100} = \frac{c \times 4 \times 3}{100}$$

$\Rightarrow$ a = 2b = 3c = 6K(let)

$\therefore$ a = 6K, b = 3K, c = 2K

so the parts are in ratio is 6:3:2

$\therefore$ Smallest part $= \frac{2189}{11} \times 2 = 199 \times 2 =$ Rs. 398

17. (c); Suppose amount invested in scheme A = x

Suppose amount invested in scheme B = y

Suppose amount invested in scheme C = z

$\therefore$ x + y + z = 65000 ...(i)

From question

$x = 72\%$ of $z = \frac{18}{25}z$ ...(ii)

So, 12x + 16y + 18z = 1018000

$\Rightarrow$ 6x + 8y + 9z = 509000 ...(iii)

From (i), (ii) and (iii) get

$\frac{43}{25}z + y = 65000$ ...(iv)

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$$\frac{108}{25}z + 8y + 9z = 509000$$

$$\Rightarrow \frac{333}{25}z + 8y = 509000 \quad ...(v)$$

From (iv) we have $\frac{344}{5}z + 8y = 520000$ ...(vi)

$$\therefore \quad (vi) - (v) \Rightarrow \frac{11}{5}z = 11000$$

$\therefore$ 11z = Rs. 275000, z = Rs. 25000

$\therefore$ y = Rs. 22000

18. (a); Here, Population P = 100000

$$\underset{(2004)}{100000} \xrightarrow{5\%\uparrow} \underset{(2005)}{105000} \xrightarrow{5\%\uparrow} \underset{(2006)}{110250} \xrightarrow{5\%\uparrow} \underset{(2007)}{115762.5}$$

Hence Population after 3 years is almost 115760

19. (c); This question can be solved either using statement (1) or (2)
In statement (1), it is simple formula of difference

$$= \frac{PR^2}{(100)^2}$$

In statement (2), it is simple formula of SI

20. (c); This question can be solved either using statement (1) or (2)
In statement (1), we can apply formula of SI in statement (2), we need to determine difference formula of $= \frac{PR^2}{(100)^2}$

21. (e); We can solve this question using both information together. Because, in statement I, we can find rate of interest and in statement II, we know the Principal.

22. (d); Given, T_1 = 5 yr, R_1 = 10% and
T_2 = 10 yr and R_2 = 8%
Let the first part = x

Then, second part = (1521 – x)

Now, according to the question,

$$\frac{x \times 5 \times 10}{100} = \frac{(1521 - x) \times 10 \times 8}{100}$$

$\Rightarrow$ 5x = 12168 – 8x $\Rightarrow$ 13x = 12168, x = Rs. 936

and second part = 1521 – 936 = Rs. 585

23. (d); Given, T_1 = 2 years and T_2 = 4 years,

P_1 = Rs. 600, P_2 = Rs. 150 and $SI_1 + SI_2$ = Rs. 80

According to the question,

$$\frac{600 \times R \times 2}{100} + \frac{150 \times R \times 4}{100} = 80$$

$\Rightarrow$ 120R + 60R = 800 $\Rightarrow$ 180R = 800

$$\therefore \quad R = \frac{800}{180} = \frac{80}{18} = \frac{40}{9} = 4\frac{4}{9}\%$$

24. (c); Given, time = 42 months

$$\Rightarrow \quad \frac{42}{12} \text{ years} = 3\frac{1}{2} \text{ years}$$

$$\Rightarrow \quad \frac{7}{2} \times 2 = 7 \text{ half-yr, rate} = \frac{13}{2}\% \text{ half-yearly}$$

$$SI = \frac{20000 \times 13 \times 7}{100 \times 2} = \text{Rs. } 9100$$

$\therefore$ Amount (A) = 20000 + 9100 = Rs. 29100

25. (d); Given, R_1 = 6%, R_2 = 10%

According to the question,

$$800 + \frac{800 \times 6 \times T}{100} = 600 + \frac{600 \times 10 \times T}{100}$$

800 + 48T = 600 + 60T $\Rightarrow$ 12T = 200 $\Rightarrow$ 3T = 50

$$\therefore \quad T = \frac{50}{3} = 16\frac{2}{3} \text{ years}$$

26. (c); According to the formula,

$$\text{Annual payment} = \frac{100P}{100T + \frac{R\,T(T-1)}{2}}$$

$$= \frac{1092 \times 100}{100 \times 2 + \frac{24(2-1)}{2}} = \frac{1092 \times 100}{212}$$

= Rs. 515.09 ≈ Rs. 515

27. (b); Given, annual payment = Rs. 160
R = 5%, T = 5 years, debt (P) = ?
According to the formula,

$$\text{Annual payment} = \frac{100P}{100T + \frac{R\,T(T-1)}{2}}$$

$$\Rightarrow 160 = \frac{100P}{5 \times 100 + \frac{5 \times 4 \times 5}{2}} \Rightarrow 160 = \frac{100P}{550}$$

$$\therefore \quad P = \frac{550 \times 160}{100} = 55 \times 16 = \text{Rs. } 880$$

28. (b); Given that, P = 370440, R = 5% and n = 3 years
According to the formula,

$$\text{Population n years ago} = \frac{P}{\left(1 + \frac{R}{100}\right)^n}$$

$$\text{Population 3 years ago} = \frac{370440}{\left(1 + \frac{5}{100}\right)^3} = \frac{370440}{\left(\frac{21}{20}\right)^3}$$

$$= \frac{370440 \times 20 \times 20 \times 20}{21 \times 21 \times 21} = \frac{370440 \times 8000}{9261} = 40 \times 8000 = 320000$$

29. (e); Population of particular area P of a city = 5000

In 1st year population got increased by 10%

$\therefore$ Population P_1 = 5000 + 10% of 5000 = 5500

In 2nd year population decreased by 20%

$\therefore$ Population P_2 = 5500 – 20% of 5500

$$= 5500 - \frac{20}{100} \times 5500 = 4400$$

In 3rd year population increased by 30%

Population P_3 = 4400 + 30% of 4400

$$= 4400 + \frac{30}{100} \times 4400 = 5720$$

30. (c); Given that cost of a car, P = Rs. 400000

$\Rightarrow$ Decreasing rate = 10%, year = 3 years

$$\Rightarrow \text{Price of car after 3 years} = P\left(1 - \frac{R}{100}\right)^3$$

$$= 400000\left(1 - \frac{10}{100}\right)^3 = 400000 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10} = \text{Rs. } 291600$$

31. (b); Let the sum borrowed be Rs. P

Rate of interest = R%

CI = Rs. 110, SI = Rs. 100, Time (t) = 2 years

CI – SI = 110 – 100 = 10

$$\Rightarrow \text{Difference} = \frac{PR^2}{(100)^2} \Rightarrow 10 = \frac{PR^2}{(100)^2} \quad \text{...(i)}$$

$$\Rightarrow \text{Difference} = \frac{SI \times R}{200} \Rightarrow 10 = \frac{100 \times R}{200} \; ; \; R = 20\% \quad \text{...(ii)}$$

Put value (ii) in (i)

$$\Rightarrow 10 = \frac{P(20)^2}{(100)^2} \; ; \; P = \text{Rs. } 250$$

32. (b); Let the sum be Rs. P

According to given question:

$$\Rightarrow P\left(1+\frac{R}{100}\right)^n > 2P \Rightarrow P\left(1+\frac{20}{100}\right)^n > 2P$$

$$\Rightarrow \left(\frac{6}{5}\right)^n > 2$$ By hit and tril method, n > 4 years

33. (c); Given, P = 10 crore

and population after 3 years = 13.31 crore

According to the formula,

$$\text{Population after n year} = P\left(1+\frac{R}{100}\right)^n$$

$$\Rightarrow 13.31 = 10\left(1+\frac{R}{100}\right)^3 \Rightarrow \frac{1331}{1000} = \left(1+\frac{R}{100}\right)^3$$

$$\Rightarrow \left(\frac{11}{10}\right)^3 = \left(1+\frac{R}{100}\right)^3 \Rightarrow 1+\frac{R}{100} = \frac{11}{10}$$

$$\Rightarrow \frac{R}{100} = \frac{11}{10} - 1 = \frac{1}{10} \quad \therefore \text{ R = 10\%}$$

34. (a); Initial income of Hemant, P = Rs. 4000

Let r_1(rate of decrease) = 10%,

r_2(rate of decrease) = 5%, r_3(rate of growth) = 15%

So, Net final

$$\text{Income} = P\left(1-\frac{r_1}{100}\right)\left(1-\frac{r_2}{100}\right)\left(1+\frac{r_3}{100}\right)$$

$$= 4000\left(1-\frac{10}{100}\right)\left(1-\frac{5}{100}\right)\left(1+\frac{15}{100}\right)$$

$$= 4000 \times \frac{9}{10} \times \frac{19}{20} \times \frac{23}{20} = \text{Rs. 3933}$$

35. (a); Let the installment in each part be Rs. P

According to question:

$$\Rightarrow \frac{P}{\left(1+\frac{R}{100}\right)}+\frac{P}{\left(1+\frac{R}{100}\right)^2}=\text{Rs. } 5100$$

$$\Rightarrow \frac{P}{\left(1+\frac{4}{100}\right)}+\frac{P}{\left(1+\frac{4}{100}\right)^2}=5100$$

$$\frac{25P}{26}+\frac{625}{676}P=5100 \quad \Rightarrow \quad 1275P = 5100 \times 676$$

$$P=\frac{5100\times 676}{1275}=\text{Rs. } 2704$$

36. (a); Let the first part be Rs. a

Second part Rs. (2602 – a)

According to question:

Amount after 7 years = Amount after 9 years

$$\Rightarrow a\left(1+\frac{r}{100}\right)^7=(2602-a)\left(1+\frac{r}{100}\right)^9$$

$$\Rightarrow \frac{a}{(2602-a)}=\left(1+\frac{4}{100}\right)^2$$

$$\Rightarrow \frac{a}{(2602-a)}=\frac{26}{25}\times\frac{26}{25}=\frac{676}{625}$$

$$\Rightarrow 625a = 676\,(2602 - a)$$

$$\Rightarrow a=\frac{676\times 2602}{1301}=\text{Rs. } 1352$$

Second part = Rs. (2602 – a) = Rs. 1250

37. (b); Let rate = R% and time = n year

Then, $4320 = 3000\left(1+\frac{R}{100}\right)^n$

$\Rightarrow \left(1+\frac{R}{100}\right)^n = \frac{4320}{3000} = 1.44$

$\therefore \left(1+\frac{R}{100}\right)^{n/2} = \sqrt{1.44} = 1.2$

$\therefore$ Required amount for $\frac{n}{2}$ year

$= 3000\left(1+\frac{R}{100}\right)^{n/2}$ = 3000 × 1.2 = Rs. 3600

38. (a); Let the principal be Rs. P

If CI is compounded half-yearly,

$\Rightarrow CI = P\left[\left(1+\frac{10}{100}\right)^4 - 1\right]$

(where R = $\frac{R}{2}$% p.a. and T = 2T years)

$\Rightarrow CI = P\left[\left(\frac{11}{10}\right)^4 - 1\right] = \frac{4641\,P}{10000}$

If CI is compounded annually,

$\Rightarrow CI = P\left[\left(1+\frac{20}{100}\right)^2 - 1\right] = \frac{11P}{25}$

According to question:

$\Rightarrow \frac{4641P}{10000} - \frac{11}{25}P = 964$

$\Rightarrow P = \frac{964 \times 10000}{241}$ = Rs. 40000

39. (c); Let shares of X and Y be Rs. x and Rs. (8448 – x), respectively.
Amount got by X after 3 years = Amount got by Y after 2 years

$$x\left(1+\frac{6.25}{100}\right)^3 = (8448-x)\times\left(1+\frac{6.25}{100}\right)^2$$

$$\Rightarrow\ 1+\frac{6.25}{100} = \frac{8448-x}{x} \Rightarrow 1+\frac{1}{16} = \frac{8448-x}{x}$$

$$\Rightarrow\ \frac{17}{16} = \frac{8448-x}{x} \Rightarrow 17x = 135168 - 16x \Rightarrow$$

x = Rs. 4096

40. (b); Let the population at beginning of first year be 'a'
So, according to question:

$$\Rightarrow\ a\left[1+\frac{5}{100}\right]\times\left[1-\frac{5}{100}\right] = 47880$$

$$\Rightarrow\ a\times\left[\frac{21}{20}\right]\times\left[\frac{19}{20}\right] = 47880$$

$$\Rightarrow\ a = \frac{47880\times 20\times 20}{21\times 19} = \text{Rs. } 48000$$

Difficult

1. (a); Here from 2010 on wards we would determine the population of Faridabad.

Here, we would be creating 2 tables, one for population growth rate and another for decrease due to migration. On comparing both the tables, if the migration rate would become greater than population growth rate, then there would be a fall in population.

Year	Growth rate (A.P. where a = 5%, d = 5%)	Migration rate (G.P. where a = 1%, r = 2%)
2011	5%	1%
2012	10%	2%
2013	15%	4%
2014	20%	8%
2015	25%	16%
2016	30%	32%

From 2016 on wards, Migration rate > Growth rate

2. (b); Let the amount invested by Monica in first scheme be Rs. x and in another be Rs. (10500 – x)

Rate of interest = 10% p.a.

According to CI

The amount in 1st scheme after 2 years = Rs. 1.21x

The amount in 2nd scheme after 3 years = Rs. 1.331 (10500 – x)

Now since, she got same amount from both scheme. Hence,

$\Rightarrow 1.21x = 1.331 (10500 - x)$

$\Rightarrow 1.21x + 1.331x = 10500 \times 1.331$

$\Rightarrow 2.541x = 13975.5$

$$x = \frac{13975.5}{2.541} = 5500$$

$\Rightarrow$ Hence, her amount in 3 years scheme is

$\Rightarrow$ (10500 – 5500) = Rs. 5000

3. (a); Here, $SI = \frac{P \times R \times T}{100}$

$$\Rightarrow \quad A - P = \frac{P \times 5 \times 2}{100} \quad \Rightarrow \quad 2750 = P\left[1 + \frac{10}{100}\right]$$

$\Rightarrow$ Principal P = Rs. 2500

Now, we need SI for Rs. 300 after 2 years.

$$\Rightarrow \quad SI = 300 = \frac{2500 \times R \times 2}{100} \quad \Rightarrow \quad R = 6\%$$

4. (a); The amount of Rs. 1000 at 10% p.a. after 3 years would becomes:

$$\Rightarrow P\left(1 + \frac{R}{100}\right)^3 = A \Rightarrow 1000\left(1 + \frac{10}{100}\right)^3 = A$$

$\Rightarrow$ A = Rs. 1331

Here, now the principal of Rs. 1728 depreciated at rate of R% per annum and amounts to Rs. 1331

$$\Rightarrow \quad P\left[\left(1 - \frac{R}{100}\right)\right]^3 = 1331$$

$$\Rightarrow \quad 1728\left[\left(1 - \frac{R}{100}\right)\right]^3 = 1331$$

$$\Rightarrow \quad \left(1 - \frac{R}{100}\right)^3 = \frac{1331}{1728} \quad \Rightarrow \quad 1 - \frac{R}{100} = \frac{11}{12}$$

$$\Rightarrow \quad \frac{R}{100} = \frac{1}{12} \text{ or } R = 8.33\%$$

$\Rightarrow$ Hence rate difference between CI and depreciation is almost = $(10 - 8.33)\% \approx 1.7$

5. (a); Here, we assume original deposit of Bani be Rs. x.

$\Rightarrow$ The SI obtained in both cases is same

$$\Rightarrow \underset{[R = 5\% \text{ p.a.}]}{\frac{x \times 5 \times T}{100}} = \underset{[R = 4.5\% \text{ p.a.}]}{\frac{4000 \times 4.5 \times T}{100}}$$

$\Rightarrow$ 5x = 4000 × 4.5 $\Rightarrow$ x = Rs. 3600

6. (b); Here, Amount = Rs. 1088

Let principal invested be Rs. x and Let Rate of interest be R% in first case and (R + 3)% in later case.

$$\Rightarrow A = P\left(1 + \frac{RT}{100}\right)$$

$$\Rightarrow 1088 = x\left(1 + \frac{4R}{100}\right) \quad ...(i)$$

$$\Rightarrow 1088 = x\left(1 + \frac{3(R+3)}{100}\right) \quad ...(ii)$$

Hence, $x\left(1 + \frac{4R}{100}\right) = x\left(1 + \frac{3(R+3)}{100}\right)$

$$\Rightarrow \frac{4R}{100} = \frac{3R+9}{100} \quad \Rightarrow \quad R = 9\% \text{ p.a.}$$

7. (c); Let the total money invested be Rs. P.

According to question:

$$\Rightarrow 500 = \frac{\left(\frac{P}{3} \times 4 \times 1\right)}{100} + \frac{\left(\frac{P}{4} \times 3 \times 1\right)}{100} + \frac{\left[\left(P - \left(\frac{P}{3} + \frac{P}{4}\right)\right) \times 5 \times 1\right]}{100}$$

$$\Rightarrow \quad 500 = \frac{4P}{300} + \frac{3P}{400} + \frac{25P}{1200}$$

$$\Rightarrow \quad 500 = \frac{16P}{1200} + \frac{9P}{1200} + \frac{25P}{1200} \Rightarrow P = \text{Rs. } 12000$$

8. (a); Let Shruti borrowed Rs. x from one of her friends.
Then remainning amount borrowed from another friend be Rs. (2500 – x)

$\Rightarrow$ Total SI for 1 year = Rs. 180

$$\Rightarrow \quad 180 = \frac{x \times 8 \times 1}{100} + \frac{(2500 - x) \times 6 \times 1}{100}$$

$$\Rightarrow \quad 180 = \frac{8x}{100} + \frac{6(2500 - x)}{100}$$

$$\Rightarrow \quad 180 = \frac{8x}{100} + \frac{15000 - 6x}{100}$$

$$\Rightarrow \quad 180 = \frac{8x - 6x}{100} + 150$$

$$\Rightarrow \quad 30 = \frac{2x}{100} \quad x = \text{Rs. } 1500$$

9. (b); Let us evaluate overall rate of interest.

$$\Rightarrow \quad SI = \text{Rs. } 312.42 = \frac{2540 \times R \times 1}{100}$$

$$\Rightarrow \quad R = \frac{31242}{2540} = 12.3\%$$

Now using alligation method, we can determine ratio of sum invested in both parts.

12% 12.5%

12.3%

0.2% 0.3%

$\Rightarrow$ 2 : 3

Hence, sum lent at 12% p.a. $= \frac{2}{5} \times 2540$ = Rs. 1016

10. (a); Let the first part be x. Then the second part be (38800 – x)

Now, $\frac{x \times 0.72 \times 1/2}{(38800 - x) \times 0.05 \times 2} = \frac{5}{4}$

1.44x = 19400 – 0.5x $\Rightarrow$ x = 10000

The second part = 38800 – 10000 = Rs. 28800

11. (d); Let the principal (sum of money) be Rs. 100

$\Rightarrow$ Amount after 2 years = Rs. 144

$$\Rightarrow 100\left[\left(1+\frac{R}{100}\right)^2\right] = 144 \Rightarrow \left(1+\frac{R}{100}\right)^2 = \frac{144}{100}$$

$$\Rightarrow 1+\frac{R}{100} = \frac{12}{10};\ R = 20\%.$$

Now, we have to make amount from Rs. 200 to Rs. 400. So, SI would be Rs. 200.

$$\Rightarrow 200 = \frac{200 \times 20 \times T}{100} \Rightarrow T = 5 \text{ years}$$

12. (a); No. of days between 1st January and 8th August (take non-leap year)

(30 + 28 + 31 + 30 + 31 + 30 + 31 + 8) = 219 days

Here, 219 constitutes $\left(\frac{219}{365}\right)$ or $\frac{3}{5}$th of the year

Thus Arun must invest certain sum for $\frac{3}{5}$th of year at 7% to get 42 Rs. (at 42 years of Asha's age)

$$\Rightarrow SI = 42 = \frac{P \times 7 \times 3}{100 \times 5} \Rightarrow P = \text{Rs. } 1000$$

13. (c); Here, Let us assume the rate of interest overall be 8.13% (average interest)

$$= \frac{10000 \times 8.13 \times 1}{100} = SI\ ,\ \ SI = Rs.\ 813$$

Now, the interest levied on different parts must be combined to get resultant interest of Rs. 813.

$\Rightarrow$ 8% of 2000 + 7.5% of 4000 + 8.5% of 1400 + y% of (10000 – 7400). = 813

(where y% = Rate on remainder money)

$$\Rightarrow\ 8 \times 20 + 75 \times 4 + 8.5 \times 14 + \frac{y}{100} \times 2600 = 813$$

$\Rightarrow$ y = 9%

14. (d); The difference in amount of money will determine compound interest of one year

$\Rightarrow$ Hence, Rs. [2977.54 – 2809] = Rs. 168.54

This is the CI levied on Rs. 2809, in one year.

$$\text{Hence, } CI = P\left[1 + \frac{R}{100} - 1\right]$$

$$\Rightarrow\ 168.54 = 2809\left[\frac{R}{100}\right] \Rightarrow \frac{16854}{2809} = R \Rightarrow R = 6\%$$

The amount at CI for 2 years is:

$$\Rightarrow\ 2809 = P\left[1 + \frac{6}{100}\right]^2 \Rightarrow\ 2809 = P\left[\frac{106}{100} \times \frac{106}{100}\right]$$

$\Rightarrow$ P = Rs. 2500

15. (a); The SI obtained after 12 years would be:

$$\Rightarrow\ \frac{9000 \times 8 \times 2}{100} + \frac{9000 \times 9.5 \times 4}{100} +$$

$$\frac{9000 \times 11 \times 2}{100} + \frac{9000 \times 12 \times 4}{100}$$

$\Rightarrow$ 90 [16 + 38 + 22 + 48] = Rs. 11160

$\Rightarrow$ Final amount = P + SI

= Rs. (9000 + 11160) = Rs. 20160

16. (b); Here, Amount $= P\left[\left(1+\frac{R}{100}\right)^2\right]$

$$\Rightarrow 1323 = 1200\left[\left(1+\frac{R}{100}\right)^2\right]$$

$$\Rightarrow \frac{1323}{1200} = \left(1+\frac{R}{100}\right)^2$$

On solving above equation we get Rate of interest R = 5%

Hence, amount of principal = Rs. 1600 in 3 years would become:

$$\Rightarrow A = 1600\left[\left(1+\frac{5}{100}\right)^3\right] = 1600\left[\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}\right]$$

$$= \frac{1600}{8000}[21]^3 = \frac{1}{5}\times 9261 = \text{Rs. } 1852.50$$

17. (c); According to the question

$\Rightarrow$ CI – SI = 183 ...(i)

Here, $SI = \frac{P\times 5\times 3}{100} = \frac{3P}{20}$ ...(ii)

$$\Rightarrow CI = P\left[\left(1+\frac{5}{100}\right)^3 - 1\right] = P\left[\left(\frac{21}{20}\right)^3 - 1\right] = P\left[\frac{1261}{8000}\right] \quad ...(iii)$$

Putting values of (ii) and (iii) in (i):

$$\Rightarrow \frac{1261}{8000}P - \frac{3P}{20} = 183 \Rightarrow \frac{1261P}{8000} - \frac{1200P}{8000} = 183$$

$\Rightarrow$ 61P = 183 × 8000 $\Rightarrow$ P = Rs. 24000

18. (d); Here, $CI = P\left[\left(1+\frac{R}{100}\right)^3 - 1\right]$

$\Rightarrow \quad 504.40 = P\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$

$\Rightarrow \quad 504.40 = P\left[\left(\frac{21}{20}\right)^3 - 1\right] \Rightarrow \quad 504.40 = P\left[\frac{1261}{8000}\right]$

$\Rightarrow$ P(Principal) = Rs. 3200

$\Rightarrow \quad SI = \frac{P \times R \times T}{100} = \frac{3200 \times 5 \times 3}{100}$ = Rs. 480

19. (a); Here, P = Rs. 1500, R = 25% p.a.
n = ? (No. of years)
Now according to question:

$\Rightarrow \quad P\left[\left(1+\frac{R}{100}\right)^n\right] > 2P \quad \Rightarrow \left(1+\frac{25}{100}\right)^n > 2 \Rightarrow \quad \left(\frac{5}{4}\right)^n > 2$

By hit and trial method, we get $\Rightarrow$ n = 4 years

20. (c); Here, SI for 3 years = Rs. 240

SI for 1 year $= \text{Rs.}\ \frac{240}{3}$

SI for 2 years $= \text{Rs.}\ \frac{240}{3} \times 2$ = Rs. 160

$\Rightarrow \quad 160 = \frac{P \times R \times 2}{100} \quad \Rightarrow$ PR = 8000

Hence, $(164 - 160) = P\left(\frac{R}{100}\right)^2$

$\Rightarrow \quad 4 = P\left[\frac{8000}{P \times 100}\right]^2 \quad \Rightarrow \quad 4 = \frac{P \times 8000 \times 8000}{P^2 \times (10000)}$

$\Rightarrow$ P = Rs. 1600

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Previous Year Memory Based

1. (c); Here, Amount = Principal + SI

$$\Rightarrow P+\frac{P\times R\times T}{100} \Rightarrow P\left[1+\frac{RT}{100}\right]$$

$$\Rightarrow 4000\left[1+\frac{5\times 2}{100}\right]=\text{Rs. } 4400$$

2. (e); Let the rate of interest = R%

$$\Rightarrow SI=\frac{P\times R\times T}{100}$$

$$1875=\frac{2500\times R\times 6}{100} \quad \text{or} \quad R=12.5\%$$

Required SI on Rs. 6875

$$=\frac{6875\times 12.5\times 6}{100}=\text{Rs. } 5156.25$$

3. (b); Let the sum lent by Manish to Sunil be Rs. x

SI received when Manish borrowed from Anil earlier

$$=\frac{1150\times 6\times 3}{100}=\text{Rs. } 207$$

Now Manish added some money to borrowed sum and gave it to Sunil. Hence, he gains Rs. 274.95

According to question:

$$\Rightarrow \frac{x\times 9\times 3}{100}=\text{Rs.}\left[207+274.95\right]$$

On solving, it x = Rs. 1785

4. (b); Let the money given to Mohit be Rs. x

[SI (Suhit→Mohit)] – [SI (Vikas→Suhit)] = Rs. 618

$$\frac{x\times 16\times 3}{100}-\frac{6300\times 14\times 3}{100}=618 \Rightarrow x=\text{Rs. } 6800$$

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5. (d); At 1st case,
Let SI be x

$$\Rightarrow \quad x = \frac{P \times R \times 4}{100} \quad ...(i)$$

$$1.5x = \frac{P \times R \times 6}{100} \quad ...(ii)$$

From (i) and (ii), we can not determine the rate of interest. Hence, information given is incomplete.

