Education Reform Unit

Eastern Caribbean Education Reform Unit Project
(ECERP)

Curriculum Harmonization

MATHEMATICS

***

GRADE 1

Anguilla | Antigua & Barbuda | British Virgin Islands

Dominica | Grenada | Montserrat

St. Kitts & Nevis | St. Lucia | St. Vincent & the Grenadines

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PREFACE

The development of learning outcomes for the core curriculum in OECS primary schools is an essential part of the harmonization of OECS educational systems. The curriculum harmonization process commenced with discussions between the OECS Education Reform Unit (OERU) and educational personnel in all member countries (See *Eastern Caribbean Education Reform Project: Initiative on curriculum and remediation – Design Mission report, February 1998*). Subsequent to the preparation of the report curriculum officers, teacher educators and evaluation officers, in a sub-regional workshop in Antigua and Barbuda, developed basic principles for mathematics in the primary school. All mathematics curricula from member countries were examined during the workshop. *The Report of proceedings: sub-regional curriculum and remedial planning workshop held on October 25-30, 1998* presents a full account of the decisions taken at the workshop.

During the years following the Antigua workshop a core team of curriculum officers and teacher educators, together with groups of teachers and principals from most member countries, contributed to the development and refinement of the outcomes. The purpose of using these learning outcomes is to ensure that all children in OECS primary schools attain an acceptable level of knowledge, skills and attitude associated with mathematics. Each member country retains the right and responsibility for integrating these outcomes into the national mathematics curriculum. As usual teachers will continue to use their initiative and resourcefulness in the implementation of the primary mathematics programme.

The OERU is extremely grateful for the contribution made by all persons and institutions that have been involved in this developmental exercise. First, OERU expresses thanks to the Canadian International Development Agency (CIDA) for the interest shown and the funding provided for the reform programme. The Ministries and Departments of Education have contributed resource personnel, accommodation, refreshment, ground transportation, and some materials for workshops. Most importantly, however, has been the high level of cooperation and commitment to the reform effort displayed by both the administrative and professional arms of Ministries of Education.

The following mathematics professionals have made significant contribution over the period of development.

Country	Participant	Designation
Anguilla	Mrs. Rosena Brooks Ms. Alison Hughes Mrs. Josephine Hodge Mrs. Yolande Richardson Mrs. Hyacinth Hughes	Education Officer, Curriculum Curriculum Officer, Mathematics Education Officer Former Chief Education Officer Principal, Valley Primary School
Antigua and Barbuda	Ms. Caron Weston Mr. Conrad Clarke Mr. Michael Francis Mr. Conrad Powell-Clarke	Curriculum Officer, Mathematics Former Lecturer, Antigua State College
British Virgin Islands	Ms. Beverlie Brathwaite	Education Officer, Mathematics
Dominica	Mr. Nicholas Goldberg Mr. Simon Sharplis Ms. Roseanne Lander Mr. Rupert Lance	Senior Education Officer Curriculum Officer, Mathematics Former Lecturer, Dominica State College
Grenada	Mr. Dennis Bell Mrs. Jean Brizan Mr. Cecil Johnson	Curriculum Officer, Mathematics Senior Education Officer, Curriculum Lecturer, Mathematics, T. A. Marryshow, Community College
Montserrat	Mrs. Rosamunde Meade Ms. Yasmin White	Former Education Officer Education Officer, Curriculum and Exams
St. Kitts and Nevis	Dr. Ruth Thomas Mr. Calwyn Morton Ms. Hazel Riley	Director of Curriculum Curriculum Officer, Mathematics Lecturer, Clarence Fitzroy College
St. Lucia	Mrs. Leonise Francois Mr. Joseph Serieux Mrs. Clermina James Dr. Cheryl Campbell	Former Curriculum Head Curriculum Officer, Mathematics Lecturer, Sir Arthur Lewis Community College
St. Vincent and the Grenadines	Mrs. Jacqueline Glasgow-Browne Mrs. Sylvia Jack Dr. Sandra Trotman Miss Yvonne Gaines Miss Zilta James	Curriculum Officer, Mathematics Former Senior Education Officer, Curriculum Former Teacher, Secondary School

The actual planning and subsequent developmental process for the learning outcomes and Teachers' Guide became the responsibility of Mrs. Sonia Severin, Senior Lecturer at Sir Arthur Lewis Community College, St. Lucia to whom the OERU is very grateful.

Mrs. Lorna Callender, former Head of OERU, and Ms. Candia Alleyne, former Head of OERU, have supported the project organizationally and morally; Mr. Johnson Cenac, ECERP Officer, and other members of the administrative and professional staff have made significant contribution in various ways and at various times throughout the development of this work. Special thanks should go to Ms. Cleotha Randolph, Ms. Suzette Merrill, Ms. Zena Hippolyte, Ms. Deborah Alphonse, and Ms. Emma McFarlane, Administrative Professionals, who have been responsible for preparation for the workshops and in refining most of the documents in relation to this initiative.

The OERU hopes that principals and teachers will continue to play their roles in making the outcomes come to life in classrooms throughout the OECS. The commitment and effort will surely contribute to the enhancement of knowledge, and skills and the development of positive attitude towards language in our children.

Henry Hinds, Head
September 2007

INTRODUCTION

This curriculum guide provides information on the focus of mathematics teaching and learning at the Grade 1 level. The document includes a brief rationale for the mathematics curriculum at the primary level, the learning outcomes to be developed at the Grade 1 level, some suggestions for teaching/learning activities and assessment strategies. Also included are the attainment criteria for this grade level and an Appendix.

The learning outcomes, suggested activities and strategies have been specified in the five main content areas of Statistics, Geometry, Measurement, Number Concepts, and Computation. The outcomes for each content area have been organized according to specific topics. Some sets of outcomes also contain general outcomes. These general outcomes are not related to any one specific topic. They have been identified as general outcomes, because they should be developed and reinforced as students engage in activities related to the outcomes for the various topics.

The teaching/learning activities and assessment strategies are suggestions. Teachers are encouraged to augment and further develop these suggestions to meet the needs of the students in their classrooms.

The attainment criteria provide a means of monitoring students' progress in developing the knowledge, skills, and processes outlined in the learning outcomes. They may also be used as basis for organizing teaching/learning experiences.

The Appendix provides an overview of the mathematics curriculum at the primary level. It contains a set of tables that outline the aims of mathematics teaching and learning for the primary level and indicate how these aims have been developed across the grade levels, Kindergarten to Grade 6.

The list of persons who participated in various ways in the development of this curriculum is also included in the Appendix. The contribution of these persons is greatly appreciated. Special thanks are also extended to the many principals and teachers who provided feedback on the drafts of the document and who participated in the pilot implementation process.

Sonia Severin
Consultant

RATIONALE

Participants at the 1998 Sub-Regional Workshop on harmonization of the mathematics curriculum in the Organization of Eastern Caribbean States (OECS) began the process of developing this curriculum guide. The discussions and outcomes of the Workshop indicated that, essentially, the aim of the mathematics curriculum should be the development of mathematically powerful individuals "who understand[s] and can confidently use mathematical concepts and principles across disciplines and in everyday life" (OECS Education Reform Unit (OERU), 1998, p. 33). Additionally, they recommended that the curriculum should enable these individuals to be critical thinkers and problem solvers who enjoy the challenges of mathematics and readily pursue solutions to problems. If the mathematics curriculum is to achieve this aim, it should of necessity focus, from the outset, on the attributes and behaviours that describe this individual.

