

# SSC

## CHSL (10+2)

Combined Higher Secondary Level

## TIER-I

Online Recruitment Examination-2020

# QUANTITATIVE APTITUDE

(Basic Arithmetic Skill)

Based on the Latest Syllabus

# 46

Chapterwise  
Solved Papers  
(2017-19)

Quick  
Revision

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Chapterwise  
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(2017-19)

Team Prabhat



प्रभात  
पेपरबैक्स

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Publisher

**PRABHAT PAPERBACKS**

4/19 Asaf Ali Road, New Delhi-110 002

Ph. 23289555 • 23289666 • 23289777 • Helpline/ 7827007777

e-mail: prabhatbooks@gmail.com • Website: www.prabhatexam.com

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*First Edition*

2020

*Price*

One Hundred Ninety Five Rupees

ISBN 978-93-5322-881-1

*Printed at*

Japan Arts, Delhi

**SSC CHSL COMBINED HIGHER SECONDARY LEVEL (10 + 2)**

**TIER-I, ONLINE RECRUITMENT EXAMINATION, 2020**

**QUANTITATIVE APTITUDE**

**46 CHAPTERWISE SOLVED PAPERS**

*by Team Prabhat*

Published by **PRABHAT PAPERBACKS**

4/19 Asaf Ali Road, New Delhi-110 002

ISBN 978-93-5322-881-1

₹ 195.00

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# 1

# Numbers and Fractions

## Important points:

- **Numeral:** In Hindu Arabic system, we use ten symbols, numeral 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. We call them digits. A number is denoted by a group of digits, called numeral.
- **Place value:** In a numeral 176524, we have  
Place value of 4 =  $(4 \times 1) = 4$   
Place value of 2 =  $(2 \times 10) = 20$   
Place value of 5 =  $(5 \times 100) = 500$   
Place value of 6 =  $(6 \times 1000) = 6000$   
Place value of 7 =  $(7 \times 10000) = 70000$   
Place value of 1 =  $(1 \times 100000) = 100000$
- **Face value:** The face value of a digit in a numeral is the value of the digit itself. Wherever it may be in the place value chart.  
In the numeral 17625, the face value of 5 is 5, the face value of 2 is 2, the face value of 6 is 6 and so on.

## Types of numbers:

- (i) **Natural number :** The counting numbers are called natural numbers.  
Thus,  $N = \{1, 2, 3, 4, 5, 6, 7 \dots\}$  is the set of natural numbers.
- (ii) **Whole number :** All natural numbers together with zero (0) form the set  $W$  of all whole numbers.  
 $W = \{0, 1, 2, 3, 4, 5, 6, 7 \dots\}$  is the set of all whole numbers.  
Note:
  - Every natural number is a whole number.
  - 0 is a whole number which is not a natural number.
- (iii) **Integers:** All natural numbers, negatives of natural number and 0, together form the set  $I$  of all integers.  
Thus,  $I = \{\dots - 4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$ ,  $I$  is the set of all negative and positive integers.
- (iv) **Even numbers:** A number divisible by 2 is called an even number.  
Thus,  $\{2, 4, 6, 8, 10, 12, 14, 16 \dots\}$  is the set of all even numbers.
- (v) **Odd numbers:** A number not divisible by 2 is called an odd number.  
Thus,  $\{1, 3, 5, 7, 9, 11, 13, 15 \dots\}$  is the set of odd numbers.
- (vi) **Prime numbers:** A number greater than 1 having exactly two factors, namely 1 and itself is called a prime number.
- (vii) **Rational numbers:** A number of the form  $\frac{p}{q}$  is called Rational number, (where  $p$  and  $q$  are integers and  $q \neq 0$ )  
Thus,  $\frac{356}{467}$  - (etc.) are rational numbers.
- (viii) **Irrational numbers:** A number which is not of the form of  $\frac{p}{q}$  is called irrational number (where  $p$  and  $q$  are integers and  $q \neq 0$ )  
Thus  $\sqrt{3}, \sqrt[3]{5}, \pi$  etc. are Irrational numbers.
- (ix) **Composite number :** Numbers greater than 1 which are not prime, are called composite numbers.  
Thus, 4, 6, 8, 9, 10 and 12 etc. are composite numbers.  
Note: (i) 1 is neither prime nor composite.  
(ii) 2 is the only even number which is prime.
- (x) **Co-prime:** Two natural numbers  $a$  and  $b$  are said to be co-prime if their HCF is 1.  
Thus, (2, 3), (4, 5), (7, 9) etc. are pairs of co-primes.  
**Division on numbers:** Dividend, Divisor, Quotient and Remainder.  
Let a number  $a$  is divided by another number  $b$  and we get quotient  $q$  and remainder  $r$ .  
Then,  $\text{Dividend} = \text{Divisor} \times \text{Quotient} + \text{Remainder}$   
 $[a = bq + r]$  where  $(a \leq r < b)$

## Test of divisibility:

- (i) **Divisibility by 2:** A number is divided by 2 if its units digit is any of 0, 2, 4, 6 and 8.  
Example: 342, 4616, 52316 etc.

(ii) Divisibility by 3: A number is divisible by 3 if the sum of its digits is divisible by 3.

Example: 96342, 462372 etc.

(iii) Divisibility by 4: A number is divisible by 4 if the number formed by the last two digits is divisible by 4.

Example: 1728, 16520, 17624 etc.

(iv) Divisibility by 5: A number is divisible by 5, if its unit's digit is either 0 or 5.

Example: 625, 15725, 100000 etc.

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

Example: 6432, 74936 etc.

(vi) Divisibility by 8: A number is divisible by 8, if the number formed by the last three digits of the given number is divisible by 8.

Example: 175248, 976488 etc.

(vii) Divisibility by 9: A number is divisible by 9, if the sum of its digits is divisible by 9.

Example: 6372, 5943276 etc.

(viii) Divisibility by 10: A number is divisible by 10, if it ends with zero.

Example: 17650, 1000, 18980, 16550 etc.

(ix) Divisibility by 11: A number is divisible by 11, if the difference of the sum of its digits at odd places and the sum of its digits at even places is either 0 or a number divisible by 11.

Example: The number 14641 is divisible by 11, since:

(Sum of digits at odd places) – (sum of digits at even places) = (1 + 6 + 1) – (4 + 4) = 8 – 8 = 0

So, number 14641 is divisible by 11.

(x) Divisibility by 12: A number is divisible by 12, if it is divisible by 4 and 3.

Example: 43524, 34632 etc.

Fractions: A fraction is the part of a whole. Mathematically,

we define fractions as the numbers of the form  $\frac{a}{b}$ , where  $a$  and  $b$  are whole numbers and  $b \neq 0$ .

Thus, a fraction consists of a top number and a bottom number, separated by a dividing line. The top number is called the numerator and bottom number is called denominator.

Example:  $\frac{3569}{46711}$  and — etc.

### Kinds of Fractions:

(i) Like fractions: Fractions having same denominators are called like fractions.

Example:  $\frac{739}{555}$  etc.—

(ii) Unlike fractions: Fractions having the different denominators are called unlike fractions.

Example:  $\frac{146}{357}$ , etc.

(iii) Proper Fractions: A fraction whose numerator is less than its denominator, is called proper fraction.

Example:  $\frac{146}{5611}$ , — etc.

(iv) Improper fractions: A fraction whose numerator is greater than or equal to its denominator is called an improper fraction.

Example:  $\frac{7118}{597}$ , — etc.

(v) Complex fractions: A fraction whose one or both the terms are fractions, is called a complex fraction.

Example:  $\left(\frac{4/34}{77/5}\right)^3 \left(\frac{—}{—}\right)$  etc.

(vi) Decimal fractions: Fractions in which denominators are powers of 10 are known as decimal fractions.

Example:  $\frac{111}{101010}$  — etc.

(vii) Recurring Decimal: If in a decimal fraction, a figure or a set of figures is repeated continuously, then such a number is called recurring decimal.

Examples : (i)  $\frac{1}{9} = 0.1111... \text{---} 1$

(ii)  $\frac{50}{3} = 16.666... \text{---} 6.6$

• Pure recurring decimal: A decimal fraction in which all the figures after the decimal points are repeated, is called a pure recurring decimal.

• Mixed Recurring Decimal: A decimal fraction in which some figures do not repeat and some of them are repeated, is called mixed recurring decimal.

Examples : (i) 0.12444 ...  $\text{---} 0.12\bar{4}$

(ii) 0.1424242 .....  $\text{---} 0.14\bar{2}$

• Converting a mixed Recurring Decimal into vulgar fraction: If the numerator take the difference between the number formed by all the digits after decimal points (taking repeated digits only once) and that formed by the digits which are not repeated. In the denominator, take the

number formed by as many nines as there are repeating digits followed by as many zeros as is the number of non repeating digits.

Examples : (i)  $0.1\overline{7} = \frac{17-1168}{909045} = \dots$

(ii)  $0.15\overline{2} = \frac{152-5210010}{99099099} = \dots$

**Some Important Results on Addition:**

- (i) Sum of first n natural numbers =  $\frac{n(n+1)}{2}$
- (ii) Sum of the first n even numbers = n (n + 1)
- (iii) Sum of the first n odd numbers = n<sup>2</sup>
- (iv) Sum of the squares of first n naturals numbers

$$\frac{n(n+1)(2n+1)}{6}$$

(v) Sum of the cubes of first n natural numbers =  $\left[\frac{n(n+1)}{4}\right]^2$

**Some Important Results on Division:**

- (i) (x<sup>n</sup> - a<sup>n</sup>) is divisible by (x - a) for all values of n.
- (ii) (x<sup>n</sup> - a<sup>n</sup>) is divisible by (x + a) for all values of n.
- (iii) (x<sup>n</sup> + a<sup>n</sup>) is divisible by (x + a) for all values of n.

**Solved Examples**

**Example 1:** Find the sum of first 12 natural numbers.

**Sol.** Sum of first 'n' natural numbers =  $\frac{n(n+1)}{2}$   
(Here n = 12)

$\therefore$  Required sum =  $\frac{12(12+1)}{2} = 78$

**Example 2:** If 590 \* 9 is exactly divisible by 9. Find the digit in place of \*.

**Sol.** 590 \* 9 = (5 + 9 + 0 + \* + 9) = (23 + \*) must be divisible by 9.

$\therefore$  \* = 4 ( $\because$  smallest number which is divisible by 9 nearest to 23 is 27)

**Example 3:**  $\frac{3}{4}$  of a number exceeds its  $\frac{2}{3}$  by 6. Find the number.

**Sol.** Let the required number be x.

Then,  $\frac{3x}{4} - \frac{2x}{3} = 6$

$\Rightarrow \frac{9x - 8x}{12} = 6$

$\Rightarrow x = 72$

**Example 4:** Find the difference between  $\frac{13}{15}$  of ₹ 675

and  $\frac{9}{16}$  of ₹ 656.

**Sol.**  $\frac{13}{15}$  of ₹ 675 =  $\left(\frac{13}{15} \times 675\right)$  ₹ 585

$\frac{9}{16}$  of ₹ 656 =  $\left(\frac{9}{16} \times 656\right)$  ₹ 369

Required difference = ₹ (585 - 369) = ₹ 216

**Exercise**

1. Reduce 2530/1430 to lowest terms.  
(a) 47/17      (b) 23/13  
(c) 47/19      (d) 29/17

[SSC CHSL (Tier-1) Online Exam 31 January 2017 Morning Shift]

Ans. (b)  $\frac{2530}{1430} = \frac{253H}{143H} = \frac{23}{13}$

2. What should be the missing digit so that the number 347\_547 becomes exactly divisible by 11?

- (a) 5      (b) 3
- (c) 9      (d) 2

[SSC CHSL (Tier-1) Online Exam 30 January 2017 Morning Shift]

Ans. (b) Let missing digit be x  
Sum of odd place - sum of even place = 0, 11, 22, .....  
(3 + 7 + 5 + 7) - (4 + x + 4) = 0, 11, 22, .....  
22 - (8 + x) = 0, 11, 22'

$\Rightarrow 22 - 8 - x = 11$   
 $\Rightarrow 14 - x = 11$   
 $\Rightarrow 14 - 11 = x$

Hence, x = 3, which is exactly divisible by 11.

3. If 9/4th of 7/2 of a number is 126, then 7/2th of that number is .....  
(a) 56      (b) 284  
(c) 72      (d) 26

[SSC CHSL (Tier-1) Online Exam 30 January 2017 Afternoon Shift]



Ans. (a) Let the number be  $x$

$$\frac{9}{4} \text{ of } \frac{7}{2} \text{ of } x = 126$$

$$\frac{9}{4} \times \frac{7}{2} x = 126$$

$$\frac{63}{8} x = 126$$

$$x = \frac{126 \times 8}{63} = \frac{14 \times 8}{7} = 16$$

$$\frac{7}{2} x = \frac{7}{2} \times 16 = 56$$

4. The ten's digit of a 2-digit number is greater than the units digit by 4. If we subtract 36 from the number, the new number obtained is a number formed by interchange of the digits. Find the number.

