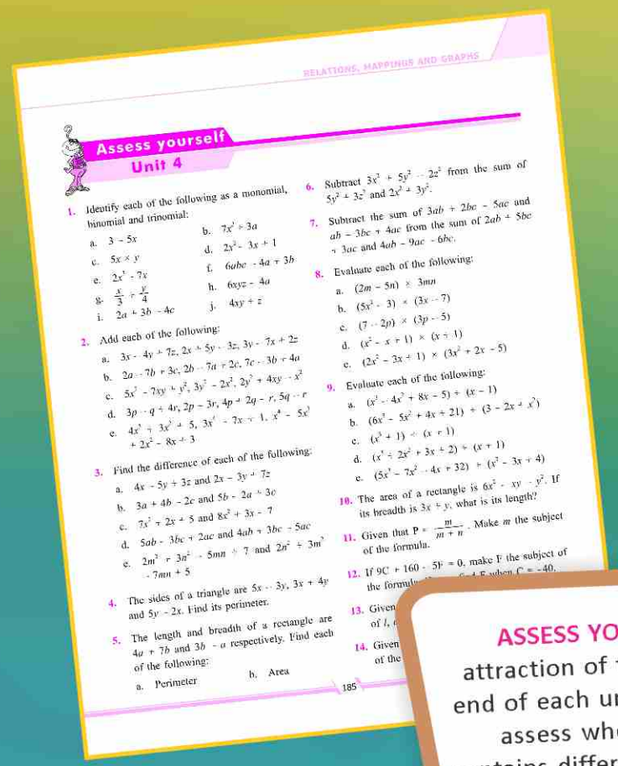
RELATIONS, MAPPINGS AND GRAPHS

Assess yourself
Unit 4

1. Identify each of the following as a monomial, binomial and trinomial:
   a. $3 - 5x$ b. $7x^2 + 3a$
   c. $5x \times y$ d. $2x^2 - 3x + 1$
   e. $2x^3 - 7x$ f. $6abc - 4a + 3b$
   g. $\frac{x}{3} + \frac{y}{4}$ h. $6xyz - 4a$
   i. $2a + 3b - 4c$ j. $4xy + z$

2. Add each of the following:
   a. $3x - 4y + 7z$, $2x + 5y - 3z$, $3y - 7x + 2z$
   b. $2a - 7b + 3c$, $2b - 7a + 2c$, $7c - 3b + 4a$
   c. $5x^2 - 7xy + y^2$, $3y^2 - 2x^2$, $2y^2 + 4xy - x^2$
   d. $3p - q + 4r$, $2p - 3r$, $4p + 2q - r$, $5q - r$
   e. $4x^3 + 3x^2 + 5$, $3x^3 - 7x + 1$, $x^4 - 5x^3 + 2x^2 - 8x + 3$

3. Find the difference of each of the following:
   a. $4x - 5y + 3z$ and $2x - 3y + 7z$
   b. $3a + 4b - 2c$ and $5b - 2a + 3c$
   c. $7x^2 + 2x + 5$ and $8x^2 + 3x - 7$
   d. $5ab - 3bc + 2ac$ and $4ab + 3bc - 5ac$
   e. $2m^3 + 3n^2 - 5mn + 7$ and $2n^2 + 3m^3 - 7mn + 5$

4. The sides of a triangle are $5x - 3y$, $3x + 4y$ and $5y - 2x$. Find its perimeter.

5. The length and breadth of a rectangle are $4a + 7b$ and $3b - a$ respectively. Find each of the following:
   a. Perimeter b. Area

6. Subtract $3x^2 + 5y^2 - 2z^2$ from the sum of $5y^2 + 3z^2$ and $2x^2 + 3y^2$.

7. Subtract the sum of $3ab + 2bc - 5ac$ and $ab - 3bc + 4ac$ from the sum of $2ab + 5bc + 3ac$ and $4ab - 9ac - 6bc$.

8. Evaluate each of the following:
   a. $(2m - 5n) \times 3mn$
   b. $(5x^2 - 3) \times (3x - 7)$
   c. $(7 - 2p) \times (3p - 5)$
   d. $(x^2 - x + 1) \times (x + 1)$
   e. $(2x^2 - 3x + 1) \times (3x^2 + 2x - 5)$