Analysis of the characteristics of the mathematically powerful individual, as well as descriptions of an appropriate learning environment (also developed at the 1998 workshop), provides an indication of these attributes. The descriptions suggest that students should have developed and be able to apply:

- knowledge of mathematical concepts and procedures
- knowledge of mathematical relationships
- problem solving skills
- reasoning skills
- language and communication skills
-

The curriculum outlined in this document therefore focuses on these emphases. However, it is guided by particular interpretations of the emphases.

A focus on the development and use of mathematical concepts and procedures begs the question of what is relevant and appropriate mathematics for the primary school student. A response to this question may be obtained by considering the nature of mathematics. Mathematics may be perceived as an art or a way of thinking (Reys, Suydam, & Lindquist, 1984). These descriptions relate to the fact that mathematics is also characterized as a study of patterns and order (Mathematical Sciences Education Board, 1989). Additionally, mathematics is also described as a social activity. It is shaped by our observation and analyses of real world objects and phenomena (Borasi, 1998). Yet another portrayal of mathematics depicts it as a subject that consists of several facts, skills, concepts, and general procedures or processes (Department of Education & Science (DES), 1987; National Council of Teachers of Mathematics [NCTM], 1989, 2000). These descriptions of mathematics imply that students at the primary level should be provided with opportunities to develop mathematical ideas, skills, and processes through investigations that involve interaction with each other and their teacher.

Consistent with the recommendations coming out of the 1998 sub-regional workshop, the mathematical ideas have been organized into five strands or content areas:

- Statistics/Data Management
- Geometry
- Measurement
- Number Concepts, and
- Computation.

With this curriculum, young children's exposure to mathematics therefore begins with an exploration of ways of processing information, basic number work, pre-measurement ideas, and the geometrical shapes that they see around them. As they mature and move through the grades, they move on to more in-depth analysis of the mathematical ideas and procedures. At each grade, there is a focus on ensuring that students develop an understanding of the nature of the subject and what it means to know and do mathematics. Some general elements of the curriculum are as follows:

- An important aspect of the mathematics curriculum is the development of an understanding of, and ability to use, general procedures or strategies that are an integral part of doing mathematics. These procedures include problem solving and logical reasoning, and they are the means through which the students learn about mathematical facts, concepts and skills.

- The facts are related to terms, such as names for numbers or shapes, and qualities such as odd, symmetrical. Additionally, there is attention to notations and their meaning. Some examples are numerals, signs for operations, and number statements. Also included in this category are rules or generalizations, formulae, and conventions (e.g., ways of recording measurements in the metric system).

- The focus on concepts includes the development of an understanding of the meanings associated with a range of concepts as well as the relationships that exist among them.

- There is an emphasis on developing competency in a variety of skills. These skills include calculating or performing basic operations, representing, classifying, estimating, measuring, observing, comparing, inferring, and sequencing (Hatfield, Edwards & Bitter, 1999; James, 1995). Moreover, with the increased influence of technology, sensible use of a calculator, at the very least, is considered an important skill (OERU, 1998).

- Attention is also given to the development of several personal qualities related to work habits and attitudes towards mathematics. The description of the mathematically powerful child identifies persistence as a desirable work habit. Other important work habits are:
    - ✓ The willingness and ability to work independently or co-operatively as part of a group, when necessary;

- ✓ A tendency to work in a systematic manner, carrying out and reviewing tasks to ensure that the most appropriate steps are used to complete the task;
- ✓ A willingness to try several approaches to a task and to consider an idea from several perspectives (NCTM, 2000).

A focus on desirable work habits is one step towards enhancing students' attitude to mathematics, given that in developing these habits they are likely to experience success in mathematics (Sheffield & Cruishank, 2000). The development of a positive attitude towards mathematics focuses on ensuring that students acquire:

- ✓ A fascination with the subject;
- ✓ An interest in doing the subject;
- ✓ An appreciation for the purposes and relevance of the mathematics that is studied;
- ✓ Confidence in their ability to do the subject (NCTM, 2000; OERU. 1998).

The development of these elements of mathematics can be facilitated by appropriate experiences that emphasize problem solving, logical reasoning, making connections in mathematics, and communication.

Problem solving is one means through which students can generate new knowledge. Interpretations of problem solving have for the most part focused on its role in the application of mathematical concepts and procedures. Schroeder and Lester (1989) refer to this interpretation as 'teaching for problem solving'. In this scenario, students are taught a concept or skill and then are required to use it to solve several problems. According to Schroeder and Lester, this interpretation represents a limited perspective of problem solving. Two other interpretations are also important and should be included in mathematics programmes. These are:

- *Teaching about problem solving*. Students are taught a general procedure, consisting of several steps, for solving problems. One example of such a procedure is Polya's (1973) four steps
  - ✓ Analyze the problem
  - ✓ Identify and select possible strategies
  - ✓ Implement the strategies
  - ✓ Check the solution.

  Students may also be taught a number of problem solving strategies such as draw a diagram or solve a simpler problem.

- *Teaching via problem solving*. In this situation, problems are viewed as a means of developing concepts and skills. Thus, the introduction to a concept may involve analysis of a problem situation. The concept is developed through the search for a solution to that problem.

- Inclusion of the three approaches to problem solving implies that problem solving should not be viewed as an add-on. Thus, it is integrated throughout the mathematics

curriculum, with problem solving taking place during and after the development of concepts and skills.

- Students develop mathematical competence and positive personal qualities through activities that allow them to examine and restructure their knowledge (Hatfield, Edwards, & Bitter, 1999; Ishii, 2003; James, 1995; Reys, Suydam, & Lindquist, 1984; van de Walle, 2004). Attention to reasoning skills is therefore important. This emphasis necessitates a classroom atmosphere in which teachers and students explore the 'how' and 'why' of mathematics. Thus, while there is an emphasis in the curriculum on doing and learning mathematics through actions such as calculating and solving, there is also an infusion of experiences that involve justifying, representing, predicting, and testing predictions.

The development and use of reasoning skills should also involve an analysis of how mathematics is organized. Curricula that focus on mathematical relationships reflect the notion that mathematics is a coherent body of knowledge and skills. Connections can be developed, and in this curriculum have been made, between/among

- Mathematical concepts or topics;
- Concepts and procedures - for example, the concept of place value and the regrouping process;
- Modes of representing mathematics - for example, concrete, pictorial, and symbolic representations;
- Mathematics and other subjects - for example, the use of statistical procedures in Mathematics, Science and Social Studies;
- Mathematics and everyday activities.

By focusing on these types of interrelationships, students are more likely to develop a thorough understanding of mathematical facts, concepts, skills and procedures and how they might be applied in a variety of situations. Moreover, this focus will allow them to see the relevance of what they are learning. Significantly, these benefits could positively affect the students' attitude to mathematics.

Development of students' reasoning skills suggests a concurrent emphasis on communication, as it is through language and communication that we formulate our ideas and make our reasoning known. Communication within the mathematics classroom involves reading, writing about, listening to, and discussing mathematics (NCTM, 1989, 2000). It also requires attention to ways in which mathematical ideas can be represented. Therefore, students have been provided with opportunities to:

- read about mathematical ideas, for example, in their textbook, workbook, storybook, or on classroom charts;
- represent mathematical ideas in writing using pictures, diagrams, graphs, words, and symbols;
- participate in discussions, listening to and contributing ideas as necessary.

The discussion of mathematical ideas requires that students be able to explain their understanding of concepts and procedures. Indeed, the significance of an emphasis on communication lies in the fact that it compels students to select aspects of their mathematical knowledge that are important for conveying information in a given situation and those that are not (Sheffield & Cruishank, 2000). Therefore, students should not only know the various concepts and procedures, they should also be able to identify the contexts in which they are useful.