6. (e); According to question:

$$8190 = \underbrace{\frac{P \times 6 \times 1}{100}}_{\text{1st year}} + \underbrace{\frac{P \times 7.5 \times 1}{100}}_{\text{2nd year}} + \underbrace{\frac{P \times 9 \times 1}{100}}_{\text{3rd year}}$$

$$8190 = \frac{6P}{100} + \frac{7.5P}{100} + \frac{9P}{100} \quad \Rightarrow \text{ P = Rs. 36400}$$

7. (a); According to given question:
Here, SI = $P_2 - P_1$ = Rs. [12710 – 10250] = Rs. 2460

$$2460 = \frac{10250 \times 4 \times T}{100} \quad \Rightarrow \quad \text{T = 6 years}$$

8. (d); $R = \frac{SI \times 100}{P \times T} = \frac{120 \times 100}{600 \times 4} = 5\%$

Now, from the second part of the question
R = 5 + 2 = 7%

$$\therefore \quad SI = \frac{600 \times 7 \times 4}{100} = \text{Rs. } 168$$

$\therefore$ Amount = P + SI = 600 + 168 = Rs. 768

9. (c); Let the principal be Rs. x.
$\therefore$ Interest = (19050 – x)

$$\text{Now, Principal} = \frac{\text{Interest} \times 100}{\text{Time} \times \text{Rate}}$$

$$\Rightarrow \quad x = \frac{(19050 - x) \times 100}{3 \times 9}$$

$\Rightarrow$ 27x = 1905000 – 100x $\Rightarrow$ 127x = 1905000

$$\Rightarrow \quad x = \frac{1905000}{127} = \text{Rs. } 15000$$

10. (a); Interest on Re 1 in 4 years = Rs. 0.4

$\therefore$ Interest on Rs. 100 in 4 years = Rs. 40

$\therefore$ Interest on Rs. 100 in 1 year = Rs. 10

$$\therefore \quad \text{Interest} = \frac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$$

$$= \frac{450 \times 2 \times 10}{100} = \text{Rs. } 90$$

11. (c); Let the required time = t years

Simple interest = Rs. (11442 – 9535) = Rs. 1907

$$SI = \frac{PRT}{100} \Rightarrow 1907 = \frac{9535 \times 4 \times t}{100}$$

$$\therefore \quad t = \frac{1907 \times 100}{9535 \times 4} = 5 \text{ years}$$

12. (e); Here, Sushma received total SI as Rs. 138

$$\Rightarrow \quad 138 = \frac{P_1 \times R_1 \times T_1}{100} + \frac{P_2 \times R_2 \times T_2}{100}$$

$$138 = \frac{3000 \times 4 \times 1}{100} + \frac{P_2 \times 5 \times 1}{100} \quad \Rightarrow P_2 = \text{Rs. } 360$$

13. (d); Simple interest (I) $= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$$\text{I for 1st case} = \frac{200000 \times 12 \times 1}{100} = \text{Rs. } 24000$$

I for 2nd case $= \frac{200500 \times 13 \times 1}{100} =$ Rs. 26065

He would receive (26065 – 24000) = Rs. 2065 more as interest

14. (c); It would be very time saving if we do it by unitary method.
873 – 756 = Rs. 117
Rs. 117 is the interest for 1.5 years
So, Rs. 78 is the interest for 1 year
It means Rs. 156 is the interest for 2 years at actual principal.
Principal = 756 – 156 = Rs. 600

$$SI = \frac{(P \times R \times T)}{100} \Rightarrow P = \text{Rs. } 600,\ SI = 78,\ T = 1$$

So, R = 13%

15. (e); The annual payment that will discharge a debt of Rs. A due in t years at the rate of interest r% per annum is

$$= \frac{100A}{100t + \frac{rt(t-1)}{2}} = \frac{100 \times 770}{5 \times 100 + \frac{5 \times 4 \times 5}{2}} = \text{Rs. } 140$$

16. (d); Let his deposit = Rs. 100
Interest for first 2 years = Rs. 6
Interest for next 3 years = Rs. 24
Interest for the last years = Rs. 10
Total interest = Rs. 40
When interest is Rs. 40, deposited amount is Rs. 100
When interest is Rs. 1520, deposited amount

$$= \frac{100}{40} \times 1520 = \text{Rs. } 3800$$

17. (b); Amount of 1st part $= \frac{110}{100} \times 1^{st}$ part

Amount of 2nd part $= \frac{115}{100} \times 2^{nd}$ part

Amount of 3st part $= \frac{120}{100} \times$ 3rd part

According to the question, these amounts are equal 110 × 1st part = 115 × 2nd part = 120 × 3rd part

1st part: 2nd part: 3rd part $= \frac{1}{110} : \frac{1}{115} : \frac{1}{120}$

$= \frac{1}{22} : \frac{1}{23} : \frac{1}{24} = 23 \times 24 : 22 \times 24 : 22 \times 23$

23 × 12 : 11 × 12 : 11 × 23 = 276 : 264 : 253

Hence, dividing Rs. 4758 into three parts in the ratio 276 : 264 : 253,

we have 1st part = Rs. 1656, 2nd part = Rs. 1584, 3rd part = Rs. 1518

18. (b); After t years, let P = Rs. 4x and Amount = Rs. 5x.

P + SI for t years = Rs. 5x. ...(i)

P : [P + SI for (t + 3) years] = 5 : 7

$= 1 : \frac{7}{5} = 4x : \left(\frac{7}{5} \times 4x\right) = 4x : \frac{28x}{5}$

P + SI for (t + 3) years $=$ Rs. $\frac{28x}{5}$ ...(ii)

On subtracting (i) from (ii), we get:

SI for 3 years $=$ Rs. $\left(\frac{28x}{5} - 5x\right) = \frac{3x}{5}$

SI on Rs. 4x for 3 years $= \frac{3x}{5}$

$\Rightarrow$ Rate $= \left(\frac{100 \times \frac{3x}{5}}{4x \times 3}\right)$%p.a. $=$ 5%p.a.

19. (a); $CI = P\left[\left(1+\frac{R}{100}\right)^2 - 1\right] = 7850 \times \left[\left(1+\frac{14}{100}\right)^2 - 1\right]$

$$= 7850 \times \left(\frac{114}{100} \times \frac{114}{100} - 1\right) = 7850\left[\frac{12996 - 10000}{10000}\right]$$

$$= 7850 \times \frac{2996}{10000} = \text{Rs. } 2351.86$$

20. (a); $6500.52 = P\left[\left(1+\frac{15}{100}\right)^3 - 1\right]$

$$= P\left[\frac{23 \times 23 \times 23 - 20 \times 20 \times 20}{20 \times 20 \times 20}\right] = \frac{P \times 4167}{8000}$$

$$\therefore \quad P = \frac{6500.52 \times 8000}{4167} = \text{Rs. } 12480$$

21. (d); $CI = 7400\left[\left(1+\frac{13.5}{100}\right)^2 - 1\right] = 7400\left[\left(\frac{113.5}{100}\right)^2 - 1\right]$

$$= 7400\left[\frac{12882.25 - 10000}{10000}\right] = 7400 \times \frac{2882.25}{10000} = \text{Rs. } 2132.87$$

22. (b); $1414.4 = P\left[\left(1+\frac{8}{100}\right)^2 - 1\right] \Rightarrow 1414.4 = P \times (1.1664 - 1)$

$$\Rightarrow \quad P = \frac{1414.4}{0.1664} = \text{Rs. } 8500$$

$\therefore$ Amount = 8500 + 1414.4 = Rs. 9914.4

23. (b); According to formula

$$A = P\left[1+\frac{R_1}{100}\right]\left[1+\frac{R_2}{100}\right]\left[1+\frac{R_3}{100}\right]$$

$$5305.53 = P\left(1+\frac{1}{100}\right)\left(1+\frac{2}{100}\right)\left(1+\frac{3}{100}\right)$$

$$P = \frac{5305.53}{1.01\times1.02\times1.03} = \text{Rs. } 5000$$

24. (a); Required difference $= \frac{P\times r^2}{(100)^2}\left(\frac{r}{100}+3\right)$

$$\Rightarrow\ 595.35 = \frac{P\times15\times15}{100\times100}\left(\frac{15}{100}+3\right) = \frac{225P}{10000}\times\frac{315}{100}$$

$$\therefore\ P = \frac{595.35\times1000000}{225\times315} = \text{Rs. } 8400$$

25. (c); Principal $= \frac{1000\times100}{4\times5} = \text{Rs. } 5000$

$$\therefore\ \text{Required CI} = 10000\left[\left(1+\frac{5}{100}\right)^2-1\right]$$

[Principal is double of original one]

$$= 10000\left[\frac{441-400}{400}\right] = 10000\times\frac{41}{400} = \text{Rs. } 1025$$

26. (b); $SI = \frac{P\times R\times T}{100} \Rightarrow 7200 = \frac{20000\times R\times3}{100} \Rightarrow R = 12\%$

Hence, $CI = P\left[\left(1+\frac{R}{100}\right)^3-1\right]$

$$= 20000\left[\left(1+\frac{12}{100}\right)^3 - 1\right] = 20000\left[\left(\frac{28}{25}\right)^3 - 1\right]$$

$$= 20000\left[\frac{21952-15625}{15625}\right] = 20000\left[\frac{6327}{15625}\right] = \text{Rs. } 8098.56$$

27. (e); In 2003, the population of state is 15 lakhs.
Now, we have to determine the population of state in 2005.

$$A = P\left[1+\frac{r}{100}\right]^2$$

[where P = Initial population
and r = rate / year
A = Population in 2005]

$$\Rightarrow \text{ 15 Lakh}\left[1+\frac{10}{100}\right]^2 \Rightarrow \text{ 15 Lakh} \times \frac{121}{100} \Rightarrow \text{ 18.15 Lakhs}$$

28. (b); The present value of machine is Rs. 29644.032
To determine its rate 3 years ago,
The formula to determine is:

$$\frac{P}{\left[1-\frac{r}{100}\right]^3} \qquad \left[\begin{array}{c}\text{where P = Present value of machine} \\ \text{r = Rate of depreciation / yr}\end{array}\right]$$

$$= \frac{29644.032}{\left[1-\frac{12}{100}\right]^3} = \frac{29644.032}{\left(\frac{88}{100}\right)^3}$$

$$= \frac{29644.032 \times 100 \times 100 \times 100}{88 \times 88 \times 88} = \text{Rs. } 43500$$

29. (a); Initially, the no. of students admitted in college in 2008 were = 5000
The no. of students admitted in college gets increased by 24% every year.

$$= P\left[1+\frac{r}{100}\right]^2 \quad \begin{bmatrix} P = \text{No. of students} \\ R = \text{Rate of increase} \end{bmatrix}$$

$$= 5000\left[1+\frac{24}{100}\right]^2 = \text{Rs. } 7688$$

30. (b); Initially the SI was Rs. 7128

$$\Rightarrow \quad SI = \frac{P \times R \times T}{100} \quad \Rightarrow \quad 7128 = \frac{19800 \times R \times 3}{100}$$

$$\Rightarrow \quad R = 12\%$$

$$\Rightarrow \quad CI = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$$

$$= 19800\left[\left(1+\frac{12}{100}\right)^3 - 1\right] \text{ (Time = 3 years)}$$

$= 19800\ [(1.12)^3 - 1] = 19800\ [1.4049 - 1]$

= Rs. 8017.5744

31. (b); If the difference between CI and SI for 2 years is given then the Principal can be found using:

$$\Rightarrow \quad \text{Principal} = \frac{(\text{Difference}) \times (100)^2}{(\text{Rate})^2}$$

$$= \frac{16 \times (100)^2}{(5)^2} = \text{Rs. } 6400$$

32. (b); Let the population of town be 100

$$\underset{(\text{Initial})}{100} \xrightarrow[(\text{Increase})]{25\%} \underset{(\text{1st year})}{125} \xrightarrow[(\text{Decrease})]{15\%} \underset{(\text{2nd year})}{106.25}$$

If the initial population of city is 100, then final population becomes 106.25

Hence, if initial population was 11200, then final population becomes

$$= \frac{106.25}{100} \times 11200 = 11900$$

33. (b); The production in factory in 2008 was Rs. 70 lakh tonnes

The production after 2 years would becomes:

$$\Rightarrow \ P\left(1+\frac{R}{100}\right)^2 \ \Rightarrow \ 70 \text{ Lakh}\left[1+\frac{8}{100}\right]^2$$

$$\Rightarrow \ 70 \text{ Lakh}\left(1+\frac{2}{25}\right)^2 = 81.648 \text{ lakh tonnes}$$

34. (b); $\text{A's SI} = \frac{6000 \times 5 \times 2}{100} = 600$

$$\text{B's Amount} = 5000\left[1+\frac{8}{100}\right]^2 = 5000\left[\frac{27}{25}\right]^2 = \text{Rs. } 5832$$

CI = A – P = 5832 – 5000 = 832

Difference between their interest = 832 – 600 = Rs. 232

35. (a); $A = 10000\left[1+\frac{4}{100}\right]\left[1+\frac{5}{100}\right]\left[1+\frac{6}{100}\right]$

$$= 10000 \times \frac{26}{25} \times \frac{21}{20} \times \frac{53}{50} = \frac{289380000}{25000} = 11575.20$$

CI = A – P = 11575.20 – 10000 = Rs. 1575.20

36. (c); Rate = 5%, Time = 4 half-years

By the Formula

$$CI = P\left[\left(1+\frac{r}{100}\right)^t - 1\right] = 5000\left[\left(1+\frac{5}{100}\right)^4 - 1\right] = 5000\left[\frac{194481}{160000} - 1\right]$$

$$= \frac{5000 \times 34481}{160000} = \text{Rs. } 1077.5$$

$$SI = \frac{5000 \times 10 \times 2}{100} = \text{Rs. } 1000$$

Difference = 1077.5 – 1000 = Rs. 77.5

37. (c); Let the sum be Rs. P.

By the Formula

$$\Rightarrow CI = P\left[\left(1+\frac{r}{100}\right)^t - 1\right] \quad \Rightarrow 101.50 = P\left[\left(1+\frac{3}{100}\right)^2 - 1\right]$$

$$\Rightarrow 101.50 = P\left[\left(\frac{103}{100}\right)^2 - 1\right] \quad \Rightarrow 101.50 = P\left(\frac{10609-10000}{10000}\right)$$

$$\Rightarrow P = \frac{101.50 \times 10000}{609} = \text{Rs. } \frac{1015000}{609}$$

$$\therefore \quad SI = \frac{1015000 \times 2 \times 3}{609 \times 100} = \text{Rs. } 100$$

38. (d); Here, CI = Rs. 1272, t = 2 years, r = 12%

By the Formula

$$\Rightarrow CI = P\left[\left(1+\frac{r}{100}\right)^t - 1\right] \quad \Rightarrow 1272 = P\left[\left(1+\frac{12}{100}\right)^2 - 1\right]$$

$$\Rightarrow 1272 = P\left[\left(\frac{112}{100}\right)^2 - 1\right] \quad \Rightarrow 1272 = P \times 0.2544$$

$$\Rightarrow P = \text{Rs. } 5000 \quad \Rightarrow \text{Now, } SI = \frac{P \times r \times t}{100}$$

$$\Rightarrow SI = \frac{5000 \times 12 \times 2}{100}$$

$\therefore$ SI = Rs. 1200

39. (a); $A = P\left(1+\frac{r}{100}\right)^t$

$$\therefore \quad 3840 = P\left(1+\frac{r}{100}\right)^4 \quad ...(i)$$

$$3936 = P\left(1+\frac{r}{100}\right)^5 \quad ...(ii)$$

On dividing Eq. (ii) by Eq. (i), we get

$$\frac{3936}{3840} = 1+\frac{r}{100} \quad \Rightarrow \quad \frac{3936}{3840} - 1 = \frac{r}{100}$$

$$\Rightarrow \frac{3936-3840}{3840} = \frac{r}{100}$$

$$\Rightarrow \frac{96}{3840} = \frac{r}{100} \Rightarrow r = \frac{96\times 100}{3840}$$

$\therefore$ r = 2.5% per annum

40. (a); Difference between CI and SI $= \frac{Pr^2}{(100)^2}$

$$\Rightarrow \quad 4 = \frac{P\times 16}{10000} \quad \Rightarrow \quad P = \frac{10000}{4} = \text{Rs. } 2500$$

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Chapter 6

Average

Average: Average is defined as the sum of different data (terms) divided by total number of terms

$$\text{Average} = \frac{\text{Sum of given terms (S)}}{\text{Total number of terms (N)}}$$

Example: Find the average of given terms 2, 3, 4, 5, 6

Sol. Total number of terms = 5

$$\text{Average} = \frac{2+3+4+5+6}{5} = 4$$

Some Basic Formulae

1. Average of 'n' natural number = $\frac{(n+1)}{2}$
2. Average of 'n' even numbers = (n + 1)
3. Average of 'n' odd numbers = n
4. Average of 'n' consecutive natural numbers

$$= \frac{\text{First number} + \text{Last number}}{2}$$

5. Average of sum of squares of first 'n' natural numbers

$$= \frac{(n+1)(2n+1)}{6}$$

Some Important Points:

1. If the value of each number is increased by the same value 'a', then the average of all numbers will also increase by 'a'.
2. If the value of each number is decreased by the same value 'a', then the average of all numbers will also decrease by 'a'.
3. If the value of each number is multiplied by the same value 'a', then the average of all numbers will also get multiplied by 'a'.
4. If the value of each numbers is divided by the same value 'a', then the average of all numbers will also get divided by 'a'.

Some useful Formulae

1. If the average of 'x' numbers is a and that of 'y' numbers is b, then the average of (x + y) numbers = $\frac{xa+yb}{x+y}$

   Example:The average of 10 numbers is 15 and that of 15 numbers is 20. Find the average of all 25 numbers?

   Sol.Average = $\frac{10\times15+15\times20}{10+15}$ = $\frac{150+300}{25}$ = $\frac{450}{25}$ = 18

2. If the average of 'n' quantities is equal to 'x' when a quantity is removed the average becomes 'y'. Then the value of the removed quantity is = [n (x – y) + y]

   Example:The average age of 24 men and 1 woman is equal to 35 years. If 1 woman left, the average becomes 34 years. Find the age of woman who left the class?

   Sol:Age of women = [25(35 – 34) + 34] = 59 years

3. If the average of marks obtained by 'n' students in an exam is 'M'. If the average marks of passed students in 'P' and that of failed students is 'F'. Then the number of students who failed in exam is $\frac{n(P-M)}{P-F}$.

   No. of failed students

   $$= \frac{\text{Total students(Passed average} - \text{Total average)}}{\text{Passed average} - \text{Failed average}}$$

   Example: The average marks obtained by 125 students in an exam is 29. If the average marks of passed students is 36 and that of failed students is 11. Find the numbers of failed students?

   Sol. No of failed students = $\frac{125(36-29)}{36-11}$ = $\frac{125\times7}{25}$ = 35

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4. If a batsman in his nth innings makes a score of 's' and thereby increased his average by 't' then the average after 'n' innings is 's – t(n – 1)]

Example: A bastman in his 44th innings makes a score of 86 and thereby increases his average by 1. Find the average after 44 innings?

Sol. Average after 44th innings = (86 – 1(44 – 1)) = 86 – 43 = 43

Types of Questions

1. A bastman scores 34, 36, 38, 40, 42, in his five innings respectively. Find the average runs in the five innings?

Sol. Average runs = $\frac{34+36+38+40+42}{5} = \frac{190}{5} = 38.$

2. The average of 10 quantities is 12. The average of 6 of them is 8. What is the average of remaining four numbers.

Sol. The required average = $\frac{10 \times 12 - 6 \times 8}{10 - 6} = 18.$

3. Average of marks obtained by 120 candidates in a certain examination is 35. If the average marks of passed candidates is 39 and that of the failed candidates is 15, what is number of candidates who passed the examination?

Sol. Let the number of passed candidates be x.

Then, total marks = 120 × 35 = 39x + (120 – x) × 15

or, 4200 = 39x + 1800 – 15x

or, 24x = 2400 ∴ x =100

∴ number of passed candidates = 100.

4. The average salary of the entire staff in a office is Rs. 120 per month. The average salary of officers is Rs. 460 and that of non-officers is Rs 110. If the number of officers is 15, then find the number of non-officers in the office.

Sol. Let the required number of non-officers = x

Then, 110x + 460 × 15 = 120 (15 + x)

or, 120x – 110x = 460 × 15 – 120 × 15 = 1 (460 – 120)

or, 10x = 15 × 340; ∴ x = 15 × 34 = 510

No. of non-officers = No. of officers ×

$$\left(\frac{\text{Av. salary of officers} - \text{Mean average}}{\text{Mean average} - \text{Av. Salary of non} - \text{officers}}\right) = 15\left(\frac{460-120}{120-110}\right) = 510.$$

5. The average of the first and the second of three numbers is 10 more than the average of the second and the third of these numbers. What is the difference between the first and third of these three numbers?

Sol. Average of the first and the second numbers = $\frac{\text{First + Second}}{2}$

Average of the second and the third numbers = $\frac{\text{Second + Third}}{2}$

According to the question, $\frac{\text{First + second}}{2} - \frac{\text{Second + Third}}{2} = 10$

∴ First – Third = 20

6. The average height of 50 students of a class is 152 cm. If 10 among them whose average height is 148 cm left the class and 10 new boys of average height 150 cm are included in the class, then what will be the new average height of the students of the class?

Sol. The total height of 50 students = 152 × 50 = 7600cm

Total decrease in the height when 10 students left the class

= 148 × 10 = 1480 cm

Total increase in the height after 10 new students came

= 10 × 150 = 1500 cm

Now, Total height of 50 students = 7600 – 1480 + 1500 = 7620cm

New average = $\frac{7620}{50} = 152.4$ cm

7. The sum of the present ages of Hari and Mohan is double the difference of their present ages. Four years ago this ratio was one and half times. Find the ratio of their ages after 12 years.

