Mathematics

SYLLABUS - GRADE 6

2007

Department of Mathematics
Faculty of Science & Technology
National Institute of Education

Grade 6 – Mathematics
Competencies, Competency Levels, Subject Content, and Number of Periods

Competencies, Competency Levels	Subject Content	Periods
Competency – 1 **Fulfills the requirements of day to day life by manipulating the mathematical operations in the set of real numbers.** 1.1 Investigates the quantitative values of numbers.	• Place value of a number • Reading and writing numbers up to a billion (standard form)	06
1.2 Relates the number line to introduce negative numbers.	• Representation of whole numbers on the number line • Introduction of negative numbers • Representation of integers on the number line	06
1.3 Uses symbols to facilitate the comparison of numbers.	• Use of the vocabulary and symbols >, < and = to compare and order integers • Finding an integer between two integers	05
1.4 Manipulates natural numbers under addition and subtraction.	• Numbers (Large numbers) • Addition and Subtraction	05
1.5 Manipulates natural numbers under the basic mathematical operations.	• Multiplication and Division • By 10, 100, 1000 • By two digit numbers	05
1.6 Investigates the divisibility of a natural number using a multiplication table.	• Factors and Multiples • Using a 10 x 10 multiplication table	04

Competencies, Competency Levels	Subject Content	Periods
1.7 Investigates methods by which the divisibility of one number by another is easily observable.	• Divisibility • By 2, by 5, by 10	04
1.8 Gives a rough estimate for the numerical value of a quantity.	• Estimation • Number of elements in a set that can be counted	04
1.9 Obtains approximate values for numbers to facilitate communication and calculation.	• Approximation • Numbers less than 100 to the nearest 10	04

Competency – 2
Makes decisions for future requirements by investigating the various relationships in number patterns.
2.1 Classifies numbers using number patterns.
	• Types of numbers
	  • Even numbers
	  • Odd numbers
	  • Square numbers
	  • Composite numbers
	  • Triangular numbers
	  • Prime numbers
		05

2.2 Constructs patterns between various types of numbers.	• Various number patterns
	• Relationship between odd and even numbers
	  • Addition
	  • Subtraction
	  • Multiplication
		05

Competencies, Competency Levels	Subject Content	Periods

Competency – 3
Easily fulfills the day to day requirements of life by manipulating units and parts of units under the mathematical operations.
3.1 Identifies unit fractions and proper fractions.
	• Introduction of fractions
	  • Unit fractions
	  • Proper fractions
	  • Equivalent fractions
		04

3.2 Compares fractions.	• Comparison of fractions
	  • Unit fractions
	  • Equal denominators
	  • Related denominators
		04

3.3 Manipulates parts of units under the mathematical operations.	• Addition and subtraction of fractions
	  • Equal denominators
	  • Related denominators
		04

3.4 Compares parts of units by identifying them as decimals.	• Introduction of decimals • Comparison of decimals	03
3.5 Manipulates decimals in daily activities.	• Addition and subtraction of decimals	03

Competency - 4
Uses ratios to facilitate day to day activities.
4.1 Builds relationships between quantities.
	• Ratios
	  • Concept
	  • Simplest form (between two quantities)
	  • Use of rate
		06

Competencies, Competency Levels	Subject Content	Periods
Competency – 6 **Solves mathematical problems in day to day life by using logarithms.** 6.1 Builds relationships between numbers and powers to facilitate representation.	• Indices • Notation • Number $\rightleftharpoons$ power (less than 100) • Expansion of powers • Writing as products of powers of prime factors (less than 100)	05
Competency – 7 **Carries out daily work effectively by investigating the various methods of finding the perimeter.** 7.1 Investigates the instances in which length associated measurements are applied, by using appropriate units.	• Length • Concept (height, distance, depth, width as a length) • Units (mm, cm, km, m) • Conversion (mm $\rightleftharpoons$ cm $\rightleftharpoons$ m $\rightleftharpoons$ km)	04
7.2 Relates length associated measurements to perimeters of plane figures.	• Finding the perimeter (Not with the use of formulae) • Measurement of length	04
Competency – 8 **Makes use of a limited space in an optimal manner by investigating the area.** 8.1 Inquires into the area of rectilinear plane figures.	• Area – concept • Units (cm^2) • Square • Rectangle	05