9. Evaluate each of the following:
   a. $(x^3 - 4x^2 + 8x - 5) \div (x - 1)$
   b. $(6x^3 - 5x^2 + 4x + 21) \div (3 - 2x + x^2)$
   c. $(x^3 + 1) \div (x + 1)$
   d. $(x^3 + 2x^2 + 3x + 2) \div (x + 1)$
   e. $(5x^3 - 7x^2 - 4x + 32) \div (x^2 - 3x + 4)$

10. The area of a rectangle is $6x^2 - xy - y^2$. If its breadth is $3x + y$, what is its length?

11. Given that $P = \frac{mt}{m+n}$. Make m the subject of the formula.

12. If $9C + 160 - 5F = 0$, make F the subject of the formula ... $C = -40$.

13. Given ... of l, ...

14. Given ... of the ...

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ASSESS YOURSELF is a very special attraction of the series. It is given at the end of each unit to enable the students to assess where exactly they stand. It contains different types of questions based on the different chapters in a unit.

Kriti Prakashan Limited Lucknow

KRITI PRAKASHAN LIMITED

Vedang Tower, Amrapali Bazar, Sector-22, Indira Nagar, Lucknow-226 016 (INDIA)
Phones : (0522) 2350903, 2350904, Fax : (0522) 2350907
e-mail : contact@kritiprakashan.com, visit us at : www.kritiprakashan.com

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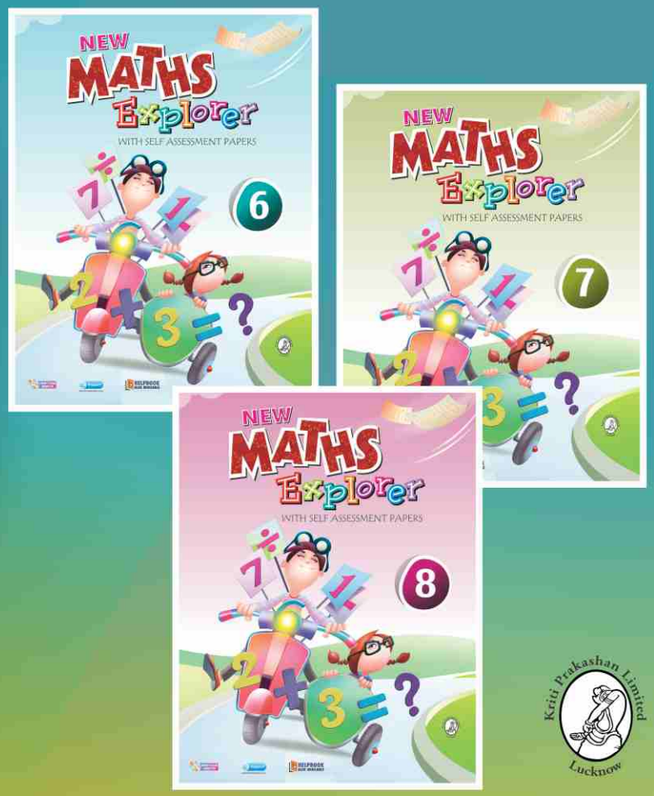