Sol. Let the present ages of Hari and Mohan be respectively x years and y years then

$x + y = 2(x - y)$, $x = 3y$ ... (i)

From the question, $(x - 4 + y - 4) = \frac{3}{2}\{(x - 4) - (y - 4)\}$

or, $2x + 2y - 16 = 3x - 3y$

or, $5y - x = 16$ ... (ii)

Solving eqn (i) and (ii),

$x = 24$ and $y = 8$

Hari's age after 12 years = 24 + 12 = 36 years

Mohan's age after 12 years = 8 + 12 = 20 years

The ratio of their ages = 36 : 20 = 9 : 5

8. The present age of Geeta is 5 year more than the present age of his brother Mahesh. The present age of their father is twice the sum of their ages. At the time of Mahesh's birth their father's age was 8 times of the age of Geeta. Find their present ages.

Sol. Let the present age of Mahesh is x years then the present age of Geeta will be x + 5 and the present age of their father will be 2(x + x + 5) = 4x + 10 years.

The age of Geeta at the time of Mahesh's birth will be $x + 5 - x = 5$ years while the age of the father will be $4x + 10 - x = 3x + 10$ years

From the question,

$3x + 10 = 5 \times 8$

or, $3x = 40 - 10 = 30$ or, $x = 10$ years

and $x + 5 = 15$ and $4x + 10 = 50$ years

So, the ages of Mahesh, Geeta and their father are 10, 15 and 50 years respectively.

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Foundation

1. A motorist covered the first 20 km of his journey in 30 minutes and the remaining 29 km in 40 minutes. His average speed in km / hr is:

(a) $41\frac{3}{4}$ (b) 42 (c) 49

(d) $57\frac{1}{6}$ (e) None of these

2. A cyclist goes from a place to another and returns by the same route. He pedals his way uniformly with speed u while going and with speed v while returning. The average speed of his journey is :

(a) $\frac{u+v}{2}$ (b) $\frac{u-v}{2}$ (c) $\frac{1}{\frac{1}{2}\left(\frac{1}{u}+\frac{1}{v}\right)}$

(d) $\frac{1}{\frac{1}{2}\left(\frac{1}{u}-\frac{1}{v}\right)}$ (e) None of these

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3. The mean of 19 observations is 4. If one more observation of 24 is added to the data, the new mean will be:

(a) 4 (b) 5 (c) 6
(d) 7 (e) None of these

4. A student bought 4 books for Rs. 120 from one book shop and 6 books for Rs. 150 from another. The average price (in rupees), he paid per book was :

(a) 27 (b) 27.50 (c) 135
(d) 138 (e) None of these

5. The average of the price per kg. of rice at 10 different places was Rs. 4.85. After a week, the price per kg. was increased by 20 paise at 3 places and decreased by 10 paise at one place. The new average of price per kg is:

(a) Rs. 4.88 (b) Rs. 4.86 (c) Rs. 4.90
(d) Rs. 5.35 (e) None of these

6. The average weight of a group of 20 boys was calculated to be 89.4 kg and it was later discovered that one weight was misread as 78 kg instead of the correct one of 87 kg. The correct average weight is :
(a) 88.95 kg (b) 89.25 kg (c) 89.55 kg
(d) 89.85 kg (e) None of these

7. A class has 20 boys and 30 girls. The average age of boys is 11 years and that of girls is 12 years. What is the average age of the whole class
(a) 11.6 years (b) 12 years (c) 10 years
(d) 11.2 years (e) None of these

8. Find the average of the following set of scores 253, 124, 255, 534, 836, 375, 101, 443, 760
(a) 427 (b) 413 (c) 141
(d) 490 (e) None of these

9. What will be the average of even numbers between 11 to 63?
(a) 37.5 (b) 47 (c) 42
(d) 37 (e) None of these

10. Find average of all prime numbers between 60 and 90.
(a) 72 (b) 74.7 (c) 74
(d) 73.6 (e) None of these

11. Average age of 5 boys is 16 yr, of which that of 4 boys is 16 yr 3 months. The age of the 5th boy is
(a) 15 yr (b) 15 yr 6 months (c) 15 yr 4 months
(d) 15 yr 2 months (e) None of these

12. The average age of 30 girls is 13 yr. The average of first 18 girls is 15 yr. Find out the average age of remaining 12 girls?
(a) 12 yr (b) 10 yr (c) 16 yr
(d) 10.5 yr (e) None of these

13. The average of 13 results is 60. If the average of first 7 results is 59 and that of last 7 results is 61, what will be the seventh result?
(a) 90 (b) 50 (c) 75
(d) 60 (e) None of the above

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14. The average of nine numbers is 50. The average of the first five numbers is 54 and that of the last three numbers is 52. Then, the sixth number is?
(a) 34 (b) 24 (c) 44
(d) 30 (e) None of these

15. The average age of 30 women decreases by 3 months if a new person Neha is included in place of a 25 yr old woman. Calculate the age of Neha?
(a) 17.5 yr (b) 20 yr (c) 30 yr
(d) 22 yr (e) None of the above

16. The average salary per head of all workers of an institution is Rs. 60. The average salary per head of 12 officers is Rs. 400. The average salary per head of the rest is Rs. 56. Then, the total number of workers in the institution is?
(a) 1030 (b) 1032 (c) 1062
(d) 1060 (e) None of these

17. A cricketer scored some runs in his continuous 9 innings. He scored 100 runs in his 10th innings and this increased his average by 8 runs. What was the average of his runs at the end of 10th innings?
(a) 20 (b) 24 (c) 28
(d) 32 (e) None of the above

18. The average age of three boys is 15 yr. If the ratio of their ages is 3 : 5 : 7, what is the age of the oldest boy?
(a) 7 yr (b) 14 yr (c) 20 yr
(d) 21 yr (e) None of these

19. Nine friends have a dinner in a hotel. Eight of them spent Rs. 12 each on their meals and the ninth spent Rs. 16 more than the average expenditure of all the nine. Find out the total money spent by them?
(a) Rs. 126 (b) Rs. 135 (c) Rs. 111
(d) Rs. 141 (e) None of these

20. The average of certain first consecutive even number is 101. Find their sum?
(a) 25,000 (b) 33,600 (c) 10100
(d) 24,960 (e) None of these

21. The average of certain first consecutive natural numbers is 20.5. Find their sum.
(a) 282 (b) 450 (c) 518
(d) 820 (e) None of these

22. If the average of m numbers is n^2 and that of n numbers is m^2, then the average of (m + n) numbers is -
(a) $\frac{m}{n}$ (b) $m+n$ (c) mn
(d) m – n (e) None of these

23. A, B, C, D & E are five consecutive even numbers. Average of A and E is 46. What is the largest number?
(a) 52 (b) 42 (c) 50
(d) 48 (e) None of these

24. Of the three numbers whose average is 60, the first is one-fourth of the sum of the others. The first number is
(a) 30 (b) 36 (c) 42
(d) 45 (e) None of these

25. The average salary of 15 persons is Rs. 5,500. If the salary of one person is added, the average increase to Rs. 5,700. What is the salary of this one person?
(a) Rs. 8,700 (b) Rs. 9,500 (c) Rs. 7,800
(d) Rs. 8,500 (e) None of these

26. The average weight of 24 students is 35 kgs. If the weight of teacher is added the average increased by 400 gms. What is the weight of the teacher?
(a) 45 (b) 36 (c) 54
(d) 63 (e) None of these

27. The average of runs of a cricket player of 10 innings was 32. How many runs must he score in his next innings so as to increase his average of runs by 4?
(a) 76 (b) 70 (c) 4
(d) 2 (e) None of these

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28. 10 kg of rice priced at Rs. 12 per kg is mixed with 6 kg of rice priced at Rs. 16 per kg. Find the average price of the whole mixture?
(a) Rs. 14 per kg (b) Rs. 14.50 per kg (c) Rs. 13 per kg
(d) Rs. 13.50 per kg (e) None of these

29. The average of 5 quantities is 6. The average of three of them is 4. What is the average of remaining two quantities?
(a) 2 (b) 5 (c) 9
(d) 7 (e) None of these

30. The average of five numbers is 6.9. If one of the numbers is deleted, the average of the remaining numbers is 4.4. What is the value of the number deleted?
(a) 12.5 (b) 17.2 (c) 16.9
(d) 16.8 (e) None of these

31. The average age of Seema, Sapna, Asha, Kavita and Atrye is 40 years. The average age of Seema and Sapna is 35 years and the average age of Asha and Kavita is 42 years. The age of Atrye is?
(a) 48 (b) 47 (c) 46
(d) 32 (e) None of these

32. The average of 11 numbers is 10.9. If the average of the first six is 10.5 and the average of last six is 11.4, find the middle (sixth) number.
(a) 11 (b) 10.6 (c) 11.5
(d) 10.45 (e) None of these

33. The average temperature from Monday to Thursday is 48°C and from Tuesday to Friday, the average temperature is 52°C. If the temperature on Monday is 42°C, what was it on Friday?
(a) 46°C (b) 58°C (c) 50°C
(d) 45°C (e) None of these

34. Find the average of first 25 multiples of 5.
(a) 65 (b) 60 (c) 75
(d) 80 (e) None of these

35. What was the average daily expenditure of a man in 1999 who spent Rs. 76535 in the first half year and Rs. 88165 in the last?
(a) Rs. 450 (b) Rs. 451.32 (c) Rs. 451.23
(d) Rs. 450.23 (e) None of these

36. The average of 6 numbers is 8. What is the 7th number so that average becomes 10?
(a) 22 (b) 18 (c) 21
(d) 20 (e) None of these

37. The average expenditure of a man for the first five months is Rs. 120 and for the next seven months is Rs. 130. His monthly average income if he saves Rs. 290 in that year, is
(a) Rs. 160 (b) Rs. 170 (c) Rs. 150
(d) Rs. 140 (e) None of these

38. The average salary of 20 workers in an office is Rs. 1900 per month. If the manager's salary is added, the average becomes Rs. 2000 per month. The manager's annual salary (in Rs) is:
(a) Rs. 24000 (b) Rs. 25200 (c) Rs. 45600
(d) Rs. 48000 (e) None of these

39. A club has 15 men and 25 women. The average age of men is 10 years and the average age of women is 12 year. What is the average age of the whole club?
(a) 11.40 years (b) 11.60 years (c) 11.25 years
(d) 12.25 years (e) None of these

40. The average of 12 results is 15, and the average of the first two is 14. What is the average of the rest?
(a) 15.2 (b) 13.2 (c) 15
(d) 16 (e) None of these

Moderate

1. An aeroplane flies along the four sides of a square field at speeds of 200, 400, 600 and 800 km / hr. The average speed of the plane in the flight around the field in km / hr is:
(a) 384 (b) 400 (c) 500
(d) 284 (e) None of these

2. The average speed of a cyclist who covers first, second and third km at 20, 16 and 12 km / hr respectively (in km / hr) is:

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(a) 16.24 (b) 16 (c) 15.66
(d) 15.32 (e) None of these

3. In a class of 100 students, the mean marks obtained in a subject is 30 and in another class of 50 students the mean marks obtained in the same subject is 60. The mean marks obtained by the students of two classes taken together is :
(a) 40 (b) 45 (c) 48
(d) 50 (e) None of these

4. The mean weight of 34 students of a school is 42 kg. If the weight of the teacher be included, the mean rises by 400 g. Find the weight (in kg) of the teacher.
(a) 66 (b) 56 (c) 55
(d) 57 (e) None of these

5. The average weight of 21 boys was recorded as 64 kg. If the weight of the 'teacher was added, the average increased by one kg. What was the teacher's weight?
(a) 86 kg (b) 64 kg (c) 72 kg
(d) 98 kg (e) None of these

6. Roshan bought 5 pants at Rs. 25 each, 10 shirts at Rs. 50 each and 15 ties at Rs. 35 each. Find the average price of all the articles.
(a) Rs. 38.33 (b) Rs. 45 (c) Rs. 60
(d) Rs. 45.33 (e) None of these

7. The mean weight of 150 students in a class is 60 kg. The mean weight of boys is 70 kg and that of girls is 55 kg. What is the number of boys in the class?
(a) 50 (b) 60 (c) 75
(d) 100 (e) None of these

8. The average of the test scores of a class of 'm' students is 70 and that of 'n' students is 91. When the scores of both the classes are combined, the average is 80. What is n / m?
(a) $\frac{11}{10}$ (b) $\frac{13}{10}$ (c) $\frac{10}{13}$
(d) $\frac{10}{11}$ (e) None of these

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9. The average marks of 120 students are 35. If average of passed students was 39 and failed students was 15, then Find the number of students who have passed?
(a) 80 (b) 100 (c) 120
(d) 140 (e) None of these

10. A person covers 9 km with a speed of 3 km / h, 25 km with a speed of 5 km / h and 30 km with a speed of 10 km / h. Find out the average speed of person?
(a) $5\frac{9}{11}$ km / h (b) $11\frac{5}{9}$ km / h (c) $9\frac{5}{11}$ km / h
(d) $5\frac{5}{11}$ km / h (e) None of these

11. Five years ago, the average age of P and Q was 15 yr. Now, average age of P, Q and R is 20 yr. What whould be the age of R after 10 yr?
(a) 35 yr (b) 40 yr (c) 30 yr
(d) 50 yr (e) None of these

12. The average salary of the entire staff in an office is Rs. 500 per day. The average salary of officers is Rs. 750 and that of non-officers is Rs. 250. If the number of officers is 15, then find the number of non-officers in the office?
(a) 25 (b) 10 (c) 15
(d) 20 (e) None of these

13. Three year ago, the average age of a family of five members was 27 yr. The present average age is also 27 yr after the inclusion of a child into the family. Find the age of the child?
(a) 16 yr (b) 12 yr (c) 24 yr
(d) 20 yr (e) None of these

14. The average age of 5 sisters is 20 yr. If the age of the youngest sister be 4 yr, what was the average age of the group of sisters at the birth of the youngest sister?
(a) 25 yr (b) 15 yr (c) 18 yr
(d) 20 yr (e) None of these

15. The average weight of 4 men A, B, C and D, is 67 kg. The 5th man E is included and the average weight decreases by 2 kg. A is replaced by F. The weight of F is 4 kg more than E. Average weight decreases because of the replacement of A and now the average weight is 64 kg. Find the weight of A?

(a) 78 kg (b) 66 kg (c) 75 kg
(d) 58 kg (e) None of these

16. Average of a, b and c is 11; average of c, d and e is 17; average of e and f is 22 and average of e and c is 17. Find out the average of a, b, c, d, e and f?

(a) $15\frac{2}{3}$ (b) $18\frac{1}{2}$ (c) $21\frac{1}{3}$
(d) $16\frac{1}{2}$ (e) None of these

17. The average age of a man and his two twin born on the same day is 30 yr. The ratio of the ages of father and one son is 5 : 2, what is the father's age?

(a) 50 yr (b) 30 yr (c) 45 yr
(d) 20 yr (e) None of these

18. If the average of the ages of Rakesh and Mohan is 15, average of the ages of Mohan and Ramesh is 12 and the average of the ages of Rakesh and Ramesh is 13, then the age of Mohan, is?

(a) 16 (b) 13 (c) 14
(d) 12 (e) None of these

19. The average of three numbers is 28. If first number is half of the second and the 3rd number is twice the second, tthen the third number is?

(a) 48 (b) 36 (c) 24
(d) 18 (e) None of these

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20. The average temperature from Monday to Wednesday is 37°C while the average temperature from tuesday to thursday is 34°C. The temperature of thursday is $\frac{4}{5}$ times to that of Monday. Find the temperature of thursday?
(a) 36°C (b) 33°C (c) 37°C
(d) 34°C (e) None of these

21. The average salary of the entire staff in a office is Rs. 120 per month. The average salary of officers is Rs. 460 and that of non-officers is Rs. 110. If the number of officers is 15, then find the number of non-officers in the office?
(a) 610 (b) 510 (c) 410
(d) Can't be determined (e) None of these

22. The average of marks obtained by 150 candidates in a certain examination is 50. If the average marks of passed candidates is 55 and that of the failed candidates is 25, what is the number of candidates who passed the examination?
(a) 125 (b) 120 (c) 140
(d) 160 (e) None of these

23. The average age of 24 boys and their teacher is 15 years. When the teacher's age is excluded, the average age decreases by 1 year. The age of the teacher is?
(a) 38 years (b) 39 years (c) 40 years
(d) 41 years (e) None of these

24. The average age of 8 members of a group is 40 years. The age of 1 member is 55 yrs. After his retirement a new member comes in his place of age 39. What is the effect of his retirement on the average age of group?
(a) 2 (b) 0 (c) 3
(d) 5 (e) None of these

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25. The average age of 11 players of a cricket team is increased by 2 months when two of them aged 18 years and 20 years are replaced by two new players. The average age of the new players is?
(a) 19 years 1 month (b) 19 years 6 months
(c) 19 years 11 months (d) 19 years 5 months
(e) None of these

26. In a school, the average age of students is 6 years, and the average age of 12 teachers is 40 years. If the average age of the combined group of all the teachers and students is 7 years, then the number of students is?
(a) 396 (b) 400 (c) 408
(d) 416 (e) None of these

27. A batsman has a certain average in 11 innings. In the 12th innings, he scores 90 runs and his average decreases by 5. After the 12th innings what is his average?
(a) 145 (b) 130 (c) 135
(d) 140 (e) None of these

28. A cricketer gives 12.4 runs per wicket. He gives 26 runs and takes 5 wicket in a match after which his average becomes 12 per wicket. How many wickets had been taken till the last match?
(a) 85 (b) 90 (c) 65
(d) 72 (e) None of these

29. The average of a batsman after 25 innings was 56 runs per innings. If after the 26th inning his average increased by 2 runs, then find his score in the 26th inning?
(a) 100 (b) 102 (c) 108
(d) 98 (e) None of these

30. The average age of a class of 30 students and a teacher reduce by 0.5 years if we exclude the teacher. If the initial average is 14 years, find the age of the class teacher?
(a) 29 years (b) 30 years (c) 31 years
(d) 32 years (e) None of these

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31. The average marks of a group of 20 students on a test is reduced by 4 when the topper who scored 90 marks is replaced by a new students. Find the marks of the new student.
(a) 10 (b) 51 (c) 56
(d) 86 (e) None of these

32. The average age of x and y is 20 years. If z were to replace x, the average would be 19 and if z were to replace y, the average would be 21. Find the ages of x, y and z.
(a) 22, 18, 20 (b) 18, 22, 20 (c) 22, 18, 20
(d) 18, 20, 22 (e) None of these

33. The average age of a family of 6 members is 22 years. If the age of the youngest member be 7 years, then what was the average age of the family at the birth of the youngest member?
(a) 18 (b) 15 (c) 13
(d) 26 (e) None of these

34. The average age of 10 men is increased by 2 years when one of them of 25 years age, is replaced by new man. What is the age of new man?
(a) 50 (b) 45 (c) 35
(d) 25 (e) None of these

35. The mean of the marks obtained by 100 students is 60. If the marks obtained by one of the students was incorrectly calculated as 75, whereas the actual marks obtained by him were 65, what is the correct mean of the marks obtained by the students?
(a) 59.9 (b) 59 (c) 58.5
(d) 59.4 (e) None of these

36. A, B, C and D are four consecutive even numbers respectively and their average is 65. What is the product of A and D?
(a) 3968 (b) 4092 (c) 4216
(d) 4352 (e) None of these

37. The average weight of 36 students is 50 kg. If was found later that the weight of one of the student was misread as 73 kg. whereas his actual weight was 37 kg. Find the correct average.
(a) 47 (b) 49.5 (c) 49
(d) 51 (e) None of these

38. The average score of Sachin after 25 innings is 46 runs per innings. If after the 26th innings, his average runs increased by 2 runs, then what is his score in the 26th innings?
(a) 48 (b) 84 (c) 98
(d) 89 (e) None of these

39. 3 years ago the average age of a family of 5 members was 17 years, with the birth of a new baby, the average age of six members remains the same even today. Find the age of the new baby.
(a) 2 years (b) 3 years (c) 5 years
(d) can't be determined (e) None of these

40. The average marks of a student in four subjects is 75. If the student obtained 80 marks in the 5th subject then the new average is?
(a) 80 (b) 76 (c) 92
(d) 95 (e) None of these

Difficult

1. The average weight of A, B and C is 84 kgs. If D joins, the average weight now is 80 kgs. If another person E who is 3 kgs heavier than D replaces A then the average weight of B, C, D and E becomes 79 kgs. what is the weight of A?
(a) 70 kg (b) 75 kg (c) 65 kg
(d) 55 kg (e) None of these

2. A batsman has an average of 30 runs in his 42 inning. The difference between his maximum and minimum score is 100. If these two innings are removed his average for 40 innings comes down to 28. What is his minimum score?
(a) 20 (b) 30 (c) 45
(d) 40 (e) None of these

3. Five years ago the average age of husband and wife was 23 years. Today the average age of husband, wife and child is 20 yrs. How old is child?
(a) 3 yrs (b) 4 yrs (c) 12 yrs
(d) 2 yrs (e) None of these

4. The average age of a husband and wife, who were married 7 years ago, was 25 years at the time of their marriage, Now, the average age of the family, including husband, wife and a child, born during the interval, is 22 years. What is the present age of the child?
(a) 4 yrs. (b) 2 yrs. (c) 3 yrs.
(d) 5 yrs. (e) None of these
5. The average age of mother, father and son was 42 yrs. at the time of the marriage of the son. After one year an infant was born in the family and after 6 yrs of marriage the average age of the family is 36 years. What was the age of the bride at the time of marriage.
(a) 25 yrs. (b) 23 yrs. (c) 22 yrs.
(d) 24 yrs. (e) None of these
6. There were 35 students in a hostel. If the number of students increases by 7, the expenses of the mess increase by Rs. 42 per day while the average expenditure per head decreases by Rs. 1. Find the original expenditure of the mess.
(a) Rs. 420 (b) Rs. 520 (c) Rs. 450
(d) Rs. 550 (e) None of these
7. Ashish has earned an average of 4200 dollars for the first eleven months of the year. If he justifies his staying on in the US on the basis of his ability to earn at least 5000 dollars per month for the entire year, how much should he earn (in dollars) in the last month to achieve his required average for the whole year?
(a) 14,600 (b) 5,800 (c) 12,800
(d) 13800 (e) None of these
8. The sum of three numbers is 98. If the ratio between the first and second is 2 : 3 and that between the second and the third is 5 : 8, then the second number is
(a) 30 (b) 20 (c) 58
(d) 48 (e) None of these
9. The average salary per head of all the workers in a company is Rs. 95. The average salary of 15 officers is Rs. 525 and the average salary per head of the rest is Rs. 85. Find the total number of workers in the workshop.