- (a) 37                      (b) 18  
(c) 81                      (d) 73

[SSC CHSL (Tier-1) Online Exam 30  
January 2017 Afternoon Shift]

Ans. (d) Let two digit number be  $10x + y$   
According to question

In case I,

$$x = y + 4$$

$$x - y = 4$$

In case II

$$10x + y - 36 = 10y + x$$

$$a(x - y) = 36$$

$$x - y = 4$$

By solving,  $x = 7$ , and  $y = 3$

We get the number =  $10 \times 7 + 3 = 73$

5.  $(91 + 92 + 93 + \dots + 110)$  is equal to

- (a) 4020                      (b) 2010  
(c) 6030                      (d) 8040

[SSC CHSL (Tier-1) Online Exam 30  
January 2017  
Evening Shift]

Ans. (b)  $(91 + 92 + 93 + \dots + 110)$   
=  $(1 + 2 + 3 \dots + 110) - (1 + 2 + 3 + \dots + 90)$   
where  $n_1 = 110$  and  $n_2 = 90$

$$= \frac{n_1(n_1 + 1)}{2} - \frac{n_2(n_2 + 1)}{2}$$

$$\frac{110 \times 111}{2} - \frac{90 \times 91}{2}$$

$$= 55 \times 111 - 45 \times 91$$

$$= 6105 - 4095 = 2010$$

6. The ten's digit of a 2-digit number is greater than the units digit by 7. If we subtract 63 from the number, the new number obtained is a number formed by interchange of the digits. Find the number.

- (a) 81                      (b) 18  
(c) 62                      (d) 26

[SSC CHSL (Tier-1) Online Exam 30  
January 2017  
Evening Shift]

Ans. (a) Let the number be  $10x + y$

$$x = y + 7$$

$$x - y = 7$$

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

$$9(x - y) = 63$$

$$x - y = 7$$

We assume based on given options

$$x = 8 \text{ and } y = 1$$

Hence, the number is 81.

7. What is the value of  $(81 + 82 + 83 + \dots + 130)$ ?

- (a) 5275                      (b) 10550  
(c) 15825                      (d) 21100

[SSC CHSL (Tier-1) Online Exam 29  
January 2017 Afternoon Shift]

Ans. (a)  $(81 + 82 + 83 + \dots + 130)$   
=  $(1 + 2 + 3 + 4 + \dots + 130) - (1 + 2 + 3 + 80)$

$$= \frac{n_1(n_1 + 1)}{2} - \frac{n_2(n_2 + 1)}{2}$$

$$\frac{130(130 + 1)}{2} - \frac{80(80 + 1)}{2}$$

$$= 65 \times 131 - 40 \times 81$$

$$= 8515 - 3240$$

$$= 5275$$

8. What is the value of  $5/9 + 7/8$ ?

- (a)  $103/72$                       (b)  $97/42$   
(c)  $12/17$                       (d)  $15/13$

[SSC CHSL (Tier-1) Online Exam 27  
January 2017 Morning Shift]

Ans. (a) The value of  $\frac{57}{98} + \frac{7}{98}$

$$= \frac{4063103}{7272} = \dots$$

9. The sum of the digits of a 2-digit number is 11. If we add 45 to the number, the new number obtained is a number formed by interchange of the digits. What is the number?

- (a) 83                      (b) 38  
(c) 64                      (d) 46

[SSC CHSL (Tier-1) Online Exam 27  
January 2017 Morning Shift]

Ans. (b) Let the number be  $10x + y$

In case I

$$x + y = 11 \quad \dots(i)$$

$$10x + y + 45 = 10y + x$$

In case II

$$10x + y - 10y - x = -45$$

$$9(x - y) = -45$$

$$x - y = -5 \quad \dots(ii)$$

Solving equation (i) and (ii), we get

$$x = 3 \text{ and } y = 8$$

Hence, the number

$$= 30 + 8 = 38.$$

10. Two fractions are such that their product is  $9/10$  and sum is  $13/40$ .

What are the two fractions?

- (a)  $2/5, 9/4$                       (b)  $1/5, 9/2$   
(c)  $4/5, 9/8$                       (d)  $2/5, 9/4$

[SSC CHSL (Tier-1) Online Exam 27  
January 2017 Afternoon Shift]

Ans. (c) Let  $x$  and  $y$  be two fractions

In case-I

$$xy = \frac{9}{10} \quad \dots(i)$$

In case-II

$$x + y = \frac{77}{40} \quad \dots(ii)$$

Solving equations (i) and (ii), we get

$$x + y = \frac{77}{40}$$

$$\frac{9}{10y} + y = \frac{77}{40}$$

$$40y^2 - 77y + 36 = 0$$

$$(8y - 9)(5y - 4) = 0$$

$$y = \frac{94}{85} \text{ or } y = -$$

$$x = \frac{49}{58} \text{ or } x = -$$

11. The simplest form of 3774/2958 is:  
 (a) 43/19 (b) 37/29  
 (c) 31/13 (d) 31/23

[SSC CHSL (Tier-1) Online Exam 27  
 January 2017 Afternoon Shift]

Ans. (b) The simplest form = 3774/2958

$$= \frac{188737}{147929}$$

12. The simplest form of 3565/1495 is:  
 (a) 31/13 (b) 43/19  
 (c) 23/13 (d) 31/23

[SSC CHSL (Tier-1) Online Exam 25  
 January 2017 Afternoon Shift]

Ans. (a) The fraction  $\frac{3565}{1495}$

$$\therefore \text{The simplest form} = \frac{31}{13}$$

13. The sum of thrice a number and twice its reciprocal is 97/4. What is the number?  
 (a) 9 (b) 10  
 (c) 8 (d) 7

[SSC CHSL (Tier-1) Online Exam 25  
 January 2017 Afternoon Shift]

Ans. (c) Let the number be x

$\therefore$  According to question,

$$3x + \frac{2}{x} = \frac{97}{4}$$

$$\frac{3x^2 + 2}{x} = \frac{97}{4}$$

$$12x^2 + 8 = 97x$$

$$12x^2 - 97x + 8 = 0$$

$$12x^2 - 96x - x + 8 = 0$$

$$12x(x - 8) - 1(x - 8) = 0$$

$$(x - 8)(12x - 1) = 0$$

$$x - 8 = 0 \text{ and } 12x - 1 = 0$$

$$x = 8, x = \frac{1}{12}$$

$\therefore$  Hence, the number is 8.

14. What is the value of  $99992 \times 100008$  ?

- (a) 9999999936 (b) 9999899936  
 (c) 9999999836 (d) 9999999926

[SSC CHSL (Tier-1) Online Exam 25  
 January 2017  
 Evening Shift]

Ans. (a) The expression,  
 $99992 \times 100008 = 9999999936$

15. Two fractions are such that their product is 4 and sum is 68/15. Find the two fractions.

- (a) 6/15, 10/3 (b) 6/5, 10/3  
 (c) 7/2, 8/7 (d) 10/7, 14/5

[SSC CHSL (Tier-1) Online Exam 25  
 January 2017  
 Evening Shift]

Ans. (b) Let the two fractions be x and y respectively. According to question,

$$x \times y = 4 \quad \dots(i)$$

and  $x + y = \frac{68}{15} \quad \dots(ii)$

From eq<sup>i</sup> (i)

$$x \times y = 4$$

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

Putting value of y in eq<sup>i</sup> (ii)

$$x + \frac{4}{x} = \frac{68}{15}$$

$$\frac{x^2 + 4}{x} = \frac{68}{15}$$

$$15x^2 + 60 = 68x$$

$$15x^2 - 68x + 60 = 0$$

$$15x^2 - 60 \left( \frac{610}{53} \right) + 60 = 0$$

$$15x^2 - 60 \frac{610}{53} + 60 = 0$$

$$\left( 15x - \frac{610}{53} \right) (x - 1) = 0$$

$$15x - \frac{610}{53} = 0 \text{ and } x - 1 = 0$$

$$15x = \frac{610}{53}, x = \frac{10}{3}$$

Finally the two fractions are  $\frac{6}{5}$  and

$$\frac{10}{3} \text{ respectively.}$$

16. When 0.363636..... is converted into a fraction, then the result is .....  
 (a) 7/11 (b) 4/11  
 (c) 14/33 (d) 8/33

[SSC CHSL (Tier-1) Online Exam 24  
 January 2017 Morning Shift]

Ans. (b)  $x = 0.363636 \dots$

$$x = 0.\overline{36} \quad \dots(i)$$

$$100x = 36.\overline{36} \quad \dots(ii)$$

Subtracting equation (i) from (ii)  
 $99x = 36$

$$x = \frac{36}{99} = \frac{4}{11}$$

17.  $2 \times [0.3(1.3 + 3.7)]$  of 0.8 = ?

- (a) 1.92 (b) 0.72  
 (c) 2.16 (d) 2.4

[SSC CHSL (Tier-1) Online Exam 24  
 January 2017 Afternoon Shift]

Ans. (d)  $2 \times [0.3(1.3 + 3.7)]$  of 0.8 = ?

$$\begin{aligned} ? &= 2 \times [0.3(5)] \times 0.8 \\ &= 2 \times 1.5 \times 0.8 \\ &= 2.4 \end{aligned}$$

18. If 7/8th of 5/4th of a number is 315, then 5/9th of that number is .....

- (a) 123 (b) 81  
 (c) 140 (d) 160

[SSC CHSL (Tier-1) Online Exam 23  
 January 2017 Afternoon Shift]

Ans. (d) Let the number be x

$$\frac{7}{8} \times \frac{5}{4} \times x = 315$$

$$\frac{35}{32} x = 315$$

$$x = \frac{315 \times 32}{35} = 288$$

$$\text{Now, } \frac{5}{9} \text{ of } 288 = \frac{5}{9} \times 288 = 160$$

19. Which of the following numbers is not a prime number?

- (a) 731 (b) 227  
 (c) 347 (d) 461

[SSC CHSL (Tier-1) Online Exam 01  
 February 2017 Morning Shift]

Ans. (a) 731 is not a prime number.

20. The largest 5 digit number exactly divisible by 95 is :  
 (a) 99936 (b) 99935  
 (c) 99940 (d) 99933  
 [SSC CHSL (Tier-1) Online Exam 01  
 February 2017 Afternoon Shift]

Ans. (c) The largest 5 digit number = 99999

$$\begin{array}{r} 95 \overline{)99999} \phantom{1052} \\ \underline{95} \phantom{000} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ 499 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ \underline{475} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ 249 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ \underline{190} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ 59 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \end{array}$$

Hence, divisible by 95 = 99999 - 59 = 99940

21. When 0.090909..... is converted into a fraction, then the result is:  
 (a) 1/33 (b) 1/11  
 (c) 2/33 (d) 6/11  
 [SSC CHSL (Tier-1) Online Exam 02  
 February 2017 Morning Shift]

Ans. (b)  $x = 0.090909..... = 0.09$   
 $100x = 9.09$   
 Subtracting (i) from (ii), we get  
 $99x = 9$

$$x = \frac{9}{99} = \frac{1}{11}$$

22. If  $\frac{6}{7}$ th of  $\frac{8}{5}$ th of a number is 192, then  $\frac{3}{4}$ th of that number is -----  
 (a) 105 (b) 77  
 (c) 36 (d) 80  
 [SSC CHSL (Tier-1) Online Exam 02  
 February 2017 Afternoon Shift]

Ans. (a) Let the number be x

$$\frac{x \times 68}{75} \times - = 192$$

$$x = \frac{19235}{68} = \frac{24}{6} \times 35 = 140$$

$$\frac{3}{4} \text{ of } x = \frac{3}{4} \times 140 = 3 \times 35 = 105$$

23. If the number 583\_437 is completely divisible by 9, then the smallest whole number in the place of the blank digit will be :

- (a) 4 (b) 5  
 (c) 3 (d) 6

[SSC CHSL (Tier-1) Online Exam 02  
 February 2017 Evening Shift]

Ans. (d) 583 - 437 is complete by divisible by 9.  
 583m437  
 Sum of digit of this number must be divided by 9

$$\begin{aligned} 5 + 8 + 3 + m + 4 + 3 + 7 &= 36 \\ m + 30 &= 36 \\ m &= 36 - 30 = 6 \end{aligned}$$

Hence, the digit is 6 to be divisible by 9.

24. The sum of a non-zero number and thrice its reciprocal is  $52/7$ . Find the number.

- (a) 8 (b) 9  
 (c) 7 (d) 6

[SSC CHSL (Tier-1) Online Exam 02  
 February 2017 Evening Shift]

Ans. (c) Let the number be x

$$x + \frac{3}{x} = \frac{52}{7}$$

$$\frac{x^2 + 3}{x} = \frac{52}{7}$$

$$7x^2 + 21 = 52x$$

$$7x^2 - 52x + 21 = 0$$

$$7x^2 - 49x - 3x + x = 0$$

$$7x(x - 7) - 3(x - 7) = 0$$

$$(x - 7)(7x - 3) = 0$$

$$x - 7 = 0 \text{ or } 7x - 3 = 0$$

$$x = 7 \text{ or } x = \frac{3}{7}$$

Hence, the required number is 7.