Competencies, Competency Levels	Subject Content	Periods
Competency – 9 **Fulfills daily requirements by working with an awareness of mass.** 9.1 Uses appropriate units to measure mass in daily requirements.	• Mass • Estimation • Units (g, kg) • g $\rightleftharpoons$ kg (conversion) • Measurements (g, kg) • Addition • Subtraction	05
Competency – 11 **Fulfills daily needs by working critically with the knowledge of liquid measurements.** 11.1 Uses appropriate units to measure liquids in daily activities.	• Liquid measurements • Estimation of volume • Units (ml, l) • Conversion (ml $\rightleftharpoons$ l) • l, ml – addition and subtraction	04
Competency – 12 **Fulfills the needs of the world of work by time management.** 12.1 Plans daily activities by being conscious of time.	• Time • Units (seconds, minutes, hours, days) • Difference between time period and time difference • Addition/subtraction	03
12.2 Prepares for international relations using standard time and date.	• 24 hour clock $\rightleftharpoons$ 12 hour clock • Writing the date (standard form)	03

Competencies, Competency Levels	Subject Content	Periods
Competency – 13 **Uses scale drawings in practical situations by exploring various methods.** 13.1 Builds connections with the environment by having an awareness of directions.	• Eight directions • Vertical and horizontal (Relative to the ground)	05
Competency – 14 **Simplifies algebraic expressions by systematically exploring various methods.** 14.1 Represents numbers by algebraic symbols.	• Representation of unknown terms by algebraic symbols • Depending on the requirement, representing variables by algebraic symbols	05
14.2 Constructs simple algebraic expressions that include addition and subtraction.	• Constructing algebraic expressions • With one variable • With coefficient equal to one • Substitution in an algebraic expression • With one variable	05
Competency – 21 **Analyzes the relationships between various angles.** 21.1 Classifies angles using right angles.	• Angles • Right angles • Straight angles • Obtuse angles • Acute angles • Reflex angles	04

Competencies, Competency Levels	Subject Content	Periods

Competency – 22
Creates new models by exploring various solids.
22.1 Investigates the properties of solids.
	• Vertices, edges, faces
	  • Cube
	  • Cuboid
	  • Regular tetrahedron
		08

Competency – 23 **Makes decisions regarding day to day activities on the basis of geometrical concepts related to rectilinear plane figures.** 23.1 Investigates the shapes of rectilinear plane figures.	• Properties of rectilinear plane figures and drawing on a grid • Rectangle • Square • Triangle • Parallelogram • Trapezium	04
Competency – 24 **Thinks logically to make decisions based on geometrical concepts related to circles.** 24.1 Creates various patterns using circular shapes.	• Creation of circular patterns • Using physical objects (such as coins, bangles)	04

Competencies, Competency Levels	Subject Content	Periods

Competency – 28
Facilitates daily work by investigating the various methods of representing data.
28.1 Investigates methods of collecting data and convenient methods of representing data.
	• Data
	  • Collection, with tally marks (with not more than 5 groups and less than 100 data points)
	• Representation
	  • Tables
	  • Picture graphs
		06

Competency – 29
Analyzing data by various methods and makes predictions to facilitate daily activities.
29.1 Interprets data represented by various methods.
	• Interpretation
	  • By tables
	  • By picture graphs
		05

Competency – 30 **Manipulates the principles related to sets to facilitate daily activities.** 30.1 Groups items according to common properties.	• Sorting • Names for groups	04

Competency – 31
Analyzes the likelihood of an event occurring to predict future events.
31.1 Inquires into the likelihood of an event occurring.
	• Likelihood of an event occurring
	  • Events that are certain
	  • Events that are impossible
	  • Events that may or may not occur
		04

Grade 6 – Mathematics – Relationship between subject themes and content

Content	Learning Outcomes
1.0 Numbers **1.1 Natural Numbers, Integers** 1.1.1. Large Numbers	
	• Reads natural numbers up to a billion and writes natural numbers up to a billion in words and numerically.
1.1.2. Place Value	• Identifies the place value of each digit in a number.
1.1.3. Number Line	• Identifies negative numbers and represents natural numbers and integers on a number line.
1.1.4. Comparison	• Uses the vocabulary and symbols >, <, = to compare and order integers. Writes a number that lies between two numbers.
1.1.5. Estimation	• Gives an estimate of the number of items in a set that can be counted.
1.1.6. Approximation	• Approximates a number less than 100 to the nearest 10.
1.1.7. Odd and Even Numbers	• Classifies odd and even numbers. • Identifies properties of the sums and products of odd and even numbers.
1.1.8. Prime Numbers	• Classifies prime numbers.
1.1.9. Composite Numbers	• Classifies composite numbers.
1.1.10. Number Patterns	• Identifies simple number patterns including triangular numbers and square numbers.
1.1.11. Addition and Subtraction	• Adds natural numbers. Subtracts them.
1.1.12. Multiplication and Division	• Multiplies and divides natural numbers by 10, 100, 1000 and by two digit numbers.
1.1.13. Factors and Multiples	• Finds factors and multiples of numbers using a 10 x 10 multiplication table.
1.1.14. Divisibility	• Tests whether a number is divisible by 2, 5 and 10.
1.2 Fractions 1.2.1. Unit Fractions and Proper Fractions	• Identifies unit fractions and proper fractions.
1.2.2. Equivalent Fractions	• Finds equivalent fractions.
1.2.3. Comparison	• Compares unit fractions, fractions with equal denominators and fractions with related denominators.
1.2.4. Addition and Subtraction	• Adds and subtracts fractions with equal denominators, with related denominators (answer limited to proper fractions).