This communicative emphasis can therefore provide cognitive benefits for students. It can encourage them to reflect on their understandings. It can also help them to regulate their knowledge, in that difficulties in formulating the language to describe a situation may lead them to analyze and modify their understanding and thus, to develop new knowledge (Lappan & Schram, 1989). It also provides opportunities for teachers to assess students' learning and to use the feedback to organize experiences to facilitate further learning.

The question of whether these emphases can effect improvements in students' learning of mathematics is a critical consideration. Apparently, they hold the potential to do so. By incorporating these emphases into the curriculum, students are likely to:

- Learn mathematics meaningfully and therefore, acquire a greater understanding of concepts and procedures;
- Remember and be able to use mathematical concepts, skills, and procedures effectively. If they forget, the focus on interrelationships and problem solving will allow them to derive the relevant information for themselves.
- Recognize the relevance of mathematics to their lives. In so doing, it is likely that they would develop positive attitudes towards the subject.
  (Barb & Quinn, 1997; Grant & Searl, 1997; Ishii, 2003; Reys, Suydam, & Lindquist, 1984)

The range of outcomes and the teaching/learning and assessment strategies included in this guide provide relevant guidelines.

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STATISTICS/DATA MANAGEMENT

Topics	*Learning Outcomes* *By the end of Grade One, students should be able to:*
Data Collection Collecting data through looking and asking Recording data using numbers and words	1. Classify objects and people (e.g., classmates) according to selected criteria. 2. Collect simple sets of data in the class and school environment through observation and simple interviews. 3. Record collected data using simple number statements.
Data Representation Recording data using objects and tables Describing simple graphs	4. Represent collected data using objects, e.g., picture cut-outs, drawings and blocks. 5. Describe how data are presented in simple tables. 6. Describe how data are presented in simple pictographs, where one picture represents one unit of data. 7. Describe how data are presented in simple bar graphs, where one block represents one unit of data. 8. Describe similarities and differences between pictographs and bar graphs.
Data Interpretation Interpreting tables and graphs	9. Read the data presented in simple tables. 10. Interpret the data represented in tables. 11. Read the data represented in simple pictographs and bar graphs. 12. Interpret the data represented in simple pictographs and bar graphs.

Materials	***Teaching/Learning Activities***	***Assessment Strategies***
Household objects Toys School Supplies Objects and persons in the classroom Fruits Dice	*The Students can:* Sort household objects according to colour, size, function, etc. Bring toys to school, and sort them according to type, e.g., blocks, cars, dolls, balls, etc. Sort themselves according to several criteria related to school activities, e.g., membership in houses; membership in clubs. Talk about the number of objects or persons in the groups that they form. Write number statements to indicate the number of persons or objects in the groups that they form. Talk about ways of finding answers to questions that require the collection of data. Examples of questions are: How many girls in the class have blue ribbons and white ribbons? How many boys have red pencils and yellow pencils? What is the favourite drink of the students in this class? Work in groups to collect the data needed to answer the questions, and record their data in simple statements. Select their favourite fruit from a basket containing several types of fruit. Place their choices on a table in an array to show the number of fruits of each type that they selected.  	Practical tasks Observation Questioning Simple projects such as making a display of the data that were collected. Oral and written exercises Simple journal entries. 'Today I learned that ….'

Materials	*Teaching/Learning Activities*	*Assessment Strategies*
	The Students can: Draw their choices on a card or piece of paper and arrange their cards or paper in an array to show their choices. Answer questions about their choices, e.g., 'How many children like apples?' 'Which fruit do most children like?' Throw a die 20 times and record the number on the face that appears up. The students record the results using number statements. E. g, 'One appeared 5 times.' Represent data that they have collected by using one block to indicate one object or person in each group, and arranging their blocks in an array. Examine examples of simple tables and talk about the parts of the tables. For example, they can talk about the data that are shown in the table and how these data are arranged. Examine examples of pictographs that their teacher has drawn using the data that they collected. They can talk about the features of the pictograph. For example, they can be guided to talk about the data that were collected and how these data are shown in the pictograph. (A similar activity can be carried out for bar graphs.) Compare the number statements that they wrote to record the data they collected with the information provided in pictographs that represent the data. They can answer questions such as the following: What is used to represent each person or object in each group?' 'How does the pictograph tell us that …?' (Insert information as necessary, e.g., 'How does the pictograph tell us that three persons like apples?') Repeat similar activities that are based on bar graphs. Answer questions based on the data presented in tables, pictographs, and bar graphs.	

Materials	*Teaching/Learning Activities*	*Assessment Strategies*
	The students can: Examine a pictograph and a bar graph that show the same data, e.g., the students' favourite song. For example, they can talk about how the pictograph shows the data and how the bar graph shows the data. They can talk about what is used to represent each person or object in the pictograph and the bar graph. They can also compare where the names of the songs are displayed.	

GEOMETRY

Topics	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Three-dimensional shapes</u> Classification Attributes/ Features of the shapes	1. Describe the attributes of three-dimensional shapes, using phrases such as flat, curved, round, etc. 2. Classify three-dimensional shapes on the basis of their attributes such as shape and/or size. 3. Select and use their own criteria to classify three-dimensional shapes. 4. Explain the criteria that they selected and used to classify a set of three-dimensional shapes. 5. Explain why a given three-dimensional shape can slide, roll, or stack. 6. Classify objects (e.g., lead pencils, sticks of chalk, balls, etc.) according to the three-dimensional shape they represent. 7. Use three-dimensional shapes to make objects, e.g., a tower, a car.

Materials	*Teaching/Learning Activities*	*Assessment Strategies*
Household objects; e.g., cereal boxes, juice boxes, milk tins Toys Blocks	*The students can:* Pass their hand over the surfaces of three-dimensional objects and describe the surfaces as flat or curved. Pass a finger along the edges of three-dimensional shapes and describe the edges as straight, round, or curved. Examine examples of three-dimensional shapes and talk about their features, e.g., whether they have straight or curved edges, whether they have flat or curved surfaces. Sort sets of three-dimensional shapes, according to given criteria. For example, they can sort the shapes according to whether: their edges are straight or curved; the faces are flat or curved; the solids are small or large; the solids can slide or roll. Sort a set of three-dimensional shapes into groups and then explain to the class how the shapes in each group are alike. Sort a set of three-dimensional shapes into groups and then ask a classmate to explain how the shapes in each group are alike. The students must say whether the classmate is correct. Look at a selected three-dimensional shape, e.g., a cylinder, and then select objects in the classroom that have the same shape as the selected three-dimensional shape. This activity can be repeated using 2 or 3 three-dimensional shapes at a time. Play with a set of shapes, rolling or sliding them on their desk and stacking them one on the other. They make observations about the features of the faces on which the solids roll or slide. They can also answer questions such as the following: 'How can I get two milk cans to stand one on the other?' Which shapes could I use to make the wheels of a toy car? Why?	Practical tasks Observation Questioning Simple projects E.g., a scrapbook collection of pictures of household objects that have been sorted according to criteria selected by the students.

Topics	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Plane Shapes</u> Classification Naming shapes Drawing shapes Spatial relationships	8. Identify examples of two-dimensional shapes. 9. Classify two-dimensional shapes on the basis of their attributes, e.g., shape, size, number of sides. 10. Select and use their own criteria to classify two-dimensional shapes. 11. Explain the criteria that they used to classify a set of two-dimensional shapes. 12. Identify and name rectangles, squares, and circles. 13. Sketch two-dimensional shapes. 14. Use two-dimensional shapes to draw patterns and pictures. 15. Make observations about their patterns and pictures. (E.g., Some two-dimensional shapes make patterns that cover a page; others leave spaces.) 16. Identify the relative position of objects presented in concrete and pictorial form. 17. Position objects according to descriptions of their relative position.