(a) 660 (b) 580 (c) 650
(d) 460 (e) None of these

10. A batsman makes a score of 270 runs in the 87th inning and thus increases his average by a certain number of runs that is a whole number. Find the possible values of the new average.
(a) 98 (b) 184 (c) 12
(d) All of these (e) None of these

11. 19 persons went to a hotel for a combined dinner party. 13 of them spent Rs. 79 each on their dinner and the rest spent Rs. 4 more than the average expenditure of all the 19. What was the total money spent by them.
(a) 1628.4 (b) 1534 (c) 1492
(d) 1496 (e) None of these

12. The average age of a group of persons going for a picnic is 16.75 years. 20 new persons with an average age of 13.25 years join the group on the spot due to which the average of the group becomes 15 years. Find the number of persons initially going for the picnic?
(a) 24 (b) 20 (c) 15
(d) 18 (e) None of these

13. The average salary of workers in AMS careers is Rs. 2,000, the average salary of faculty being Rs. 4,000 and the management trainees being Rs. 1,250. The total number of workers could be
(a) 450 (b) 300 (c) 110
(d) 500 (e) None of these

14. 10 years ago the average age of all the 25 teachers of the Girls college was 45 years. 4 years ago, the principal has retired from her post at the age of 60 year. So after one year a new principal whose age was 54 years recruited from outside. The present average age of all the teachers is, if principal is also considered as a teacher:
(a) $54\frac{18}{25}$ years (b) $55\frac{17}{25}$ years (c) $49\frac{1}{2}$ years
(d) $49\frac{2}{3}$ years (e) None of these

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15. The average weight of all the 11 players of Indian cricket team is 50 kg. If the average of first six lightest weight players is 49 kg and that of the six heaviest players is 52 kg. The average weight of the player which lies in the sixth position in the list of players when all the 11 players are arranged in the order of increasing or decreasing weights:
(a) 56 kg (b) 52 kg (c) 51 kg
(d) 50 kg (e) None of these

16. The average age of Sachin and Ganguli is 35 years. If Kaif replaces Sachin, the average age becomes 32 years and if Kaif replaces Ganguli, then the average age becomes 38 years. If the average age of Dhoni and Irfan be half of the average age of Sachin, Ganguli and Kaif, then the average age of all the five people is:
(a) 28 years (b) 32 years (c) 25 years
(d) 26 years (e) None of these

17. The average age of a family of 6 members 4 year ago was 25 years. Mean while a child was born in this family and still the average age of the whole family is same today. The present age of the child is:
(a) 2 years (b) $1\frac{1}{2}$ years (c) 1 year
(d) data insufficient (e) None of these

18. Amitabh's average expenditure for the January to June is Rs. 4200 and he spends Rs. 1200 in January and Rs. 1500 in July. The average expenditure for the month of February to July is:
(a) Rs. 4250 (b) Rs. 4520 (c) Rs. 4060
(d) Rs. 4200 (e) None of these

19. The average price of 80 computers in an electronic shop is Rs. 30,000. If the highest and lowest price computers are sold out then the average price of the remaining 78 computers is Rs. 29,500. The cost of the highest price computer is Rs. 80,000. The cost of lowest price computer is:
(a) Rs. 19,000 (b) Rs. 20,000 (c) Rs. 29,000
(d) can't be determined (e) None of these

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20. Eleven years earlier the average age of a family of 4 members was 28 years. Now the age of the same family with six members is yet the same, even when 2 children were born in this period. If they belong to the same parents and the age of the first child at the time of the birth of the younger child was same as there were total family members just after the birth of the youngest member of this family, then the present age of the youngest member of the family is :
(a) 3 years (b) 5 years (c) 6 years
(d) 4 years (e) None of these

21. Mr. Patel walked 6 km to reach the station from his house, then he boarded a train whose average speed was 60 km/hr and thus he reached his destination. In this way he took total of 3 hours. If the average speed of the entire journey was 32 km/hr then the average speed of walking is :
(a) 3 km/hr (b) 4.5 km/hr (c) 4 km/hr
(d) 5 km/hr (e) None of these

22. In a set of prime and composite numbers, the composite numbers are twice the number of prime number and the average of all the numbers of the set is 9. If the number of prime numbers and composite numbers are exchanged then the average of the set of numbers is increased by 2. If during the exchange of the numbers the average of the prime numbers and composite numbers individually remained constant, then the ratio of the average of composite numbers to the average of prime numbers (initially) was:
(a) $\frac{7}{13}$ (b) $\frac{13}{7}$ (c) 9/11
(d) $\frac{7}{11}$ (e) None of these

23. The average marks of Sameer decreased by 1, when he replaced the subject in which he has scored 40 marks by the other two subjects in which he has just scored 23 and 25 marks respectively. Later he has also included 57 marks of Computer Science, then the average marks increased by 2. How many subjects were there initially?

(a) 6 (b) 12 (c) 15
(d) can't be determined (e) None of these

24. The average age of Donald, his wife and their two children is 23 years. His wife is just 4 year younger than Donald himself and his wife was 24 years old when his daughter was born. He was 32 years old when his son was born. Th average age of Donald and his daughter is :
(a) 25 years (b) 22.5 years (c) 26 years
(d) can't be determined (e) None of these

25. There are 6 consecutive odd numbers in increasing order. The difference between the average of the squares of the first 4 numbers and the last four numbers is 64. If the sum of the squares of the first and the last element (i.e., odd numbers) is 178, then the average of all the six numbers is:
(a) 7 (b) 8 (c) 9
(d) 10 (e) None of these

26. The average age of board of directors of a company, having 10 directors was 48 years. Coincidentally when a director aged 53 resigned from the board of directors, another director died on the same day. So a new director joined the board of directors aged 34. Next year in the same month the average age of all the 9 directors was found to be 46 years. The age of the late (i.e., dead) director at the time of his death was :
(a) 56 years (b) 53 years (c) 57 years
(d) 61 years (e) None of these

Previous Year (Memory Based)

1. The average of 6 numbers is 20. If one number is removed, the average becomes 15. What is the number removed?
(a) 5 (b) 35 (c) 112
(d) 45 (e) None of these

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2. After replacing an old member by a new member, it was found that the average age of five members of a club is the same as it was 3 yr ago. The difference between the ages of the replaced and the new member is
(a) 2 yr (b) 4 yr (c) 8 yr
(d) 15 yr (e) None of these
3. The average of first 25 numbers is 10 and the average of the next 25 numbers is 12. The average of all 50 numbers is
(a) 10 (b) 12 (c) 15
(d) 11 (e) None of these
4. If the average of m numbers is n^2 and that of n numbers is m^2, then the average of (m + n) numbers is
(a) $\frac{m}{n}$ (b) mn (c) m – n
(d) m + n (e) None of these
5. The average of the first nine integral multiples of 3 is
(a) 12 (b) 15 (c) 18
(d) 21 (e) None of these
6. The mean of 11 numbers is 35. If the mean of first 6 numbers is 32 and that of the last 6 numbers is 37, then find the sixth number.
(a) 28 (b) 29 (c) 30
(d) 27 (e) None of these
7. The average of 5 consecutive integers starting with m is n. What is the average of 6 consecutive integers starting with (m + 2)?
(a) $\frac{2n+5}{2}$ (b) (n +2) (c) (n + 3)
(d) $\frac{2n+9}{2}$ (e) None of these
8. The mean of 100 items was 46. Later on, it was discovered that an item 16 was misread as 61 and another item 43 was misread as 34. It was also found that the number of items was 90 and not 100. Then, what is the correct mean?
(a) 50 (b) 50.7 (c) 52
(d) 52.7 (e) None of these

9. If the average of x and $\frac{1}{x}(x \neq 0)$ is M, then the average of x^2 and $\frac{1}{x^2}$ is

(a) $1 - M^2$ (b) $1 - 2M$ (c) $2M^2 - 1$
(d) $2M^2 + 1$ (e) None of these

10. The average of n numbers $x_1, x_2, ..., x_n$ is $\bar{x}$. Then, the value of $\sum_{i=1}^{n}(x_i - \bar{x})$ is equal to

(a) n (b) 0 (c) $n\bar{x}$
(d) $\bar{x}$ (e) None of these

11. The average of six numbers is 32. If each of the first three numbers is increased by 2 and each of the remaining three numbers is decreased by 4, then the new average is?

(a) 35 (b) 34 (c) 31
(d) 30 (e) None of these

12. The average of three numbers is 135. The largest number is 195 and the diference between the other two is 20. The smallest number is

(a) 65 (b) 95 (c) 105
(d) 115 (e) None of these

13. A student finds the average of ten 2-digit numbers. While copying numbers, by mistake, he writes one number with its digits interchaged. As a result his answer is 1.8 less than the correct answer. The diference of the digits of the number, in which he made mistake, is

(a) 2 (b) 3 (c) 4
(d) 6 (e) None of these

14. The average of the squares of of first ten natural numbers is

(a) 35.5 (b) 36 (c) 37.5
(d) 38.5 (e) None of these

15. The average of 30 numbers is 12. The average of the first 20 of them is 11 and that of the next 9 is 10. The last number is

(a) 60 (b) 45 (c) 40
(d) 50 (e) None of these

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16. Of the three numbers, the second is twice the first and thrice the third. If the average of the three numbers is 44, then the largest number is
(a) 24 (b) 72 (c) 36
(d) 108 (e) None of these

17. The average of 30 numbers is 15. The average of the first 18 numbers is 10 and that of the next 11 numbers is 20. The last number is
(a) 56 (b) 52 (c) 60
(d) 50 (e) None of these

18. The average of first nine prime numbers is
(a) 9 (b) 11 (c) $11\frac{2}{9}$
(d) $11\frac{1}{9}$ (e) None of these

19. A man spends Rs. 1800 monthly on an average for the first four months and Rs. 2000 monthly for the next eight months and saves Rs. 5600 a year. His average monthly income is
(a) Rs. 2000 (b) Rs. 2200 (c) Rs. 2400
(d) Rs. 2600 (e) None of these

20. 16 children are to be divided into two groups A and B of 10 and 6 children, respectively. The average marks obtained by the children of group A is 75 and that of all the children is 76. Then, the average marks of the children of group B is?
(a) $77\frac{1}{3}$ (b) $77\frac{2}{3}$ (c) $78\frac{1}{3}$
(d) $78\frac{2}{3}$ (e) None of these

21. The average weight of five persons sitting in a boat is 38 kg. The average weight of the boat and the persons sitting in the boat is 52 kg. What is the weight of the boat?
(a) 228 kg (b) 122 kg (c) 232 kg
(d) 242 kg (e) None of these

22. The average pocket-money of 3 friends A, B, C is Rs. 80 in a particular month. If B spends double and C spends triple of what A spends during that month and if the average of their unspent pocket-money is Rs. 60, then A spends (in Rs.)
(a) 10 (b) 20 (c) 30
(d) 40 (e) None of these

23. In a 20 over match, the required run rate to win is 7.2. If the run rate is 6 at the end of the 15th over, the required run rate to win the match is
(a) 1.2 (b) 13.2 (c) 10.8
(d) 12 (e) None of these

24. Out of nine persons, eight persons spent Rs. 30 each for their meals. The ninth one spent Rs. 20 more than the average expenditure of all the nine. The total money spent by all of them was
(a) Rs. 260 (b) Rs. 290 (c) Rs. 292.50
(d) Rs. 400.50 (e) None of these

25. The batting average of a cricket player for 64 innings is 62 runs. His highest score exceeds his lowest score by 180 runs. Excluding these two innings, the average of remaining innings becomes 60 runs. His highest score was
(a) 180 runs (b) 209 runs (c) 212 runs
(d) 214 runs (e) None of these

26. The average weight of a group of 20 boys was calculated to be 89.4 kg and it was later discovered that one weight was misread as 78 kg instead of 87 kg. The correct average weight is
(a) 88.95 kg (b) 89.25 kg (c) 89.55 kg
(d) 89.85 kg (e) None of these

27. 30 pens and 75 pencil altogether were purchased for Rs. 510. If the average price of 75 pencil was Rs. 2, then what was the average price of a pen?
(a) Rs. 9 (b) Rs. 10 (c) Rs. 11
(d) Rs. 12 (e) None of these

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28. The bowling average of a cricketer was 12.4. He improves his bowling average by 0.2 points, when he takes 5 wickets for 26 runs in his last match. The number of wickets taken by him before the last match was?
(a) 125 (b) 150 (c) 175
(d) 200 (e) None of these

29. A cricketer had a certain average of runs for his 64 innings. In his 65th innings, he is bowled out for no score on his part. This brings down his average by 2 runs. His new average of runs is?
(a) 130 (b) 128 (c) 70
(d) 68 (e) None of these

30. In a family, the average age of father and mother is 38 yr whereas the average age of father, mother and their only daughter is 28 yr. Then, the age of the daughter is?
(a) 5 yr (b) 6 yr (c) 8 yr
(d) 10 yr (e) None of these

31. The average of marks of 28 students in Mathematics was 50. 8 students left the school, then this average increased by 5. What is the average of marks obtained by the students who left the school?
(a) 50.5 (b) 37.5 (c) 42.5
(d) 45 (e) None of these

32. Average weight of 25 persons is increased by 1 kg, when one man weighing 60 kg is replaced by a new person. Weight of new person is?
(a) 50 kg (b) 61 kg (c) 86 kg
(d) 85 kg (e) Non of these

33. The average of a collection of 20 measurements was calculated to be 56 cm. But later, it was found that a mistake had occurred in one of the measurements which was recorded as 64 cm, but should have been 61 cm. The correct average must be?
(a) 53 cm (b) 54.5 cm (c) 55.85 cm
(d) 56.15 cm (e) None of these

34. The average age of 15 students of a class is 15 yr. Out of these, the average age of 5 students is 14 yr and that of the other 9 students is 16 yr. The age of the 15th students is?

(a) 11 yr (b) 15 yr (c) $15\frac{2}{7}$ yr
(d) 14 yr (e) None of these

35. The average of marks obtained by 120 candidates in a certain examination is 35. If the average marks obtained by passed candidates are 39 and those of the failed candidates are 15, then what is the number of candidates who passed the examination?

(a) 100 (b) 120 (c) 150
(d) 140 (e) None of these

36. The average age of four brothers is 12 yr. If the age of their mother be also included, the average is increased by 5 yr. The age of the mother (in years) is

(a) 37 yr (b) 43 yr (c) 48 yr
(d) 53 yr (e) None of these

37. There were 35 students in a hostel. If the number of students is increased by 7, the expenditure on food increase by Rs. 42 per day while the average expenditure of students is reduced by Rs. 1. What was the initial expenditure on food per day?

(a) Rs. 400 (b) Rs. 432 (c) Rs. 442
(d) Rs. 420 (e) None of these

38. The mean weight of 34 students of a school is 42 kg. If the weight of the teacher be included, the mean rises by 400 g. Find the weight of the teacher (in kg).

(a) 55 (b) 57 (c) 66
(d) 56 (e) None of these

39. The average of odd numbers upto 100 is?

(a) 50.5 (b) 50 (c) 49.5
(d) 49 (e) None of these

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40. Out of seven given numbers, the average of the first four numbers is 4 and that of the last four numbers is also 4. If the average of all the seven numbers is 3, then fourth number is?

(a) 3 (b) 4 (c) 7
(d) 11 (e) None of these

Foundation

1. (b); Total distance covered = (20 + 29) km = 49 km
Total time taken = (30 + 40) min = 70 min

Average speed = $\left(\frac{49}{70} \times 60\right)$ = 42 km/h

2. (c); Let one way distance be 'x'.
∴ Total distance = 2x

Total time taken = $\left(\frac{x}{u} + \frac{x}{v}\right)$

∴ Average speed = $\frac{2x}{\frac{x}{u} + \frac{x}{v}} = \frac{1}{\frac{1}{2}\left(\frac{1}{u} + \frac{1}{v}\right)}$

3. (b); New mean = $\left(\frac{19 \times 4 + 24}{20}\right) = \frac{100}{20}$ = 5

4. (a); Cost of 10 books= Rs (120 + 150) = Rs 270

Average cost = Rs. $\left(\frac{270}{10}\right)$ = Rs. 27

5. (c); The sum of price of per kg Rice at 10 different places = 4.85 × 10 = 48.5
Increased price = 20 × 3 – 10 × 1 = 50 paise

∴ Sum of the increased price of rice at 10 different places = 48.50 + 0.50 = 49.0 Rs.

New Average = $\frac{49}{10}$ = 4.90 Rs.

6. (d); Total weight of 20 boys = 89.4 × 20 = 1788 kg
Increase in weight due to misreading = 87 – 78 = 9 kg
Correct weight of 20 boys = 1788 + 9 = 1797 kg

Correct average weight = $\frac{1797}{20}$ = 89.85 kg

Shortcut:
Increase in weight = 9 kg.

New average $= 89.4 + \frac{9}{20} = 89.85$ kg

7. (a); Sum of the Age of 20 boys = 20 × 11 = 220 years
Sum of the Age of 30 girls = 30 × 12 = 360 years
Total age of 20 boys and 30 girls = 220 + 360 = 580 years.

Average age of the whole class = $\frac{580}{50}$ = 11.6 years

8. (e); Average

$$= \frac{253+124+255+534+836+375+101+443+760}{9} = 409$$

9. (d); Total even no = $\frac{63-11}{2} = \frac{52}{2}$ = 26

Sum of the even number between is 11 to 63

$= \frac{26}{2}$ [2 × 12 + (26 – 1) × 2] = 13 [24 + 50] = 13 × 74 = 962

Average of even numbers between 11 to 63 = $\frac{962}{26}$ = 37

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10. (b); Average of all prime numbers between 60 to 90

$$= \frac{61+67+71+73+79+83+89}{7} = \frac{523}{7} = 74.7$$

11. (a); Total age of 5 boys = 16 × 5 = 80 years

Total age of 4 boys = $\left(16\frac{3}{12}\right) \times 4$ = 16.25 × 4 = 65

The age of the 5th boy = 80 – 65 = 15 years

12. (b); Total age of 30 girls = 30 × 13 = 390 years

Total age of 18 girls = 18 × 15 = 270 years

∴ Average age of remaining 12 girls = $\frac{390-270}{12} = \frac{120}{12}$ =10 years.

13. (d); Sum of the first 13 Results = 13 × 60 = 780

Sum of the first 7 Results = 59 × 7 = 413

Sum of the last 7 Results = 7 × 61 = 427

∴ 7th Result = Sum of first 7 Results + sum of last 7 Results – sum of 13 Results = 413 + 427 – 780

= 840 – 780 = 60

14. (b); The sum of 9 numbers = 9× 50 = 450

Sixth number = sum of 9 numbers – (Sum of first 5 numbers + sum of last 3 numbers)

= 450 – (54 × 5 + 52 × 3) = 450 – (270 + 156) = 450 – 426 = 24

15. (a); Average decreases by 3 months or $\frac{3}{12}$ years.

Sum of the age decreased = 30 × $\frac{3}{12} = \frac{15}{2}$ = 7.5 years

∴ Age of Neha = 25 – 7.5 = 17.5

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16. (b); Let the total number of workers = x

According to the question

$60x = 12 \times 400 + 56(x - 12)$ $60x - 56x = 4800 - 672$

$4x = 4128 \Rightarrow x = 1032$

17. (c); Let average of 9 innings = x, Total run = 9x

According to the question

$\frac{9x + 100}{10} = x + 8$ $9x + 100 = 10x + 80 \Rightarrow x = 20$

Average after 10 innings = 20 + 8 = 28

Shortcut:

Average at the end of 10th innings = $(100 - 9 \times 8) = 28$ runs.

18. (d); Total age of all the three boys = 3 × 15 = 45 years

Given ratio of ages = 3 : 5 : 7 = $\frac{7}{3+5+7} \times 45 = 21$ years.

19. (a); Let average expenditure of 9 person = x

∴ According to the question

$12 \times 8 + (x + 16) = 9x \Rightarrow 8x = 112 \Rightarrow x = \frac{112}{8} = 14$

Total money spent = 9x = 9 × 14 = 126 Rs.

20. (c); Let the total consecutive even number = x

∴ Average of consecutive even no = x + 1

$x + 1 = 101 \Rightarrow x = 100$

∴ Sum = 101 × 100 = 10100

21. (d); Let the total consecutive natural number = N

∴ Average of consecutive natural number

$= \frac{N+1}{2} \Rightarrow \frac{N+1}{2} = 20.5 \Rightarrow N + 1 = 41 \Rightarrow N = 40$

∴ Sum = 40 × 20.5 = 820

22. (c); Sum of m numbers = $n^2 \times m$
Sum of n numbers = $m^2 \times n$

Average of (m + n) = $\frac{n^2 \times m + m^2 \times n}{m+n} = \frac{mn(n+m)}{(n+m)} = mn$

23. (c); Let A is x
∴ Then E = x + 8
According to the question

$\frac{x+x+8}{2} = 46 \Rightarrow 2x = 84 \Rightarrow x = 42$

Largest number is = 42 + 8 ⇒ 50

24. (b); Let the First no = x
Sum of the other numbers = 4x
According to the question

$\frac{x+4x}{3} = 60 \Rightarrow 5x = 180 \Rightarrow x = 36$

25. (a); Sum of the Salary of 15 person is = 5500 × 15 = 82500
Sum of the Salary of 16 person is = 5700 × 16 = 91200
Salary of this one person is = 91200 – 82500 = 8700

26. (a); Total weight of 24 students = 24 × 35 = 840 kg
Total weight after teacher is added = 25 × 35.4 = 885 kg
Weight of teacher = 885 – 840 = 45 kg

27. (a); Let the run scored in 11th innings = x
∴ According to the question
10 × 32 + x = 11 × (32 + 4)
320 + x = 36 × 11 ⇒ x = 396 – 320 = 76

Shortcut:
He must score 32 runs and some extra runs.
So, in the next innings he should score:
32 + 11 × 4 = 76

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28. (d); Total price of 10 kg Rice = 12 × 10 ⇒ 120

Total price of 6 kg Rice = 16 × 6 ⇒ 96

∴ Average = $\frac{120+96}{16} = \frac{216}{16}$ = 13.50 kg

29. (c); Let the average of remaining two quantities is y.

According to the question

$\frac{3\times4+2\times y}{5} = 6 \Rightarrow 12 + 2y = 30 \Rightarrow y = 9$

Hence the average of remaining two quantities is 9.

30. (c); Average of five numbers

$\Rightarrow \frac{a+b+c+d+e}{5} = 6.9 \Rightarrow a + b + c + d + e = 34.5$

Let the number is deleted be e. The average of remaining 4 number is

$\Rightarrow \frac{a+b+c+d}{4} = 4.4 \Rightarrow a + b + c + d = 17.6$

Value of deleted number = 34.5 – 17.6 = 16.9

31. (c); Total age of Seema + Sapna + Asha + Kavita + Atrye = 40 × 5 = 200

Seema+ Sapna = 35 × 2 = 70

Asha + Kavita = 42 × 2 = 84

∴ Age of Atrye = 200 – (70 + 84) = 46 years

32. (c); Total first 6 number = 10.5 × 6 = 63

Total of last 6 number = 11.4 × 6 = 68.4

Total of all 11 number = 11 × 10.9 = 119.9

∴ Sixth number = 63 + 68.4 – 119.9 = 11.5

Hence the middle number is = 11.5

33. (b); Total temp of mon + tues + wed + thus = 4 × 48°C = 192°C
Temp on mon = 42°C
temp on Tue + Wed + Thus = 192° – 42° = 150°C
Total temp for tue + wed + thus + Fri = 52° × 4 = 208°C
Tem on Friday = 208° – 150° = 58°C

34. (a); Sum of first 25 multiples of 5 = 5 (1 + 2 + 3....25)

$$= 5 \times \frac{25 \times 26}{2} = 1625 \Rightarrow \text{Average} = \frac{1625}{25} = 65$$

35. (c); Total expenditure of a man in year 1999
= 76535 + 88165 = 164700

$$\text{Average} = \frac{164700}{365} = 451.23$$

36. (a); Let the 7th number be x.
According to the question
6 × 8 + x = 7 × 10 ⇒ x = 70 – 48 = 22

37. (c); Total expenditure for first 5 months = 120 × 5 = 600 Rs.
Total expenditure for next 7 months = 130× 7 = 910 Rs.
Total income = Total expenditure of the whole year + saving
= 600 + 910 + 290 = 1800 Rs

$$\text{Monthly average income} = \frac{1800}{12} = 150 \text{ Rs.}$$

38. (d); Total monthly salary of 20 workers in an office
= 1900 × 20 = Rs. 38000
Total monthly salary of 20 workers and manager = 2000 × 21
= Rs. 42000
Manager monthly salary = 42000 – 38000 = Rs. 4000
Manager annual salary = 12 × 4000 = Rs. 48000

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39. (c); Total age of men = 15 × 10 = 150

Total age of women = 25 × 12 = 300

Average age of the whole club = $\frac{150+300}{40} = \frac{450}{40}$ = 11.25 years.

40. (a); Let the average of rest results = x

According to the question

$14 \times 2 + x \times 10 = 15 \times 12 \Rightarrow 10x = 180 - 28\ x = \frac{152}{10} \Rightarrow x = 15.2$

Hence average of the rest is 15.2

Moderate

1. (a); Let the side of square be a

and average speed of aeroplane x

$\therefore \frac{a}{200} + \frac{a}{400} + \frac{a}{600} + \frac{a}{800} = \frac{4a}{x}$

$\Rightarrow \frac{12a+6a+4a+3a}{2400} = \frac{4a}{x} \Rightarrow \frac{25}{2400} = \frac{4}{x}$

$\therefore$ x = 384

Hence average speed of a aeroplane = 384 km / hr

2. (d); Let the average speed of a cyclist = x

Total distance = 3 km

$\therefore \frac{1}{20} + \frac{1}{16} + \frac{1}{12} = \frac{3}{x} \Rightarrow \frac{12+15+20}{240} = \frac{3}{x}$

$\frac{47}{240} = \frac{3}{x}$ x = 15.32 km / hr

Average speed of cyclist is 15.32 km / hr

3. (a); total marks obtained by 150 students.