Content	Learning Outcomes

1.3 Decimals
   1.3.1. Concept
 	
   1.3.2. Comparison
   1.3.3. Addition and Subtraction
	• Identifies decimal numbers (knows what each digit in a decimal number represents).
	• Compares and orders decimal numbers.
	• Adds and subtracts decimal numbers.

1.4 Indices
   1.4.1. Notation
   1.4.2. Powers
	• Recognizes and uses index notation.
	• Expresses a number as a power.
	• Expands a power and writes it as a number.
	• Writes a number as a product of powers using prime factors (for numbers less than 100).

1.5 Ratios
   1.5.1. Concept
 	
   1.5.2. Simplest form
   1.5.3. Rate
	• Understands the concept of a ratio between two quantities.
	• Writes a ratio in the simplest form.
	• Applies rate in transactions.

2.0 Measurement
 	
2.1 Length
   2.1.1. Concept
 	
   2.1.2. Units
 	
   2.1.3. Conversion
   2.1.4. Estimation
   2.1.5. Measurements
   2.1.6. Perimeter
	• Identifies height, distance, width and depth etc., as lengths.
	• Selects and uses mm, cm, m, km appropriately to measure length.
	• Converts m $\rightleftharpoons$ cm, mm $\rightleftharpoons$ cm, m $\rightleftharpoons$ km.
	• Estimates distance, height, depth and width.
	• Measures lengths.
	• Identifies that the perimeter of a given rectilinear plane figure is the length around it.

2.2 Area
   2.2.1. Concept
 	
   2.2.2. Units
   2.2.3. Rectilinear Plane Figures
	• Identifies the extent of a bounded region in a plane or the surface of a solid as area.
	• Uses cm^2 to measure area.
	• Finds the areas of squares and rectangles.

Content	Learning Outcomes

2.3 Mass
    2.3.1.   Units
    2.3.2.   Conversion
    2.3.3.   Addition and Subtraction
	• Uses g, kg appropriately to measure mass.
	• Converts g $\rightleftharpoons$ kg.
	• Adds and subtract weights that include both kg and g.

2.4 Liquid Measures
    2.4.1.   Units
    2.4.2.   Conversion
    2.4.3.   Addition and Subtraction
	• Uses ml, l to measure capacity.
	• Converts ml $\rightleftharpoons$ l.
	• Adds and subtracts liquid volumes that include both l and ml.

2.5 Time
    2.5.1.   Units
 	
    2.5.2.   24 Hours Clock
 	
    2.5.3.   Date in Standard Form
	• Understands the difference between time period and time difference.
	• Uses the units seconds, minutes, hours and days appropriately. Identifies their relationships.
	• Measures time with a 24 hours clock.
	• Converts time on a 24 hours clock to a 12 hours clock time and converts a 12 hours clock time to a 24 hours clock time.
	• Writes the date in standard form.

2.6 Directions
    2.6.1.   Eight Directions
    2.6.2.   Horizontal, Vertical
	• Identifies and uses the eight directions.
	• Identifies the horizontal and the vertical.

3.0 Geometry **3.1 Angles** 3.1.1. Types of angles	 • Classifies angles as acute angles, right angles, obtuse angles, straight angles and reflex angles using right angles.
3.2 Solids 3.2.1. Cube, Cuboid, Regular Tetrahedron	• Creates cubes, cuboids and regular tetrahedrons and identifies properties such as vertices, edges and faces.

Content	Learning Outcome
3.3 Circles 3.3.1. Shapes 3.3.2. Patterns	• Identifies circular shapes in physical objects. • Constructs circular patterns using physical objects such as bangles and coins.
3.4 Rectilinear Plane Figures 3.4.1. Shapes and their characteristic properties	• Identifies and draws triangles, squares, rectangles, parallelograms and trapeziums in a grid.
4.0 Algebra	
4.1 Symbols 4.1.1. Unknowns 4.1.2. Variables	• Represents unknowns by algebraic symbols. • Depending on the requirement, represents variables by algebraic symbols.
4.2 Algebraic Expressions 4.2.1. Construction 4.2.2. Substitution	• Constructs algebraic expressions with one variable (coefficient equal to 1) using addition and subtraction. • Converts an algebraic expression with one variable into a numerical value by substituting natural numbers.
5.0 Statistics	
5.1 Handling Data 5.1.1. Collection 5.1.2. Representation 5.1.3. Interpretation	• Identifies methods of collecting data. • Collects data of not more than five kinds and less than hundred values and tabulates it using tally marks. • Represents data by tables and picture graphs. • Interprets data represented by tables and picture graphs.
6.0 Sets and Probability	
6.1 Sets 6.1.1. Sorting objects 6.1.2. Naming groups	• Sorts a group of objects by common attributes. • Names groups of objects having common attributes.
6.2 Chance 6.2.1. Likelihood of occurrence	• Identifies events that occur with certainty, never occur, may or may not occur.