Materials	*Teaching/ Learning Activities*	*Assessment Strategies*
Three-dimensional shapes Representations of two-dimensional shapes made from straws, matchsticks, paper strips, paper cut-outs Examples of rectangles, squares, and circles of various sizes Household objects (e.g., mugs, bowls, ornaments) and pieces of cloth with geometric patterns	*The students can:* Use the shapes to make objects of their choice. Select examples of two-dimensional shapes from a set of three-dimensional and two-dimensional shapes. Select a two-dimensional shape that matches the description given by a classmate or teacher. E.g., find and name a shape that has four sides. Sort two-dimensional shapes, according to given criteria, e.g., whether the shapes are large/small; whether they have three, four, or five sides. Sort sets of two-dimensional shapes into groups, using criteria they have selected, and then explain how the shapes in each group are alike and how the groups are different. Name the shape (rectangle, square or circle) that has been placed on their desk. Pick out the rectangles from a set of two-dimensional shapes and sketch them. Repeat the activity for squares and circles. Observe household objects and pieces of cloth, and talk about the patterns in these objects. Use two-dimensional shapes to sketch patterns on paper. Talk about their patterns. E.g., they can identify those shapes that make a pattern that entirely covers a sheet of paper, and those shapes that leave spaces in the pattern. Talk about the relative positions of a set of objects that have been placed on their desks. Identify and mark the objects drawn on a sheet of paper, given the positions of the objects. Place objects in the classroom according to directions involving positions. E.g., 'place the ruler beside the mathematics book.'	Practical activities Simple projects; such as making a poster that includes sketches of a particular shape (e.g., squares) and the name of the shape.

MEASUREMENT

Topic	*Learning Outcomes* *By the end of Grade One, students should be able to:*
Linear Measurement Use of non-standard units Use of the metre to measure lengths, heights and distances	1. Estimate lengths and heights of objects using non-standard units. 2. Measure lengths and heights of objects using non-standard units. 3. Estimate and measure distances in the school environment using non-standard units. 4. Explain why standard units are necessary. 5. Estimate and measure lengths and heights of objects using the metre as the unit of measure. 6. Estimate and measure distances in the school environment using the metre as the unit of measure. 7. Record linear measurements using appropriate notation. 8. Compare two linear measurements using phrases such as: longer than, shorter than, taller than, etc.
Measurement of mass Use of non-standard units Use of the kilogram Comparison of mass	9. Estimate and measure the mass of objects using non-standard units. 10. Estimate and measure the mass of objects using the kilogram as the unit of measure. 11. Record measurements of mass using appropriate notation. 12. Compare the mass of two objects, using phrases such as heavier than, lighter than, etc.

Materials	***Teaching/Learning Activities***	***Assessment Strategies***
Drinking straws Pencils Pens Popsicle sticks Metre rulers, tape measures that are 1 metre long Household objects e.g., combs, boxes, belts Objects in the classroom 1cent, 2 cent, and 5 cent coins	*The students can:* Carry on a discussion with their teacher about how people measured before there were measuring instruments. Observe demonstrations of how a non-standard unit (e.g., hand span, foot span, pencil) may be used to measure the length of objects. Estimate the length of objects in the classroom and household objects using the non-standard unit that the teacher demonstrated. Record their estimates, e.g., the desk is five hand spans long. Measure the lengths that they have estimated and record the estimates. Talk about whether the estimates and actual measures were close or far apart. Repeat the activity using other non-standard activities. Use non-standard units such as foot span, stride, or arm length to estimate and measure distances in the school, e.g., the distance between the school gate and the principal's office. Measure the length of an object or a distance using several non-standard units (e.g., hand span, a drinking straw) and record the measurements. Talk about why the measurements were different even though they measured the same length. Measure the length of an object using several of the same non-standard unit. E.g, one student measures the length using his/her hand span. Another student measures the same object using his/her hand span. Compare the results of the measurement and give reasons for any differences. Talk about why we need to use a standard/same unit to measure lengths and distances. Observe and talk about examples of metre rulers and metre long measuring tapes. Observe demonstrations of how to use metre rulers and measuring tapes to measure lengths.	Practical tasks Observation Questioning

Topics	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Measurement of capacity</u> Use of non-standard units	13. Estimate and measure the capacity of containers using non-standard units. 14. Compare the capacity of containers using non-standard units, and using phrases such as: holds more than, holds less than, etc. 15. Record measurements of capacity using appropriate notation.
<u>Measurement of temperature</u> Vocabulary	16. Describe the temperature of an object using phrases such as: 'warm', 'hot', 'cold', etc.
<u>Time</u> Vocabulary Use of the calendar Time on the hour and half-hour	17. Use time vocabulary appropriately, e.g., now, later, soon, year, month, day, etc. 18. Name the days of the week. 19. State the number of days in a week. 20. Name the months of the year. 21. State and write the date of the current day. 22. Tell time on the hour and half-hour. 23. Read and write time on the hour and half hour in several ways (e.g., 8:00, eight o' clock). 24. Represent time on the hour and half-hour. 25. Represent and write the time for events that occur on the hour or half-hour, e.g., break time.

Materials	***Teaching/ Learning Activities***	***Assessment Strategies***
	The students can:	
Non-standard units for mass, e.g., bags of sand, bundles of pencils Balance scales Bathroom scales Containers of different sizes and shapes Charts Large and small clocks Sets of 1cent, 2 cents and 5 cents coins Empty or used household objects for a class shop Calendars	Measure the lengths of several objects and distances using metre rulers or measuring tapes. Write sentences to record their comparisons of the lengths of objects. E.g., 'The pencil is shorter than the piece of string.' Hold a non-standard unit in one hand and an object in their other hand, then estimate the mass of the object and record their estimate. Use a balance scale and the same non-standard unit to measure the mass of the object, and record the measurement. Estimate, measure, and record the mass of objects using a variety of non-standard units. Hold a kilogram mass, then select objects in the classroom that have a mass of about 1kilogram. Estimate the mass of objects in kilograms, and record the estimate. They then measure and record the mass of the objects. They talk about whether their estimates were close or far apart. Select two objects in their classroom that have different masses and say which is heavier/lighter. Use non-standard units (cups, bowls, etc) to fill containers with water and record the capacity of the containers. E.g., 'the jug can hold 6 bowls of water.' Observe two containers (one of which is tall and narrow, the other short and wide) and decide which holds more or less water. They then find the capacity of each container using the same unit of measurement, e.g., the same cup. They talk about their decision and measurements. E.g., they can give reasons for their decision.	Practical tasks Observation Written exercises Simple projects, e.g., a bulletin board display

Topics	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Money</u> Features of coins Representation of money Making change	26. Describe the 1-cent, 2 cent, 5-cent, and 10-cent coins. 27. Identify the 1-cent, 2-cent, 5-cent, and 10-cent coins. 28. Represent a coin value (up to 20 cents) using several combinations of coins. 29. Find the total value of a combination of coins, with totals up to 20 cents. 30. Make change from amounts up to 20 cents, using counting on. 31. Create and solve problems involving money.