$= 100 \times 30 + 50 \times 60 = 6000$

mean marks $= \frac{6000}{150} = 40$

4. (b); Let the weight of teacher = x kg

and average weight of students and teacher

$= 42 + .40 = 42.40$ kg

$\therefore$ $34 \times 42 + x = 35\ (42.4) \Rightarrow x = 1484 - 1428 = 56$ kg

Hence weight of the teacher is 56 kg.

Shortcut:

The mean rises by 0.4 kg and total number of persons = 35

Weight of teacher $= 42 + 0.4 \times 35 = 56$ kg

5. (a); Let the weight of teacher = x kg

According to the question

$\therefore$ $21 \times 64 + x = 22 \times 65$

$x = 1430 - 1344 \Rightarrow x = 86$ kg

Hence weight of the teacher is 86 kg.

Shortcut:

Teacher's weight $= 64 + 22 \times 1 = 86$ kg

6. (a); Total price of all the articles.

$= 5 \times 25 + 10 \times 50 + 15 \times 35$

$= 125 + 500 + 525 = 1150$ Rs.

Average price $= \frac{1150}{30} = 38.33$ Rs.

7. (a); Let the no of boys in a class = x

$\therefore x \times 70 + (150 - x)\ 55 = 150 \times 60$

$70x - 55x = 9000 - 8250 \Rightarrow 15x = 750$

$x = 50 \Rightarrow$ No. of boys = 50

8. (d); Total score of a class of m students = 70 × m
Total score of a class of n students = 91 × n
∴ 70 m + 91n = (m + n) 80 70 m + 91n = 80m + 80 n

$$11n = 10\ m \Rightarrow \frac{n}{m} = \frac{10}{11}$$

9. (b); Let the no of passed student = x
According to the question
x × 39 + 15 (120 – x) = 120 × 35
39x – 15x = 4200 – 1800
24x = 2400 ⇒ x = 100
Hence no of passes student is 100.

10. (a); Here a = 9 km, b= 25 km, c = 30 km
P= 3 km / hr Q = 5 km / hr R = 10 km / hr
∴ Requried average speed

$$= \frac{a+b+c}{\frac{a}{P}+\frac{b}{Q}+\frac{c}{R}} = \frac{9+25+30}{\frac{9}{3}+\frac{25}{5}+\frac{30}{10}} = \frac{64}{3+5+3} = \frac{64}{11} = 5\frac{9}{11}\ \text{km/hr}$$

Hence average speed of a person = $5\frac{9}{11}$ km / h

11. (c); Total present age of Pand Q = 15 × 2 + 10 = 40 years.
Total present age of P, Q and R
= 20 × 3 = 60 years. P + Q + R = 60
(Present age) R = 20 years.
R age after 10 years = 20 + 10 = 30 years.

12. (c); Let the total no of non officer staff in an office = x
According to the question
750 × 15 + 250x = 500 (x + 15)
500x – 250x = 11250 – 7500

$$250x = 3750 \Rightarrow x = \frac{3750}{250} = 15$$

Hence no of non-officer staff = 15

13. (b); Total Present age of family of 5 members
= 27 × 5 + 3 × 5 = 135 + 15 = 150 years
Total present age of a family including child
= 27 × 6 = 162 years
age of a child = 162 – 150 = 12 years.

14. (d); Total age of 5 sisters = 100years.
Total age of a group of sister at the birth of youngest sister = 100 – 4 × 5 = 80 years.

Average age of group of sisters $\frac{80}{4}$ = 20 years.

15. (b); Sum of the weight of A, B, C and D = 67 × 4 = 268 kg
Sum of the weight of A, B, C, D, E = 65 × 5 = 325 kg
weight of E = 325 – 268 = 57 kg
Weight of F = 57 + 4 = 61 kg
Total weight of F, B, C, D, E = 64 × 5 = 320 kg
Total weight of B, C, D, E = 320 – 61 = 259 kg.
∴ Weight of A = 325 – 259 = 66 kg.

Shortcut:
Weight of E = (67 – 2) – (4 × 2) = 57 Weight of F = 61 kg
Average weight decreases by 1 kg on replacing A.
So, weight of A = 61 + 5 × 1 = 66 kg

16. (a); Total of a + b + c = 33, c + d + e = 51
e + f = 44, e + c = 34, d = 51 – 34 = 17
∴ a + b + c + d + e + f = 33 + 17 + 44 = 94

Average of a, b, c, d, e, f = $\frac{94}{6} = 15\frac{2}{3}$

17. (a); Total age of a man and his twin born son
= 30 × 3 = 90 years
given the ratio of father and his twin son
= 5 : 2 : 2

Father's age = $\frac{90}{9} \times 5$ = 50 years

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18. (c); Total age of Rakesh and Mohan = 30 years
Mohan + Ramesh = 24 years
Rakesh + Ramesh = 26 years

(Rakesh + Mohan + Ramesh) = $\frac{80}{2}$ = 40 years.

age of Mohan = 40 – 26 = 14 years.

19. (a); Let the second number = x

$$\frac{x}{2} + x + 2x = 84 \Rightarrow \frac{x + 2x + 4x}{2} = 84$$

$$7x = 84 \times 2 \Rightarrow x = \frac{84 \times 2}{7} \Rightarrow x = 24$$

Third number = 24 × 2 = 48

20. (a); Total temp of Mon + tues + wed = 111°C
tues + wed + thus = 34 × 3 = 102°C
Mon – Thus = 9°C

$$M - \frac{4}{5} M = 9°C \Rightarrow \frac{M}{5} = 9°C \Rightarrow M = 45\ °C$$

Temp on thursday = 45 × $\frac{4}{5}$ = 36°C

21. (b); let the number of non–officer staff in the office = x
15 × 460 + x × 110 = (x + 15) 120
120x – 110x = 6900 – 1800 10x = 5100 ⇒ x = 510
No of non–officer staff in the office = 510

22. (a); Let the number of candidates who passed = x
According to question
55 × x + 25 (150 – x) = 150 × 50
55x – 25x = 7500 – 3750 = 3750 / 30 ⇒ x = 125
Hence no of candidate who passed the exam
= 125

23. (b); Total age of 24 boys and teacher = (24 +1) × 15 = 375 years

Total age of all boys excluding teacher

= 24 × (15 – 1) = 336 years.

age of teacher = 375 – 336 = 39 years

Shortcut:

Age of teacher = 15 + 24 × 1 = 39 years

24. (a); Total age of 8 members = 8 × 40 = 320 years.

Total age after replacement of 1 member

= 320 – 55 + 39 = 304 years.

New average = $\frac{304}{8}$ = 38 years

Hence average decreased by 2 years.

Shortcut:

Difference in ages = 55 – 39 = 16 years its effect $= \frac{16}{8} = 2$

25. (c); Sum of the age of 2 new players

$= 18 + 20 + 11 \times \frac{2}{12} = 38 + \frac{22}{12} = \frac{478}{12}$ years

average age of 2 new players

$= \frac{478}{12 \times 2} = \frac{478}{24} = 19\frac{22}{24}$ = 19 years 11 months.

26. (a); Let the number of students = x

According to the question

x × 6 + 12 × 40 = (x + 12) 7

6x + 480 = 7x + 84 $\Rightarrow$ x = 396

27. (a); Let the average of 11 innings = x

Total run of 11 innings = 11x

After 12 innings

11x + 90 = (x – 5)12 $\Rightarrow$ 12x – 11x = 90 + 60 $\Rightarrow$ x = 150

Average after 12th innings = 150 – 5 = 145

Shortcut:

Average after 12 innings = (90 + 12 × 5) – 5 = 145

28. (a); Let the no of wicket taken by the cricketer = x

According to the question

$$\frac{12.4 \times x + 26}{x + 5} = 12 \Rightarrow 12.4x + 26 = 12x + 60$$

$$x = \frac{34}{4} = \frac{340}{4} = 85$$

29. (c); Let his score in 26th inning = x

According to the question

25 × 56 + x = 26 (56 + 2)

x = 1308 – 1400 ⇒ x = 108

Shortcut:

Score in the 26th innings = 56 + 2 – 26 = 108

30. (a); Let the age of a class teacher = x

According to question

30 × 13.5 + x = 14 × 31 ⇒ x = 434 – 405= 29 years

Shortcut:

Age of the teacher = 14 + 0.5 × 30 = 29 years

31. (a); Let the marks of New student = x

x = 90 – 20 × 4 ⇒ x = 80

Marks of New student = 10

32. (a); Sum of Age of x and y = 40 years

y and z = 38 years, Z and X = 42 years

$$x + y + z = \frac{40 + 38 + 42}{2} = \frac{120}{2} = 60$$

x = 60 – 38 = 22 years, y = 60 – 42 = 18 years

z = 60 – 40 = 20 years

33. (a); Total age of a family of 6 members = 22 × 6 = 132 years
Total age of the family at birth of youngest member
= 132 – 7 × 6 = 132 – 42 = 90 years.

Average age = $\frac{90}{5}$ = 18 years.

34. (b); Age of a new man = 25 + 10 × 2 = 45 years.

35. (a); Total correct marks obtained by students
= 100 × 60 – 75 + 65 = 5990

mean marks of 100 students = $\frac{5990}{100}$ = 59.9

Shortcut:

The actual marks are 10 less then the previous marks.

So, correct mean $= 60 - \left(\frac{10}{100}\right) = 59.9$

36. (c); Let the consecutives even numebr
= x, x + 2, x + 4, x + 6

∴ x + x + 2 + x + 4 + x + 6 = 260

4x = 248 ⇒ x = 62

A × D = 62 × 68 = 4216

37. (c); Total correct weight of 36 students
= 50 × 36 – 73 + 3 = 1800 – 36 = 1764 kg.

Correct average = $\frac{1764}{36}$ = 49 kg.

Shortcut:

Correct average $= 50 - \left(\frac{73-37}{36}\right) = 49$ kg

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38. (c); Sachin score in 26th innings.

$= 26 \times (46 + 2) - 25 \times 46 \quad = 1248 - 1150 = 98$

Shortcut:

Sachin's score in 26th innings $= 46 + 2 \times 26 = 98$

39. (a); total present age of 5 members $= 17 \times 5 + 3 \times 5 = 100$

total present age including new baby $= 17 \times 6 = 102$

Age of new baby $= 102 - 100 = 2$ years.

40. (b); Total sum of all the 5 subjects $= 75 \times 4 + 80 = 380$

$$\text{Average} = \frac{380}{5} = 76$$

Shortcut:

$$\text{New average} = 75 + \left(\frac{80-75}{5}\right) = 76 \text{ marks}$$

Difficult

1. (b); Total weight of A + B + C $= 84 \times 3 = 252$ kgs

A + B + C + D $= 80 \times 4 = 320$ kgs.

D = 68, E = 68 + 3 = 71 kgs

B + C + D + E $= 79 \times 4 = 316$ kg

B + C + D $= 316 - 71 = 245$ kg

A $= 320 - 245 = 75$ kgs.

2. (a); Total runs of 42 innings $= 42 \times 30 = 1260$

Total run excluding min and max inning

$= 40 \times 28 = 1120$

max + min $= 1260 - 1120 = 140$ ...(i)

max – min = 100 ...(ii)

On solving (i) & (ii)

max = 120, min = 20

Hence, minimum score is 20.

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3. (b); Sum of the present age of Husband and wife

$= 23 \times 2 + 5 \times 2 = 56$ years

Sum of the present age of Husband, wife and child

$= 20 \times 3 = 60$

Age of child $= 60 - 56 = 4$ years.

4. (b); Present age of Husband and wife $= 25 \times 2 + 7 \times 2 = 64$ years

Present age of Husband wife and child

$= 22 \times 3 = 66$ years

Age of a child is $= 66 - 64 = 2$ years.

5. (a); Sum of the present age of Mother, Father and Son

$= 42 \times 3 + 6 \times 3 = 126 + 18 = 144$ years.

Sum of present age of the family $= 36 \times 5 = 180$

Present age of the bride $= 180 - 144 - 5 = 31$ years.

Age of the bride at the time of marriage

$= 31 - 6 = 25$ years.

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6. (a); Let the average expenditure of a man = x Rs.

$\therefore$ According to the question

$\therefore$ $35 \times x + 42 = 42(x - 1)$

$\therefore$ $7x = 84 \Rightarrow x = 12$ Rs.

Original expenditure $= 35 \times 12 = 420$ Rs.

7. (d); Ashish total earnings of 11 months

$= 4200 \times 11 = 46{,}200\$$

Total earnings to be needed for 12 months

$= 5000 \times 12 = 60{,}000\$$

Last month earnings $= 60{,}000 - 46{,}200 = 13{,}800\$$

Shortcut:

Required earning in the last month

$= 5000 + (5000 - 4200) \times 11 = \$\ 13800$

8. (a); Let the three no is x, y, z

$x : y \Rightarrow (2 : 3) \times 5$

$y : z \Rightarrow (5 : 8) \times 3 \Rightarrow x : y : z = 10 : 15 : 24$

$$\text{Second number } y = \frac{15}{49} \times 98 = 30$$

9. (a); Let the total number of workers = x

$\therefore$ $15 \times 525 + (x - 15)\, 85 = x \times 95$

$\therefore$ $15 \times 525 - 15 \times 85 = 10x$

$\therefore$ $7875 - 1275 = 10x \Rightarrow 10x = 6600 \Rightarrow x = 660$

10. (d); Let his Avg be A

And increased average = A + x

$$86A + 270 = 87\,(A + x) \Rightarrow x = \frac{(270 - A)}{87}$$

if x be a whole number possible value of A

A = 9, 96, 183, 270 for x = 3, 2, 1, 0

So new value = 12, 98, 184, 270

11. (e); Let the Average expenditure of the party is x

$\therefore$ $13 \times 79 + 6(x + 4) = 19 \times x$

$$13x = 13 \times 79 + 24 \Rightarrow x = \frac{1027 + 24}{13} = 80.84$$

Total expenditure of the party = 80.84 × 19 = 1536.07

12. (b); Let the person initially going for picnic is x

$\therefore$ $16.75 \times x + 20 \times 13.25 = 15\,(x + 20)$

$1.75x = 15 \times 20 - 20 \times 13.25$

$1.75x = 35 \Rightarrow x = 20$

13. (c); Let the total no of faculty = x

and management trainees = y

$4000x + 1250y = (x + y)2000$

$8x = 3y \Rightarrow x : y = 3 : 8$

So the possible value could be = 110

14 (a); 10 years ago average age of 25 teachers = 45 years.
4 years ago (just before the retirement of principal) average age of 25 teachers = 45 + 6 = 51
and at the same time total age of 25 teachers = 51 × 25 = 1275
and the total age of remaining 24 teachers when just principal has retired = 1275 – 60 = 1215 years
1 year later (i.e. 3 years ago from present)
total age of 25 teacher (just before the recruitment of new principal) = 1215 + (1 × 24) = 1239 years.
and the total age of 24 teacher including new principal just after the recuitment = 1239 + 54 = 1293 years.
Thus the present age of all the 25 teachers
= 1293 + 3 × 25 = 1368 years.
Hence the present average age of the 25 teacher.

$$= \frac{1368}{25} = 54\frac{18}{25} \text{ years.}$$

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15. (a); Sum of six lightest weight players = 49 × 6 = 294 kgs.
sum of six heaviest players weight = 52 × 6 = 312 kg
∴ weight of the player at 6th position = 312 + 294 – 550 = 56 kg.

16. (a); Total age of S + G = 35 × 2 = 70 years
K + G = 32 × 2 = 64 years S + K = 38 × 2 = 76 years

$$S + G + K = \frac{70+64+76}{2} = \frac{210}{2} = 105 \text{ years}$$

$$\text{Average of } S + G + K = \frac{105}{3} = 35 \text{ years}$$

$$D + I = \frac{35}{2} \Rightarrow \text{Sum of age of } D + I = 35$$

$$\text{Average of } S, G, K, D, I = \frac{105+35}{5} = 28 \text{ years}$$

17. (c); Total present age of a family of 6 members

$= 25 \times 6 + 4 \times 6 = 174$

Total present age of a family including child $= 25 \times 7 = 175$ years.

Age of child is $= 175 - 174 = 1$ year.

18. (a); Total expenditure of Jan to June $= 4200 \times 6$

$=$ Rs. 25200

Total expenditure from Feb to July

$= 25200 - 1200 + 1500 =$ Rs. 25500

$$\text{Average} = \frac{25500}{6} = \text{Rs. } 4250$$

19. (a); The price of the costliest and cheapest computers

$=(80 \times 30{,}000) - (78 \times 29{,}500) = 99{,}000$

Therefore the price of cheapest computer

$= 99{,}000 - 80{,}000 = 19{,}000$

20. (a);

	No. of family member	Average	Total
Eleven years Earlier	4	28	112
Presently	if 4	39	156
	6	28	168

Since it is obvious that the youngest member (i.e. child) was the 6th family member in the family. Therefore at the time of the birth of the youngest child the elder child's age was 6 years.

Now the sum of their ages

Let age of the youngest member = x

$x + x + 6 = (168 - 156) \Rightarrow 2x + 6 = 12 \Rightarrow x = 3$

Then the present age of the youngest member of the familly is = 3 years.

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21. (c); let the average of walking = x km / hr

Total distance = 32 × 3 = 96

$\therefore \quad \frac{6}{x}+\frac{90}{60} = 3, \qquad \therefore \frac{6}{x}+\frac{3}{2} = 3$

$\frac{12+3x}{2x} = 3 \quad \Rightarrow \quad 3x = 12 \quad \Rightarrow \quad x = 4 \text{ km / hr.}$

22. (a); Let the average of prime number be P and average of composit number be C.

Again the number of prime number be x,

then the number of composite number be 2x

$\frac{Px+2Cx}{3x} = 9 \quad \Rightarrow \quad P + 2C = 27$

$\frac{2Px+Cx}{3x} = 11 \quad \Rightarrow \quad 2P + C = 33$

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On adding eq. (i) and (ii)

we get P + C = 20

and on Subtracting eq. (i) from (ii)

we get P – C = 6

Therefore P = 13 and C = 7 $\Rightarrow$ thus = $\frac{C}{P} = \frac{7}{13}$

23. (c); Let the number of subjects be n and average marks be x, the total marks = nx

Again (n + 1) (x – 1) = (nx – 40) + (23 + 25) x – n = 9 ...(i)

Further (n + 2) (x + 1) = (nx – 40) + (23 + 25) + 57

nx + 2x + n + 2 = nx + 65 2x + n = 63 ...(ii)

Solving equation I and II we get

n = 15 $\Rightarrow$ x = 24

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24. (a); Let Donald be denoted by H (Husband)
His wife be denoted by W, His daughter be denoted by D, His son be denoted by S
The average age of 4 persons

$$= \frac{H+W+D+S}{4} = 23$$

H + W + D + S = 92 $\Rightarrow$ H = W + 4

	H		W	D	S
At the time when daughter is born →	28	$\xleftarrow{(+4)}$	24	0	×
	↓				
At the time when Son is born →	32	$\xleftarrow{(-4)}$	28	4	0

So at the time of birth of his Son, total age of his family = 64 years. (32 + 28 + 4 + 0 = 64) and presently the total age of his family = 92 years.
It means total increase in age of the whole family = 28 years.

Thus average increase in age = $\frac{28}{4}$ = 7 years.

It means the age of Donald = 39 years
and age of his daughter = 11 years
Therefore the average age of Donald and his Daughter is 25 years.

25. (b); let the number be (a – 5), (a – 3), (a – 1), (a + 1) (a + 3) (a + 5)
Then the average of all six consecutive odd no.

$$= \frac{(a-5)+(a-3)+(a-1)+(a+1)+(a+3)+(a+5)}{6} = a$$

The value of 'a' can be found by using the last statement
$(a-5)^2 + (a+5)^2 = 178 \Rightarrow a^2 = 64$ a = 8
Average of all six number is 8.

26. (a);

	No of Directors	Average Age	Total age
Just before death and resignation	10	48	480
Just after death and resignation	9		(480 - (53 + x) + 34
one year later	9	46	414

So one year later, after the incident

total age = {480 – (53 + x) + 34} + 9 × 1 = 414 x = 56

where x is the age of the dead person at the time of his death.

Previous Year (Memory Based)

1. (d); Removed number = 20 × 6 – 15 × 5 = 45
2. (d); Let the average of 5 person be 10 year.

Then, sum of their age = 5 × 10 = 50 year

Average age of 5 member 3 year ago

$= \frac{50 - 3 \times 5}{5} + = 7$ year.

So after Adding the new member average become 7 year.

Difference in the age of old member and New member

= 5 × 10 – 7 × 5 = 15 year.

3. (d); Average of all 50 numbers = $\frac{25 \times 10 + 25 \times 12}{50}$

Average of 50 numbers = 11

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4. (b); Sum of m numbers = mn^2, Sum of n number = nm^2

Average of (m + n) = $\frac{mn^2 + nm^2}{m+n}$ = mn

5. (b); Sum of the 9 integral multiple of 3.

$$= \frac{9}{2}[2 \times 3 + (9-1)3] \qquad \left[\begin{array}{l}\text{Uning Formula} \\ S_n = \frac{n}{2}\left[2a + (n-1)d\right]\end{array}\right] = 135$$

$$\therefore \quad \text{Average} = \frac{135}{9} = 15$$

6. (b); Some of all 11 Number = 35 × 11 = 385
Some of First 6 Number = 32 × 6 = 192
Some of last 6 Number = 37 × 6 = 222
Sixth number = 192 + 222 – 385 = 414 – 385 = 29

7. (a); Let the 5 consecutive integers be
m, m + 1, m + 2, m + 3, m + 4
m + m + 1 + m + 2 + m + 3 + m + 4 = 5n
5m + 10 = 5n $\Rightarrow$ n = m + 2
Now, the average of 6 consective number starting with (m + 2)

$$= \frac{[m+2+m+3+m+4+m+5+m+6+m+7]}{6} = \frac{6m+27}{6}$$

$$= \frac{2m+9}{2} = \frac{2(n-2)+9}{2} = \frac{2n+5}{2}$$

8. (b); Given average of 100 items = 46
Sum of 100 items = 46 × 100 = 4600
According to the question
When 16 was misread as 61 and 43 was misread 34, then total sum = 4600 + 16 – 61 – 34 + 43 = 4564

$$\text{Average} = \frac{4564}{90} = 50.7$$

9. (c); Average of x and $\frac{1}{x}$ = m

$$\Rightarrow \frac{x+\frac{1}{x}}{2} = m \Rightarrow x+\frac{1}{x} = 2m$$

Now x^2 and $\frac{1}{x^2}$

$$\Rightarrow \frac{x^2+\frac{1}{x^2}}{2} = \frac{\left(x+\frac{1}{x}\right)^2 - 2}{2} = \frac{4m^2-2}{2} = 2m^2 - 1$$

10. (b); By the formula

$$\frac{(x_1+x_2+x_3....+x_n)}{n} = \bar{x} \quad \text{... (i)}$$

$$\therefore \sum_{i=1}^{n}(x_i - \bar{x})$$

Putting value of i from 1 to n.

$(x_1-\bar{x})+(x_2-\bar{x})+(x_3-\bar{x})+....+(x_n-\bar{x})$ from (i)

$$= n\frac{(x_1+x_2+....+x_n)}{n} - n\bar{x}$$

$$\therefore \left[\frac{(x_1+x_2+....+x_n)}{n} = \bar{x}\right] = n\bar{x} - n\bar{x} = 0$$

11. (c); Total sum of all six numbers = 32 × 6 = 192

According to the question

New sum = 192 + 3 × 2 – 3 × 4 = 186

Required Average = $\frac{186}{6}$ = 31

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12. (b); Let the there Number be A, B, C

A = 195 $\Rightarrow$ A + B + C = 135 × 3

B + C = 405 – 195

B + C = 210 ... (i)

given

B – C = 20 ... (ii)

Therefore,
$$\begin{array}{r} B + C = 210 \\ B - C = 20 \\ \hline 2B = 230 \end{array}$$

B = 115 $\Rightarrow$ C = 115 – 20 = 95

Smallest Number = 95

13. (a); Difference in average = 1.8

Difference between the number and the number formed by inter changing the digits = 1.8 × 10 = 18

By Hit and Trial $\Rightarrow$ 53 – 35 = 18

Number = 35 $\Rightarrow$ Difference = 5 – 3 = 2

14. (d); The sum of the squares of n Natural numbers

$$= \frac{n(n+1)(2n+1)}{6}$$

$$\text{Average} = \frac{n(n+1)(2n+1)}{6 \times n} = \frac{(n+1)(2n+1)}{6}$$

Average Square of 10 Natural number

$$= \frac{11 \times 21}{6} = \frac{77}{2} = 38.5$$

15. (d); Sum of all 30 Number = 30 × 12 = 360

The last Number = 360 – (20 × 11 + 9 × 10)

= 360 – (220 + 90) = 50

16. (b); Let the third Number = x

$\therefore$ The second Number = 3x

and first Number = $\frac{3x}{2}$

According to the question

$$x + 3x + \frac{3x}{2} = 44 \times 3 \Rightarrow \frac{2x + 6x + 3x}{2} = 132$$

$$x = \frac{132 \times 2}{11} \Rightarrow x = 24$$

Largest Number = 24 × 3 = 72

17. (d); Sum of 30 Number = 30 × 15 = 450

$\therefore$ Last number = 450 – (18 × 10 + 11 × 20)

= 450 – (180 + 220) = 50

18. (d); Average of First 9 prime Number

$$= \frac{2+3+5+7+11+13+17+19+23}{9} = \frac{100}{9} = 11\frac{1}{9}$$

19. (c); Sum of expenditure for first four months

= 1800 × 4 = Rs. 7200

Sum of expenditure for next eight months

= 2000 × 8 = 16000 Rs.

saving = 5600 Rs.

