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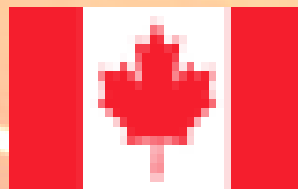
ORGANISATION OF EASTERN CARIBBEAN STATES

Education Reform Unit

Eastern Caribbean Education Reform Unit Project (ECERP)

Curriculum Harmonization

MATHEMATICS

* * *

GRADE 2

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 2 level. The document includes a brief rationale for the mathematics curriculum at the primary level, the learning outcomes to be developed at the Grade 2 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.

References

Barb, C. & Quinn, S. (1997). Problem solving does not have to be a problem. *Mathematics Teacher, 90*(7), 536-541.

Borasi, R. (1998). *Rationale for an inquiry approach to mathematics instruction.* Retrieved March 27, 2005 from http://www.rochester.edu/radiate/C/c1_menu.htm

Department of Education and Science (1987). *Mathematics from 5 to 16* (2nd ed.). London: HMSO Publications.

Grant, F. & Searl, J. (1997). Practical activities in mathematics classrooms. *Mathematics in Schools, 26*(4), 27.

Hatfield, M. M., Edwards, N. T., & Bitter, G. G. (1999). Methods for elementary and middle school teachers (3rd ed.). New York: John Wiley.

Ishii, D. K. (2003). *Constructivist views of learning in Science and Mathematics.* ERIC Clearinghouse for Science, Mathematics and Environmental Education. Retrieved January 30, 2005 from http://www.ericdigest.org/2004-3/views.html

James A. (1995). Teaching methods and assessment. In D. Broomes, G. Cumberbatch, A. James, & O Petty (Eds.), *Teaching primary school mathematics* (pp. 1 – 28). Kingston, Jamaica: Ian Randle.

Lappan, G. & Schram, P. W. (1989). Communication and reasoning: Critical dimensions of sense making in mathematics. In P. R. Trafton & A. P. Shulte (Eds.), *New directions for elementary school mathematics* (pp.14-30). Reston, VA: National Council of Teachers of Mathematics.

Mathematical Sciences Education Board. (1989). *Everybody counts: A report to the nation on the future of mathematics education.* Washington, DC: National Academy of Sciences Press.

National Council of Teachers of Mathematics. (1989). *Curriculum and evaluation standards for school mathematics.* Reston, VA: Author.

National Council of Teachers of Mathematics. (2000). *Principles for school mathematics: Overview of principles and standards* [On-line]. Retrieved January 30, 2005 from http://nctm.org/standards/principles.htm

Organisation of Eastern Caribbean States Education Reform Unit (OERU). (1998). *Report on the Sub-Regional Workshop on Curriculum and Remediation.* Castries, St. Lucia: Author.

Polya, G. (1973). *How to solve it.* Princeton, NJ: Princeton University Press.

Reys, R. E., Suydam, M. N., & Lindquist, M. M. (1984). *Helping children learn mathematics.* Englewood Cliffs, NJ: Prentice Hall.

Schroeder, T. L. & Lester, F. K. Jr. (1989). Developing understanding in mathematics via problem solving. In P. R. Trafton & A. P. Shulte (Eds), *New directions for elementary school mathematics* (pp. 31-42). Reston, VA: National Council of Teachers of Mathematics.

Sheffield, L. J. & Cruishank, D. E. (2000). *Teaching and learning elementary and middle school mathematics* (4th ed.). New York: John Wiley.

Van de Walle, J. A. (2004). *Elementary and middle school mathematics: Teaching developmentally.* Boston, MA: Pearson.

STATISTICS/DATA MANAGEMENT

Topics	*Learning Outcomes* *By the end of Grade 2, students should be able to:*
<u>Data collection</u> Developing simple questions of interest to students. Procedures for observation and interviewing. Collecting and recording data.	1. Generate questions that may be answered through data collection. 2. Describe how to collect data through observation and simple interviews. 3. Identify similarities and differences between observation and interviewing. 4. Collect simple sets of data through observation and simple interviews. 5. Use number statements to record the collected data.
<u>Data representation</u> Use of tables, pictographs, and bar graphs.	6. Describe how data are represented in a table. 7. Record collected data in tables. 8. Describe how data are represented in pictographs and bar graphs. 9. Explain the benefits of presenting data in tables and graphs. 10. Select appropriate means, pictograph or bar graph, to graphically represent collected data. 11. Represent recorded data by completing pictographs or bar graphs for which an outline or grid has been provided, and in which one picture or bar represents one unit of data.

Topics	*Learning Outcomes* *By the end of Grade 2, students should be able to:*
<u>Interpretation of data</u> Reading tables and graphs. Answering simple questions on the information represented in graphs.	12. Read the data presented in simple tables, pictographs, and bar graphs. 13. Interpret the data in simple tables, pictographs, and bar graphs.