Materials	*Teaching/Learning Activities*	*Assessment Strategies*
	The students can: Touch containers filled with water of different temperatures, e.g. a container filled with cold tap water, another filled with water and ice, and another filled with hot tap water, and describe the temperature of the water. Talk about school and national events using time vocabulary. Take responsibility for changing, on a daily basis, a chart that records the day of the week and the date. Identify the date of the current day on a calendar, and write the date. Show the times indicated for particular events (e.g., time for a concert, break time, lunch time) on a real or model clock. Draw the hands on clock faces to show times on the hour or half-hour. Write a short description indicating the times that they carry out various activities. State the time that is shown on a real clock, model clock, or drawing of a clock. Sort a set of coins comprised of 1-cent, 2-cent, 5-cent and 10-cent coins. Close their eyes, then describe a coin that has been placed in their hand and identify the coin. Represent 5 cents using 1-cent and 2-cent coins. Represent 10 cents using a set of 1-cent coins, 2-cent coins, and a combination of 1-cent and 2-cent coins. Talk about and show how 5-cent coins can be used to show 10 cents. Use counting and skip counting to determine combinations of coins that can be used to represent amounts up to 20 cents. Set up a class shop. In playing shop, they use counting on to find the total of a set of coins and to make change from amounts up to 20 cents. Make up problems based on the cost of goods in their shop and solve them.	

NUMBER CONCEPTS

Topic	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Counting</u> Counting forwards Counting backwards Counting on Skip counting Ordinal numbers	1. Count in sequence to 100. 2. Count by 10's to 100. 3. Count by 2's and 5's to 50. 4. Count backwards from 10. 5. Count on from a given number. 6. Identify the ordinal position of an object in an arrangement of up to 10 objects. 7. Use calculators to count in a variety of ways.

Materials	*Teaching/Learning Activities*	*Assessment Strategies*
	The students can:	
Manipulatives, such as blocks, shells, large buttons, bottle caps, Popsicle sticks, etc Numeral cards, i.e., cards with a numeral written on them Number cards, i.e., cards with a set of objects drawn or stuck on them; cards with a number written in words Hundred chart Number lines Calculators	Touch a set of objects, one at a time, and count the objects. State the number of objects in the group. Count as they make a set of objects. State the number of objects in the set. Use problem-solving strategies, such as acting out the problem, and counting, to solve problems. E.g., There are five persons in a group. Each person has 10 marbles. How many marbles are there altogether? Talk about the different ways that they can count to find the answer to the problem. Count as they make a set of objects of a given number (e.g. 30). Place these objects into smaller sets of 2 (or 5 or 10). Use the smaller sets to practise skip counting. Draw jumps of 2's (or 5's) on a number line and skip count as they make the jumps. Use a hundred chart to skip count; e.g, circle the numbers that would be counted in counting by 5's or 10's. Arrange a set of numeral cards to represent the sequence of numbers as they skip count. Look for patterns in the sequence of numbers. Use the patterns to help them skip count. Recite, and demonstrate, rhymes that involve counting. Count as they make a set of 10 objects. Practise counting backwards as they remove one object at a time from the set. Use a number line to practise counting backwards, by walking back from a given number to one, and stating the number name as each step is made.	Practical tasks Observation Questioning

Topic	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Whole Numbers</u> Representation of numbers Making and comparing sets	8. Count and identify the number of objects in a set of up to 20 objects. 9. Make and draw sets of up to 20 objects. 10. Read and write numbers up to twenty in words and numerals. 11. Make and draw a set that is equal to, one more than, or one less than a given set. 12. Compare sets of up to twenty objects using the symbols '=', '>', or '<'. 13. Compare pairs of numerals (up to 20) using the symbols '<' or '>'. 14. Use collective number names such as pair, set, and group.

Materials	***Teaching/Learning activities***	***Assessment Strategies***
Manipulatives, such as blocks, shells, large buttons, bottle caps, Popsicle sticks, etc Numeral cards, i.e., cards with a numeral written on them Number cards, i.e., cards with a set of objects drawn or stuck on them; cards with a number written in words Hundred chart Number lines Calculators Sheets of paper divided into 20 rectangles	*The students can:* State whether a given counting sequence is correct. E.g., John was asked to count from 25 to 29. He said: "twenty five, twenty-seven, twenty-nine." Was he correct? Explore their calculator to find out how it can be used to skip count and count backwards. Demonstrate the procedures to the class. Arrange a set of class activities in the order in which they occurred. Arrange the events in a story in the order in which they occurred. Talk about the activities and events, using words related to ordinal arrangements, such as first, second, third, last etc. Follow directions related to ordinal arrangements; e.g., 'Identify the third person in the line.' Look at an arrangement of objects that are different and identify the position of an object given its description. Look for patterns in the way in which numbers between 10 and 20 are written in words. Count the number of objects on number cards with sets of objects, and match the cards with the cards showing the corresponding numeral and number written in words. Count the number of objects in a set that is presented in concrete or pictorial form, and write the number in words and numerals. Use a variety objects to make sets of a given size. E.g., use buttons, blocks, and sticks to represent fifteen.	Questioning Observation Oral presentations

Topic	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Fractions</u> Meaning of a whole and a part Unit fractions: One-half, one-quarter	15. Identify a whole and parts of a whole. 16. Identify one-half and one-quarter of a whole. 17. Explain what one-half and one-quarter mean. 18. Represent one-half and one-quarter of a whole. 19. Read and write the fractions: $\frac{1}{2}$ and $\frac{1}{4}$.

Materials	***Teaching/Learning activities***	***Assessment Strategies***
	The students can:	
Manipulatives, such as blocks, shells, large buttons, bottle caps, Popsicle sticks, etc Number lines Sheets of paper divided into 20 rectangles	Use paper that has been separated into rectangles to draw a variety of arrangements of objects to represent a given number. Display the arrangements in the class. Answer questions such as the following: In how many different ways can you draw a set of 18 objects? Arrange sets of objects in one-to-one correspondence to help them make sets that are one more or one less than a given number. Use counting on (counting backwards) to help them draw sets that are one more (one less) than a given number. Talk about what the symbols '=' and '>' mean. Make sets that are equal to a given set. Make sets that are more than a given set. Make sets that are less than a given set. Talk about the symbol that they think could be used to represent 'less than'. Look at the symbol that represents 'less than' and talk about how it is alike and different from the symbol that represents 'more than' Choose a number between 1 and 20, and draw a set of objects on a sheet of paper to represent that number. Look at a set of objects drawn by a classmate and say whether the number of objects in the classmate's set is equal to, more than, or less than the number of objects in their arrangement. Write number statements, using =, >, or <, as appropriate, to indicate the relationship between the two sets. Use collective number names in descriptions of activities that they have carried out.	Practical tasks Observation Journal entries, e.g., to state what the collective number names mean.