Average monthly Income

$$= \frac{7200 + 16000 + 5600}{12} = \frac{28800}{12} = \text{Rs. } 2400$$

20. (b); Sum of the marks of all 16 childern = 16 × 76 = 1216

Sum of the Marks obtain by group A = 75 × 10 = 750

Marks of graup B = 1216 – 750 = 466

Average marks of Group B = $77\frac{4}{6} = 77\frac{2}{3}$

21. (b); Weight of the Boat = 52 × 6 – 38 × 5 = 312 – 190= 122 kg

22. (a); Total pocket money of A, B, C

i.e. A + B + C = 80 × 3 = 240

Total money unspent = 60 × 3 = 180

Now let A spend Rs x the B spends 2x and C spend 3x

Then, x + 2x + 3x = (240 – 180)

6x = 60 $\Rightarrow$ x = 10

$\therefore$ A spends Rs. 10

23. (c); Total Required Run = 20 × 7.2 = 144

Total Run of the end of 15th over = 15 × 6 = 90

Required Run Rate = $\frac{144-90}{5} = \frac{54}{5} = 10.8$

24. (c); Let the average Expenditure of nine person be x.

According to the question

$x = \frac{x+20+240}{9} \Rightarrow 9x = x + 260 \Rightarrow x = 32.5$

9x = 292.5 = Total Expenditure

25. (d); Sum of the highest and the lowest score

H + l = 64 × 62 – 62 × 60 = 62 (4) = 248

given, H – l = 180

$\therefore$ 2H = 248 + 180 $\Rightarrow$ H = 214

Therefore, Highest score = 214

26. (d); Sum of the weight of 20 boys = 89.4 × 20 = 1788 kg

According to the question.

New Average = 1788 – 78 + 87 = $\frac{1797}{20} = 89.85$ kg.

27. (d); Total price of 75 pencil = 75 × 2 = Rs. 150

Total price of 30 pens = 510 – 150 = Rs. 360

Average price of 30 pens = $\frac{360}{30} = \text{Rs. } 12$

28. (c); Let the number of wickets taken by cricketer before the last match = x

According to the question = $\frac{12.4x + 26}{x + 5} = 12.2$

12.4x + 26 = 12.2x + 61 $\Rightarrow$ x = $\frac{35}{0.2} = \frac{350}{2} = 175$

29. (b); Let average run of a cricketer of 64 innings be x
Total Run scored by the cricketer in 64 innings = 64x

According to the question = $\frac{64x + 0}{65} = x - 2$

64x = 65x – 130 $\Rightarrow$ x = 130
His New average age = 130 – 2 = 128

30. (c); Sum of the age of father and mother = 38 × 2 = 76 years.
Sum of the age of father Mother and daughter
= 28 × 3 = 84 years
Age of daughter = 84 – 76 = 8 year

31. (b); Total marks of 28 students = 28 × 50 = 1400
Total marks of 20 students = 20 × 55 = 1100
Total marks of 8 students = 1400 – 1100 = 300

$\therefore$ Average of 8 students = $\frac{300}{8} = 37.5$

32. (d); Total weight increased = 1 × 25 = 25 kg
Weight of new person = weight of excluded person + weight increased = 60 + 25 = 85 kg

33. (c); Given average of 20 measurements = 56 cm
$\therefore$ Sum = 56 × 20 = 1120 cm

correct average = $\frac{1120 + 61 - 64}{20} = \frac{1117}{20} = 55.85\,\text{cm}$

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34. (a); Age of 15th student = 15 × 15 – (5 × 14) – (9 × 16)
= 225 – 70 – 144 = 11 year.

35. (a); Let the passed condidate be x
∴ failed condidate be 120 – x
Therefore,
39x + 15(120 – x) = 120 × 35 ⇒ 24x = 4200 – 1800

$$x = \frac{2400}{24} = 100 \text{ students}$$

36. (a); Age of the mother = 17 × 5 – 12 × 4 = 85 – 48 = 37 year.

37. (d); Let the initial expenditure on food be x
∴ 35x + 42 = (x – 1)42 ⇒ 7x = 84 ⇒ x = 12
therefore initial expenditure on food per day
= 35 × 12 = Rs. 420

38. (d); Weight of the teacher = 42.4 × 35 – 42 × 34 = 56 kg

39. (b); Average odd Numbers upto 100

$$= \frac{1}{2}(\text{First Number} + \text{Last Number}) = \frac{1}{2}(1+99) = \frac{1}{2}100 = 50$$

Average of odd Numbers upto 100 = 50

40. (d); The 4th Number = 4 × 4 + 4 × 4 – 7 × 3 = 32 – 21 = 11
Therefore the 4th Number is 11.

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Chapter 7

Time and Work

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Chapter 7

Time and Work

Concept 1:

(1) If a person can complete a work in 'D' days, then the work done by him in 1 day is $\frac{1}{D}$

Efficiency is inversely proportional to the time taken (T) when the work done is constant.

$$E \alpha \frac{1}{T}$$

(2) If P is 'n' times more efficient than Q, than P will take $\frac{1}{n}$ time of the total time taken by Q to complete the same amount of work.

Example: Ram can do a work in 40 days. Hari is 4 times more efficient than Ram. In how many days Hari can finish the work?

Sol. Ram can do a work in 40 days

Hari can complete the work in $= \frac{1}{4} \times 40$ days = 10 days

Concept 2:

If M_1 persons can do W_1 work in D_1 days working H_1 hours and M_2 person can do W_2 work in D_2 days working H_2 hours, then relation between them is

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

Example: 24 men working 8 hours a day make a road in 15 days. In how many days 48 men working 6 hours a day will make the three times long road?

Sol. $$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2} \Rightarrow \frac{24 \times 15 \times 8}{1} = \frac{48 \times D_2 \times 6}{3}$$

$$\Rightarrow D_2 = \frac{24 \times 15 \times 8 \times 3}{48 \times 6} = 30 \text{ days}$$

Concept 3:

If A does a work in 'a' days and B in 'b' days then both can complete the work in $\frac{ab}{a+b}$ days.

Example: A complete the work in 10 days and B in 15 days. In how many days A + B can complete the work?

Sol. (A + B) complete the work is $\frac{10\times15}{10+15}=\frac{150}{25}=6$ days

Concept 4:

If A and B can complete a work in x days and A alone can finish that work in y days, then number of days B takes to complete the work is = $\frac{xy}{y-x}$ days

CAREERPOWER

Example: A and B can complete a work in 20 days and A alone can finish that work in 30 days. In how many days B can complete the work?

Sol. B complete the work = $\frac{20\times30}{30-20}=\frac{600}{10}=60$ days

Concept 5:

A, B, C can do a work in x, y and z days respectively. They will finish the work in $\frac{xyz}{xy+yz+zx}$ days

Example: A, B and C can do a work in 10, 12 & 15 days respectively. In how many days all of them together will finish the work?

Sol. (A + B + C) complete the work in

$$\frac{10\times12\times15}{10\times12+12\times15+15\times10}=\frac{1800}{120+180+150}=4 \text{ days}$$

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Concept 6:

If A and B can do a piece of work in x days, B and C can do the same work in y days and A and C can do it in z days, then, working together they can complete that work in $\frac{2xyz}{xy+yz+zx}$ days

Example: A and B can complete a work in 20 days. B and C can complete the same work in 30 days. C and A can complete the same work in 40 days. In how many days they working together to complete the work?

Sol. (A + B + C) complete the work in $\frac{2\times20\times30\times40}{20\times30+30\times40+20\times40}$

$$= \frac{48000}{600+1200+800} = \frac{48000}{2600} = \frac{240}{13} = 18\frac{6}{13} \text{ days}$$

CAREERPOWER

Concept 7:

If A takes 'a' days more to complete a work than the time taken by (A+B) to do some work and B takes 'b' days more than the time taken by (A+B) to do same work. Then (A + B) do the work in $\sqrt{ab}$ days.

Example: A takes 4 days more to complete a work than the time taken by (A + B) to do the same work and B takes 9 days more than the time taken by (A + B) to do the same work. In how many days A + B complete the work?

Sol. (A + B) complete the work in $\sqrt{4\times9} = \sqrt{36} = 6$ days

Concept 8:

A can do a certain piece of work in d_1 days and B in d_2 days. Then, the ratio of wages of A and B are:

$$\text{A's share : B's share} = \frac{1}{d_1} : \frac{1}{d_2} = d_2 : d_1$$

A, B and C can do a piece of work in d_1, d_2 and d_3 days. Then the ratio of wages of A, B and C are

$$\text{A's share : B's Share : C's share} = \frac{1}{d_1} : \frac{1}{d_2} : \frac{1}{d_3}$$

Multiplying each equation by $(d_1 d_2 d_3)$

Then the ratio is A's share : B's share : C's share = $d_2 d_3 : d_1 d_3 : d_1 d_2$

Concept 9:

If A, B and C can do a piece of work in x, y and z days respectively. The contract for the work is Rs. r and all of them work together.

Then,

$$\text{Share of A} = \text{Rs.}\left(\frac{ryz}{xy+yz+zx}\right), \text{ Share of B} = \text{Rs.}\left(\frac{rzx}{xy+yz+zx}\right), \text{ Share of C} = \text{Rs.}\left(\frac{rxy}{xy+yz+zx}\right)$$

CAREER POWER

Example: A, B and C can do a work in 20 days, 25 days and 30 days respectively. They finished together that work and gained Rs. 3700 as wage. Find the wages of A, B and C respectively.

Sol. $$\text{Share of A} = \text{Rs.}\left(\frac{3700\times25\times30}{20\times25+25\times30+20\times30}\right) = \text{Rs.}\ \frac{2775000}{500+750+600} =$$

$$\text{Rs.}\ \frac{2775000}{1850} = \text{Rs. } 1500$$

$$\text{Share of B} = \text{Rs.}\left(\frac{3700\times20\times30}{500+750+600}\right) = \text{Rs.}\ \frac{2220000}{1850} = \text{Rs. } 1200$$

$$\text{Share of C} = \text{Rs.}\left(\frac{3700\times20\times25}{500+750+600}\right) = \text{Rs.}\ \frac{1850000}{1850} = \text{Rs. } 1000$$

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Concept 10:

A can do a piece of work in x days. With the help of B, A can do the same work in y days. If they get Rs. a for that work

Then,

Share of $A = \text{Rs.}\left(\frac{ay}{x}\right)$, And Share of $B = \text{Rs.}\left(\frac{a(x-y)}{x}\right)$

Example: A can do a piece of work in 20 days. With the help of B, A can do the same work in 15 days. If A + B gets Rs. 1500 for the work, find the share of A and B respectively?

Sol. Share of $A = \text{Rs.}\left(\frac{1500 \times 15}{20}\right) = \text{Rs. } 1125$, Share of B

$= \text{Rs.}\left(\frac{1500 \times 5}{20}\right) = \text{Rs. } 375$

Types of Questions

1. A can do a piece of work in 8 hours and B can do the same work in 12 hours. In how much time both can finish the whole work working together?

Sol. Work done by A in 1 hour $= \frac{1}{8}$

Work done by B in 1 hour $= \frac{1}{12}$

Work done by (A + B) in 1 hour $= \frac{1}{8} + \frac{1}{12} = \frac{5}{24}$

Time taken to finish the work $= \frac{24}{5} = 4\frac{4}{5}$ hours

Direct formula $\rightarrow \frac{ab}{a+b}, \frac{8 \times 12}{8+12} = \frac{8 \times 12}{20} = \frac{24}{5} = 4\frac{4}{5}$ hours

Shortcut:

Take L.C.M. as total work.

One hour work of A is $\frac{24}{8}$ = 3 units and one hour work of B is $\frac{24}{12}$ = 2 units. Combined work of (A + B) in 1 hour is (3 + 2) units $= 5$ units.

Therefore total work will be completed by both (A + B) in $\frac{24}{5}$ hours

$= 4\frac{4}{5}$ hours

2. Ram, Rohit and Rahul can do a work in 10 days, 12 days and 15 days respectively. In how many days will they finish the work?

Sol. Work done by Ram in 1 day $= \frac{1}{10}$

Work done by Rohit in 1 day $= \frac{1}{12}$

Work done by Rahul in 1 day $= \frac{1}{15}$

Work done by Ram, Rohit and Rahul in 1 day

$$= \frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{6+5+4}{60} = \frac{1}{4}$$

Time taken by them to complete the work = 4 days

Direct formula: $= \frac{xyz}{xy + yz + zx}$ days

$$= \frac{10 \times 12 \times 15}{10 \times 12 + 12 \times 15 + 15 \times 10} = 4 \text{ days}$$

Shortcut:

Work completed by Ram, Rohit and Rahul in 1 day
= 6 + 5 + 4 = 15 units

Total work completed by them in $= \frac{60}{15} = 4$ days

3. A and B do a work in 10 days, B and C do it in 15 days while C and A in 20 days. In how many days A, B and C all working together can finish the same work?

Sol. Work done by (A + B) in 1 day $= \frac{1}{10}$

Work done by (B + C) in 1 day $= \frac{1}{15}$

Work done by (C + A) in 1 day $= \frac{1}{20}$

Work done by 2(A + B + C) in 1 day $= \frac{1}{10} + \frac{1}{15} + \frac{1}{20}$

Work done by (A + B + C) in 1 day $= \frac{6+4+3}{60 \times 2} = \frac{13}{120}$

Time taken by them to complete the work $= \frac{120}{13}$ days

Direct Formula $\rightarrow \frac{2xyz}{xy + yz + zx} = \frac{2 \times 10 \times 15 \times 20}{10 \times 15 + 15 \times 20 + 10 \times 20} = \frac{120}{13}$ days

Shortcut:

A + B →	10	LCM 60 (Total work)	6 units / day
B + C →	15		4 units / day
C + A →	20		3 units / day

Work done by A + B in 1 day = 6 units
Work done by B + C in 1 day = 4 units
Work done by C + A in 1 day = 3 units
Work done by 2(A + B + C) in 1 day = 6 + 4 + 3 = 13 units

Total work completed by them in $= \dfrac{60}{\frac{13}{2}} = \dfrac{120}{13}$ days

4. A is thrice as good as B. A is able to finish the work in 20 days less than B. In how many day B will finish the work?

Sol. A's efficiency = 3 × B's efficiency.

$$\frac{\text{A's efficiency}}{\text{B's efficiency}} = \frac{3}{1} \Rightarrow 3:1$$

Ratio of Time taken by A and B = 1 : 3
Let A and B do the work in x and 3x days respectively.
3x – x = 20 ⇒ 2x = 20 ⇒ x = 10
Time taken by B to finish the work = 3x = 3 × 10 = 30 days

Shortcut:

	A : B
Efficiency	3 : 1
Time Taken	1 : 3

$$\text{Efficiency } \alpha \frac{1}{\text{Time taken}}$$

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The difference between time taken by A & B is 20 days
The difference between ratio of A & B is 2
Therefore, $2 = 20 \Rightarrow 1 = 10$
Therefore A completed the work in 10 days and B in
$= 3 \times 10 = 30$ days

5. Ram does 40% more work than Shiv. If Shiv can do it in 14 days, then in how many days Ram can do the same work?

Sol. Shiv's 1 day work $= \frac{1}{14}$

Ram's 1 day work $= \frac{1}{14} \times \frac{140}{100} = \frac{1}{10}$

Ram alone can finish the work = 10 days
Shortcut:

	Ram		Shiv
Efficiency	140	:	100
	7	:	5
Time taken	5	:	7

The time taken by Shiv to complete the work is 14 days
Therefore, $7 \equiv 14 \Rightarrow 1 \equiv 2$
Time taken by Ram to complete the work = 2 × 5 = 10 days

6. A can do a certain work in 12 days. B is 20% more efficient than A. How many days will A and B together take to do the same job?

Sol. A's 1 day work $= \frac{1}{12}$

B's 1 day work $= \frac{1}{12} \times \frac{120}{100} = \frac{1}{10}$

(A+B)'s 1 day work $= \left(\frac{1}{12} + \frac{1}{10}\right) = \frac{5+6}{60} = \frac{11}{60}$

(A+B) completed the work in $\frac{60}{11}$ days

Shortcut:

	A		B
Efficiency	100	:	120
	5	:	6
Time taken	6	:	5

Time taken by B to complete the work in 2 × 5 = 10 days

Both can complete the work in $\frac{12 \times 10}{12 + 10} = \frac{60}{11}$ days

7. The ratio of efficiency of two workers is 3 : 2. Working together if they complete a work in 6 days then in how many days will they do it respectively?

Sol. Ratio of efficiency of two workers = 3 : 2
Ratio of Time taken by them = 2 : 3
They complete the work in 2x days and 3x days.

$\therefore \frac{1}{2x} + \frac{1}{3x} = \frac{1}{6} \Rightarrow \frac{5}{6x} = \frac{1}{6} \Rightarrow x = 5$

$\therefore$ They will complete the work in 2x days and 3x days i.e. 10 days 15 days respectively.

8. A and B complete a work in 10 days and 15 days respectively. They started together but A leaves the work after 2 days and B alone continues the work. In how many days B had complete the rest of the work?

Sol. A's work done in 1 day $= \frac{1}{10}$

B's work done in 1 day $= \frac{1}{15}$

(A+B)'s work done in 1 day $= \frac{1}{10} + \frac{1}{15} = \frac{5}{30} = \frac{1}{6}$

(A+B)'s work done in 2 days $= 2 \times \frac{1}{6} = \frac{1}{3}$

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Remaining work $= 1 - \frac{1}{3} = \frac{2}{3}$

Time taken to finish remaining work by B

$$= \frac{\text{Remaining work}}{\text{B's efficiency}} = \frac{\frac{2}{3}}{\frac{1}{15}} = \frac{2}{3} \times \frac{15}{1} = 10 \text{ days}$$

Shortcut:

Work done by (A + B) in 2 days = 2(3 + 2) = 10 units

Remaining work = 30 – 10 = 20 units

Remaining work completed by B in $\frac{20}{2} = 10$ days

9. A, B, C can do a piece of work in 10 days, 15 days and 20 days respectively. They began to work together but A leaves the work after 2 days and B after 3 days. In how many days will C alone finish the remaining work?

Sol. Two day's work + third day's work

$$= 2\left(\frac{1}{10} + \frac{1}{15} + \frac{1}{20}\right) + \left(\frac{1}{15} + \frac{1}{20}\right)$$

$$= 2 \times \left(\frac{6+4+3}{60}\right) + \left(\frac{4+3}{60}\right) = \frac{26}{60} + \frac{7}{60} = \frac{33}{60} = \frac{11}{20}$$

Remaining work $= 1 - \frac{11}{20} = \frac{9}{20}$

Time taken by C to finish the remaining work

$$= \frac{\text{Remaining work}}{\text{C's efficiency}} = \frac{\frac{9}{20}}{\frac{1}{20}} = 9 \text{ days.}$$

Shortcut:

Work done by (A + B + C) in 2 days = 2(6 + 4 + 3) = 26 units
Work done by (B + C) in 1 day = 7
Remaining work = 60 – (26 + 7) = 27 units

Remaining work completed by C in $\frac{27}{3} = 9$ days.

10. A and B can separately make a wall in 10 days and 15 days. How many days before will B leave the work so that the wall would be finished in total 8 days?

Sol. Let B will leaves the work before x day of its completion.

$\therefore$ A's 8 day's work + B's (8 – x) day's work = 1

$$\therefore 8 \times \frac{1}{10} + (8 - x) \times \frac{1}{15} = 1 \Rightarrow \frac{8 - x}{15} = 1 - \frac{4}{5}$$

$$\therefore \frac{(8 - x)}{15} = \frac{1}{5} \Rightarrow 8 - x = 3 \Rightarrow x = 8 - 3 = 5 \text{ days}$$

Shortcut:

Work done by A in 8 days = 8 × 3 = 24 units
Remaining work = 30 – 24 = 6 units
Therefore B work for $\frac{6}{2} = 3$ days
B leaves the work before 5 days.

11. 15 men working 8 hours make a wall in 10 days. In how many days will 12 men working 10 hours will make it?

Sol. 15 men working 8 hours make a wall in 10 days
Let 12 men working 10 hours make that wall in x days
By using MDH formula
15 × 8 × 10 = x × 12 × 10

$$x = \frac{15 \times 8}{12} = 10 \text{ days}$$

12. If 10 masons working 7 h daily can build 28 pumps in 16 days, how many days will 12 masons working 6 h daily take to build 36 pumps?

Sol. Given,
$M_1 = 10, H_1 = 7, D_1 = 16, W_1 = 28$
And $M_2 = 12, H_2 = 6, D_2 = ?, W_2 = 36$
We know that,

$$\frac{M_1D_1H_1}{W_1} = \frac{M_2D_2H_2}{W_2}$$

Or, $M_1D_1H_1W_2 = M_2D_2W_1H_2$

$$\therefore \quad D_2 = \frac{M_1D_1H_1W_2}{M_2W_1H_2} = \frac{10 \times 7 \times 16 \times 36}{12 \times 6 \times 28} = 20 \text{ days}$$

Number of days taken = 20 days

13. A can do a piece of work in 40 days and B can do it in 50 days. They do the work alternatively. In how many days will they finish the work, if A begins?

Sol. Work done by A and B in first 2 days $= \frac{1}{40} + \frac{1}{50} = \frac{5+4}{200} = \frac{9}{200}$

$\therefore$ work done in 44 days $= 22 \times \frac{9}{200} = \frac{99}{100}$

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remaining work after 44 days $= 1 - \frac{99}{100} = \frac{1}{100}$

On 45th day A's turn

$\therefore$ Time taken to finish remaining work by

$$A = \frac{\text{Remaining work}}{\text{A's efficiency}} = \frac{\frac{1}{100}}{\frac{1}{40}} = \frac{1}{100} \times \frac{40}{1} = \frac{2}{5}$$

$\therefore$ Total days to finish the work $= 44 + \frac{2}{5} = 44\frac{2}{5}$ days.

14. Either 8 men or 17 women can paint a wall in 33 days. The number of days required to paint three such walls by 12 men and 24 women working at the same rate is

Sol. Given,

8 men = 17 women $\Rightarrow$ 1 man $= \frac{17}{8}$ women

12 men $= \frac{17}{8} \times 12 = \frac{51}{2}$ women

$\therefore$ 12 men + 24 women $= \frac{51}{2} + 24 = \frac{99}{2}$ women

By $\frac{M_1D_1}{W_1} = \frac{M_2D_2}{W_2} \Rightarrow \frac{17 \times 33}{1} = \frac{99 \times D_2}{2 \times 3}$

$$D_2 = \frac{17 \times 33 \times 6}{99} = 34 \text{ days}$$

15. 20 men or 24 women can complete a piece of work in 20 days. If 30 men and 12 women undertake to complete the work, then the work will be completed in

Sol. Given,

20 men = 24 women $\Rightarrow$ 5 men = 6 women

Or 10 men = 12 women

$\therefore$ 30 men + 12 women = 40 men

By $M_1D_1 = M_2D_2$

$20 \times 20 = 40 \times D_2 \Rightarrow D_2 = \frac{20 \times 20}{40} = 10$ days

$\therefore$ Work will be completed in 10 days.