25. What should be the missing digit so that the number 275\_476 becomes exactly divisible by 11?

- (a) 6 (b) 4  
 (c) 2 (d) 3

[SSC CHSL (Tier-1) Online Exam 03  
 February 2017 Morning Shift]

Ans. (d) 275 - 476 is exactly divisible by 11

$$\overbrace{275} \times \overbrace{476}$$

$$(2 + 5 + 4 + 6) - (7 + x + 7) = 0, 11, 22$$

$$\begin{aligned} 17 - (14 + x) \\ 17 - 14 - x = 0 \end{aligned}$$

$$\Rightarrow 3 = x$$

$$\Rightarrow x = 3$$

Hence, the missing digit is 3.

26. Product of digits of a 2-1 digit number is 72. If we add 9 to the number, the new number obtained is a number formed by interchange of the digits. Find the number.

- (a) 98 (b) 89  
 (c) 78 (d) 87

[SSC CHSL (Tier-1) Online Exam 03  
 February 2017 Morning Shift]

Ans. (b) Let the number be  $10x + y$  where x and y are digits,

In case - I

$$xy = 72 \quad \dots(i)$$

In case - II

$$10x + y + 9 = 10y + x$$

$$9(x - y) = -9$$

$$x - y = -1 \quad \dots(ii)$$

On putting  $x = y - 1$  in eq.(i), we get

$$(y - 1)y = 72$$

$$y^2 - y - 72 = 0$$

$$y^2 - 9y + 84 - 72 = 0$$

$$y(y - 9) + 8(y - 9) = 0$$

$$(y - 9)(y + 8) = 0$$

$$y = 9, \text{ or } y = -8$$

$$y = 9, x = 8$$

Hence, the number =  $10 \times 8 + 9 = 80 + 9 = 89$

27. What smallest number should be added to 2957 so that the sum is completely divisible by 17 ?  
 (a) 9 (b) 2  
 (c) 3 (d) 1

[SSC CHSL (Tier-1) Online Exam 03  
 February 2017 Afternoon Shift]

Ans. (d)

$$\begin{array}{r} 17 \overline{)2957} \phantom{173} \\ \underline{17} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ 125 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ \underline{119} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ 67 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ \underline{51} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\ 16 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \end{array}$$

$17 - 16 = 1$

∴ 1 should be added to divide completely.

28. The ten's digit of a 2-digit number is greater than the units digit by 2. If we subtract 18 from the number, the new number obtained is a number formed by interchange of the digits. Find the number.

- (a) 75 (b) 64  
(c) 53 (d) 86

[SSC CHSL (Tier-1) Online Exam 03 February 2017 Afternoon Shift]

Ans. (d) Let two digit number be  $10x + y$   
In case -I

$$x = y + 2$$

$$x - y = 2 \dots(i)$$

In case -II

$$10x + y - 18 = 10y + x$$

$$9x - 9y = 18$$

$9(x - y) = 18 \Rightarrow x - y = 2 \dots(ii)$   
solving by hit and trial method  
 $x = 8, y = 6$

Hence, the number will be 86.

29. If Gaganjyot's salary is  $\frac{7}{6}$  times of Hafiz's and Sayed's is  $\frac{8}{7}$  times of Hafiz's, what is the ratio of Gaganjyot's salary of Sayed's salary ?

- (a) 49 : 48 (b) 3 : 4  
(c) 4 : 3 (d) 48 : 49

[SSC CHSL (Tier-1) Online Exam 03 February 2017 Evening Shift]

Ans. (a) Gaganjyot's salary =  $\frac{7}{6}$  of Hafiz

$$\text{Sayed's salary} = \frac{8}{7} \text{ of Hafiz}$$

$$\text{Required ratio} = \frac{7/8}{6/7} = \frac{7 \times 7}{6 \times 8}$$

$$= \frac{49}{48} = 49 : 48$$

30. What is the value of  $(91 + 92 + 93 + \dots + 140)$  ?

- (a) 5775 (b) 11550  
(c) 17325 (d) 23100

[SSC CHSL (Tier-1) Online Exam 07 February 2017 Morning Shift]

Ans. (a) We know that

$$1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$$

∴ The value of  $(91 + 92 + \dots + 140)$   
 $= (1 + 2 + \dots + 90)$

$$= \frac{140(140+1) - 90(90+1)}{22} +$$

$$= \frac{140 \times 141 - 90 \times 91}{22}$$

$$= 70 \times 141 - 45 \times 91 = 9870 - 4095 = 5775$$

31. The sum of the digits of a 2-digit number is 17. If we add 9 to the number, the new number obtained is a number formed by interchange of the digits. Find the number.

- (a) 89 (b) 98  
(c) 78 (d) 87

[SSC CHSL (Tier-1) Online Exam 07 February 2017 Morning Shift]

Ans. (a) Let two digit number be  $10x + y$   
According to question

In Case-I

$$x + y = 17 \dots(i)$$

In Case-II

$$10x + y + 9 = 10y + x$$

$$9x - 9y = -9$$

$$x - y = -1 \dots(ii)$$

Solving eq. (i) and (ii), we get

$$x = 8, \text{ and } y = 9$$

Hence, the number =  $10 \times 8 + 9 = 89$

32. Reduce  $3596 / 4292$  to lowest terms.

- (a) 29/37 (b) 17/43  
(c) 31/37 (d) 19/23

[SSC CHSL (Tier-1) Online Exam 08 February 2017 Morning Shift]

Ans. (c) Lowest terms be

$$\frac{3596}{4292} = \frac{899}{1073}$$

$$\frac{899}{1073} = \frac{31}{37}$$

33. Product of digits of a 2-digit number is 27. If we add 54 to the number, the new number obtained is a number formed by interchange of the digits. Find the number.

- (a) 39 (b) 93  
(c) 63 (d) 36

[SSC CHSL (Tier-1) Online Exam 08 February 2017 Evening Shift]

Ans. (a) Let number be =  $10x + y$

$$xy = 27 \dots(i)$$

$$10y + x = 10x + y + 54$$

$$9(y - x) = 54$$

$$y - x = 6$$

$$y = 6 + x \dots(ii)$$

From (i) and (ii), we get

$$x(6 + x) = 27$$

$$\Rightarrow 6x + x^2 = 27$$

$$\Rightarrow x^2 + 6x - 27 = 0$$

$$\Rightarrow x^2 + 9x - 3x - 27 = 0$$

$$\Rightarrow x(x + 9) - 3(x + 9) = 0$$

$$\Rightarrow (x + 9)(x - 3) = 0$$

$$x = 3, x = -9$$

$$x = 3, y = 9,$$

$$\text{Number} = 30 + 9 = 39$$

34. Between 200 and 400 how many numbers are divisible by 7?

- (a) 28 (b) 29  
(c) 30 (d) 31

[SSC CHSL (Tier-1) Online Exam 29 January 2017 Morning Shift]

Ans. (b) First number divisible by 7 between 200 and 400 is 203 that means  $a = 203$ , common difference = 7

$a_n = 399$ , It is an arithmetic progression

$$a_n = a + (n - 1)d$$

$$399 = 203 + (n - 1)7$$

$$\left( \frac{399 - 203}{7} \right) + 1 = n$$

$$\frac{196}{7} = n - 1$$

$$n - 1 = 28$$

$$n = 29 \text{ numbers.}$$

35. Find the least number among

$$\frac{59}{94}, \sqrt{0.43} \text{ and } (0.7)^2.$$

$$(a) 5/9 (b) (0.7)^2$$

$$(c) \sqrt{9/49} (d) 0.43$$

[SSC CHSL (Tier-1) Online Exam 15 March 2018 Evening Shift]

Ans. (c)  $\frac{5}{9} = 0.55$

$$\sqrt{\frac{9}{49}} \Rightarrow \sqrt{\frac{9}{49}} = \frac{3}{7} = 0.42$$

$$0.43 \Rightarrow 0.43$$

$$(0.7)^2 \Rightarrow 0.49$$

$$0.42 < 0.43 > 0.49 < 0.55$$

$$\sqrt{\frac{9}{49}} < 0.43 < (0.7)^2 < \frac{5}{9}$$

Hence the least number will be

$$\sqrt{\frac{9}{49}}$$

36. If  $3\sqrt{343} + 10\sqrt{21} =$  then find

the value of  $\sqrt{252207} \sqrt{\quad}$ .

(a) 39.4 (b) 49.9

(c) 56.8 (d) 92.3

[SSC CHSL (Tier-1) Online Exam 15  
March 2018 Evening Shift]

Ans. (b)  $3\sqrt{343} + 10\sqrt{21} = 19.21$

$$3\sqrt{7^3} + 10\sqrt{7 \times 3} = 19.21$$

$$10\sqrt{21} = 19.21$$

$$\sqrt{7} = \frac{19.21}{10}$$

$$= 1.921$$

$$\therefore \sqrt{252207} \sqrt{\quad}$$

$$= 6\sqrt{207} \sqrt{\quad}$$

$$= 6 \times 1.921 + 20 \times 1.921$$

$$= 11.526 + 38.420$$

$$= 49.946 \approx 49.9$$

37. Find the remainder, when  
(37+57+78+75+179) is divided by 17.

(a) 1 (b) 2

(c) 5 (d) 7

[SSC CHSL (Tier-1) Online Exam 16  
March 2018 Afternoon Shift]

Ans. (a)  $(37 + 57 + 78 + 75 + 179) \div 17$   
 $426 \div 17$

$$= 25 \frac{1}{17}$$

Hence the remainder will be 1.

38. If  $(1 / 2.315) = 0.4319$ , find the  
value of  $(1 / 0.0002315)$ .

(a) 4319 (b) 2315

(c) 431.9 (d) 231.5

[SSC CHSL (Tier-1) Online Exam 16  
March 2018 Afternoon Shift]

Ans. (a) If  $\frac{1}{2.315} = 0.4319$

Then,

$$\frac{1}{0.0002315} = 0.4319 \times 10000$$

$$= 4319$$

39. What will be the value of that  
smallest positive integer N, such  
that  $\sqrt{294N}$  is an integer?

(a) 2 (b) 4

(c) 6 (d) 8

[SSC CHSL (Tier-1) Online Exam 16  
March 2018 Afternoon Shift]

Ans. (c)

40. Find the unit place digit in  $(192)^{102}$   
 $-(193)^{103}$ :

(a) 0 (b) 1

(c) 3 (d) 5

[SSC CHSL (Tier-1) Online Exam 15  
March 2018 Morning Shift]

Ans. (b)  $(192)^{102} - (193)^{103}$

The unit digit of

$$= (64 \times 3)^{17 \times 6} - (193)^{17 \times 6 + 1}$$

$$= (2^6 \times 3)^{17 \times 6} - (193)^{17 \times 6 + 1}$$

Hence, the unit place digit will  
be 1.

41. Find the greatest number among

$(2)^{\frac{11}{3}}, (3)^{\frac{1}{5}}$

(a)  $(2)^{\frac{1}{3}}$  (b)  $(3)^{\frac{1}{2}}$

(c) 1 (d)  $(5)^{\frac{1}{6}}$

[SSC CHSL (Tier-1) Online Exam 15  
March 2018 Morning Shift]

Ans. (b)  $(2)^{1/3} = \sqrt[3]{2}$

$$(3)^{1/2} = \sqrt{3}$$

$$1 = 1$$

$$(5)^{1/6} = \sqrt[6]{5}$$

Hence,  $\sqrt{3}$  will be greatest  
number among them.

42. What will be the maximum power of  
8 that exactly divides 25?

(a) 6 (b) 7

(c) 8 (d) 9

[SSC CHSL (Tier-1) Online Exam 16  
March 2018 Evening Shift]

Ans. (b) Maximum power of 8 will be 7.

43. If a number 657423547X46 is  
divisible by 11, then find the value of  
X.

(a) 7 (b) 9

(c) 8 (d) 6

[SSC CHSL (Tier-1) Online Exam 17  
March 2018 Morning Shift]

Ans. (b)  $(6\ 5\ 7\ 4\ 2\ 3\ 5\ 4\ 7\ X\ 4\ 6)$

for divisibility of 11,  
(sum of number at even places)  
- (sum of numbers at odd  
places) = 0 or divisible by 11  
 $(5 + 4 + 3 + 4 + X + 6)$

$$- (6 + 7 + 2 + 5 + 7 + 4) = 0$$

$$\Rightarrow (X + 22) - (31) = 0$$

$$\Rightarrow X - 9 = 0$$

$$\Rightarrow X = 9$$

44. Which of the following numbers is  
largest among all?

$$0.7, 0.\bar{7}, 0.0\bar{7}, 0.0\bar{7}\bar{7}$$

(a)  $0.\bar{07}$  (b)  $0.0\bar{7}$

(c) 0.7 (d)  $0.\bar{7}$

[SSC CHSL (Tier-1) Online Exam 17  
March 2018 Evening Shift]

Ans. (d)  $0.7 = \frac{7}{9}$

$$0.\bar{7} = \frac{7}{9}$$

$$0.0\bar{7} = \frac{7}{90}$$

$$0.\bar{07} = \frac{7}{99}$$

Hence the largest number will be  $0.\bar{7}$ .