Materials	***Teaching/Learning activities***	***Assessment Strategies***
Manipulatives, such as blocks, shells, large buttons, bottle caps, Popsicle sticks, etc Geometric shapes cut from paper. String Ribbon	*The students can:* Tell stories that involve collective number names. Make up problems that involve collective number names and solve them. Talk about situations in which they have divided things into parts, using terms such as part, piece, whole. Talk about those situations in which the parts were equal or of the same size. Explain how they were able to divide the things into equal parts. Talk about situations in which they have used the words 'half' or 'halves'. Act out the situations. Talk about what half or halves meant in those situations. Fold a geometric shape cut from paper into two equal parts. Describe the parts formed, using phrases such as 'two equal parts' and 'halves'. Work in groups. One group has circular cut-outs, another rectangles, another squares, and another hexagons, etc. Each group folds the shapes into halves in as many ways as possible. Each group presents its shapes to the class and explain why their folds resulted in halves. Draw diagrams to represent the shapes with their folds. Shade one of the parts of their geometric cut-outs. Talk about the shaded part, using phrases such as 'one of two equal parts', 'half', and 'one-half'. Talk about, and demonstrate, how they would fold or cut other material (e.g., string, ribbon, cookies) into halves.	Observation Questioning Oral presentations Practical tasks

Materials	***Teaching/Learning activities***	***Assessment Strategies***
Diagrams of shapes that have been divided into two or four equal parts	*The students can:* Look at examples of things that have been separated into two parts and identify those that have been folded or cut into halves. Shade parts of diagrams to show one-half, and write the numeral to represent the fraction. Talk about the numeral: $\frac{1}{2}$, e.g., what 1 represents and what 2 represents. Take several geometric shapes, pieces of ribbon and string, and demonstrate how they would fold them into four equal parts. Talk about what each part represents, using terms such as 'one of four equal parts', 'one-fourth', 'one-quarter'. Talk about what the numeral $\frac{1}{4}$ represents. Identify representations of one-quarter from among a set of shapes or diagrams that have been divided into four parts.	Observation Questioning Oral presentations Practical tasks

COMPUTATION

Topic	*Learning Outcomes* *By the end of Grade One, students should be able to:*
General Vocabulary Relationships among operations Basic facts	1. Describe the procedures for carrying out addition, subtraction, and multiplication, using appropriate vocabulary such as 'total', 'sum', 'join together', 'subtract', 'take away', 'sets of', 'times', etc. 2. Use several devices (e.g., concrete and pictorial representations, a calculator) to explore the properties of addition and subtraction, e.g., if 5 + 2 =7 then 2 + 5 = 7; 7 - 0 = 7. 3. Use several devices to demonstrate relationships among the number facts for addition and subtraction, e.g., if 5 + 4 = 9 then 9 – 5 = 4. 4. Use several devices and strategies (e.g., properties of addition and subtraction) to build up the basic number facts for addition and subtraction.
Addition of whole numbers Concrete, pictorial and symbolic representation of addition	5. Create and solve problems involving addition of one-digit numbers, with totals up to 20. 6. Add two one-digit numbers, using objects and pictures/diagrams. 7. Add three one-digit numbers, using objects and pictures/diagrams, with totals up to 20. 8. Mentally add two one-digit numbers, with totals up to 10. 9. Write number sentences to represent addition. 10. Use objects to determine the missing number in an addition number sentence, e.g., 7 + ❑ = 12, ❑ + 4 = 8

Materials	***Teaching/Learning Activities***	***Assessment Strategies***
	The students can:	
Manipulatives such as shells, stones, buttons, etc. Number lines Numeral cards, each with a numeral from 0 to 20 Number cards, each with a diagram depicting a set of objects Packages of addition cards: each packet containing some cards with a numeral (0 to 20), some cards with an addition combinations (e.g. 3 plus 4), and some cards with sets of objects that represent the addition combinations Calculators	Read problems which involve addition. Act out the problems, and draw diagrams to represent the actions in the problems. Talk about how they could use counting to complete the solution to the problems. Write sentences to represent the solution to the problems. Form two sets of a given size (e.g., 3 and 5). Join the sets and find the size of the combined sets. Repeat the activity using other numbers. Talk about their actions, using phrases/words such as 'joined together', 'and', 'added to' 'makes'. Write sentences to describe the addition. E.g., 'A set of 3 joined to a set of 5 makes a set of 8.' '3 objects added to 5 objects give 8 objects.' Compare sets of statements such as the following. Six oranges are in a basket. Five oranges are in another basket. The total number of oranges is eleven. Six and five make eleven. Six added to five equal eleven. The sum of 6 and 5 is 11 6 and 5 = 11 6 plus 5 = 11 6 + 5 = 11 Talk about what the words 'total', 'sum', and 'plus' mean, and what the symbol + means. Find the total number of dots on a domino piece. Play with dice. Throw two dice and find the total of the two numbers that appear face up. The students record the total. They repeat the activity and record the totals. They can talk about the largest/smallest answer that they got. Make up problems involving addition. Use materials of their choice or diagrams to solve the problems. Write number sentences to represent the solution.	Practical tasks Observation Questioning Pencil and paper exercises Portfolio assessment, with entries focusing on e.g., addition and subtraction vocabulary, representations of addition and subtraction, solutions to problems

Topic	*Learning Outcomes* *By the end of Grade One, students should be able to:*
<u>Subtraction of whole numbers</u> Concrete, pictorial and symbolic representation of subtraction	11. Create and solve problems involving subtraction situations. 12. Subtract a one-digit number from numbers up to 20, using objects and pictures/diagrams. 13. Write number sentences to represent subtraction.
<u>Multiplication of whole numbers</u> Repeated addition	14. Use objects and pictures/diagrams to show repeated addition situations. 15. Describe repeated addition situations using 'sets of'. 16. Write number sentences to represent repeated addition situations, e.g., 2 +2 +2 = 6, 3 sets of 2 make 6. 17. Complete multiplication number statements, with products up to 12. 18. Create and solve problems involving multiplication with products up to 12.

Materials	*Teaching/Learning Activities*	*Assessment Strategies*
	The students can: Pick a numeral card at random and show it to the class. Pick two number cards at random and show them to the class. Tell the class whether the sum of the numbers represented by the sets on the number cards is equal to the numeral shown on the numeral card. Pick a numeral card (e.g., 12) and use the number cards to help them list the addition statements with a sum represented by the numeral shown on the numeral card. Play card games using the packets of addition cards. E.g., match cards with addition combinations to the numeral cards that represent the answer to the addition statement and/or to cards with sets that represent the addition combinations. Talk about what statements such as 6 + ? = 9 and ? + 5 = 11 mean. Use objects, diagrams, number lines, and counting on to complete number statements such as 6 + ? = 9 and ? + 5 = 11. Form three sets of objects according to given directions; e.g., a set of 6 objects, a set of 3 objects, and a set of 5 objects. Demonstrate how they would find the total number of objects in the three sets. Repeat the activity using other numbers. Talk about the different strategies that they used. Use their strategies to complete number statements involving three addends.	

Materials	*Teaching/Learning Activities*	*Assessment Strategies*
	The students can: Work in groups of 4 to 6 persons. Each person uses objects, diagrams, a number line, or a calculator to obtain the answers to pairs of statements such as 5 + 4 = ? ; 4 + 5 = ? Compare their answers. Talk about the patterns in their answers. Work in groups to prepare poster displays of the basic facts for addition and subtraction; e.g., a poster display for the 'family of 9' (all the addition facts with a sum of 9 and the related subtraction facts); or a poster display of addition facts involving 0 and the related subtraction facts; or a poster display of doubles (e.g., 4 + 4 = 8; 8 – 4 = 4). Talk about the patterns in their posters. Listen to stories involving subtraction and act out the stories. Read problems which involve subtraction. Solve the problems by using strategies such as acting out the problem, drawing diagrams, solving a simpler problem. Talk about how they obtained their answers to the problems. Write sentences and number statements to show their solutions to the problems. Talk about the subtraction words/phrases (e.g., take away; gave away; how many more does Janet have than Albert; how much more is needed) in the problems and what the words/phrases meant. Examine statements such as the following. 8 take away 3 leaves 5 8 minus 3 is 5 8 – 3 = 5 Talk about what the symbol — means.	