16. Hemant contracted to finish a work in 62 days. He employed 32 men to work. But $\frac{1}{3}$rd of work was done in 30 days. How many additional men would be employed so that remaining work be finished in given duration?

Sol. Total time = 62 days and total work = 1

Remaining time = 62 – 30 = 32 days

Remaining work $= 1 - \frac{1}{3} = \frac{2}{3}$

32 men do $\frac{1}{3}$rd of a work in 30 days

Let (32 + x) men will do $\frac{2}{3}$rd of work in 32 days

$$\frac{32 \times 30}{\frac{1}{3}} = \frac{(32+x) \times 32}{\frac{2}{3}} \Rightarrow \frac{32 \times 30}{1} = \frac{(32+x) \times 32}{2}$$

32 + x = 60 $\Rightarrow$ x = 60 – 32 = 28 men

17. A and B together can complete a work in 12 days. A alone can complete it in 20 days. If B does the work only half a day daily, then in how many days A and B together will complete the work?

Sol. (A+B)'s 1 day's work $= \frac{1}{12}$ and

A's 1 day's work $= \frac{1}{20}$

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B's 1 day's work $= \frac{1}{12} - \frac{1}{20} = \frac{5-3}{60} = \frac{1}{30}$

$\therefore$ B's $\frac{1}{2}$ day's work $= \frac{1}{60}$

$\therefore$ (A+B)'s 1 day's work $= \frac{1}{20} + \frac{1}{60} = \frac{3+1}{60} = \frac{1}{15}$

$\therefore$ The work will be completed in 15 days.

Shortcut:

A's 1 day work = 3 units
B's 1 day work = 2 units
when B works half a day daily then B's works = 1 unit
then, (A + B)'s 1 day work = 3 + 1 = 4 units

work will be completed in $= \frac{60}{4} = 15$ days

18. A, B and C can do a piece of work in 30, 20 and 10 days, respectively. A is assisted by B on one day and by C on the next day, alternately. How long would the work take to finish?

Sol. Work done in first two days

$$= \frac{2}{30} + \frac{1}{20} + \frac{1}{10} = \frac{1}{15} + \frac{1}{20} + \frac{1}{10} = \frac{4+3+6}{60} = \frac{13}{60}$$

Work done in first 8 days $= \frac{52}{60}$

Remaining work $= 1 - \frac{52}{60} = \frac{8}{60} = \frac{2}{15}$

Now, it is the turn of A and B

(A+B)'s 1 day's work $= \frac{1}{30} + \frac{1}{20} = \frac{2+3}{60} = \frac{1}{12}$

$\therefore$ Remaining work $= \frac{2}{15} - \frac{1}{12} = \frac{8-5}{60} = \frac{3}{60} = \frac{1}{20}$

Now, it is the turn of A and C

(A+C)'s 1 day's work $= \frac{1}{30} + \frac{1}{10} = \frac{1+3}{30} = \frac{2}{15}$

$\therefore$ Time taken $= \frac{1}{20} \times \frac{15}{2} = \frac{3}{8}$ days

Total time $= 9 + \frac{3}{8} = 9\frac{3}{8}$ days

Shortcut:

(A + B)'s 1 day work = (2 + 3) = 5 units
(A + C)'s 1 day work = (6 + 2) = 8 units
2 days work = (8 + 5) = 13 units

Remaining work = 8 units
(A + B) does 5 units in next day

(A + C) finish the remaining work in $\frac{3}{8}$ days

Total time taken $= 8 + 1 + \frac{3}{8} = 9\frac{3}{8}$ days

19. A, B and C undertake to complete a piece of work for Rs. 1200. A can complete the work in 8 days, B in 12 days and C in 16 days. They complete the work with the help of D in 3 days. What does the D get?

Sol. Total money = Rs. 1200

Time taken by A = 8 days

One day work of A $= \frac{1}{8}$

Similarly,

One day work of B $= \frac{1}{12}$, One day work of C $= \frac{1}{16}$

Let D does the work in x days.

Then, according to the question.

$$\frac{1}{8}+\frac{1}{12}+\frac{1}{16}+\frac{1}{x}=\frac{1}{3} \Rightarrow \frac{1}{x}=\frac{1}{3}-\frac{1}{8}-\frac{1}{12}-\frac{1}{16}$$

$$\frac{1}{x}=\frac{16-6-4-3}{48} \Rightarrow \frac{1}{x}=\frac{3}{48} \Rightarrow x = 16$$

Now, ratio of work done by A, B, C and D

$$=\frac{1}{8}:\frac{1}{12}:\frac{1}{16}:\frac{1}{16} = 6 : 4 : 3 : 3 \text{ (taking LCM)}$$

So, amount got by D $= \frac{3}{16} \times 1200 =$ Rs. 225

Shortcut:

One day work of D = 16 - (6 + 4 + 3) = 16 - 13 = 3

D can get $= \frac{3}{16} \times 1200 = \frac{3}{4} \times 300 =$ Rs. 225

20. A worker was appointed by a contractor on the condition that he would be paid Rs. 75 for each day of his work but would be fined at the rate of Rs. 15 per day for his absence, apart from losing his wages. After 20 days, the contractor paid the worker Rs. 1140. Find the number of days the worker absented from the work

Sol. Total salary for 20 days = Salary of one day × number of days = Rs. (75 × 20) = Rs. 1500

Actual salary received = Rs.1140

Difference = Rs. (1500 – 1140) = Rs. 360

Money deducted for 1 day's absence from work

= Rs. (15 + 75) = Rs. 90

Number of days he absented $= \frac{360}{90} = 4$ days

Foundation

1. 18 boys can do a piece of work in 24 days. In how many days can 27 boys do the same work?
   (a) 16 (b) 32 (c) 23
   (d) 48 (e) None of these
2. How many days will 1648 persons take to construct a dam, if 721 persons can build the same in 48 days?
   (a) 21 days (b) 20 days (c) 23 days
   (d) 24 days (e) None of these
3. If 10 persons can do a job in 20 days, then 20 persons with twice the efficiency can do the same job in :
   (a) 5 days (b) 10 days (c) 20 days
   (d) 40 days (e) None of these
4. A and B can separately do a piece of work in 6 days and 12 days respectively. How long will they together take to do the work?
   (a) 9 days (b) 18 days (c) 6 days
   (d) 4 days (e) None of these

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5. A job can be completed by 12 men in 12 days. How many extra days will be needed to complete the job if, 6 men leave after working for 6 days?
(a) 3 (b) 6 (c) 12
(d) 24 (e) None of these

6. A and B can do a piece of work in 12 days and 15 days, respectively. They began to work together but A left after 4 days. In how many more days would B alone complete the remaining work?
(a) $\frac{20}{3}$ (b) $\frac{25}{3}$ (c) 6
(d) 5 (e) None of these

7. Working efficiencies of A and B for completing a piece of work are in the ratio 3 : 4. The number of days to be taken by them to complete the work will be in the ratio
(a) 3 : 2 (b) 2 : 3 (c) 3 : 4
(d) 4 : 3 (e) None of these

8. 5 men can prepare 10 toys in 6 days working 6 hours a day. Then in how many days can 12 men prepare 16 toys working 8 hrs a day?
(a) 5 days (b) 3 days (c) 4 days
(d) 6 days (e) None of these

9. If A and B together can complete a work in 18 days, A and C together in 12 days, and B and C together in 9 days, then B alone can do the work in
(a) 18 days (b) 24 days (c) 30 days
(d) 40 days (e) None of these

10. P, Q and R contract a work for Rs. 550. Together, P and Q are supposed to do $\frac{7}{11}$ of the work. How much does R get?
(a) Rs. 200 (b) Rs. 300 (c) Rs. 150
(d) Rs. 250 (e) None of these

11. P, Q and R undertake to do a work for Rs. 707. P and Q together do $\frac{5}{7}$ of the work and rest is done by R alone. How much should R get?
(a) Rs. 202 (b) Rs. 200 (c) Rs. 102
(d) Rs. 150 (e) None of these

12. A and B can complete a piece of work in 15 days and 10 days respectively. They contracted to complete the work for Rs. 30000. The share of A in the contracted money will be
(a) Rs. 18000 (b) Rs. 16500 (c) Rs. 12500
(d) Rs. 12000 (e) None of these

13. A daily-wage labourer was engaged for a certain number of days for Rs 5,750 but being absent on some days he was paid only Rs 5,000. What was his maximum possible daily wage?
(a) Rs 125 (b) Rs 250 (c) Rs 375
(d) Rs 500 (e) None of these

14. A can finish a work in 24 days, B in 9 days and C in 12 days. B and C start the work but are forced to leave after 3 days. The remaining work was done by A in:
(a) 5 days (b) 6 days (c) 10 days
(d) $10\frac{1}{2}$ days (e) None of these

15. If 3 men or 6 women can do a piece of wok in 16 days, in how many days can 12 men and 8 women do the same piece of work?
(a) 4 days (b) 5 days (c) 3 days
(d) 2 days (e) None of these

16. A can do a work in 15 days and B in 20 days. If they together work on it for 4 days, then the fraction of the work that is left is:
(a) $\frac{8}{15}$ (b) $\frac{7}{15}$ (c) $\frac{1}{4}$
(d) $\frac{1}{10}$ (e) None of these

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17. If a job is to be completed in 10 days, it requires 270 persons. If 180 persons take up the same job, they will finish it in
(a) 27 days (b) 12 days (c) 15 days
(d) 18 days (e) None of these

18. 4 mat-weavers can weave 4 mats in 4 days. At the same rate how many mats would be woven by 8 mat-weavers in 8 days?
(a) 4 (b) 8 (c) 12
(d) 16 (e) None of these

19. A and B can do a job in 6 and 12 days, respectively. They began the work together but A leaves after 3 days. Then, the total number of days needed for the completion of the work is
(a) 4 (b) 5 (c) 6
(d) 9 (e) None of these

20. A alone can complete a work in 18 days and B alone in 15 days. B alone worked at it for 10 days and then left the work. In how many more days, will A alone complete the remaining work?
(a) 5 (b) $5\frac{1}{2}$ (c) 6
(d) 8 (e) None of these

21. How many men will be required to plough 100 acres of land in 10 days if 10 men require 8 days to plough 20 acres of land?
(a) 30 (b) 40 (c) 60
(d) 50 (e) None of these

22. A and B can do a piece of work in 20 days and 12 days, respectively. A started the work alone and then after 4 days B joined him till the completion of the work. How long did the work last?
(a) 10 days (b) 20 days (c) 15 days
(d) 6 days (e) None of these

23. A can do piece of work in 12 days and B in 15 days. They work together for 5 days and then B left. The days taken by A to finish the remaining work is
(a) 3 (b) 5 (c) 10
(d) 12 (e) None of these

24. A and B can do a work in 12 days. B and C can do the same work in 15 days, C and A can do the same work in 20 days. The time taken by A, B and C to do the same work to
(a) 5 days (b) 10 days (c) 15 days
(d) 20 days (e) None of these

25. 18 women can complete a work in 12 days and 12 men can complete the same work in 9 days. In how many days will 8 men and 8 women complete that work?
(a) 9 days (b) 6 days (c) 12 days
(d) 8 days (e) None of these

26. A and B can do a piece of work in 12 days, B and C in 8 days, and C and A in 6 days. How long would B take to do the same work alone?
(a) 24 days (b) 32 days (c) 40 days
(d) 48 days (e) None of these

27. A group of men decided to do a work in 10 days, but five of them absented themselves. If the rest of the group finished the work in 12 days, find the original number of men?
(a) 20 men (b) 30 men (c) 40 men
(d) 50 men (e) None of these

28. To complete a work, A takes 50% more time than B. If together they take 18 days to complete the work, how much time shall B take to do it?
(a) 30 days (b) 35 days (c) 40 days
(d) 45 days (e) None of these

29. A complete a piece of work in 4 days and B completes it in 6 days. If they both work on it together, then the number of days required to complete the same work is
(a) $2\frac{2}{5}$ days (b) $3\frac{2}{5}$ days (c) $3\frac{5}{2}$ days
(d) $2\frac{5}{2}$ days (e) None of these

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30. A and B can do a piece of work in 18 days, B and C in 24 days, A and C in 36 days. In what time can they do it all working together?
(a) 12 days (b) 13 days (c) 16 days
(d) 26 days (e) None of these

31. A and B can separately complete a piece of work in 20 days and 30 days respectively. They worked together for some time, then B left the work. If A completed the rest of the work in 10 days, then B worked for?
(a) 6 days (b) 8 days (c) 12 days
(d) 16 days (e) None of these

32. A can do a work in 6 days and B can do the same work in 5 days. The contract for the work is of Rs. 220. How much shall B get if both of them work together?
(a) Rs. 110 (b) Rs. 120 (c) Rs. 130
(d) Rs. 150 (e) None of these

33. P, Q and R undertake to do a work for Rs. 660. P and Q together do $\frac{8}{11}$ of the work and rest is done by R alone. How much should R get?
(a) Rs. 200 (b) Rs. 160 (c) Rs. 180
(d) Rs. 190 (e) None of these

34. A farmer can plough a field working 6 h per day in 18 days. The worker has to work how many hours per day to finish the same work in 12 days?
(a) 7 (b) 9 (c) 11
(d) 13 (e) None of these

35. A can do a job in 6 days and A and B can do it together in 2 days. How many days will be taken by B to do the job alone?
(a) 5 days (b) 3 days (c) 4 days
(d) 8 days (e) None of these

36. If 6 men and 8 boys can do a piece of work in 10 days and 26 men and 48 boys can do the same work in 2 days, the time taken by 15 men and 20 boys to do the same type of work will be:
(a) 5 days (b) 4 days (c) 6 days
(d) 7 days (e) None of these

37. If 10 men or 20 boys can make 260 shirts in 20 days, then how many shirts will be made by 8 men and 4 boys in 20 days?
(a) 260 (b) 240 (c) 280
(d) 520 (e) None of these

38. A can finish a work in 12 days and B can do it in 15 days. After A had worked for 3 days, B also joined A to finish the remaining work. In how many days, the remaining work will be finished?
(a) $5\frac{1}{2}$ (b) $4\frac{1}{2}$ (c) 5
(d) 6 (e) None of these

39. A man and a boy received Rs. 800 as wages for 5 days for the work they did together. The man's efficiency in the work was three times that of the boy. What are the daily wages of the boy?
(a) Rs. 76 (b) Rs. 56 (c) Rs. 44
(d) Rs. 40 (e) None of these

40. If a work can be completed by A in 30 days and by B in 60 days, then the number of days taken by them to finish the work, working together, is:
(a) 20 (b) 25 (c) 45
(d) 50 (e) None of these

Moderate

1. Some staff promised to do a job in 18 days, but 6 of them went on leave. So, the remaining men took 20 days to complete the job. How many men were there originally?
(a) 55 (b) 62 (c) 56
(d) 60 (e) None of these

2. 5 men and 5 women earn Rs. 660 in 3 days. 10 men and 20 women earn Rs. 3500 in 5 days. In how many days can 6 men and 4 women earn Rs. 1060?
(a) 5 days (b) 10 days (c) 6 days
(d) 12 days (e) None of these

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3. A track of 100 m can be built by 7 men or 10 women in 10 days. How many days will 14 men and 20 women take to build a track of 600 m?
(a) 15 (b) 20 (c) 25
(d) 30 (e) None of these

4. A and B together can complete a work in 3 days. They start together but after 2 days, B left the work. If the work is completed after two more days, B alone would do the work in
(a) 5 days (b) 6 days (c) 9 days
(d) 10 days (e) None of these

5. P can complete $\frac{1}{4}$ of a work in 10 days, Q can complete 40% of the same work in 15 days, R can complete $\frac{1}{3}$ of the work in 13 days and S can complete $\frac{1}{6}$ of the work in 7 days, Who will be able to complete the work first?
(a) P (b) Q (c) R
(d) S (e) None of these

6. A can do a work in 20 days and B in 40 days. If they work on it together for 5 days. Then fraction of the work that is left, is:
(a) $\frac{5}{8}$ (b) $\frac{5}{15}$ (c) $\frac{7}{15}$
(d) $\frac{1}{10}$ (e) None of these

7. A is 50% as efficient as B. C does half of the work done by A and B together in same time in same time. If C alone does the work in 20 days, then A, B and C together can do work in:
(a) $5\frac{2}{3}$ days (b) $6\frac{2}{3}$ days (c) 6 days
(d) 7 days (e) None of these

8. If 12 men or 18 women can make a wall in 14 days, then working at the same rate, 8 men and 16 women can make the same wall in:
(a) 9 days (b) 5 days (c) 7 days
(d) 8 days (e) None of these

9. A certain number of men complete a work in 160 days. If there were 18 men more, the work could be finished in 20 days less. How many men were originally there?
(a) 116 (b) 122 (c) 124
(d) 126 (e) None of these

10. A team of 30 men is supposed to do a work in 38 days. After 25 days, 5 more men were employed and the work was finished one day earlier. How many days would it have been delayed if 5 more men were not employed?
(a) 1 day (b) 2 days (c) 3 days
(d) 4 days (e) None of these

11. 8 children and 12 men complete a certain piece of work in 9 days. If each child takes twice the time taken by a man to finish the work, in how many days will 12 men finish the same work?
(a) 8 days (b) 10 days (c) 11 days
(d) 12 days (e) None of these

12. A, B and C together earn Rs. 2700 in 18 days. A and C together earn Rs. 940 in 10 days. B and C together earn Rs. 1520 in 20 days. Find the daily earning of C?
(a) Rs. 20 (b) Rs. 40 (c) Rs. 10
(d) Rs. 15 (e) None of these

13. Two women, Sita and Gita working separately can mow a field in 8 and 12 hrs respectively. If they work in stretches of one hours alternatively, Sita beginning at 9 a.m., when will the mowing be finished?
(a) 6:30 pm (b) 5:30 pm (c) 7:00 pm
(d) 6:30 am (e) None of these

14. If the wages of 45 women amount to Rs. 46575 in 48 days, how many men must work 16 days to receive Rs. 17250, the daily wages of a man being double than those of a woman?

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(a) 20 men (b) 25 men (c) 30 men
(d) 15 men (e) None of these

15. 5 men or 7 women can earn Rs. 5,250 per day, how much would 7 men and 13 women earn per day?
(a) Rs. 11,600 (b) Rs. 11,700 (c) Rs. 16,100
(d) Rs. 17,100 (e) None of these

16. A, B and C together can finish a piece of work in 4 days, A alone can do it in 12 days and B alone in 18 days. How many days will be taken by C to do it alone?
(a) 21 (b) 16 (c) 14
(d) 9 (e) None of these

17. A and B can do a piece of work in 20 days and 12 days respectively. A started the work alone and then after 4 days B joined him till the completion of the work. How long did the work last?
(a) 10 days (b) 20 days (c) 15 days
(d) 6 days (e) None of these

18. A man, a woman and a boy can together complete a piece of work in 3 days. If a man alone can do it in 6 days and a boy alone in 18 days, how long will a woman alone take to complete the work?
(a) 9 days (b) 21 days (c) 24 days
(d) 27 days (e) None of these

19. A certain job was assigned to a group of men to do in 20 days. But, 12 men did not turn up for the job and the remaining men did the job in 32 days. The original number of men in the group was:
(a) 32 (b) 34 (c) 36
(d) 40 (e) None of these

20. If 16 men or 20 women can do a piece of work in 25 days, in what time will 28 men and 15 women do it?
(a) $14\frac{2}{7}$ days (b) $33\frac{1}{3}$ days (c) $18\frac{3}{4}$ days
(d) 10 days (e) None of these

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21. A certain number of men can do a piece of work in 40 days. If there were 45 men more the work could have been finished in 25 days. Find the original number of men employed in the work.
(a) 70 (b) 85 (c) 65
(d) 75 (e) None of these

22. 7 men can complete a piece of work in 12 days. How many additional men will be required to complete double the work in 8 days?
(a) 28 (b) 21 (c) 14
(d) 7 (e) None of these

23. 6 men or 12 women can do a piece of work in 20 days. In how many days can 8 men and 16 women do twice as big as this work?
(a) 2 (b) 5 (c) 15
(d) 10 (e) None of these

24. A and B working separately can do a piece of work in 9 and 12 days, respectively. If they work for a day alternatively with A beginning, the work would be completed in:
(a) $10\frac{2}{3}$ days (b) $10\frac{1}{2}$ days (c) $10\frac{1}{4}$ days
(d) $10\frac{1}{3}$ days (e) None of these

25. If 10 men or 18 boys can do a work in 15 days, then the number of days required by 15 men and 33 boys to do twice the work is
(a) 9 (b) 36 (c) $4\frac{1}{2}$
(d) 8 (e) None of these

26. 20 women together can complete a work in 16 days. 16 men together can complete the same work in 15 days. The ratio of the working capacity of a man to that of a woman is:
(a) 3 : 4 (b) 4 : 3 (c) 5 : 3
(d) 4 : 5 (e) None of these

27. Ram can finish a work in 15 days working 8 hrs a day. Hari can finish it in $6\frac{2}{3}$ days at 9 hrs a day. Find in how many days both can finish it together, if both work 10 hrs a day?
(a) 2 days (b) 3 days (c) 4 days
(d) Can't be determined (e) None of these

28. 3 men and 2 women can do a piece of work in 15 days. 2 men and 3 women can do the same work in 18 days. The number of days to be taken by 1 man and 1 woman to do the work is.
(a) $20\frac{10}{11}$ (b) $30\frac{10}{11}$ (c) $40\frac{10}{11}$
(d) $45\frac{10}{11}$ (e) None of these

29. A takes twice as much time as B and C takes thrice as much time as B to finish a piece of work. Working together they can finish the work in 12 days. The number of days needed for A to do the work alone is
(a) 20 (b) 22 (c) 33
(d) 44 (e) None of these

30. Hemant decided to build a farmhouse in 40 days. He employed 100 men in the beginning and 100 more after 35 days and completed the construction in stipulated time. If he had not employed the additional men, how many days behind schedule would it have been finished?
(a) 5 days (b) 6 days (c) 8 days
(d) 10 days (e) None of these

31. P, Q and R contracted to do a work for Rs. 4200. P can do the work in 6 days, Q in 10 days and R in 12 days. If they work together to do the work, what is the share of R?
(a) Rs. 2000 (b) Rs. 1200 (c) Rs. 1000
(d) Rs. 1500 (e) None of these

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32. If 8 men or 10 women can do a piece of work in 50 days, in what time will 28 men and 15 women do it?

(a) $14\frac{2}{7}$ days (b) $33\frac{1}{3}$ days (c) $18\frac{3}{4}$ days
(d) 10 days (e) None of these

33. If 3 men with 4 boys can earn Rs. 2100 in 7 days and 11 men with 13 boys can earn Rs. 8300 in 8 days, in what time will 7 men with 9 boys earn Rs. 11000?

(a) 16 days (b) 18 days (c) 14 days
(d) 20 days (e) None of these

34. There is sufficient food for 400 men for 31 days. After 28 days 280 men leave the place. For how many days will the rest of the food last for the rest of the men?

(a) 5 days (b) 10 days (c) 12 days
(d) 15 days (e) None of these

35. If 28 men complete $\frac{7}{8}$ of a piece of work in a week, then the number of men, who must be engaged to get the remaining work completed in another week is

(a) 5 (b) 6 (c) 4
(d) 3 (e) None of these

36. A contractor undertakes to dig a canal 12 km long in 350 days and employs 45 men. After 200 days he find that only 4.5 km of the canal has been completed. Find the number of extra men he must employ to finish the work in time.

