

Chapter 1 – Ratio, Proportion, Logarithms

Indices,

Topic 1 – Ratio

1. If a quantity increases or decreases in the ratio $a : b$, then new quantity =
2. **Inverse Ratio** – The inverse ratio of a/b is:
3. **Compound Ratio** – The multiplication of two or more ratios is called compound ratio. The compound ratio of $a : b$ and $c : d$ is:
4. **Duplicate Ratio** – A ratio compounded of itself is called a Duplicate Ratio. The duplicate ratio of $a : b$ is:
5. **Sub-Duplicate Ratio** – The sub-duplicate ratio of $a : b$ is:
6. **Triplicate Ratio** – The triplicate ratio of $a : b$ is:
7. **Sub-Triplicate Ratio** – The sub-triplicate ratio of $a : b$ is:

Topic 2 – Proportion

1. Cross Product Rule: If $\frac{a}{b} = \frac{c}{d}$, then,

2. Invertendo: If $\frac{a}{b} = \frac{c}{d}$, then,

3. Alternendo: If $\frac{a}{b} = \frac{c}{d}$, then,

4. Componendo: If $\frac{a}{b} = \frac{c}{d}$, then,

5. Dividendo: If $\frac{a}{b} = \frac{c}{d}$, then,

6. Componendo and Dividendo: If $\frac{a}{b} = \frac{c}{d}$, then,

7. Addendo: If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \dots$, then each of these ratios is equal to:

8. Subtrahendo: If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \dots$, then each of these ratios is equal to:

Topic 3 – Indices

1. $a^n =$

2. $a^{-n} =$

3. $a^0 =$

4. $a^m \times a^n =$

5. $\frac{a^m}{a^n} =$

6. $(a^m)^n =$ $=$

7. $(ab)^n =$; or, $\left(\frac{a}{b}\right)^n =$

8. $a^{m/n} =$, i.e., $a^{m/n} =$ $=$

Topic 4 – Logarithms

1. $\log_a m = x \Rightarrow m =$

2. $\log_a 1 =$; $\log_a a =$

3. $\log_a (mn) =$

4. $\log_a \left(\frac{m}{n} \right) =$

5. $\log_a (m^n) =$

6. $\log_a m =$

7. $\frac{1}{\log_a m} =$

8. $a^{\log_a n} =$

9. $\log_{a^q} n^p =$

Chapter 2 – Equations

1. Quadratic Formula =

2. $\alpha =$

3. $\beta =$

4. Sum of Roots $(\alpha + \beta) =$

5. Product of Roots $\alpha\beta =$

6. If α and β are the roots of the equation, the equation is given by:

7. $(a+b)^2 =$

8. $(a-b)^2 =$

9. $a^2 - b^2 =$

10. $(a+b)^3 =$

11. $(a-b)^3 =$

12. $(a+b+c)^2 =$

13. If $b^2 - 4ac = 0$, the roots are _____ and _____.

14. If $b^2 - 4ac > 0$, the roots are _____ and _____.

15. If $b^2 - 4ac$ is a perfect square, the roots are _____, _____, and _____.

16. If $b^2 - 4ac$ is not a perfect square, the roots are _____, _____, and _____.

17. If $b^2 - 4ac < 0$, the roots are _____ and _____.

18. Irrational roots occur in conjugate pairs, i.e., if $(m + \sqrt{n})$ is a root, then _____ is the other root of the same equation.