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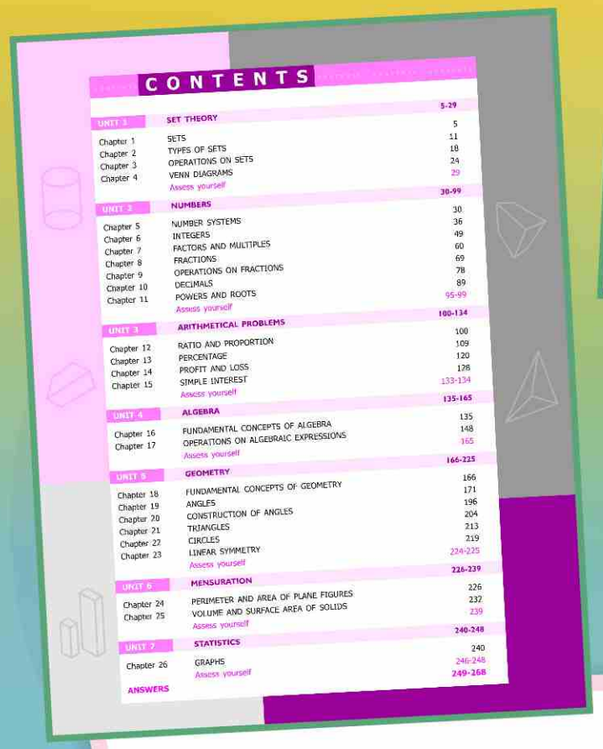

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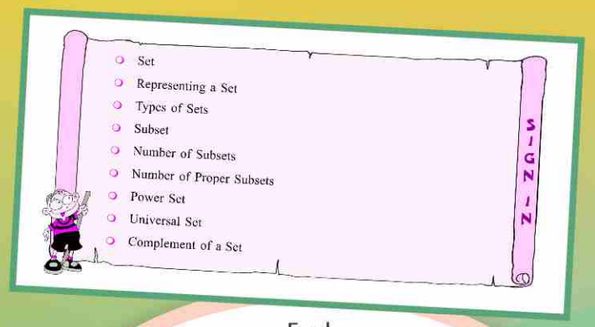
A colourful **CONTENTS** page not only gives to list of the lessons divided into different units but also a colourful division of each unit attracts the children to explore the book.



SIGN IN

- Set
- Representing a Set
- Types of Sets
- Subset
- Number of Subsets
- Number of Proper Subsets
- Power Set
- Universal Set
- Complement of a Set

Each unit has been divided into different chapters and each chapter begins with **SIGN IN** which informs the students what they are going to study in the chapter. This is extremely useful because this works as the contents of the chapter.

REMEMBER

A *numerical expression* is a combination of numerals related by one or more of the symbols + , – , × , ÷ , while an *algebraic expression* is a combination of variables and constants related by one or more of the symbols + , – , × , ÷ .

Important points are given within a box under 'REMEMBER'.

Treasury

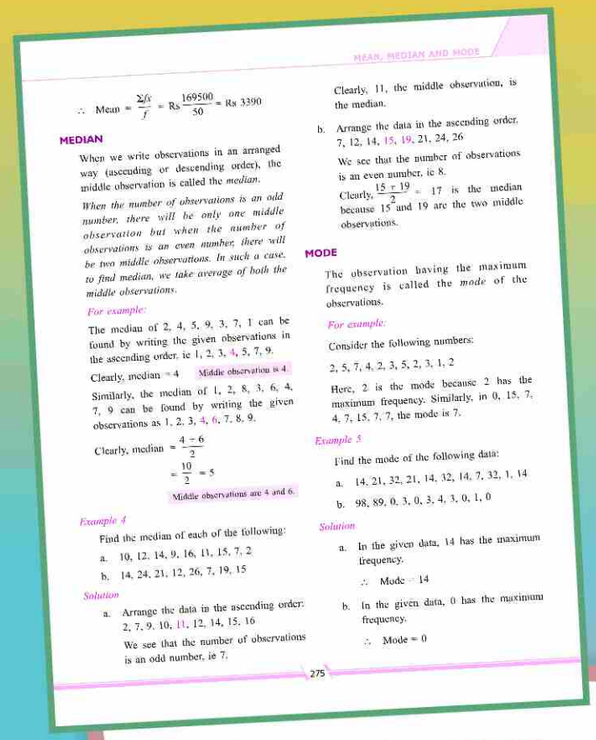
- Comparison of Fractions
  - We compare the fractions by making them like fractions.
  - We make the denominator of each fraction same and then compare.
  - $\frac{5}{6}$, $\frac{2}{3}$, $\frac{4}{15}$ and $\frac{1}{10}$ can be Expressed as $\frac{5 \times 5}{6 \times 5}$, $\frac{2 \times 10}{3 \times 10}$, $\frac{4 \times 2}{15 \times 2}$, and $\frac{1 \times 3}{10 \times 3}$ or $\frac{25}{30}$, $\frac{20}{30}$, $\frac{8}{30}$ and $\frac{3}{30}$, where 30 is the L.C.M. of the denominators.