(a) 45 men (b) 55 men (c) 65 men
(d) 75 men (e) None of these

37. A and B undertook to do a piece of work for Rs. 4500. A alone could do it in 8 days and B alone in 12 days. With the assistance of C they finished the work in 4 days. Then, C's share of the money is

(a) Rs. 2250 (b) Rs. 1500 (c) Rs. 750
(d) Rs. 375 (e) None of these

38. A can do a piece of work in 16 days and B in 24 days. They take the help of C and three together finish the work in 6 days. If the total renumeration for the work is Rs. 400. The amount (in Rs.) each will receive, in proportion, to do the work is
(a) A : 150, B : 100, C : 150 (b) A : 100, B : 150, C : 150
(c) A : 150, B : 150, C : 100 (d) A : 100, B : 150, C : 100
(e) None of these

39. A, B and C completed a work costing Rs. 1800. A worked for 6 days, B for 4 days and C for 9 days. If their daily wages are in the ratio of 5 : 6 : 4, how much amount will be received by A?
(a) Rs. 800 (b) Rs. 600 (c) Rs. 900
(d) Rs. 750 (e) None of these

40. A man can do a work in 10 days. With the help of a boy he can do the same work in 6 days. If they get Rs. 50 for that work , what is the share of that boy?
(a) Rs. 20 (b) Rs. 40 (c) Rs. 50
(d) Rs. 60 (e) None of these

Difficult

1. A 10 hectare field is reaped by 2 men, 3 women and 4 children together in 10 days. If working capabilities of a man, a woman and a child are in the ratio 5 : 4 : 2, then a 16 hectare field will be reaped by 6 men, 4 women and 7 children in
(a) 5 days (b) 6 days (c) 7 days
(d) 8 days (e) None of these

2. A can do a certain work in the same time in which B and C together can do it. If A and B together could do it in 10 days and C alone in 50 days, then B alone could do the work in
(a) 15 days (b) 20 days (c) 25 days
(d) 30 days (e) None of these

3. One man, 3 women and 4 boys can do a work in 96 hrs, 2 men and 8 boys can do it in 80 hrs and 2 men and 3 women can do it in 120 hrs. In how many hours can it be done by 5 men and 12 boys?

(a) $41\frac{5}{11}$ hrs (b) $43\frac{7}{11}$ hrs (c) $43\frac{5}{11}$ hrs

(d) $42\frac{7}{11}$ hrs (e) None of these

4. 40 men can complete a work in 40 days. They started the work together. But at the end of each 10th day, 5 men left the job. The work would have been completed in

(a) $56\frac{2}{3}$ days (b) $56\frac{1}{3}$ days (c) 52 days

(d) 50 days (e) None of these

5. 3 women and 18 children together take 2 days to complete a piece of work. How many days will 9 children alone take to complete the piece of work, if 6 women alone can complete the piece of work in 3 days?

(a) 9 (b) 7 (c) 5

(d) 6 (e) None of these

6. A can do a piece of work in 120 days and B can do it in 150 days. They work together for 20 days. Then B leaves and A alone continues the work. After C joins A and the work is completed in 48 days more. In how many days can C do it if he works alone?

(a) 230 days (b) 225 days (c) 240 days

(d) 220 days (e) None of these

7. 2 men and 1 woman can do a piece of work in 14 days, while 4 women and 2 men can do the same work in 8 days. If a man gets Rs. 90 per day, what should be the wages per day of a women?

(a) Rs. 48 (b) Rs. 60 (c) Rs. 72

(d) Rs. 135 (e) None of these

8. Heena can do a work in 20 days, while Himani can do the same work in 25 days. They started the work jointly. Few days later Mayuri also joined them and thus all of them completed the whole work in 10 days. All of them were paid total Rs. 700. What is the share of Mayuri?

(a) Rs. 130 (b) Rs. 185 (c) Rs. 70

(d) Rs. 80 (e) None of these

9. A and B can complete a piece of work in 12 and 18 days respectively. A begins to do the work and they work alternatively one at a time for one day each. The whole work will be completed in

(a) $14\frac{1}{3}$ days (b) $15\frac{2}{5}$ days (c) $16\frac{1}{3}$ days

(d) $18\frac{2}{3}$ days (e) None of these

10. A, B and C can do a piece of work individually in 8, 10 and 15 days respectively. A and B start working but A quits after working for 2 days. After this, C joins B till the completion of work. In how many days will the work be completed?

(a) $\frac{53}{9}$ days (b) $\frac{34}{7}$ days (c) $\frac{85}{13}$ days

(d) $\frac{53}{10}$ days (e) None of these

11. A can complete a work in 10 days, B can complete the same work in 20 days and C in 40 days. A starts working on the first day, B works for second day and C works for third day. Again A works for fourth day and B for fifth day and so on. If they continued working in the same way, in how many days will the work be completed?

(a) 15 days (b) 16.5 days (c) 15.5 days
(d) 17 days (e) None of these

12. A can complete a work in 10 days, B in 12 days and C in 15 days. All of them began the work together; but A had to leave the work after 2 days of the start and B also left 3 days before the completion of the work. How long did the work last?

(a) 7 days (b) 8 days (c) 10 days
(d) 12 days (e) None of these

13. A piece of work was to be completed in 40 days. A number of men employed upon it did only half the work in 24 days, 16 more men were then set on, and the work was completed in the specified time, how many men were employed at first?

(a) 16 men (b) 32 men (c) 24 men
(d) 48 men (e) None of these

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14. A contract is to be completed in 50 days and 105 men were set to work, each working 8h a day. After 25 days, $\frac{2}{5}$th of the work is finished. How many additional men be employed, so that the work may be completed on time, each man now working 9 h a day?
(a) 34 (b) 36 (c) 35
(d) 37 (e) None of these

15. A can do a work in 5 days less than the time taken by B to do it. If both of them together take $11\frac{1}{9}$ days, then the time taken by 'B' alone to do the same work (in days) is
(a) 15 (b) 20 (c) 25
(d) 30 (e) None of these

16. A and B can complete a piece of work in 45 and 40 days respectively. Both started to work together, but after some days A left and B alone completed the rest work in 23 days. For how many days did A work?
(a) 12 days (b) 10 days (c) 8 days
(d) 9 days (e) None of these

17. 4 men and 6 women together can complete a work in 8 days while 3 men and 7 women together can complete it in 10 days, 20 women working together will complete it in
(a) 36 days (b) 32 days (c) 24 days
(d) 20 days (e) None of these

18. Two workers A and B working together completed a job in 5 days. If A worked twice as efficiently as he actually did and B worked $\frac{1}{3}$ as efficiently as he actually did, the work wouldhave completed in 3 days. Find the time for A to complete the job alone?
(a) $6\frac{1}{2}$ days (b) $6\frac{1}{4}$ days (c) $6\frac{3}{4}$ days
(d) $12\frac{1}{2}$ days (e) None of these

19. A contract is to be completed in 92 days and 234 men were set to work, each working 16 h a day. After 66 days, $\frac{4}{7}$ of the work is completed. How many additional men may be employed, so that the work may be completed in time, each man now working 18 h a day?
(a) 162 (b) 234 (c) 262
(d) 81 (e) None of these

20. A, B and C can complete a piece of work in 15, 30 and 40 days respectively. They started the work together but A left 2 days before the completion of the work and B left 4 days before the completion of the work. In how many days was the work completed?
(a) $7\frac{3}{10}$ days (b) $10\frac{2}{15}$ days (c) $10\frac{7}{30}$ days
(d) $10\frac{7}{15}$ days (e) None of these

21. A , B and C can do a piece of work individually in 8, 12 and 15 days, respectively. A and B start working but A quits after working for 2 days. After this, C joins B till the completion of work. In how many days will the work be completed?
(a) $5\frac{8}{9}$ days (b) $4\frac{6}{7}$ days (c) $6\frac{7}{13}$ days
(d) $3\frac{3}{4}$ days (e) None of these

22. A piece of work can be completed by 10 men and 6 women in 18 days. Men work 9 hours per day while women work 7.5 hours per day. Per hour efficiency of a woman is $\frac{2}{3}$rd of a man's efficiency. In how many days 10 men and 9 women complete the work?
(a) 16 days (b) 20 days (c) 30 days
(d) 25 days (e) None of these

23. 4 men and 6 women get Rs. 1600 by doing a piece of work in 5 days. 3men and 7 women get Rs. 1740 by doing the same work in 6 days.

In how many days, 7 men and 6 women can complete the same work getting Rs. 3760?

(a) 6 days (b) 8 days (c) 10 days
(d) 12 days (e) None of these

24. The total number of men, women and children working in a factory is 18. They earn Rs. 4000 in a day. If the sum of the wages of all men, all women and all children is in the ratio of 18 : 10 : 12 and if the wages of an individual man, woman and child is in the ratio 6 : 5 : 3, then how much a woman earn in a day?

(a) Rs. 400 (b) Rs. 250 (c) Rs. 150
(d) Rs. 120 (e) None of these

25. If 5 men and 3 boys can reap 23 hectares in 4 days and if 3 men and 2 boys can reap 7 hectares in 2 days, how many boys must assist 7 men in order that they may reap 45 hectares in 6 days?

(a) 2 boys (b) 6 boys(c) 4 boys
(d) 5 boys (e) None of these

Previous Year (Memory Based)

1. Subhash can copy 50 pages in 10 h, Subhash and Prakash can copy 300 pages in 40 h. In how much time can Prakash copy 30 pages?

(a) 12 h (b) 9 h (c) 13 h
(d) 10 h (e) None of these

2. A can do a piece of work in 15 days. With the help of A, B can do it in $6\frac{2}{3}$ days. B can do it alone in

(a) 13 days (b) 8 days (c) 10 days
(d) 12 days (e) None of these

3. A, B and C can complete a work in 2 h. If A does the job alone in 6 h and B in 5 h, how long will it take for C to finish the job alone?

(a) $5\frac{1}{2}$ h (b) $7\frac{1}{2}$ h (c) 9 h
(d) $4\frac{1}{2}$ h (e) None of these

4. A can do a work in 20 days and B in 40 days. If they work on it together for 5 days. Then, the fraction of the work that left is:

(a) $\frac{5}{8}$ (b) $\frac{8}{15}$ (c) $\frac{7}{15}$

(d) $\frac{1}{10}$ (e) None of these

5. A, B and C individually can do a work in 10 days, 12 days and 15 days, respectively. Number of days required to finish the work by A, B and C working together is?

(a) 16 days (b) 8 days (c) 4 days

(d) 2 days (e) None of these

6. A takes 10 days less than the time taken by B to finish a piece of work. If both A and B can do it in 12 days, then the time taken by B alone to finish the work is

(a) 30 days (b) 27 days (c) 20 days

(d) 25 days (e) None of these

7. A, B and C together can complete a piece of work in 30 min. A and B together can complete the same work in 50 min. C alone can complete the work in?

(a) 60 min (b) 75 min (c) 80 min

(d) 150 min (e) None of these

8. If A and B together can complete a piece of work in 15 days and B alone in 20 days. In how many days can A alone complete the work?

(a) 60 (b) 45 (c) 40

(d) 30 (e) None of these

9. A and B together can do a piece of work in 10 days. A alone can do it in 30 days. The time in which B alone can do it is:

(a) 10 days (b) 12 days (c) 15 days

(d) 20 days (e) None of these

10. A can complete a work in 6 days while B can complete the same work in 12 days. If they work together and complete it, the portion of the work done by A is

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(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{4}$

(d) $\frac{1}{2}$ (e) None of these

11. A and B can do a piece of work in 10 days. B and C can do it in 12 days. A and C can do it in 15 days. How long will A take to do it alone?
(a) 24 days (b) 20 days (c) 40 days
(d) 30 days (e) None of these

12. A and B can complete a piece of work in 8 days, B and C can do it in 12 days, C and A can do it in 8 days. A, B and C together can complete in:
(a) 4 days (b) 5 days (c) 6 days
(d) 7 days (e) None of these

13. A and B can complete a piece of work in 30 days B and C can complete same work in 20 days, A and C can complete it in 15 days. If all of them work together, the time taken in completing the work will be?

(a) 10 days (b) 12 days (c) $12\frac{2}{3}$ days

(d) $13\frac{1}{3}$ days (e) None of these

14. A can do a piece of work in 4 h, B and C can do it in 3 h. A and C can do it in 2 h. How long will B alone take to do it?
(a) 10 h (b) 12 h (c) 8 h
(d) 24 h (e) None of these

15. A can do a certain job in 12 days. B is 60% more efficient than A. To do the same job B alone would take?

(a) $7\frac{1}{2}$ days (b) 8 days (c) 10 days

(d) 7 days (e) None of these

16. A is twice as good a workman as B and together they finish a piece of work in 14 days. The number of days taken by A alone to finish the work is:
(a) 11 days (b) 21 days (c) 28 days
(d) 42 days (e) None of these

17. Kamal can do a work in 15 days. Sita is 50 per cent more efficient than Kamal in doing the work. In how many days will Sita do that work?
(a) 14 days (b) 12 days (c) 10 days
(d) $10\frac{1}{2}$ days (e) None of these

18. A does half as much work as B in three-fourth of the time. If together they take 18 days to complete a work, how much time shall B take to do it alone?
(a) 30 days (b) 35 days (c) 40 days
(d) 45 days (e) None of these

19. 2 men and 3 women together or 4 men together can complete a piece of work in 20 days. 3 men and 3 women will complete the same work in
(a) 12 days (b) 16 days (c) 18 days
(d) 19 days (e) None of these

20. 15 men take 20 days to complete a job working 8 h a day. The number of hours a day should 20 men take to complete the job in 12 days
(a) 5 h (b) 10 h (c) 15 h
(d) 18 h (e) None of these

21. 45 men can complete the work in 16 days. Four days after they started working, 36 more men joined them. How many days will they now take to complete the remaining work?
(a) 6 days (b) 8 days (c) $6\frac{2}{3}$ days
(d) $7\frac{3}{4}$ days (e) None of these

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22. If 10 men can do a piece of work in 12 days, the time taken by 12 men to do the same piece of work will be:
(a) 12 days (b) 10 days (c) 9 days
(d) 8 days (e) None of these

23. 10 men working 6 h a day can complete a work in 18 days. How many hours per day must 15 men work to complete the same work in 12 days?
(a) 6 (b) 10 (c) 12
(d) 15 (e) None of these

24. A certain number of persons can complete a piece of work in 55 days. If there were 6 persons more, the work could be finished in 11 days less. How many persons were originally there?
(a) 17 (b) 24 (c) 30
(d) 22 (e) None of these

25. 6 men or 12 women can do a piece of work in 20 days. In how many days can 8 men and 16 women do twice as big as this work?
(a) 2 (b) 5 (c) 15
(d) 10 (e) None of these

26. A can do a work in 12 days. When he had worked for 3 days, B joined him. If they complete the work in 3 more days, in how many days can b alone finish the work?
(a) 6 days (b) 12 days (c) 4 days
(d) 8 days (e) None of these

27. A and B together can complete a work in 8 days. B alone can complete that work in 12 days. B alone worked for four days. After that how long will A alone take to complete the work?
(a) 15 days (b) 18 days (c) 16 days
(d) 20 days (e) None of these

28. A can finish a work in 24 days, B in 9 days and C in 12 days. B and C start the work but are forced to leave after 3 days. The remaining work was done by A in:
(a) 5 days (b) 6 days (c) 10 days
(d) $10\frac{1}{2}$ days (e) None of these

29. While working 7 h a day, A alone can complete a piece of work in 6 days and B alone in 8 days. In what time would the complete it together, working 8 h a day?
(a) 3 days (b) 4 days (c) 2.5 days
(d) 3.6 days (e) None of these

30. A and B working separately can do a piece of work in 10 days and 15 days, respectively. If they work in alternate days beginning with A, in how many days will the work be completed?
(a) 18 days (b) 13 days (c) 12 days
(d) 6 days (e) None of these

31. A and B working separately can do a piece of work in 9 and 15 days respectively. If they work in alternate days beginning with A, then the work will be completed in?
(a) 10 days (b) 11 days (c) 9 days
(d) 12 days (e) None of these

32. A can do a piece of work in 20 days and B in 30 days. They work together for 7 days and then, both leave the work. Then, C alone finishes the remaining work in 10 days. In how many days will C finish the full work?
(a) 25 days (b) 30 days (c) 24 days
(d) 20 days (e) None of these

33. A and B can do a piece of work in 12 days and 15 days, respectively. They began to work together but A left after 4 days. In how many more days would B alone complete the remaining work?
(a) $\frac{20}{3}$ (b) $\frac{25}{3}$ (c) 6
(d) 5 (e) None of these

34. A and B can do a work in 45 days and 40 days, respectively. They began the work together but A left after some time and B complete the remaining work in 23 days. After how many days of the start of the work did A leave?
(a) 10 days (b) 9 days (c) 8 days
(d) 5 days (e) None of these

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35. A, B and C and do a job in 6 days, 12 days and 15 days, respectively. After $\frac{1}{8}$ of the work is completed, C leaves the job. Rest of the work is done by A and B together. Time taken to finish the remaining work is?

(a) $5\frac{5}{6}$ days (b) $5\frac{1}{4}$ days (c) $3\frac{1}{2}$ days

(d) $3\frac{3}{4}$ days (e) None of these

36. 4 men or 6 women or 10 children can paint a house in 5 days. The painting is given to a couple and their 5 sons. They finish the job in:

(a) $\frac{11}{60}$ days (b) $5\frac{5}{11}$ days (c) $5\frac{6}{11}$ days

(d) $11\frac{1}{5}$ days (e) None of these

37. 39 persons can repair a road in 12 days working 5 h per day. In how many day will 30 persons working 6 h per days complete the work?

(a) 10 (b) 13 (c) 14

(d) 15 (e) None of these

38. Some carpenters promised to do a job in 9 days but 5 of them were absent and remaining men did the job in 12 days. the original number of carpenters was:

(a) 24 (b) 20 (c) 16

(d) 18 (e) None of these

39. Twenty women together can complete a work in 16 days. 16 men together can complete the same work in 15 days. The ratio of the working capacity of a man to that of a woman is:

(a) 3 : 4 (b) 4 : 3 (c) 5 : 3

(d) 4 : 5 (e) None of these

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40. 60 men could complete a work in 250 days. They worked together for 200 days. After that the work had to stopped for 10 days due to the bad weather. How many more men should be engaged to complete the work in the time?

(a) 10 (b) 15 (c) 18
(d) 20 (e) None of these

Foundation

1. (a); Here, $M_1 = 18$, $M_2 = 27$, $D_1 = 24$

By the formula

$M_1D_1 = M_2D_2 \Rightarrow 18 \times 24 = 27 \times D_2$

$\therefore \quad D_2 = \frac{18 \times 24}{27} = 16$ days

2. (a); Let 1648 persons can construct a dam in x days

Given, $M_1 = 1648$ $M_2 = 721$

$D_1 = x$ days, $D_2 = 48$ days

$\therefore \quad M_1D_1 = M_2D_2 \Rightarrow 1648 \times x = 721 \times 48$

$x = \frac{721 \times 48}{1648} = 21$ days

$\therefore$ 1648 persons require 21 days to construct a dam.

3. (a); Efficiency is inversely proportional to time.

$\left.\begin{array}{l}\text{Efficiency } 2:1 \\ \text{Persons } 20:10\end{array}\right\} :: 20 : x \qquad \therefore x = \frac{1 \times 10 \times 20}{20 \times 2} = 5$ days.

4. (d); (A + B)'s 1 day's work $= \frac{1}{6} + \frac{1}{12} = \frac{2+1}{12} = \frac{1}{4}$

$\therefore$ A and B together will complete the work in 4 days.

5. (b); Work done by 12 men in 6 days $= \frac{1}{2}$

Remaining work $= 1 - \frac{1}{2} = \frac{1}{2}$

By the formula

$$\frac{M_1D_1}{W_1} = \frac{M_2D_2}{W_2}, \quad \frac{12 \times 12}{1} = \frac{6 \times x}{\frac{1}{2}} \qquad 12 \times 12 = 12 \times x \Rightarrow x = 12$$

Extra days to complete the work = 12 – 6 = 6 days

Shortcut:

$12 \times 12 = 12 \times 6 + 6 \times x \qquad 6x = 12 \times 6 \Rightarrow x = 12$

No. of extra days = 12 – 6 = 6 days

6. (c); 1 day's work of $A = \frac{1}{12}$ 1 day's work of $B = \frac{1}{15}$

Part of the work done by A and B in 4 days

$$= 4\left(\frac{1}{12} + \frac{1}{15}\right) = 4\left(\frac{5+4}{60}\right) = 4 \times \frac{9}{60} = \frac{3}{5}$$

Remaining work $= 1 - \frac{3}{5} = \frac{2}{5}$

$\therefore$ Time taken by B to complete the remaining work $= \frac{2}{5} \times 15 = 6$ days

Shortcut:

In 4 days, work done by (A + B) = 4(5 + 4) = 36 units

Remaining work done by B = $\frac{24}{4} = 6$ days

7. (d); Working efficiencies are in the ratio 3 : 4

$\therefore$ ratio of time taken by them = 4 : 3

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8. (b); By using MDH formula

$$M_1D_1H_1W_2 = M_2D_2H_2W_1$$

Here, $5 \times 6 \times 6 \times 16 = 12 \times D_2 \times 8 \times 10$

$$\therefore \quad D_2 = \frac{5\times6\times6\times16}{12\times8\times10} = 3 \text{ days}$$

9. (b); (A + B)'s 1 day's work $= \frac{1}{18}$ (B+C)'s 1 day's work $= \frac{1}{9}$

(A+C)'s 1 day's work $= \frac{1}{12}$

Adding all the above three,

2(A + B + C)'s 1 day's work $= \frac{1}{18} + \frac{1}{9} + \frac{1}{12} = \frac{2+4+3}{36} = \frac{9}{36} = \frac{1}{4}$

$\therefore$ (A + B + C)' s 1 day's work $= \frac{1}{8}$

$\therefore$ B's 1 day's work = (A + B + C)'s 1 day's work – (A + C)'s 1 day's work $= \frac{1}{8} - \frac{1}{12} = \frac{3-2}{24} = \frac{1}{24}$

Hence, B alone can do the work in 24 days.

10. (a); Let the total work be 11 units

According to question (P + Q) finish 7 units works means R will finish the remaining 4 units works

$\therefore$ R will get an amount $= \frac{4}{11} \times 550 =$ Rs. 200

11. (a); Let the total work be 7 units

Then, $P + Q \rightarrow 5$ units

R does $\rightarrow (7-5) = 2$ units

So, R will get $= \frac{2}{7} \times 707 =$ Rs. 202

12. (d); Total amount = 30000

A's 1 day's work $= \frac{1}{15}$

B's 1 day's work $= \frac{1}{10}$

Ratio $= \frac{1}{15} : \frac{1}{10} = 2 : 3$ (taking LCM)

Sum of the ratios = 2 + 3 = 5

$\therefore$ A's share $= \frac{2}{5} \times 30000 =$ Rs. 12000

13. (b); It is required to find the H.C.F. of 5750 and 5000, because his daily wage is their common factor.
Hence, the daily wage is Rs. 250.

14. (c); Work done by (B+C) in 3 days

$= 3 \times \left(\frac{1}{9} + \frac{1}{12}\right) = \frac{1}{3} + \frac{1}{4} = \frac{4+3}{12} = \frac{7}{12}$

Remaining work $= 1 - \frac{7}{12} = \frac{5}{12}$

This part of work is done by A alone.

Now, $\frac{1}{24}$ part of work is done by A in 1 day.

$\therefore$ $\frac{5}{12}$ part of work will be done in $= 24 \times \frac{5}{12} = 10$ days.

15. (c); 3 m = 6w

$\therefore$ 1m = 2w

12m + 8w = (12 × 2w) + 8w = 32w

$\because$ 6 women can do the work in 16 days

$\therefore$ 32 women can do the work in $\frac{16 \times 6}{32} = 3$ days.

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16. (a); A's work per day = $\frac{1}{15}$

B's work per day = $\frac{1}{20}$

(A+B)'s work per day = $\frac{1}{15}+\frac{1}{20}=\frac{7}{60}$

$\therefore$ (A+B)'s work in 4 days = $4\times\frac{7}{60}=\frac{7}{15}$

$\Rightarrow$ fraction of work left $=1-\frac{7}{15}=\frac{8}{15}$

17. (c); Here, $M_1 = 270$, $M_2 = 180$, $D_1 = 10$, $D_2 = x$

By the formula

$M_1D_1 = M_2D_2 \Rightarrow 270 \times 10 = 180 \times x$

$x=\frac{270\times 10}{180}$ =15 Days

18. (d); Given, $M_1 = 4$, $D_1 = 4$, $W_1 = 4$

$M_2 = 8$, $D_2 = 8$, $W_2 = ?$

$\frac{M_1D_1}{W_1}=\frac{M_2D_2}{W_2} \Rightarrow \frac{4\times 4}{4}=\frac{8\times 8}{W_2}$

$4W_2 = 64 \Rightarrow W_2 = 16$

19. (c); A's one day's work $=\frac{1}{6}$

B's one day's work $=\frac{1}{12}$

(A + B)'s one day's work $=\frac{1}{6}+\frac{1}{12}=\frac{2+1}{12}=\frac{1}{4}$