19. If one root is reciprocal to the other root, then their product is 1 and so $\frac{c}{a} = 1$, i.e.,

20. If one root is equal to the other root but opposite in sign, then their sum = 0, i.e.,

Chapter 4 – Mathematics for Finance

Topic 1 – Simple Interest

1. $I =$

2. $A =$

3. $i =$

4. $t =$

Topic 2 – Compound Interest

1. $A =$

2. $CI =$

3. Difference between Compound Interest and Simple Interest

4. Effective Rate of Interest $E =$

Topic 3 – Annuity

1. Future Value of Annuity Regular

$$FV =$$

2. Future Value of Annuity Due

$$FV =$$

3. Present Value of Annuity Regular

$$PV =$$

4. Present Value of Annuity Due =

Topic 4 – Perpetuity

1. Present Value of Perpetuity =

2. Present Value of Growing Perpetuity =

Topic 5 – Miscellaneous Topics

1. Nominal Rate of Return =

2. Compound Annual Growth Rate =

Chapter 5 – Permutations and Combinations

1. The number of arrangements of n items in a straight line is given by
2. Formula for selecting r items out of n items =
3. Formula for arranging r items out of n items =
4. Obvious Relationship between ${}^n C_r$ and ${}^n P_r \rightarrow$
5. The number of arrangements of n items in a circle is given by
6. The number of necklaces formed with n beads of different colours is
7. Number of ways of selecting some or all items from a set of n items –
 - a. When there are 2 choices for each item:
 - b. When there are 3 choices for each item:

8. ${}^{n+1}C_r =$

9. $\frac{{}^nC_r}{{}^nC_{r+1}} =$; $\frac{{}^nC_{r-1}}{{}^nC_r} =$

10. If ${}^nC_x = {}^nC_y$, and $x \neq y$, then _____

11. If ${}^nP_x = {}^nP_y$, and $x \neq y$, then _____

12. The number of diagonals in a polygon of n sides is

13. Division of Items in Groups –

a. Division of Distinct Items in Groups –

i. Equal items in every group – The number of ways to divide n students into k groups of h students each is given by

ii. Unequal items in every group – The number of ways to divide n items into 3 groups \rightarrow one containing a items, the second containing b items, and the third containing c items, such that $a + b + c = n$, is given by

b. Division of Identical Items in Groups – The number of ways to divide n identical objects into k groups of h items each is given by

14. Number of Factors of a number – Factors of a number N refers to all the numbers which divide N completely.

Step 1 – Express the number N in the form of $N = p^a \cdot q^b \cdot r^c$, where p , q , and r are the prime factors of the number N .

Step 2 – Use the formula: Number of factors of $N = (a+1)(b+1)(c+1)$.

15. The maximum number of points of intersection of n circles will be _____.

Chapter 6 – Sequence and Series

Topic 1 – Arithmetic Progression

1. $t_n =$

2. $n =$

3. Sum of first n terms of the series: $S_n =$

4. Sum of the series when first and last terms are known:

$$S_n =$$

Topic 2 – Geometric Progression

1. $t_n =$

2. Sum of first n terms of the series when $r > 1$: $S_n =$

3. Sum of first n terms of the series when $r < 1$: $S_n =$

4. Sum of infinite series (provided $r < 1$): $S_\infty =$

Topic 3 – Special Series

1. Sum of first n natural or counting numbers

$$(1 + 2 + 3 + 4 + \dots + n) =$$

2. Sum of first n odd numbers $\{1 + 3 + 5 + \dots + (2n - 1)\} =$

3. Sum of the Squares of first n natural numbers

$$(1^2 + 2^2 + 3^2 + 4^2 + \dots + n^2) =$$

4. Sum of the Cubes of first n natural numbers

$$(1^3 + 2^3 + 3^3 + 4^3 + \dots + n^3) =$$

5. Sum of the series such as: $1 + 11 + 111 + \dots$ to n terms, or $2 + 22 + 222 + \dots$ to n terms, or $3 + 33 + 333 + \dots$ to n terms, and so on:

6. Sum of the series $0.1 + 0.11 + 0.111 + \dots$ to n terms =

Chapter 7 – Sets, Relations, and Functions

Topic 1 – Sets

1. Number of subsets of a set with n elements:
2. Number of proper subsets of a set with n elements:
3. $(A \cup B)' =$
4. $(A \cap B)' =$
5. $n(A \cup B) =$
6. $n(A \cup B \cup C) =$

Topic 2 – Relations

1. Number of elements in a product set: $n(A \times B) =$
2. Total number of relations from Set A to Set B containing m and n elements respectively:
3. A relation R on the set A is a reflexive relation if _____ for all _____.
4. A relation R on the set A is a symmetric relation if _____.
5. A relation R on the set A is a transitive relation if _____.

Topic 3 – Functions

1. Inverse of a Function

Step 1 –	Write the function in the form of an equation, substituting y in place of $f(x)$.
Step 2 –	Rearrange the terms so that x comes on the LHS.
Step 3 –	Substitute $f^{-1}(x)$ in place of x , and x in place of y .