Materials	***Teaching/Learning Activities***	***Assessment Strategies***
Jigsaw puzzles made from pieces of poster board cut into 4 parts. One part has several sets with the same number of objects, another part has a description of the objects (e.g., 3 sets of 2), another part has the equivalent repeated addition combination (2 +2 +2), and the fourth part has the total number of objects in the sets.	*The students can:* Demonstrate and explain how they would use objects, diagrams, or a number line to complete statements or answer questions such as the following. Eight take away four is _____. Sixteen minus 4 equals _____. Jordan needs 10 books. He has 4 books. How many more books does he have to buy? Alyssa has 12 crayons. Margaret has 8 crayons. How many more crayons does Alyssa have than Margaret? Write the number sentence that goes with each statement or question. Listen to stories or situations that involve repeated addition and act out the situations or stories. Illustrate their actions using objects, pictures, or diagrams. Talk about their illustrations, identifying the numbers of sets and the number in each set. Represent the situation as a repeated addition sentence and as a sentence that uses the phrase 'sets of'. Put the jigsaw puzzles for multiplication together. Represent multiplication statements, such as 3 sets of 4 = ?, using arrays. E.g. * * * * * * * * * * * * Complete the statement by determining the number of objects in the array.	

Materials	***Teaching/Learning Activities***	***Assessment Strategies***
	The students can: Search for, and talk about, everyday situations in which things are parcelled in groups of the same size. E.g., Bread may be sold in packets of 4 or 5 loaves. Make up problems that involve multiplication. Exchange the problems among their classmates. Solve the problems and display their solution in the classroom.	

ATTAINMENT CRITERIA

The attainment criteria outline the mathematical competencies expected of students at this grade level. The criteria move progressively from Level 1(basic competency) to Level 4. It is expected that at each attainment level, the students would also be able to apply the competencies to situations involving real-life experiences, other subjects, and other mathematical topics as appropriate and to carry out tasks involving problem solving, communication, and reasoning.

The criteria are as follows.

Statistics/Data Management

Level 1: Classify objects and people according to selected attributes; collect simple sets of data through observation and simple interviews; record collected data using simple number sentences, and represent collected data using objects.

Level 2: Classify objects and people according to selected attributes; collect simple sets of data through observation and simple interviews; record collected data using simple number sentences; represent collected data using objects; and read and interpret the data presented in simple tables.

Level 3: Classify objects and people according to selected attributes; collect simple sets of data through observation and simple interviews; record collected data using simple number sentences; represent collected data using objects; read and interpret the data represented in simple tables; read and interpret the data represented in simple pictographs and bar graphs.

Level 4: Classify objects and people according to selected attributes; collect simple sets of data through observation and simple interviews; record collected data using simple number sentences; represent collected data using objects; read and interpret the data represented in simple tables; read and interpret the data represented in simple pictographs and bar graphs; describe how data are presented in tables, simple pictographs and bar graphs; and describe the similarities between pictographs and bar graphs.

Geometry

Level 1: Classify and describe three-dimensional shapes on the basis of their attributes; and classify and describe two-dimensional shapes on the basis of their attributes.

Level 2: Classify and describe three-dimensional shapes on the basis of their attributes; classify and describe two-dimensional shapes on the basis of their attributes; use three-dimensional shapes to make objects; select, use and explain their own criteria for classifying three-dimensional shapes; select, use and explain their own criteria for classifying two-dimensional shapes; and identify and name rectangles, squares, and circles.

Level 3: Classify and describe three-dimensional shapes on the basis of their attributes; classify and describe two-dimensional shapes on the basis of their attributes; use three-dimensional shapes to make objects; select, use and explain their own criteria for classifying three-dimensional shapes; classify objects according to the three-dimensional shape that they represent; select, use and explain their own criteria for classifying two-dimensional shapes; identify and name rectangles, squares, and circles; identify the relative position of objects; and position objects according to descriptions of their relative positions.

Level 4: Classify and describe three-dimensional shapes on the basis of their attributes; classify and describe two-dimensional shapes on the basis of their attributes; use three-dimensional shapes to make objects; select, use and explain their own criteria for classifying three-dimensional shapes; classify objects according to the three-dimensional shape that they represent; select, use and explain their own criteria for classifying two-dimensional shapes; explain why three dimensional shapes can slide, roll, or be stacked; identify and name rectangles, squares, and circles; identify the relative position of objects; position objects according to descriptions of their relative positions; sketch two-dimensional shapes; use two-dimensional shapes to draw patterns and describe their patterns.

Measurement

Measurement – Length, mass, capacity, and temperature

Level 1: Estimate, measure, and record lengths and the mass of objects using non-standard units.

Level 2: Estimate, measure, and record lengths and the mass of objects using non-standard units; estimate, measure and record the capacity of containers using non-standard units; explain why standard units are necessary.

Level 3: Estimate, measure, and record lengths and the mass of objects using non-standard units; estimate, measure and record the capacity of containers using non-standard units; explain why standard units are necessary; estimate, measure and record lengths and heights using the metre as the unit of measure; compare the capacity of containers using non-standard units; and describe the temperature of an object.

Level 4: Estimate, measure, and record lengths and the mass of objects using non-standard units; estimate, measure and record the capacity of containers using non-standard units; explain why standard units are necessary; estimate, measure and record lengths and heights using the metre as the unit of measure; compare the capacity of containers using non-standard units; describe the temperature of an object; and estimate, measure, and record the mass of objects using the kilogram as the unit of measure.

Measurement – Time

Level 1: Use time vocabulary appropriately; name the days of the week; and state the number of days in a week.

Level 2: Use time vocabulary appropriately; name the days of the week; state the number of days in a week; state and write the date of the current day; represent and tell time on the hour; and read and write time on the hour in several ways.

Level 3: Use time vocabulary appropriately; name the days of the week; state the number of days in a week; state and write the date of the current day; represent and tell time on the hour and half hour; and read and write time on the hour and half hour in several ways.

Level 4: Use time vocabulary appropriately; name the days of the week; state the number of days in a week; state and write the date of the current day; represent and tell time on the hour and half hour; read and write time on the hour and half hour in several ways; name the months of the year; and represent and write the time for events that occur on the hour or half hour.

Measurement – Money

Level 1: Identify and describe the 1-cent, 2-cent, 5-cent, and 10-cent coins.

Level 2: Identify and describe the 1-cent, 2-cent, 5 cent, and 10-cent coins; and represent a coin value up to 20 cents using several combinations of coins.

Level 3: Identify and describe the 1-cent, 2-cent, 5-cent, and 10-cent coins; represent a coin value up to 20 cents using several combinations of coins; and find the total value of a combination of coins, up to 20 cents.

Level 4: Identify and describe the 1-cent, 2-cent, 5-cent, and 10-cent coins; represent a coin value up to 20 cents using several combinations of coins; find the total value of a combination of coins, up to 20 cents; and make change from amounts up to 20 cents using counting on.

Number Concepts

Number Concepts - Counting

Level 1: Count in sequence to 100

Level 2: Count in sequence to 100; count by tens to 100; and count by twos and fives to 50.

Level 3: Count in sequence to 100; count by tens to 100; count by twos and fives to 50; count backwards from 10; and count on from a given number that lies between 1 and 100.

Level 4: Count in sequence to 100, count by tens to 100, and count by twos and fives to 50, count backwards from 10; count on from a given number that lies between 1 and 100, use calculators to count in a variety of ways, and identify the ordinal position of an object in an arrangement of up to 12 objects.

Number Concepts – Whole numbers

Level 1: Count and identify the number of objects in a set of up to 20 objects; make and draw sets of up to 20 objects; and read and write numbers up to twenty using numerals.

Level 2: Count and identify the number of objects in a set of up to 20 objects; make and draw sets of up to 20 objects; read and write numbers up to twenty using numerals and words; make and draw a set that is equal to a given set; and use collective number names appropriately.