45. In a fraction when 3 is added to its numerator and denominator it becomes  $\frac{4}{5}$ . And it becomes  $\frac{1}{2}$  when 2 is subtracted from both the numerator and denominator. Find the fraction.

- (a)  $\frac{15}{16}$  (b)  $\frac{14}{16}$   
(c)  $\frac{11}{16}$  (d)  $\frac{9}{16}$

[SSC CHSL (Tier-1) Online Exam 20 March 2018 Morning Shift]

Ans. (c) According to question,

Let numerator of fraction be  $x$  and denominator of fraction be  $y$  then,

$$\frac{x+34}{y+35} = \frac{4}{5}$$

$$5x + 3 \times 5 = 4y + 3 \times 4$$

$$5x - 4y = 12 - 15$$

$$5x - 4y = -3 \quad \dots (i)$$

and,  $\frac{x-21}{y-22} = \frac{1}{2}$

$$2x - 4 = y - 2$$

$$2x - y = -2 + 4$$

$$2x - y = 2 \quad \dots (ii)$$

solving equation (i) & (ii) we get

$$x = \frac{11}{3} \text{ and } y = \frac{16}{3}$$

$$\text{Required Fraction} = \frac{x}{y} = \frac{\frac{11}{3}}{\frac{16}{3}} = \frac{11}{16}$$

46. Find the approximate value of '?' in  $(14.998)^3 = ?$

- (a) 3573 (b) 4096  
(c) 3378 (d) 3374

[SSC CHSL (Tier-1) Online Exam 20 March 2018 Morning Shift]

Ans. (d)  $(14.998)^3 = (15 - 0.002)^3$   
 $= (15)^3 - 3 \times 15 \times 0.002$   
 $(15 - 0.002) - (0.002)$   
 $= 3375 - 1.34982 - 0.000000008$   
 $= 33.75 - 1.349820008$   
 $= 3373.65018 = 3374.$

47. What is the square root of

$$\frac{(\sqrt{5}+2)}{(\sqrt{5}-2)} ?$$

- (a)  $\sqrt{54} - \sqrt{4}$   
(b)  $\sqrt{52}$   
(c)  $5\sqrt{2} - \sqrt{4}$   
(d) 7

[SSC CHSL (Tier-1) Online Exam 20 March 2018 Morning Shift]

Ans. (b) The given expression

$$= \sqrt{\frac{\sqrt{5}+2}{\sqrt{5}-2}}$$

$$= \sqrt{\frac{\sqrt{5}+2}{\sqrt{5}+2} \times \frac{\sqrt{5}+2}{\sqrt{5}-2}}$$

$$= \sqrt{\frac{(\sqrt{5}+2)^2}{(\sqrt{5})^2 - (2)^2}}$$

$$= \sqrt{\frac{(\sqrt{5}+2)^2}{5-4}} = \sqrt{5} + 2$$

48.  $\frac{9}{15}$  of  $\frac{7}{3}$  of a number is greater than  $\frac{7}{12}$  of  $\frac{3}{5}$  of the same number by 7. Find the twice of the number.

- (a) 6.36 (b) 6.67  
(c) 13.3 (d) 5.36

[SSC CHSL (Tier-1) Online Exam 20 March 2018 Afternoon Shift]

Ans. (c) Let the number be  $x$  then,

$$x \times \frac{7937}{315512} \times \frac{7}{3} - \frac{7}{12} \times \frac{3}{5} \times x = 7$$

$$\Rightarrow \frac{2121}{1560} x = 7$$

$$\Rightarrow \frac{8421}{60} = 7$$

$$\Rightarrow \frac{63x}{60} = 7$$

$$\Rightarrow x = \frac{7606020}{6393} = \frac{2040}{33}$$

$\therefore$  Twice of the number

$$= 2 \times \frac{2040}{33} = \frac{4080}{33}$$

$$= 13.3$$

49. The addition of a rational number and its reciprocal is  $\frac{74}{35}$ . Calculate the number.

- (a)  $\frac{97}{75}$  (b)  $\frac{57}{75}$   
(c)  $\frac{47}{74}$  (d)  $\frac{67}{76}$

[SSC CHSL (Tier-1) Online Exam 20 March 2018 Afternoon Shift]

Ans. (b) The rational number will be

$$\frac{5}{7} \text{ and } \frac{7}{5}$$

$$\therefore \frac{5774}{7535} = \frac{5}{7} + \frac{7}{5}$$

$$\frac{254974}{3535} = \frac{5}{7} + \frac{7}{5}$$

$$\frac{7474}{3535} = \frac{5}{7} + \frac{7}{5}$$

50. Find the remainder in the expression:

$$\frac{557 \times 653 \times 672}{9}$$

- (a) 0 (b) 3  
(c) 5 (d) 6

[SSC CHSL (Tier-1) Online Exam 21 March 2018 Morning Shift]

Ans. (d) The given expression

$$= \frac{557653672}{9}$$

$$= \frac{732 \times}{9}$$

$$= \frac{42}{9}$$

$$= 4\frac{6}{9}$$

Hence the remainder will be 6.

51. Calculate the value of x, if:

$$\sqrt{1 - \frac{x}{529}} = \frac{16}{23}$$

(a) 283 (b) 276

(c) 273 (d) 374

[SSC CHSL (Tier-1) Online Exam 21

March 2018 Morning Shift]

Ans. (c) 
$$\sqrt{1 - \frac{x}{529}} = \frac{16}{23}$$

On Squaring both sides, we get

$$\Rightarrow \left(1 - \frac{x}{529}\right) = \frac{16^2}{23^2}$$

$$\Rightarrow \left(1 - \frac{x}{529}\right) = \frac{256}{529}$$

$$\Rightarrow \frac{x}{529} = 1 - \frac{256}{529}$$

$$\Rightarrow \frac{x}{529} = \frac{273}{529}$$

$$\therefore x = 273$$

□□□

# 2

## LCM and HCF of Numbers

### Important points:

- **Factors and multiples:** If a number 'p' divides another number 'q' exactly, we say that 'p' is a factor of 'q' and 'q' is a multiple of 'p'.  
Thus, a factor of a number is an exact divisor of that number and, a number is said to be a multiple of any of its factors.  
Example: Since, 5 divides 25 exactly, so, 5 is a factor of 25 and 25 is a multiple of 5.
- **Least common multiple (L.C.M.):** The least number which is exactly divisible by each one of the given numbers is called their L.C.M.

### Methods of finding L.C.M.

- (i) **Prime factorisation method:** Resolve each of the given numbers into a product of prime factors. LCM is the product of terms of highest power of all factors.  
Example: Find the LCM of 60, 108 and 162.  
Sol.  $60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3^1 \times 5^1$   
 $108 = 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$   
 $162 = 2 \times 3 \times 3 \times 3 \times 3 = 2 \times 3^4$   
 $\therefore \text{LCM} = 2^2 \times 3^4 \times 5 = 1620$
- (ii) **Common division method:** Arrange the given number in a row in any order. Divide by a number which divides exactly at last two of the given numbers and carry forward the number which are not divisible repeat the above process till no two of the numbers are divisible by the same number, other than 1. The product of the divisor and the undivided numbers is the required LCM of the given numbers.

Exmaple: Find the LCM of 48 and 120.

Sol.

24	8	2	1	2					
22	4	2	6	0					
21	2	2	3	0					
26	3	1	5						
33	5	5							
	1	1	1	1					

$\therefore \text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 5 = 240$

- **Highest common factor (HCF or GCD):** The HCF or GCD of two or more numbers is the greatest number that divides each one of them exactly.  
Example: HCF of 12, 16, 20, 24, 32 is 4

### Methods of finding HCF

- (i) **Prime factorisation method:** Express each one of the given numbers as the product of prime factors. The product of terms containing least powers of common prime factors gives the HCF of the given numbers.  
Example: Find the HCF of 270 and 504.  
Sol.  $270 = 2 \times 3 \times 3 \times 3 \times 5 = 2^1 \times 3^3 \times 5^1$   
 $504 = 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 2^3 \times 3^2 \times 7$   
 $\therefore \text{HCF} = 2 \times 3 = (2 \times 3) = 6$
- (ii) **Long division method:** Suppose we have to find the HCF of two given numbers. Divide the longer number by smaller one. Now, divide the divisor by the remainder. Repeat the process till the remainder is zero. The last divisor is called the HCF of numbers.

HCF of three numbers = HCF of [(HCF of any two) and the third]

Example: Find the HCF of 496 and 872

Sol.

496	)	872	(1
376		496	(1
120		376	(3
360		16	(2
16		120	(7
112		8	(2
16		16	(2
		0	

$\therefore \text{HCF of 496 and 872} = 8$

Note: Two natural numbers are called co-prime numbers, if their HCF is 1.

### Relation between HCF and LCM of two numbers

- (i) Product of two given numbers = Product of their HCF and LCM

(ii)  $\text{LCM of number} = \frac{\text{Product of two given numbers}}{\text{HCF of the numbers}}$



(iii)  $HCF \text{ of the number} = \frac{\text{Product of two given numbers}}{\text{LCM of the numbers}}$

HCF and LCM of fractions

(i)  $HCF \text{ of given fractions} = \frac{\text{HCF of numerators}}{\text{LCM of denominators}}$

(ii)  $LCM \text{ of given fractions} = \frac{\text{LCM of numerators}}{\text{HCF of denominators}}$

**Some Important Tricky Formulae**

(i) To find the greatest number that will exactly divide x, y and z, then,

Required number = HCF of x, y and z

(ii) To find the greatest number that will divide x, y and z leaving remainders  $r_1, r_2$  and  $r_3$  respectively, then

Required number = HCF of  $(x - r_1), (y - r_2)$  and  $(z - r_3)$

(iii) To find the least number which is exactly divisible by x, y and z, then

Required number = LCM of x, y and z.

(iv) To find the greatest number that will divide x, y and z leaving the same remainder 'r' in each case then,

Required number = HCF of  $(x - r), (y - r)$  and  $(z - r)$ .

$$= (2 \times 2 \times 2 \times 3 \times 3 \times 5) + 6$$

$$= (360 + 6)$$

$$= 366$$

**Example 2:** Find the greatest number that exactly divides 714, 1666 and 3570.

**Sol.** Required greatest number = HCF of 714, 1666 and 3570 = 238

$$\begin{array}{r} 714 \overline{)1666} \quad (2) \qquad \qquad 238 \overline{)3570} \quad (15) \\ \underline{1428} \qquad \qquad \qquad \underline{238} \\ 238 \overline{)714} \quad (3) \qquad \qquad \underline{1190} \\ \underline{714} \qquad \qquad \qquad \underline{1190} \\ \times \qquad \qquad \qquad \times \end{array}$$

**Example 3:** Find the length of the longest rope which can be used to measure exactly the lengths 7m, 3m 85 cm and 12m 95 cm.

**Sol.** The given length are

7m = 700 cm

3m 85 cm = 385 cm

12 m 95 cm = 1295 cm

$\therefore$  Length of the rope = HCF of 700, 385 and 1295 = 35 cm

$$\begin{array}{r} 385 \overline{)700} \quad (1) \qquad \qquad 35 \overline{)1295} \quad (37) \\ \underline{385} \qquad \qquad \qquad \underline{105} \\ 315 \overline{)385} \quad (1) \qquad \qquad \underline{245} \\ \underline{315} \qquad \qquad \qquad \underline{245} \\ 70 \overline{)315} \quad (4) \qquad \qquad \times \\ \underline{280} \\ 35 \overline{)70} \quad (2) \\ \underline{70} \\ \times \end{array}$$

**Solved Examples**

**Example 1:** Find the least number which when divided by 8, 18, 24, and 30 leaves the same remainder 6 in each case.

**Sol.** Required number

28	18	24	30	
24	9	12	15	
32	9	6	15	
32	3	2	5	
22	1	2	5	
1	1	1	5	

= (LCM of 8, 18, 24 and 30) + 6

**Example 4:** Find the HCF of  $\frac{36}{27}$  and  $\frac{5}{14}$ .

**Sol.**  $HCF \text{ of } \frac{36}{27} \text{ and } \frac{5}{14} = \frac{HCF \text{ of } 3, 6, \text{ and } 5}{LCM \text{ of } 2, 7, 14}$

$$= \frac{1}{14}$$

**Exercise**

1. The two numbers are 63 and 77, HCF is 7. Find the LCM.  
 (a) 668                      (b) 693  
 (c) 674                      (d) 680  
 [SSC CHSL (Tier-1) Online Exam 25 January 2017 Morning Shift]

Ans. (b) H.C.F.  $\times$  L.C.M.  
 = First Number  $\times$  Second Number  
 $7 \times L.C.M. = 63 \times 77$   
 $L.C.M. = \frac{63 \times 77}{7} = 9 \times 77 = 693.$

2. What is the HCF (highest common factor) of 77 and 275?  
 (a) 12                      (b) 11  
 (c) 7                      (d) 25  
 [SSC CHSL (Tier-1) Online Exam 24 January 2017 Evening Shift ]

Ans. (b) HCF. of 77 and 275

$$77 \overline{) 275} \begin{array}{r} 3 \\ \underline{231} \\ 44 \end{array}$$

$$44 \overline{) 77} \begin{array}{r} 1 \\ \underline{44} \\ 33 \end{array}$$

$$33 \overline{) 44} \begin{array}{r} 1 \\ \underline{33} \\ 11 \end{array}$$

$$11 \overline{) 33} \begin{array}{r} 3 \\ \underline{33} \\ 0 \end{array}$$

$$\times$$

Hence, the required HCF is 11.