Grade 6 – Syllabus (Sequence of Lessons)

Content First Term	Number of Periods	Syllabus Content Section

1. Circles
   • Shapes
   • Patterns
	4	3.3.1
		3.3.2

2. Natural Numbers
   • Large Numbers
   • Place Value
	6	1.1.1
		1.1.2

3. Operations on Whole Numbers
   • Addition, Subtraction
   • Multiplication, Division
	8	1.1.11
		1.1.12

4. Time
   • Seconds/Minutes/Hours/Days
   • 24 Hours Clock
   • Date in Standard Form
	5	2.5.1
		2.5.2
		2.5.3

5. Number Line
   • Representation on the Number Line
   • Comparison of Numbers
	6	1.1.3.
		1.1.4.

6. Estimation and Approximation
   • Estimation of Amounts
   • Approximation to the Nearest 10
	5	1.1.5
		1.1.6

7. Angles • Types	7	3.1.1

8. Directions
   • Eight Directions
   • Horizontal, Vertical
	5	2.6.1
		2.6.2

9. Fractions
   • Unit Fractions and Proper Fractions
   • Equivalent Fractions
   • Comparison
   • Addition and Subtraction
	8	1.2.1
		1.2.2
		1.2.3
		1.2.4

Content Second Term	Number of Periods	Syllabus Content Section
10. Sets • Sorting Objects • Naming Groups	5	6.1.1 6.1.2
11. Factors and Multiples/ Divisibility • 10×10 table • Divisibility (by 2, by 5 and by 10)	6	1.1.13 1.1.14
12. Rectilinear Plane Figures • Shapes	3	3.4.1
13. Decimals • Concept • Comparison • Addition and Subtraction	6	1.3.1 1.3.2 1.3.3
14. Types of Numbers / Patterns • Odd, Even / (+, ×) • Prime • Composite • Triangular, Square Numbers	7	1.1.7 1.1.8 1.1.9 1.1.10
15. Length • Concept • Units • Conversion of Units • Estimation • Measurements • Perimeter	8	2.1.1 2.1.2 2.1.3 2.1.4 2.1.5 2.1.6
16. Algebraic Symbols • Unknowns • Variables	5	4.1.1 4.1.2
17. Solids • Cube, Cuboid, Regular Tetrahedron	8	3.2.1.
18. Liquid Measures • Units • Conversion of Units • Addition and Subtraction	4	2.4.1 2.4.2 2.4.3

Content Third Term	Number of Periods	Syllabus Content Section
19. Algebraic Expressions • Construction	5	4.2.1
20. Algebraic Expressions • Substitution	4	4.2.2
21. Mass • Units • Conversion of Units • Addition and Subtraction	5	2.3.1 2.3.2 2.3.3
22. Ratio • Concept • Simplest form • Rate	8	1.5.1 1.5.2 1.5.3
23. Data • Collection	5	5.1.1
24. Data • Representation	5	5.1.2
25. Data • Interpretation	5	5.1.3
26. Indices • Notation • Powers	5	1.4.1 1.4.2
27. Area • Concept • Units • Squares, Rectangles	5	2.2.1 2.2.2 2.2.3
28. Chance • Likelihood of Occurrence	5	6.2.1

School Policies and Programmes

The mathematics syllabus has been prepared not only with the objective of inculcating knowledge and skills but also to highlight the deeper aims of communication, relationships, logical argument and problem solving. The latterly mentioned four aims aid more effectively in the development of behavioral and thinking skills. Mathematics is a subject that should not be restricted to just the syllabus or the classroom. It should be made into an active force within the school culture itself as it is a language; a science; an art; a tool to be used in thought, in calculations and in creations.

It is important therefore to organize school programmes so that the cultural values embedded in mathematics are developed in students. The following co-curricular programmes will aid in this.

1. Wall newspapers

2. Mathematics Laboratory

3. Mathematics Library

4. Exhibitions

5. Mathematics Societies

6. Quizzes

7. Mathematics Magazines

8. Mathematics Days

9. Mathematics Camps

10. Activity Cells

11. Excursions