    Clearly $25 > 20 > 8 > 3$.
    So, $\frac{5}{6} > \frac{2}{3} > \frac{4}{15} > \frac{1}{10}$
  - Comparison can also be done by making the numerator of each fraction same.

    If we have to compare two fractions only, then we use cross product rule: $\frac{2}{15} \times \frac{3}{8}$

    Clearly, 8×2 or 16 is less than 15×3 or 45.
    so, $\frac{2}{15} < \frac{3}{8}$.

TREASURY is a special feature of the series which is very significant as it adds zest to the concerned topic.



MEAN, MEDIAN AND MODE

$\therefore$ Mean $= \frac{\Sigma fx}{f} = \text{Rs}\frac{169500}{50} = \text{Rs } 3390$

MEDIAN

When we write observations in an arranged way (ascending or descending order), the middle observation is called the *median*.

When the number of observations is an odd number, there will be only one middle observation but when the number of observations is an even number, there will be two middle observations. In such a case, to find median, we take average of both the middle observations.

For example:

The median of 2, 4, 5, 9, 3, 7, 1 can be found by writing the given observations in the ascending order, ie 1, 2, 3, 4, 5, 7, 9.

Clearly, median = 4 — Middle observation is 4

Similarly, the median of 1, 2, 8, 3, 6, 4, 7, 9 can be found by writing the given observations as 1, 2, 3, 4, 6, 7, 8, 9.

Clearly, median $= \frac{4+6}{2}$

$= \frac{10}{2} = 5$

Middle observations are 4 and 6.

Example 4

Find the median of each of the following:

a. 10, 12, 14, 9, 16, 11, 15, 7, 2

b. 14, 24, 21, 12, 26, 7, 19, 15

Solution

a. Arrange the data in the ascending order:
2, 7, 9, 10, 11, 12, 14, 15, 16

We see that the number of observations is an odd number, ie 7.

Clearly, 11, the middle observation, is the median.

b. Arrange the data in the ascending order.
7, 12, 14, 15, 19, 21, 24, 26

We see that the number of observations is an even number, ie 8.

Clearly, $\frac{15+19}{2} = 17$ is the median because 15 and 19 are the two middle observations.

MODE

The observation having the maximum frequency is called the *mode* of the observations.

For example:

Consider the following numbers:

2, 5, 7, 4, 2, 3, 5, 2, 3, 1, 2

Here, 2 is the mode because 2 has the maximum frequency. Similarly, in 0, 15, 7, 4, 7, 15, 7, 7, the mode is 7.

Example 5

Find the mode of the following data:

a. 14, 21, 32, 21, 14, 32, 14, 7, 32, 1, 14

b. 98, 89, 0, 3, 0, 3, 4, 3, 0, 1, 0

Solution

a. In the given data, 14 has the maximum frequency.

$\therefore$ Mode = 14

b. In the given data, 0 has the maximum frequency.