3. HCF and LCM of two numbers are 11 and 825 respectively. If one number is 275, find the other number.

(a) 53

(b) 45

(c) 33

(d) 43

[SSC CHSL (Tier-1) Online Exam 03

February 2017 Evening Shift]

Ans. (c)

$$\text{Second number} = \frac{\text{HCF} \times \text{LCM}}{\text{1st Number}}$$

$$= \frac{11 \times 825}{275} = 33$$

∴ Hence, the second number is 33.

4. What is the LCM (least common multiple) of 57 and 93?

(a) 1767

(b) 1567

(c) 1576

(d) 1919

[SSC CHSL (Tier-1) Online Exam 08

February 2017 Evening Shift]

Ans. (a)

LCM of 57 and 93

$$3 \left( \begin{array}{l} 57, 93 \\ \hline 19, 31 \end{array} \right)$$

$$\text{LCM} = 3 \times 19 \times 31$$

$$= 1767$$



# 3

## Simplification

**Simplification:** The process which is used to solve complex mathematical operations of any expression like addition, multiplication, division, brackets etc. is called simplification.

Generally, by using 'BODMAS' Rule we can simplify any expression.

B → Bracket

O → of

D → Division

M → Multiplication

A → Addition

S → Subtraction

Note (i): After removing the bar, the brackets must be removed, strictly in the order ( ), { }, [ ]

(ii) After removing the brackets, we must use the following operations strictly in the order given below, (i) of (ii) division (iii) multiplication (iv) addition and (v) subtraction.

### Some Important Algebraic Identities:

(i)  $(a + b)^2 = (a^2 + 2ab + b^2)$

(ii)  $(a - b)^2 = (a^2 - 2ab + b^2)$

(iii)  $(a + b)^2 - (a - b)^2 = 4ab$

(iv)  $(a + b)^2(a - b)^2 = (a^2 + b^2)$

(v)  $(a^2 - b^2) = (a + b)(a - b)$

(vi)  $(a^3 + b^3) = (a + b)(a^2 - ab + b^2)$

(vii)  $(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$

(viii)  $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

(ix)  $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

(x)  $(a - b - c)^2 = a^2 + b^2 + c^2 - 2(ab - bc + ca)$

(xi) If  $a + b + c = 0$  ( $a \neq b \neq c$ )

$a^2 + b^2 + c^2 - ab - bc - ca = 0$  (i.e.  $a = b = c$ )

$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$a^3 + b^3 + c^3 - 3abc = 0$  ( $\because a + b + c = 0$ )

### Solved Examples

Example 1: If  $x^3 + y^3 = 50$  and  $(x + y) = 10$ , then find the

value of  $\left(\frac{11}{xy} + -\right)$ .

Sol.  $(x + y)^3 = (10)^3 = 1000$

$\Rightarrow x^3 + y^3 + 3xy(x + y) = 1000$

$\Rightarrow 50 + 3xy \times 10 = 1000$

$\Rightarrow 30xy = 950 \Rightarrow xy = \frac{950}{30} = \frac{95}{3}$

$\therefore \frac{xy}{xy} = \left(\frac{11}{xy} + -\right) = \frac{10}{\frac{95}{3}} = \frac{30}{95}$

Example 2: Find the value of  $2 + \frac{1}{1 + \frac{1}{3 + \frac{1}{4}}}$

Sol. Given expression =  $2 + \frac{1}{1 + \frac{1}{3 + \frac{1}{4}}}$

$2 + \frac{1}{1 + \frac{1}{3 + \frac{1}{4}}} = 2 + \frac{1}{1 + \frac{1}{\frac{13}{4}}} = 2 + \frac{1}{1 + \frac{4}{13}} = 2 + \frac{1}{\frac{17}{13}} = 2 + \frac{13}{17} = \frac{47}{17}$

Example 3: I paid  $\frac{3}{5}$  of a bill. If ₹ 600 of the bill is still due, what was the amount of the bill?

Sol. Let the amount of the bill be ₹ x

Paid bill = ₹  $\frac{3}{5}x$

$$\text{Bill due} = ₹ \left( xx - \frac{3}{5} \right) = ₹ \frac{2}{5} x$$

$$\frac{2}{5} x = 600$$

$$\Rightarrow x = \left( \frac{600 \times 5}{2} \right) = 1500$$

$$\therefore \text{Total amount} = ₹ 1500$$

Example 4: Amit read  $\frac{3}{8}$  th of a book on one day,  $\frac{4}{5}$  th of the remainder on another day. If there were 30 pages how many pages did the book contain?

Sol. Let the book contain  $x$  pages

$$\text{Part Read on one day} = \frac{3}{8} x$$

$$\text{Remaining part} = \left( xx - \frac{3}{8} \right) = \frac{5}{8} x$$

$$\therefore \text{Read on the next day} = \left( \frac{45}{58} x - x \right) = \frac{x}{2}$$

According to question,

$$\frac{3}{82} x - \frac{x}{2} = 30$$

$$xx - \frac{3}{82} - \frac{x}{2} = 30$$

$$\Rightarrow \frac{8 \times 3 \times 4}{8} = 30$$

$$\Rightarrow x = 240$$

Example 5: A total of 324 coins of 20 paise and 25 paise take a sum of ₹70. Find the number of 25 paise coins.

Sol. Let the 25 paise coins be  $x$

$$\text{Then, 20 paise coins} = (324 - x)$$

According to question,

$$\frac{xx}{45} + \frac{324 - x}{45} = 70$$

$$\Rightarrow 5x + 4(324 - x) = 70 \times 20$$

$$\Rightarrow 5x - 4x = 1296 - 1400$$

$$\Rightarrow x = 104$$

Example 6: Find the value of

$$\left( \frac{11111}{144771010131316} + \frac{1}{x} + \frac{1}{x} + \frac{1}{x} \right)$$

Sol. Given expression

$$= \left( \frac{11111}{144771010131316} + \frac{1}{x} + \frac{1}{x} + \frac{1}{x} \right)$$

$$= \frac{1}{3} \left[ \frac{11111}{144771010131316} + \left( - \right) + \left( - \right) + \left( - \right) \right]$$

$$+ \left( \frac{11}{1316} \right)]$$

$$= \frac{1}{3} \left( \frac{115}{316} \right) = \left( \frac{115}{316} \right) = \frac{5}{16}$$

## Exercise

1.  $5 \times [-0.6(2.8 + 1.2)]$  of 0.3 is equal to

- (a) - 1.44                      (b) - 1.08  
(c) - 1.2                        (d) - 3.6

[SSC CHSL (Tier-1) Online Exam 31 January 2017 Evening Shift]

Ans. (d)  $5 \times [-0.6(2.8 + 1.2)]$  of 0.3  
 $= 5 \times [-0.6 \times 4] \times 0.3$   
 $= -12.0 \times 0.3 = -3.6$

2. If  $3x^2 = 10^2 - 5^2$ , find the value of  $x$ .

- (a) 7                                (b) 5  
(c) 9                                (d) 11

[SSC CHSL (Tier-1) Online Exam 30 January 2017 Morning Shift]

Ans. (b)  $3x^2 = 10^2 - 5^2$   
 $3x^2 = (10 + 5)(10 - 5) = 15 \times 5$

$$x^2 = \frac{15 \times 5}{3} = 25$$

$$x = \sqrt{25} = 5$$

3. Simplify  $437 \text{ baz} / 23 \text{ ab}$ .

- (a)  $17xzb$                       (b)  $9xz$   
(c)  $19xz$                         (d)  $19ab$

[SSC CHSL (Tier-1) Online Exam 29 January 2017 Evening Shift]

Ans. (c)

$$\frac{437 \text{ baz}}{23 \text{ ab}} = 19 \text{ xz}$$

4. Simplify  $486b^3x^2a^4z^3 / 27a^3b^2z$  :

- (a)  $18bx^2az$                       (b)  $18bx^2az^2$   
(c)  $36ba^2z$                         (d)  $36bxa^2z$

[SSC CHSL (Tier-1) Online Exam 27 January 2017 Morning Shift]

Ans. (b)  $\frac{486b^3x^2a^4z^3}{27a^3b^2z}$   
 $= \frac{486}{27} ab^2xz^2$

$$= 18 a \times b z^2 x^2$$

$$= 18 a z^2 x^2 b = 18 ab z^2 x^2$$

5. In the first 36 overs of a cricket match, the run rate was 4.3 runs/over. Calculate the required run rate in the remaining 14 overs to reach the target of 271 runs.

- (a) 8.9 (b) 9.5  
(c) 8.3 (d) 7.7

[SSC CHSL (Tier-1) Online Exam 27 January 2017 Afternoon Shift]

Ans. (c) Number of runs in 36 overs =  $36 \times 4.3$

$$= 154.8$$

Number of runs to be made in 14 overs

$$= 271 - 154.8$$

$$= 116.2$$

$$\text{Required run rate} = \frac{116.2}{14} = 8.3$$

6. If  $3x - 8(2 - x) = -19$ , then the value of x is —

- (a)  $-3/11$  (b)  $-33/11$   
(c)  $-3/5$  (d)  $-33/5$

[SSC CHSL (Tier-1) Online Exam 08 February 2017 Evening Shift]

Ans. (a)

$$3x - 8(2 - x) = -19$$

$$3x - 16 + 8x = -19$$

$$11x = -19 + 16 = -3$$

$$x = \frac{-3}{11}$$

7. If  $\sqrt{20125} = 15.65$ , then what is the value of  $\sqrt{455} + \sqrt{\quad}$  ?

- (a) 6.98 (b) 8.94  
(c) 9.98 (d) 11.27

[SSC CHSL (Tier-1) Online Exam 15 March 2018 Evening Shift]

Ans. (b) If  $\sqrt{20125} = 15.65$

$$\Rightarrow \sqrt{455} + \sqrt{\quad} = 15.65$$

$$\Rightarrow \sqrt{\quad} = 15.65$$

$$\Rightarrow \sqrt{5} = \frac{15.65}{7}$$

Then,

$$\sqrt{455} + \sqrt{\quad}$$

$$= 3\sqrt{5} + \sqrt{\quad}$$

$$= 3 \times \frac{15.6515.65}{77} + \frac{\quad}{\quad}$$

$$= \frac{46.9515.65}{7}$$

$$= \frac{62.6}{7} = 8.94$$

8. What is the value of  $\frac{\sqrt[3]{64121}\sqrt{\quad}}{\sqrt{289169}}$  ?

- (a) 12 (b) 11  
(c) 1/11 (d) 1/12

[SSC CHSL (Tier-1) Online Exam 15 March 2018 Morning Shift]

Ans. (b) Given Expression

$$= \frac{\sqrt[3]{64121}\sqrt{\quad}}{\sqrt{289169}}$$

$$= \frac{411}{1713} = \frac{411}{4} = 11$$

9. What is the value of 'x' in

$$2\sqrt{527108}\sqrt{\quad} - \sqrt{\quad} = -21$$

- (a) 0.33 (b) 1  
(c) 3 (d) 9

[SSC CHSL (Tier-1) Online Exam 16 March 2018 Afternoon Shift]

Ans. (c)

$$2\sqrt{527108}\sqrt{\quad} + \sqrt{\quad} = -21$$

$$\Rightarrow 2\sqrt{53363} \times \sqrt{\quad} + \sqrt{\quad} = -21$$

$$\Rightarrow 2\sqrt{15363} \times \sqrt{\quad} + \sqrt{\quad} = -21$$

$$-7\sqrt{\quad} x = -21$$

$$\Rightarrow 7\sqrt{\quad} x = 21$$

$$\sqrt{\quad} x = 3$$

$$\Rightarrow 3x = 9$$

$$\Rightarrow x = 3$$

10. What is the simplified form of

$$\sqrt{\frac{64}{288}} ?$$

- (a)  $\frac{\sqrt{2}}{3}$  (b)  $\frac{1}{2}$   
(c)  $\frac{2}{\sqrt{3}}$  (d)  $\frac{3}{\sqrt{3}}$

[SSC CHSL (Tier-1) Online Exam 16 March 2018 Afternoon Shift]  
Ans. (a) The given expression

$$\sqrt{\frac{64}{288}} = \sqrt{\frac{64}{2 \times 144}}$$

$$\frac{81\sqrt{\quad}}{12\sqrt{\quad}} = \frac{2}{3\sqrt{\quad}}$$

$$\frac{2\sqrt{\quad}}{3\sqrt{2} \times \sqrt{\quad}} = \frac{\sqrt{2}}{3}$$

11. If  $a = \sqrt{522}\sqrt{\quad}$  and

$b = \sqrt{522}\sqrt{\quad}$ , then find the value of  $a^2 - b^2$ .