Level 3: Count and identify the number of objects in a set of up to 20 objects; make and draw sets of up to 20 objects; read and write numbers up to twenty using numerals and words; make and draw a set that is equal to or one more than a given set; use collective number names appropriately; and compare two sets and pairs of numerals using the symbols '=' and '>'.

Level 4: Count and identify the number of objects in a set of up to 20 objects; make and draw sets of up to 20 objects; read and write numbers up to twenty using numerals and words; make and draw a set that is equal to, one more than, or one less than a given set; use collective number names appropriately; compare two sets and pairs of numerals using the symbols '=', '>' and '<'.

Number Concepts – Fractions

Level 1: Identify a whole and parts of a whole; and identify and represent one-half of a whole.

Level 2: Identify a whole and parts of a whole; identify and represent one-half of a whole; and identify and represent one-quarter of a whole.

Level 3: Identify a whole and parts of a whole; identify and represent one-half of a whole; identify and represent one-quarter of a whole; and read and write/use the fractions '$\frac{1}{2}$' and '$\frac{1}{4}$'.

Level 4: Identify a whole and parts of a whole; identify and represent one-half of a whole; identify and represent one-quarter of a whole; read and write/use the fractions '$\frac{1}{2}$' and '$\frac{1}{4}$'; and explain what 'one-half' and 'one-quarter' mean.

Computation

Level 1: Add two one-digit numbers and write number sentences to represent addition.

Level 2: Add up to three one-digit numbers and write number sentences to represent addition; subtract one-digit numbers from numbers up to 20 using objects or diagrams and write number sentences to represent subtraction.

Level 3: Add up to three one-digit numbers and write number sentences to represent addition; subtract one-digit numbers from numbers up to 20 using objects or diagrams and write number sentences to represent subtraction; use objects and diagrams to show repeated addition; write number sentences to represent repeated addition; and demonstrate the relationships that exist among the number facts for addition and subtraction.

Level 4: Add up to three one-digit numbers and write number sentences to represent addition; subtract one-digit numbers from numbers up to 20 using objects or diagrams and write number sentences to represent subtraction; use objects and diagrams to show repeated addition; write number sentences to represent repeated addition; demonstrate the relationships that exist among the number facts for addition and subtraction; mentally add two one-digit numbers with totals up to 10; determine the missing addend in an addition statement using objects; complete multiplication number statements with products up to 12; describe the procedures for carrying out addition, subtraction, and multiplication using appropriate vocabulary.

RECORD KEEPING

The following is an example of a checklist, which may be used as a means of monitoring a student's progress in attaining the competencies outlined in the criteria. The competencies are related to the area of Geometry. Similar checklists may be prepared for each of the content strands by using the competencies listed in Level 4 to prepare the items for the checklist.

For each of the competencies, place a tick (v) in the column headed 'Yes', if at the time of evaluation the student has acquired the knowledge and/or skills related to the competency. Otherwise, check 'No'.

Student's Name:		
Competencies	***Yes***	***No***
The student can: 1. Classify three-dimensional shapes on the basis of their attributes. 2. Describe three-dimensional shapes on the basis of their attributes. 3. Classify two-dimensional shapes on the basis of their attributes. 4. Describe two-dimensional shapes on the basis of their attributes. 5. Use three-dimensional shapes to make objects. 6. Select and use his/her criteria for classifying three-dimensional shapes. 7. Explain the criteria that he/she has used to classify three-dimensional shapes. 8. Classify objects according to the three-dimensional shape that they represent. 9. Select and use his/her criteria for classifying two-dimensional shapes. 10. Explain the criteria that he/she has used to classify two-dimensional shapes. 11. Explain why three-dimensional shapes can slide, roll, or be stacked. 12. Identify and name rectangles, squares, and circles. 13. Identify the relative position of objects. 14. Position objects according to descriptions of their relative positions. 15. Sketch two-dimensional shapes. 16. Use two-dimensional shapes to draw patterns. 17. Describe the patterns that he/she has made using two-dimensional shapes.		

APPENDIX

Scope and Sequence Information

This section illustrates the scope and sequence of the specific learning outcomes in relation to the general exit outcomes for each strand. The tables identify the grade level at which concepts, skills, and processes related to each of the general exit outcomes are introduced and the grade levels at which they are further developed.

General Outcomes	***Grade Levels***						
	K	**1**	**2**	**3**	**4**	**5**	**6**
Statistics							
Discuss data collection methods	v	v	v	v	v	v	v
Collect data	v	v	v	v	v	v	v
Present data using pictographs, bar graphs and tables	v	v	v	v	v	v	v
Interpret graphs and tables	v	v	v	v	v	v	v
Discuss relationships among data collection methods		v	v	v	v	v	v
Choose appropriate methods to represent data			v	v	v	v	v
Apply statistics to other aspects of mathematics and other disciplines				v	v	v	v
Geometry							
Investigate attributes of three-dimensional shapes	v	v	v	v	v	v	v
Represent three-dimensional shapes	v	v	v	v	v	v	v
Investigate the attributes of two-dimensional shapes	v	v	v	v	v	v	v
Represent two-dimensional shapes	v	v	v	v	v	v	v
Demonstrate a sense of spatial awareness	v	v	v	v	v	v	v
Appreciate the aesthetic value of geometry	v	v	v	v	v	v	v
Measurement							
Appreciate the importance of measurement in every day life	v	v	v	v	v	v	v
Use correct measurement vocabulary/terminology	v	v	v	v	v	v	v
Identify standard units of measurement and their abbreviations	v	v	v	v	v	v	v
Identify and use measuring instruments	v	v	v	v	v	v	v
Select appropriate units and instrument to measure an object	v	v	v	v	v	v	v
Estimate and measure attributes of an object	v	v	v	v	v	v	v
Describe relationships within each type of measurement		v	v	v	v	v	v
Convert from one unit to another						v	v
Perform basic operations using units of measurement	v	v	v	v	v	v	v

General Outcomes	***Grade Levels***						
	K	**1**	**2**	**3**	**4**	**5**	**6**
Number Concepts							
Relate number to the world of objects	v	v	v	v	v	v	v
Represent and interpret number in a variety of ways	v	v	v	v	v	v	v
Translate number names to numerals	v	v	v	v	v	v	v
Explain the properties of numbers	v	v	v	v	v	v	v
Explain the relationships that exist among the various types of numbers			v	v	v	v	v
Perform and explain algorithms accurately			v	v	v	v	v
Investigate and explain the various routes to an answer to a problem	v	v	v	v	v	v	v
Determine when it is appropriate to use a calculator, a pencil and paper strategy or a mental strategy to investigate number concepts	v	v	v	v	v	v	v
Computation							
Use the vocabulary associated with the four basic operations	v	v	v	v	v	v	v
Carry out addition, subtraction, multiplication , and division of whole numbers	v	v	v	v	v	v	v
Carry out addition, subtraction, multiplication , and division of fractions		v	v	v	v	v	v
Carry out addition, subtraction, multiplication , and division of decimals					v	v	v
Explain and use the relationships that exist among the four basic operations		v	v	v	v	v	v
Apply computations to real life situations	v	v	v	v	v	v	v
Estimate the results of an operation	v	v	v	v	v	v	v
Determine the reasonableness of the answer obtained on carrying out an operation	v	v	v	v	v	v	v
Determine when it is appropriate to use a calculator, a pencil and paper strategy or a mental strategy to investigate number concepts	v	v	v	v	v	v	v

MATHEMATICS

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GRADE 1

O.E.C.S. Education Reform Unit

Designed by Emma Mc Farlane & Beverly Pierre