$\therefore$ Mode = 0

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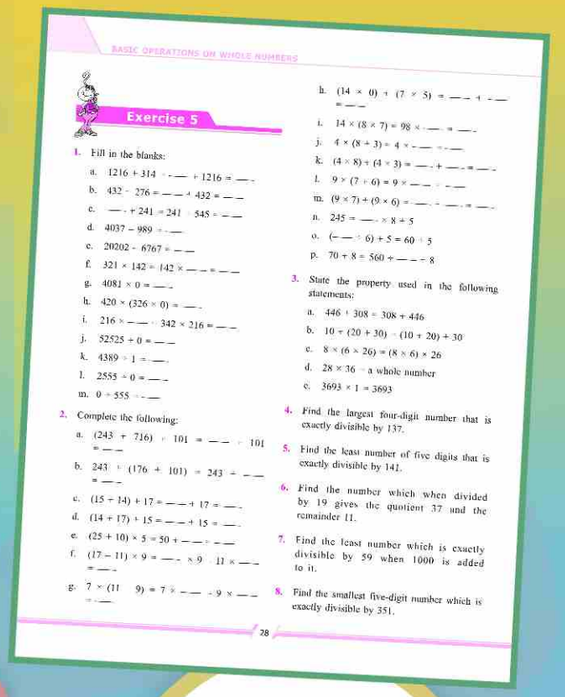
Adequate number of **SOLVED EXAMPLES** are given in each chapter so that students can understand the method of solving the different types of questions easily.



BASIC OPERATIONS ON WHOLE NUMBERS

Exercise 5

1. Fill in the blanks:
   a. $1216 + 314 = \_\_ + 1216 = \_\_$
   b. $432 - 276 = \_\_ - 432 = \_\_$
   c. $\_\_ + 241 = 241 + 545 = \_\_$
   d. $4037 - 989 = \_\_$
   e. $20202 - 6767 = \_\_$
   f. $321 \times 142 = 142 \times \_\_ = \_\_$
   g. $4081 \times 0 = \_\_$
   h. $420 \times (326 \times 0) = \_\_$
   i. $216 \times \_\_ = 342 \times 216 = \_\_$
   j. $52525 \div 0 = \_\_$
   k. $4389 \div 1 = \_\_$
   l. $2555 \div 0 = \_\_$
   m. $0 \div 555 = \_\_$
2. Complete the following:
   a. $(243 + 716) \div 101 = \_\_ \div 101 = \_\_$
   b. $243 \div (176 + 101) = 243 \div \_\_ = \_\_$
   c. $(15 \div 14) \div 17 = \_\_ \div 17 = \_\_$
   d. $(14 \div 17) \div 15 = \_\_ \div 15 = \_\_$
   e. $(25 + 10) \times 5 = 50 + \_\_ \div \_\_$
   f. $(17 - 11) \times 9 = \_\_ \times 9 \quad 11 \times \_\_ = \_\_$
   g. $7 \times (11 \quad 9) = 7 \times \_\_ \quad 9 \times \_\_ = \_\_$
   h. $(14 \times 0) + (7 \times 5) = \_\_ + \_\_ = \_\_$
   i. $14 \times (8 \times 7) = 98 \times \_\_ = \_\_$
   j. $4 \times (8 + 3) = 4 \times \_\_ = \_\_$
   k. $(4 \times 8) + (4 \times 3) = \_\_ + \_\_ = \_\_$
   l. $9 \times (7 + 6) = 9 \times \_\_ = \_\_$
   m. $(9 \times 7) + (9 \times 6) = \_\_ + \_\_ = \_\_$
   n. $245 = \_\_ \times 8 + 5$
   o. $(\_\_ \div 6) + 5 = 60 \div 5$
   p. $70 + 8 = 560 \div \_\_ = 8$
3. State the property used in the following statements:
   a. $446 + 308 = 308 + 446$
   b. $10 + (20 + 30) = (10 + 20) + 30$
   c. $8 \times (6 \times 26) = (8 \times 6) \times 26$
   d. 28×36 = a whole number
   e. $3693 \times 1 = 3693$
4. Find the largest four-digit number that is exactly divisible by 137.
5. Find the least number of five digits that is exactly divisible by 141.
6. Find the number which when divided by 19 gives the quotient 37 and the remainder 11.
7. Find the least number which is exactly divisible by 59 when 1000 is added to it.
8. Find the smallest five-digit number which is exactly divisible by 351.