[SSC CHSL (Tier-1) Online Exam 16 March 2018 Evening Shift]

- (a) 2 (b) 4  
(c)  $2\sqrt{\quad}$  (d)  $4\sqrt{\quad}$

Ans. (d) If  $a = \sqrt{522}\sqrt{\quad}$

$$\text{and } b = \sqrt{522}\sqrt{\quad}$$

$$\text{Then, } a^2 - b^2$$

$$\Rightarrow (\sqrt{522522})^{22} - (\sqrt{\quad} - \sqrt{\quad})$$

$$\Rightarrow (\sqrt{522522} + \sqrt{\quad} - \sqrt{\quad})$$

(Remove root by power 2)

$$\Rightarrow 5 + 2\sqrt{2} - 5 + 2\sqrt{2}$$

$$\Rightarrow 2\sqrt{2} + \sqrt{\quad}$$

$$\Rightarrow 4\sqrt{\quad}$$

12. If  $x = 0.139$ , then what is the value

$$\text{of } \sqrt{441} + \sqrt{\quad}$$

- (a) 1.39 (b) 1.278  
(c) 2.139 (d) 1.69

[SSC CHSL (Tier-1) Online Exam 16 March 2018 Evening Shift]

Ans. (b) If  $x = 0.139$   
Then, the value of

$$\begin{aligned} & \sqrt{44x + \dots} \\ &= \sqrt{4(0.139)40.1391 + \dots} \\ &= \sqrt{(20 \times 1391) + \dots} \\ &= \sqrt{(1.278)^2} \\ &= 1.278 \end{aligned}$$

13. In a company  $\frac{2}{3}$  of the workers are girls,  $\frac{1}{2}$  of the girls are married and  $\frac{1}{3}$  of the married girls live in hostel. If  $\frac{3}{4}$  of the boys are married and  $\frac{2}{3}$  of married boys live in hostel, calculate the part of workers who don't live in hostel.

- (a)  $\frac{11}{18}$                       (b)  $\frac{15}{18}$   
(c)  $\frac{17}{18}$                       (d)  $\frac{13}{18}$

[SSC CHSL (Tier-1) Online Exam 17  
March 2018 Morning Shift]

Ans. (d) Let total number of employees in the company =  $900x$

Total number of girls =  $\frac{2}{3} \times 900x = 600x$

Similarly, Total number of boys =  $900x - 600x = 300x$

Married girls =  $\frac{1}{2} \times 600x = 300x$

Married girls who lived in hostel =  $600x - 100x = 500x$

Married boys =  $\frac{3}{4} \times 300x = 225x$

Married boys lived in hostel =  $\frac{2}{3} \times 225x = 150x$

Boys who did not live in hostel =  $300x - 150x = 150x$

Part of workers who don't live in hostel =  $\frac{500x + 150x}{900x}$

$\frac{650}{900} = \frac{13}{18}$

14. Find the value of

$$\left[ 7 \left( \frac{11}{427} + \dots \right)^3 \right]^{\frac{1}{4}}$$

- (a) 7                                      (b) 6  
(c) 49                                    (d) 343

[SSC CHSL (Tier-1) Online Exam 17  
March 2018 Evening Shift]

Ans. (a) The given expression

$$= \left[ 7 \left( \frac{11}{427} + \dots \right)^3 \right]^{\frac{1}{4}}$$

$$= \left[ 7 \left( \frac{33 \times 11}{33 \times 427} + \dots \right)^3 \right]^{\frac{1}{4}}$$

$$\begin{aligned} &= [7(4 + 3)^3]^{\frac{1}{4}} \\ &= [7(7)^3]^{\frac{1}{4}} \\ &= [7 \times 243]^{\frac{1}{4}} \\ &= [1701]^{\frac{1}{4}} \\ &= [7 \times 243]^{\frac{1}{4}} = 7 \end{aligned}$$

15. What is the value of

$$\sqrt[3]{512} + \sqrt{216} + \sqrt{225} + \sqrt{\dots}$$

- (a) 48                                      (b) 32  
(c) 42                                      (d) 36

[SSC CHSL (Tier-1) Online Exam 17  
March 2018 Evening Shift]

Ans. (c) The given expression

$$\begin{aligned} &= \sqrt[3]{512} + \sqrt{216} + \sqrt{225} + \sqrt{\dots} \\ &= 8 + 13 + 6 + 15 \\ &= 42 \end{aligned}$$

16. If  $X = \frac{\sqrt{5}+1}{\sqrt{5}-1}$  and  $Y = \frac{\sqrt{5}-1}{\sqrt{5}+1}$

then what is the value of  $X - Y$ ?

- (a) 3                                      (b)  $\sqrt{5}$   
(c)  $2\sqrt{5}$                                       (d) 6

[SSC CHSL (Tier-1) Online Exam 20  
March 2018 Afternoon Shift]

Ans. (b) If  $X = \frac{\sqrt{5}+1}{\sqrt{5}-1}$  and  $Y = \frac{\sqrt{5}-1}{\sqrt{5}+1}$

then,

$$X - Y = \frac{\sqrt{5}+1}{\sqrt{5}-1} - \frac{\sqrt{5}-1}{\sqrt{5}+1}$$

$$= \frac{(\sqrt{5}+1)(\sqrt{5}+1) - (\sqrt{5}-1)(\sqrt{5}-1)}{(\sqrt{5}-1)(\sqrt{5}+1)}$$

$$= \frac{5 + 2\sqrt{5} + 1 - (5 - 2\sqrt{5} + 1)}{(\sqrt{5})^2 - 1}$$

$$= \frac{2\sqrt{5} \times 2}{5 - 1} = \frac{4\sqrt{5}}{4} = \sqrt{5}$$

17. Which of the following statement(s) is/are true?

(i)  $\sqrt{6766} + \sqrt{0.06766} + \sqrt{7.76} =$

(ii)  $\sqrt{339364981} + \sqrt{\dots} + \sqrt{\dots} =$

- (a) Only I  
(b) Only II  
(c) Neither I nor II  
(d) Both I and II

[SSC CHSL (Tier-1) Online Exam 21  
March 2018 Morning Shift]

Ans. (b)

$$\sqrt{6766} + \sqrt{0.06766} + \sqrt{7.76} =$$

$$\Rightarrow 26 - 2.6 + 0.26$$

$$\Rightarrow 26.26 - 2.6$$

$$\Rightarrow 23.66 \neq 27.76$$

$$\sqrt{339364981} + \sqrt{\dots} + \sqrt{\dots} =$$

$$\Rightarrow \sqrt{339679} + \dots$$

$$= \sqrt{361}$$

$$\approx 19$$

18.  $1 - \frac{11111}{24163264}$

is approximately equal to

.....

- (a) 1.5                                      (b) 2  
(c) 2.5                                      (d) 3

[SSC CHSL (Tier-1) Online Exam 24  
March 2018 Evening Shift]

Ans. (b) The given series

$$\begin{aligned}
 & 1 - \frac{11111}{24163264} \dots\dots\dots \\
 = & 1 - \frac{11111}{2 \cdot 2^{22}} \dots\dots\dots \\
 = & 2(21) \\
 = & 2
 \end{aligned}$$

19. What is the square root of  $(3 - 2\sqrt{2}) / (3 + 2\sqrt{2})$  ?

- (a)  $322\sqrt{}$
- (b)  $322\sqrt{}$
- (c) 1
- (d) 17

[SSC CHSL (Tier-1) Online Exam 24  
March 2018 Evening Shift]

Ans. (a) Rationalizing the denominator

$$= \frac{3223\sqrt{2}}{3223\sqrt{2}} \times \frac{-\sqrt{}}{-\sqrt{}}$$

$$\begin{aligned}
 & = \frac{(3223\sqrt{2})^{22}}{(3223\sqrt{2})(+\sqrt{})} = \frac{(-\sqrt{})}{98} \\
 & = (322)\sqrt{}^2
 \end{aligned}$$

Thus the square root of  $(322)\sqrt{}^2$

is  $322\sqrt{}$

□□□

# 4

# Average

**Average:** The sum of all the observations divided by total number of observations is called Average.

$$\therefore \text{Average} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

Sum of all observations = Average  $\times$  No. of observations.

### Some Important General Formulae:

(i) The average of consecutive natural numbers up to  $n$  is

$$\left( \frac{n+1}{2} \right)$$

(ii) The average of odd numbers from 1 to  $n$

$$= \left( \frac{\text{Last odd number} + 1}{2} \right)$$

(iii) The average of even numbers from 1 to  $n$

$$= \left( \frac{\text{Last even number} + 2}{2} \right)$$

(iv) The average of first  $n$  consecutive even numbers =  $(n + 1)$

(v) The average of first  $n$  consecutive odd numbers =  $n$

(vi) The average of squares of natural numbers upto  $n$  is

$$\frac{(n+1)(n+1)}{6}$$

(vii) The average of cubes of natural numbers up to

$$n = \left[ \frac{n(n+1)^2}{4} \right]$$

(viii) The average of squares of natural numbers up to  $n$  is

$$\left[ \frac{(n+1)(n+1)}{6} \right]$$

(ix) The average of squares of first  $n$  consecutive even numbers

$$= \left[ \frac{2(n+1)(n+1)}{3} \right]$$

(x) The average of squares of consecutive even numbers up

$$\text{to } n = \left[ \frac{(n+1)(n+1)}{3} \right]$$

### Important tricky formulae:

(i) If a person travels a distance at speed of  $x$  km/hr and the same distance at a speed of  $y$  km/hr, then the average speed during the whole Journey

$$= \left( \frac{xy}{x+y} \right) \text{ km/hr}$$

(ii) If a batsman completed ' $n$ ' innings and his average is ' $x$ ' runs. He must make in his next innings so as to raise his average to ' $y$ ' then

$$\text{Required number of runs} = [n(y-x) + y]$$

(iii) If a batsman in his  $n$ th innings makes a score of ' $x$ ' and thereby increases his average by ' $y$ ', then

$$\text{Average after 'n' innings} = [xy + (n-1)]$$

(iv) If the average of ' $n$ ' quantities is equal to ' $x$ ' and when a quantity is removed, the average becomes ' $y$ ', then

$$\text{Value of removed quantity} = [n(x-y) + y]$$

(v) If the average of ' $n$ ' quantities is equal to ' $x$ ' and when a new quantity is added, the average becomes ' $y$ ', then

$$\text{Value of new quantity} = [n(y-x) + y]$$

(vi) If the average age of  $x$ ' boys is ' $a$ ' and the average age of ' $y$ ' boys out of them ( $x$  boys) is ' $b$ ', then

$$\text{Average age of the rest of the boys} = \left[ \frac{axby}{xy} \right]$$

(vii) If the average of  $x$ ' quantities is ' $a$ ' and the average of  $y$ ' quantities is ' $b$ ', then

$$\text{Average of all quantities together} = \left[ \frac{axby}{xy} \right]$$



## Solved Examples

**Example 1:** The average of 6 numbers is 8. What is the 7th number so that average becomes 12?

**Sol.** Let the 7th number be  $x$ .

$$\therefore \text{Sum of 6 numbers} = (6 \times 8) = 48$$

$$\therefore \frac{48+x}{7} = 12$$

$$\Rightarrow 48 + x = 84 \Rightarrow x = (84 - 48) = 36$$

**Example 2:** The average of 10 numbers is 12. The average of 6 of them is 8. What is the average of remaining four numbers?

**Sol.** Sum of 10 numbers =  $(10 \times 12) = 120$

$$\text{Sum of 6 numbers} = (6 \times 8) = 48$$

$$\begin{aligned} \therefore \text{Average of remaining four numbers} &= \frac{120-48}{4} \\ &= \frac{72}{4} = 18 \end{aligned}$$

**Example 3:** Find the average of squares of first 17 consecutive even numbers.

**Sol.** Average of squares of first  $n$  consecutive even

$$\text{numbers} = \frac{2(1)(21) + \dots}{3}$$

(Here  $n = 17$ )

$$\begin{aligned} \therefore \text{Required average} &= \frac{2(17)(217) + \dots}{3} \\ &= \frac{2(3685)}{3} = 420 \end{aligned}$$

**Example 4:** Manisha travels half of a journey at the speed of 60 km/hr and the next half at a speed of 40 km/hr. Find the average speed of Manisha during the whole journey?

**Sol.** Required average speed =  $\left(\frac{2xy}{x+y}\right)$  km/hr

$$= \left(\frac{2(60)(40)}{60+40}\right) \text{ km/hr}$$

$$= \frac{2(2400)}{100} \text{ km/hr} = 48 \text{ km/hr}$$

## Exercise

1. In a class of 60 students there are 33 girls. The average weight of these girls is 62 kg and average weight of the full class is 66.5 kg. What is the average weight of the boys of the class?

- (a) 72 kg            (b) 71 kg  
(c) 70 kg            (d) 73 kg

[SSC CHSL (Tier-1) Online Exam 31 January 2017 Morning Shift]

**Ans.** (a) Total weight of 33 girls  
=  $33 \times 62 \text{ kg} = 2046 \text{ kg}$   
Total weight of full class  
=  $60 \times 66.5 \text{ kg}$   
= 3990 kg  
weight of 27 boys  
=  $3990 - 2046 = 1944$   
Average weight =  $\frac{1944}{27} = 72 \text{ kg}$

2. In a class of 56 students there are 21 girls. The average weight of

these girls is 56 kg and average weight of the full class is 62.875 kgs. What is the average weight of the boys of the class ?

