Preface

This book has been written with the aim to help students get a firm grasp of concepts taught at this level of Mathematics curriculum. The chapters have been written based on the topics of the latest (2020) syllabus. This will enable students to revise their lessons easily and effectively.

Each chapter starts with appropriate notes on related concepts, formulae and examples to guide the students on how to approach problems logically and work independently.

Questions in each chapter have been prepared based on easy to difficult ones in order to develop students' confidence along the way.

The two specimen papers at the end of this book have been designed to let students self-test themselves within the allotted time.

The Answers section provides worked solutions for all the questions. I hope that this book will benefit the students and will serve as an invaluable resource for them.

Contents

1 Factors and Multiples

NOTES AND EXAMPLES

1.1 Prime Factorisation

A prime number is an integer which has ONLY 2 factors, itself and 1.

Examples

2, 3, 5, 7, 11, 13, ….

Factors: A whole number a can be written as a product of two or more whole numbers b and c which are called the factors of a.

1. $24 = 4 \times 6 \rightarrow$ 4 and 6 are the factors of 24. 24 a multiple of 4 and also a multiples 6.
2. $108 = 9 \times 12 \rightarrow$ 9 and 12 are the factors of 108.

   $108 = 3 \times 36 \rightarrow$ 3 and 36 are the factors of 108.

Prime Factors: In the above example, prime number 3 is a prime factor of 108; 12 and 36 are not prime factors. They are called composite numbers.

Prime Factorisation: If a whole number is expressed as a product of only prime numbers then, it is said to be prime factorised.

Example

1. $6 = 2 \times 3$. 2 and 3 are prime factors of 6.
2. If the number is large, we can draw a factor tree as follows:

$$108 = 2 \times 54$$
$$= 2 \times 2 \times 27$$
$$= 2 \times 2 \times 3 \times 9$$
$$= 2 \times 2 \times 3 \times 3 \times 3$$

Cube roots

$5^3 = 125$, so 5 is called the cube root of 125.

$\sqrt[3]{125} = 5$

Example

The volume of a cube is 4096 cm^3. Find the length of the side of the cube.

Solution:

Volume = $side^3$

$side = \sqrt[3]{volume}$

$side = \sqrt[3]{4096}$

$= \sqrt[3]{2^{12}}$

$= \sqrt[3]{2^4 \times 2^4 \times 2^4}$

$= 2^4$

$= 16.$

The length of the side is 16 cm.

Exercise 1.4

1. Prime factorise to find the square root of the following.

(a) $\sqrt{196}$

(b) $\sqrt{576}$

(c) $\sqrt{1444}$

(d) $\sqrt{1764}$

2. Prime factorise to find the cube root of the following.

(a) $\sqrt[3]{512}$

(b) $\sqrt[3]{729}$

(c) $\sqrt[3]{2744}$

(d) $\sqrt[3]{125000}$

3.2 Approximation and Estimation

Significance figures:

The first significant digit in a number is the first non-zero digit (reading from left to right). The digit to its right is called the second significant figure and so on.

Example

(a)

Number	0	.	0	0	5	8	0	4
Significance	Not significant	.	Not significant	Not significant	1^{st}	2^{nd}	3^{rd}	4^{th}

(b)

Number	3	0	0	9	4	1
Significance	1st	2nd	3rd	4th	5th	6th

Rounding off is done similar to real numbers by observing the digit next to the desired significant figure.

Round off 0.03954 to

(a) 2 significant figures.

0.03954

5 is the first digit after the cut off point. 5 = 5 so round up.

0.040

(b) 3 significant figures

4 is the first digit after the cut off point. 4 < 5 so round down

0.0395

Estimation: The estimated value is calculated by rounding off the operands appropriately.