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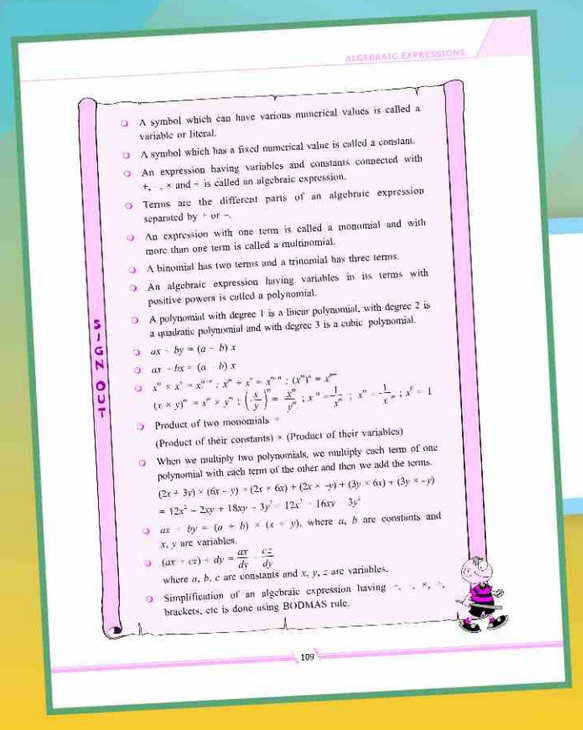
At the end of the each chapter, different types of questions are given under **EXERCISE** which is diagnostic for the students to judge how well they have prepared the concerned chapter.



ALGEBRAIC EXPRESSIONS

SIGN OUT

- A symbol which can have various numerical values is called a variable or literal.
- A symbol which has a fixed numerical value is called a constant.
- An expression having variables and constants connected with +, –, × and ÷ is called an algebraic expression.
- Terms are the different parts of an algebraic expression separated by + or –.
- An expression with one term is called a monomial and with more than one term is called a multinomial.
- A binomial has two terms and a trinomial has three terms.
- An algebraic expression having variables in its terms with positive powers is called a polynomial.
- A polynomial with degree 1 is a linear polynomial, with degree 2 is a quadratic polynomial and with degree 3 is a cubic polynomial.
- $ax + by = (a + b)\,x$
- $ax - bx = (a - b)\,x$
- $x^m \times x^n = x^{m+n}$; $x^m \div x^n = x^{m-n}$; $(x^m)^n = x^{mn}$
  $(x \times y)^n = x^n \times y^n$; $\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$; $x^{-n} = \frac{1}{x^n}$; $x^{\frac{1}{n}} = \sqrt[n]{x}$; $x^0 = 1$
- Product of two monomials =
  (Product of their constants) × (Product of their variables)
- When we multiply two polynomials, we multiply each term of one polynomial with each term of the other and then we add the terms.
  $(2x + 3y) \times (6x - y) = (2x \times 6x) + (2x \times -y) + (3y \times 6x) + (3y \times -y)$
  $= 12x^2 - 2xy + 18xy - 3y^2 = 12x^2 + 16xy - 3y^2$
- $ax + by = (a + b) \times (x + y)$, where a, b are constants and x, y are variables.
- $(ax + cz) \div dy = \frac{ax}{dy} + \frac{cz}{dy}$
  where a, b, c are constants and x, y, z are variables.
- Simplification of an algebraic expression having +, –, ×, ÷, brackets, etc is done using BODMAS rule.

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Each chapter ends with **SIGN OUT** which is the summary of the chapter. It refreshes the memory of the students.