- (a) 69.75 kg            (b) 72.5 kg  
(c) 67 kg                (d) 65 kg

[SSC CHSL (Tier-1) Online Exam 31 January 2017 Evening Shift]

**Ans.** (c) Total weight of 21 girls =  $56 \times 21$   
= 1176 kg  
Total weight of full class  
=  $62.875 \times 56$   
= 3521 kg  
Total weight of  $(56 - 21) = 35$  boys  
=  $3521 - 1176 = 2345 \text{ kg}$   
Average weight of 35 boys  
=  $\frac{2345}{35} = 67 \text{ kg}$

3. The average revenues of 9 consecutive years of a company

is ₹ 65 lakhs. If the average of first 5 years is ₹ 60 lakhs and that of last 5 years is ₹ 72 lakhs, find the revenue for the 5th year.

- (a) ₹ 77 lakhs            (b) ₹ 75 lakhs  
(c) ₹ 73 lakhs            (d) ₹ 71 lakhs

[SSC CHSL (Tier-1) Online Exam 30 January 2017 Morning Shift]

**Ans.** (b) Total revenues of 9 years  
=  $65 \times 9 = 585 \text{ lakhs}$   
Total revenues of first 5 years =  $60 \times 5 = 300 \text{ lakhs}$   
Total revenues of last 5 years =  $72 \times 5 = 360 \text{ lakhs}$   
Total revenues of 10 years =  $300 + 360 = 660 \text{ lakhs}$   
Revenues of 5th year =  $660 - 585$   
= ₹ 75 lakhs

4. The mean of marks secured by 45 students in division A of class X is 69, 65 students of division B is 65 and that of 50 students of division C is 63. Find the mean of marks of the students of three divisions of Class X.  
 (a) 65.5 (b) 64.8  
 (c) 64.1 (d) 66.9

[SSC CHSL (Tier-1) Online Exam 30 January 2017 Afternoon Shift]

Ans. (a) Mean mark of 3 divisions of class X

$$= \frac{45 \times 69 + 65 \times 65 + 50 \times 63}{160}$$

$$= \frac{3105 + 4225 + 3150}{160}$$

$$= \frac{10480}{160} = 65.5$$

5. The average revenues of 7 consecutive years of a company is ₹ 83 lakhs. If the average of first 4 years is ₹ 78 lakhs and that of last 4 years is ₹ 90 lakhs, find the revenue for the 4th year.  
 (a) ₹ 91 lakhs (b) ₹ 93 lakhs  
 (c) ₹ 89 lakhs (d) ₹ 87 lakhs

[SSC CHSL (Tier-1) Online Exam 30 January 2017 Evening Shift]

Ans. (a) Total revenues of 7 years =  $83 \times 7 = 581$  lakhs  
 Total revenues of first 4 years =  $78 \times 4 = 312$  lakhs  
 Total revenues of last 4 years =  $90 \times 4 = 360$  lakhs  
 Total revenues of 8 years = 672 lakhs  
 Revenues of 4th year =  $672 - 581 = ₹ 91$  lakhs

6. The mean of marks secured by 60 students in division A of class X is 66, 45 students of division B is 62 and that of 75 students of division C is 60. Find the

mean of marks of the students of three divisions of class X.

- (a) 61.8 (b) 62.5  
 (c) 61.1 (d) 63.9

[SSC CHSL (Tier-1) Online Exam 29 January 2017 Morning Shift]

Ans. (b) Mean Marks

$$= \frac{60 \times 66 + 45 \times 62 + 75 \times 60}{60 + 45 + 75}$$

$$= \frac{3960 + 2790 + 4500}{180}$$

$$= \frac{11250}{180} = 62.5$$

7. Among three numbers, the first is twice the second and thrice the third. If the average of three numbers is 506, then what is the difference between the first and the third number ?

- (a) 759 (b) 585  
 (c) 755 (d) 552

[SSC CHSL (Tier-1) Online Exam 29 January 2017 Afternoon Shift]

Ans. (d) Let there be p, q and r

$$\text{First } p = 2q \Rightarrow q = p/2$$

$$\text{First } p = 3r \Rightarrow r = p/3$$

$$\text{Average} = \frac{p + q + r}{3}$$

$$506 = \frac{p + p/2 + p/3}{3}$$

$$506 = \frac{6p + 3p + 2p}{6}$$

$$506 = \frac{11p}{18}$$

$$p = \frac{506 \times 18}{11} = 828$$

$$\text{Difference} = p - r$$

$$= 828 - \frac{828}{3}$$

$$= 828 - 276 = 552$$

8. In the first 43 overs of a cricket match, the run rate was 5 runs/over. Calculate the required run rate in the remaining 7 overs to reach the target of 285 runs.

- (a) 10.6 (b) 11.2  
 (c) 10 (d) 9.4

[SSC CHSL (Tier-1) Online Exam 29 January 2017 Evening Shift]

Ans. (c) Total runs in the first 43 overs =  $43 \times 5 = 215$  runs.

$$\text{Required runs in 7 overs} = 285 - 215 = 70$$

$$\text{Run rate in 7 overs} = \frac{70}{7} = 10 \text{ runs}$$

/ over

9. Among three numbers, the first is twice the second and thrice the third. If the average of three numbers is 517, then what is the difference between the first and the third number ?

- (a) 564 (b) 759  
 (c) 485 (d) 799

[SSC CHSL (Tier-1) Online Exam 27 January 2017 Morning Shift]

Ans. (a) Let three numbers be p, q, r

According to question

$$p = 2q = 3r$$

$$\text{Average} = \frac{p + q + r}{3}$$

$$517 = \frac{2q + q + \frac{2}{3}q}{3}$$

$$= \frac{6q + 3q + 2q}{9}$$

$$517 = \frac{11}{9}q$$

$$q = \frac{5179}{11} = 470.818$$

$$p = 2q = 2 \times 470.818 = 941.636$$

$$r = \frac{2}{3} = \frac{2}{3} \times 470.818$$

$$= 2 \times 156.939 = 313.878$$

Difference of the first and the third number

$$= p - r = 941.636 - 313.878 = 627.758$$

10. A factory buys 8 machines. 3 Machine A, 2 Machine B and rest Machine C. Prices of the machines are ₹100000, ₹80000 and ₹45000 respectively. Calculate the average cost of these machines ?

- (a) 74375 (b) 75000  
(c) 85625 (d) 72875

[SSC CHSL (Tier-1) Online Exam 27 January 2017 Morning Shift]

Ans. (a) Average cost of Machines

$$= \frac{3 \times 100000 + 2 \times 80000 + 3 \times 45000}{8}$$

$$= \frac{300000 + 160000 + 135000}{8}$$

$$= \frac{595000}{8} = 74375$$

Average cost of each Machine is ₹74375.

11. Of the 3 numbers whose average is 70, the first is 1/9 times the sum of other two. The first number is:  
(a) 32 (b) 21  
(c) 14 (d) 42

[SSC CHSL (Tier-1) Online Exam 25 January 2017 Evening Shift]

Ans. (b) Let the first number =  $x_1$  and other two numbers =  $x_2$  and  $x_3$  According to question,

$$\frac{x_1 + x_2 + x_3}{3} = 70$$

$$x_1 + x_2 + x_3 = 70 \times 3 \dots(i)$$

and  $x_1 = \frac{1}{9}(x_2 + x_3) \dots(ii)$

∴ From eq<sup>n</sup> (i)

$$\frac{1}{9}(x_2 + x_3) + x_2 + x_3 = 70 \times 3$$

$$\frac{10}{9}(x_2 + x_3) = 70 \times 3$$

$$x_2 + x_3 = \frac{70 \times 3 \times 9}{10} = 189$$

From eq<sup>n</sup> (ii)

$$x_1 = \frac{1}{9} \times 189 = 21$$

Finally, the first number is 21.

12. The average revenues of 11 consecutive years of a company is ₹77 lakhs. If the average of first 6 years is ₹72 lakhs and that of last 6 years is ₹84 lakhs. What is the revenue for the Sixth year.

- (a) ₹91 lakhs (b) ₹87 lakhs  
(c) ₹85 lakhs (d) ₹89 lakhs

[SSC CHSL (Tier-1) Online Exam 24 January 2017 Morning Shift]

Ans. (d) Total revenues of 11 years

$$= 77 \times 11 \text{ lakhs}$$

$$= 847 \text{ lakhs}$$

Total revenues of 6 years

$$= 72 \times 6 \text{ lakhs}$$

$$= 432 \text{ lakhs}$$

Total revenues of next 6 years

$$= 84 \times 6 \text{ lakhs}$$

$$= 504 \text{ lakhs}$$

Average of 6th years

$$= (432 + 504) - 847$$

$$= 936 - 847$$

$$= ₹89 \text{ lakhs.}$$

13. A factory buys 8 machines. 3 Machine A, 4 Machine B and rest Machine C. Prices of the machines are ₹45000, ₹25000 and ₹35000 respectively. Calculate the average cost (in ₹) of these machines ?

- (a) 33750 (b) 35000  
(c) 36250 (d) 32250

[SSC CHSL (Tier-1) Online Exam 24 January 2017 Afternoon Shift]

Ans. (a) Average Cost

$$= \frac{3 \times 45000 + 4 \times 25000 + 1 \times 35000}{8}$$

$$= \frac{135000 + 100000 + 35000}{8}$$

$$= \frac{270,000}{8} = ₹33750.$$

14. Of the 3 numbers whose average is 112, the first is 3/13 times the sum of other two the first number is .....  
(a) 63 (b) 95  
(c) 42 (d) 126

[SSC CHSL (Tier-1) Online Exam 24 January 2017 Evening Shift]

Ans. (a) Total value of 3 numbers

$$= 3 \times 112 = 336$$

Let numbers be  $x_1, x_2$  and  $x_3$ .

$$x_1 = \frac{3}{13}(x_2 + x_3)$$

$$\Rightarrow \frac{13}{3}x_1 = (x_2 + x_3)$$

$$\frac{x_1 + x_2 + x_3}{3} = 112$$

$$\frac{x_1 + (x_2 + x_3)}{3} = 112$$

$$x_1 + \frac{13}{3}x_1 = 336$$

$$x_1 \left( \frac{3 + 13}{3} \right) = 336$$

$$x_1 = \frac{336 \times 3}{16} = 63.$$

Hence, the first number  $x_1 = 63$ .

15. The brother is elder to his sister by 6 years. Seven years ago the product of their ages was 72. What is the age of the brother ?

- (a) 13 years      (b) 12 years
- (c) 6 years      (d) 19 years

[SSC CHSL (Tier-1) Online Exam 24  
January 2017 Evening Shift]

Ans. (d) Let age of her sister = x  
Brother's age = x + 6  
7 years ago,  
 $(x - 7)(x + 6 - 7) = 72$   
 $\Rightarrow (x - 7)(x - 1) = 72$   
 $\Rightarrow x^2 - 8x + 7 = 72$   
 $\Rightarrow x^2 - 8x + 7 - 72 = 0$   
 $\Rightarrow x^2 - 8x - 65 = 0$   
 $x^2 - 13x + 5x - 65 = 0$   
 $x(x - 13) + 5(x - 13) = 0$   
 $(x - 13)(x + 5) = 0$   
 $x = 13$ , or  $x + 5 = 0$   
 $x = -5$  (Invalid)

Brother's Age = 13 + 6 = 19 years.

16. The average marks of 56 students is shown as 60. It includes a wrong entry of 92 marks instead of 29 marks. The correct average is .....
- (a) 58.875 marks
  - (b) 61.125 marks
  - (c) 63.375 marks
  - (d) 56.625 marks

[SSC CHSL (Tier-1) Online Exam 23  
January 2017 Afternoon Shift]

Ans. (a) Total marks of 56 students  
 $= 56 \times 60$   
 $= 3360$   
  
Correct Average =  $\frac{3360 - 92 + 29}{56}$   
 $= \frac{3297}{56} = 58.875$ .

17. A factory buys 7 machines. 2 Machine A, 2 Machine B and rest Machine C. Prices of the machines are ₹ 95000, ₹ 75000 and ₹ 43000 respectively. Calculate the average cost of these machines.
- (a) 71000      (b) 67000
  - (c) 75000      (d) 65500

[SSC CHSL (Tier-1) Online Exam 01  
February 2017 Morning Shift]

Ans. (b) Average cost of machines  
 $= \frac{95000 \times 2 + 75000 \times 2 + 43000 \times 3}{7}$   
 $= \frac{190000 + 150000 + 129000}{7}$   
 $= \frac{469000}{7} = ₹ 67000$

18. The average revenues of 9 consecutive years of a company is ₹ 76 lakhs. If the average of first 5 years is ₹ 71 lakhs and that of last 5 years is ₹ 83 lakhs, find the revenue for the 5th year.
- (a) ₹ 88 lakhs      (b) ₹ 84 lakhs
  - (c) ₹ 86 lakhs      (d) ₹ 82 lakhs

[SSC CHSL (Tier-1) Online Exam 01  
February 2017 Afternoon Shift]

Ans. (c) Total values of 9 years =  $76 \times 9$  lakhs = 684 lakhs  
Total values of 5 years =  $71 \times 5$  = 355 lakhs  
Total values of last 5 years =  $83 \times 5$  = 415 lakhs  
Total values of 10 years = 770 lakhs  
The values of 5th years =  $(770 - 684)$  lakhs = ₹ 86 lakhs

19. The mean of marks secured by 65 students in division A of class X is 54, 30 students of division B is 50 and that of 55 students of division C is 48. Find the mean of marks of the students of three divisions of Class X.
- (a) 50.3      (b) 49.6
  - (c) 51      (d) 52.4

[SSC CHSL (Tier-1) Online Exam 02  
February 2017 Morning Shift]

Ans. (c) Mean marks of 3 divisions  
 $= \frac{54 \times 65 + 50 \times 30 + 48 \times 55}{65 + 30 + 55}$   
 $= \frac{3510 + 1500 + 2640}{150}$

$$= \frac{7650}{150} = 51$$

Hence, the mean marks is 51.

20. Of the 5 numbers whose average is 72, the first is 1/8 times the sum of other 4. The first number is ..
- (a) 60      (b) 26
  - (c) 40      (d) 80

[SSC CHSL (Tier-1) Online Exam 02  
February 2017 Afternoon Shift]

Ans. (c) Total sum of 5 numbers =  $5 \times 72 = 360$   
Let first number is x.  
Sum of 4 numbers =  $360 - x$   
According of question

$$x = \frac{1}{8}(360 - x)$$

$$9x = 360$$

$$x = 40$$

Hence, the first number is 40.

21. The average weight of Shubha, Govinda and Reshma is 65 kg. If the average weight of Shubha and Govinda be 63 kg and that of Govinda and Reshma be 70 kg, then the weight of Govinda is
- (a) 41      (b) 71
  - (c) 88      (d) 46

[SSC CHSL (Tier-1) Online Exam 02  
February 2017 Evening Shift]

Ans. (b) Total weight of Shubha, Govinda and Reshma =  $65 \times 3$   
 $S + G + R = 195 \text{ kg} \rightarrow 195 \rightarrow \dots$ i  
Total weight of Subha Govinda =  $63 \times 2$   
 $= 126 \text{ kg}$   
 $S + G = 126 \text{ kg} \dots$ (ii)  
Total weight of Govinda and Reshma =  $2 \times 70 = 140$   
 $= 140 \text{ kg} \dots$ (iii)  
 $S + 2G + R = 126 + 140 = 266 \text{ kg} \dots$ (iv)  
Subtracting equation (i) from (iv)  
Weight of Govinda =  $266 - 195 = 71 \text{ kg}$

22. In a class of 60 students, there are 30 girls. The average weight of these girls is 58 kg and average weight of the full class is 63 kgs. What is the average weight of the boys of the class?

(a) 67 (b) 66  
(c) 68 (d) 65

[SSC CHSL (Tier-1) Online Exam 03  
February 2017 Morning Shift]

- Ans. (c) Total weight of 30 girls

$$= 58 \times 30 = 1740 \text{ kg}$$

$$\text{Total weight of 60 students}$$

$$= 63 \times 60 = 3780 \text{ kg}$$

$$\text{Total weight of 30 boys}$$

$$= (3780 - 1740) = 2040 \text{ kg}$$

$$\text{Average weight of boys}$$

$$= \frac{2040}{30} = 68$$

23. The average revenues of 9 consecutive years of a company is ₹ 68 lakhs. If the average of first 5 years is ₹ 63 lakhs and that of last 5 years is ₹ 75 lakhs, find the revenue for the 5th year.

(a) ₹ 80 lakhs (b) ₹ 76 lakhs  
(c) ₹ 78 lakhs (d) ₹ 74 lakhs

[SSC CHSL (Tier-1) Online Exam 03  
February 2017 Afternoon Shift]

- Ans. (c) Total revenues of 9 years =  $9 \times 68 = 612$  lakhs

$$\text{Total revenues of first 5 years}$$

$$= 5 \times 63 = 315 \text{ lakhs}$$

$$\text{Total revenues of last 5 years}$$

$$= 5 \times 75 = 375 \text{ lakhs}$$

$$\text{The revenues of 5th year}$$

$$= 315 + 375 - 612$$

$$= 690 - 612 = 78 \text{ lakhs}$$

Hence, the volume of 5th year is ₹ 78 lakhs.

24. In a class of 65 students there are 39 girls. The average weight of these girls is 60 kg and average

weight of the full class is 64 kgs. What is the average weight of the boys of the class?

(a) 69 (b) 66  
(c) 68 (d) 70

[SSC CHSL (Tier-1) Online Exam 03  
February 2017 Evening Shift]

- Ans. (d) Total weight of 39 girls

$$= 60 \times 39 \text{ kg}$$

$$= 2340 \text{ kg}$$

$$\text{Total weight of full class}$$

$$= 64 \times 65$$

$$= 4160 \text{ kg}$$

$$\text{Average weight of boys}$$

$$= \frac{4160 - 2340}{26}$$

$$= \frac{1820}{26} = 70 \text{ kg.}$$

25. The average revenues of 9 consecutive years of a company is ₹ 80 lakhs. If the average of first 5 years is ₹ 75 lakhs and that of last 5 years is ₹ 87 lakhs, find the revenue for the 5th year.

(a) ₹ 90 lakhs (b) ₹ 92 lakhs  
(c) ₹ 88 lakhs (d) ₹ 86 lakhs

[SSC CHSL (Tier-1) Online Exam 07  
February 2017 Morning Shift]

- Ans. (a) Total revenues =  $80 \times 9 = 720$

$$\text{Revenues of first 5 years from}$$

$$\text{beginning} = 75 \times 5 = 375$$

$$\text{Revenues of 5 years from last} = 87$$

$$\times 5 = 435$$

$$\text{Fifth year's revenue} = (375 + 435$$

$$- 720)$$

$$= (810 - 720) = ₹ 90 \text{ lakhs}$$

26. The mean of marks secured by 55 students in division A of class X is 58, 45 students of division B is 54 and that of 75 students of division C is 52. Find the mean of marks of the students of three divisions of Class X.

(a) 53.7 (b) 54.4  
(c) 53 (d) 55.8

[SSC CHSL (Tier-1) Online Exam 08  
February 2017 Morning Shift]

- Ans. (b) Mean of Marks

$$= \frac{55 \times 58 + 45 \times 54 + 75 \times 52}{55 + 45 + 75}$$

$$= \frac{3190 + 2430 + 3900}{175}$$

$$= \frac{9520}{175} = 54.4$$

27. The ratio of present ages of Ratnabali and Shaukat is 8:5. After 22 years the ratio of their ages will be 10:9. At present, what is Ratnabali's age?

(a) 5 (b) 14  
(c) 81 (d) 8

[SSC CHSL (Tier-1) Online Exam 08  
February 2017 Morning Shift]

- Ans. (d) Let their ages be  $8x$  and  $5x$

$$\frac{8x}{5x} = \frac{10}{9}$$

$$72x + 198 = 50x + 220$$

$$22x = 220 - 198$$

$$x = \frac{22}{22} = 1$$

$$\text{Ratnabali's age} = 8 \times 1 = 8 \text{ years}$$

28. Of the 3 numbers whose average is 64, the first number is  $\frac{1}{3}$  times the sum of other 2. The first number is —

(a) 72 (b) 32  
(c) 96 (d) 48

[SSC CHSL (Tier-1) Online Exam 08  
February 2017 Afternoon Shift]

- Ans. (d) Let three numbers be  $x_1, x_2$  and  $x_3$

$$\text{Total sum of three numbers}$$

$$x_1 + x_2 + x_3 = 64 \times 3 = 192 \quad \dots(i)$$

$$x_1 = \frac{1}{3}(x_2 + x_3)$$

$$3x_1 = x_2 + x_3 \quad \dots(ii)$$

On putting,  $x_2 + x_3 = 3x_1$  in (i)

$$x_1 + 3x_1 = 192$$

$$4x_1 = 192$$

$$x_1 = \frac{192}{4} = 48$$

29. The mean of marks secured by 60 students in division A of class X is 64, 40 students of division B is 60 and that of 60 students of division C is 58. Find the mean of marks of the students of three divisions of Class X.

- (a) 60.05 (b) 59.35  
(c) 62.15 (d) 60.75

[SSC CHSL (Tier-1) Online Exam 08 February 2017 Evening Shift]

Ans. (d) Mean marks

$$= \frac{60 \times 64 + 40 \times 60 + 60 \times 58}{60 + 40 + 60}$$

$$= \frac{3840 + 2400 + 3480}{160} = \frac{9720}{160}$$

$$= 60.75$$

30. Of the 3 numbers whose average is 72, the first is  $\frac{2}{7}$  times the sum of other two. The first number is:

- (a) 48 (b) 72  
(c) 32 (d) 96

[SSC CHSL (Tier-1) Online Exam 25 January 2017 Afternoon Shift]

Ans. (a) Let the three number be  $X_1, X_2, X_3$  respectively. According to question,

$$\frac{X_1 + X_2 + X_3}{3} = 72$$

$$\therefore X_1 + X_2 + X_3 = 72 \times 3 \dots(i)$$

$$\text{and } X_1 = \frac{2}{7}(X_2 + X_3)$$

$$X_1 = \frac{22}{77}X_2 + \frac{2}{77}X_3 \dots(ii)$$

Putting value of  $X_1$  in equation (i)

$$X_1 + X_2 + X_3 = 72 \times 3$$

$$\Rightarrow \frac{22}{77}X_2 + \frac{2}{77}X_3 + X_2 + X_3 = 72 \times 3$$

$$\Rightarrow \frac{99}{77}X_2 + \frac{79}{77}X_3 = 72 \times 3$$

$$\Rightarrow \frac{9}{7}(X_2 + X_3) = 72 \times 3$$

$$\therefore (X_2 + X_3) = \frac{7237 \times 9}{9} = 168$$

From eq<sup>n</sup> (ii)

$$\Rightarrow X_1 = \frac{2}{7} \times 168 = 48$$

Finally, the first number ( $X_1$ ) is 48.

31. Find the average of all prime numbers from 1 to 50.

- (a) 21.867 (b) 22.857  
(c) 23.887 (d) 24.867

[SSC CHSL (Tier-1) Online Exam 15 March 2018 Evening Shift]

Ans. (a) Prime numbers from 1 to 50

$$\Rightarrow 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47$$

$$\text{Average} = \frac{328}{15}$$

$$= 21.867$$

32. A boy spends ₹ 20 to purchase toffees at ₹ 1 each. Next day, he purchased some toffees for ₹ 40 with a discount of 50 paise per toffee. What is the average price per toffee (in paise)?

- (a) 45 (b) 60  
(c) 40 (d) 55

[SSC CHSL (Tier-1) Online Exam 15 March 2018 Evening Shift]

Ans. (b) Case I: Number of toffees purchased by boy

$$= (20 \times 1) = ₹ 20$$

Case II: Number of toffees purchased by boy

$$= (40 \times 2) = ₹ 80$$

$\therefore$  Required average

$$= \frac{(40 \times 20)}{(20 + 80)} = \frac{60}{100} = 0.6 ₹$$

$$= 60 \text{ paise}$$

33. The average of 10 numbers is 30. If at the time of calculation one number was wrongly taken as 36 instead of 69, then what will be the correct average?

- (a) 33 (b) 33.3  
(c) 36 (d) 39

[SSC CHSL (Tier-1) Online Exam 15 March 2018 Morning Shift]

Ans. (b) Sum of 10 numbers =  $10 \times 30$   
= 300

$$\text{Correct sum} = 300 - 36 + 69$$

$$= 369 - 36$$

$$= 333$$

$$\therefore \text{Correct Average} = \frac{333}{10} = 33.3$$

34. A person purchased 10 shirts costing ₹ 150 per shirt. Next day he again purchased the shirts costing ₹ 150 per shirt at a discount of ₹ 30 per shirt and that day he spent a total of ₹ 1800. What is the average cost per shirt (in ₹)?

- (a) 125 (b) 132  
(c) 138 (d) 144

[SSC CHSL (Tier-1) Online Exam 16 March 2018 Evening Shift]

Ans. (b) Cost of 10 shirts =  $150 \times 10$   
= 1500

After Discount of ₹ 30 per shirt he purchased total number of

$$\text{shirts} = 10 + 10 + \frac{1800}{120}$$

$$= (10 + 15) = 25$$

$\therefore$  Average cost per shirt

$$= \frac{(1500 + 1800)}{25}$$

$$= \frac{3300}{25} = ₹ 132$$

35. Average age of 6 boys is 14 years. Average age of 11 girls is 12 years. What is the average age (in years) of all boys and girls?

- (a) 12.7 (b) 14.6  
(c) 19.3 (d) 8.5

[SSC CHSL (Tier-1) Online Exam 17 March 2018 Morning Shift]