Materials	Teaching/Learning Activities	Assessment Strategies
Examples of tables, pictographs, and bar graphs Outlines of pictographs and bar graphs	*The students can:* Talk about the parts of the tables prepared by their teacher. They can answer questions such as: Where is the title of the table? What data does the table show? What do the columns in the table show? What do the rows in the table tell us? Talk about how they will represent their data in tables. E.g., they can be guided to state the column headings they will use in their tables. Prepare tables to represent their data, present the tables to the class, and put them on display in the class. Examine examples of pictographs and describe the features of the graph. E.g., they can talk about how the graph shows the number of objects (frequency). This activity can be repeated, using examples of bar graphs. Examine a table, a pictograph, and a bar graph that represent the same data. Identify which of the three ways of presenting the data helps them to see the information quickly/clearly; which of the three ways allows them to make comparisons easily, e.g., to identify the highest frequency. State which of the ways of representing data they will use to present their data, and say why they selected the methods. Practise representing data in tables, pictographs, and bar graphs that have been partially prepared by their teacher. Answer questions that are based on the tables and graphs that they have prepared. Make up questions that are based on the information in their tables and graphs. Share their tables, graphs, and questions with the class. Classmates answer the questions.	Observation Questioning Peer assessment Practical tasks Pencil and paper exercises

GEOMETRY

Topics	Learning Outcomes By the end of Grade 2, students should be able to:
Three-dimensional shapes Faces of three-dimensional shapes Classification Cubes, cuboids, cones and cylinders	1. Identify the faces of three-dimensional shapes. 2. Describe the shape of the faces of three-dimensional shapes in terms of two-dimensional shapes. 3. Classify three-dimensional shapes on the basis of their attributes, e.g., the number of faces, shape of their faces, size, etc. 4. Describe and compare the groups formed from their classification exercises. 5. Identify and name examples of cubes, cuboids, cones, cylinders, and spheres when presented in concrete or pictorial form. 6. Develop an awareness of the uses of three-dimensional shapes in real life.

Materials	Teaching/Learning Activities	Assessment Strategies
	The Students can:	
Household objects; e.g., cereal boxes, juice boxes, milk tins	Pass their hand over the faces of three-dimensional shapes and describe what they feel, using words such as flat, curved.	Practical tasks Observation
	Identify the faces on models of three-dimensional shapes and real-life objects; count the number of faces and state the shape of the faces.	Questioning Simple Projects

Toys
 	
Models of three-dimensional shapes
	Make sets of objects according to given directions, e.g.,
	    Form a set of three-dimensional shapes whose faces are all of the same shape.
	    Make a set of three-dimensional shapes with six faces.
	    Pick out all of the three-dimensional shapes that have three faces, and one of the faces is curved.
	Identify three-dimensional shapes that can belong to only one of the sets that they form (or more than one set), and explain why the shapes belong to these sets.
		Journal writing
		
		Pencil and paper exercises

	Examine examples of cubes, and describe their features, e.g., number of faces, shape and size of the faces. Prepare small charts that contain concrete and/or pictorial examples of a cube and a description of the shape. The charts can be displayed in the classroom. This activity can be repeated using cuboids, cones, cylinders and spheres.	
	Complete activity sheets, which require them to name the shapes drawn on the sheet.	
	Select examples of a named shape (e.g., cylinder) from among drawings of examples and non-examples of the shape.	

Topics	Learning Outcomes *By the end of Grade 2, students should be able to:*
<u>Plane shapes</u> Sides of two-dimensional shapes Classification Squares, rectangles, circles, triangles Drawing shapes Curves and straight lines Spatial relationships	7. Identify the sides of two-dimensional shapes. 8. Describe two-dimensional shapes in terms of the number and length of their sides. 9. Classify two-dimensional shapes on the basis of their attributes, e.g., shape, size, number and length of sides. 10. Identify and name squares, rectangles, triangles, and circles. 11. Sketch squares, rectangles, triangles, and circles. 12. Sketch two-dimensional shapes that are a composition of squares, rectangles, triangles, and/or circles. 13. Sketch two-dimensional shapes according to given descriptions. 14. Copy drawings of curves and straight lines. 15. Draw curves and straight lines. 16. Sketch pictures to represent descriptions of the relative positions of two or more objects. 17. Describe the relative position of objects using words such as by, on, in, inside, outside, opposite, beside, etc.

Materials	Teaching/Learning Activities	Assessment Strategies
	The students can:	
Models of two-dimensional shapes made out of different materials, e.g., drinking straws, Popsicle sticks	Talk about how three-dimensional shapes are used in real life. Collect examples of three dimensional shapes that are used for different functions, e.g., storage, shipping goods, etc. Pass their fingers along the sides of models of two-dimensional shapes, and identify the number of sides that each has.	Observation Practical tasks Questioning Oral Presentations
Cut-outs of two-dimensional shapes	Use a pencil to trace two-dimensional shapes on paper, and write the number of sides that each shape has.	Journal writing
Dot paper	Use materials such as drinking straws and play dough to make models of two-dimensional shapes.	Pencil and paper exercises
Geo-boards		
Rubber bands	Use paper folding to compare the lengths of the sides of two-dimensional shapes.	
String	Cut strips of paper that are the same length as the sides of a two-dimensional shape, and use these strips to compare the lengths of the sides of the shape. Compare the lengths of the sides of a two-dimensional shape to identify sides that are the same length and sides that are different in length. Repeat, using a variety of two-dimensional shapes.	
Rulers		
	Write descriptions of models of two-dimensional shapes, focusing on the lengths of the sides and the number of sides.	
	Use cut-outs of two-dimensional shapes to make and draw shapes that are comprised of several two-dimensional shapes.	
	Present a triangle (or a square, or rectangle, or circle) to the class, name the shape and describe it.	

Materials	Teaching/ Learning Activities	Assessment Strategies
	The students can:	
	Make squares and rectangles of different sizes on a geo-board.	
	Draw squares and rectangles of different sizes on dot and plain paper.	
	Make triangles of various shapes and sizes on a geo-board.	
	Draw triangles of various shapes and sizes on dot and plain paper.	
	Challenge each other to make two-dimensional shapes on a geo-board; e.g., to make a four-sided shape with two sides of the same length.	
	Identify objects that can be used to draw circles, and use these objects to draw circles of different sizes.	
	Select examples of a square from among a set of shapes that consists of examples and non-examples of a square. This activity can be repeated with a focus on rectangles, triangles or circles.	
	Take turns to give instructions to the class to draw two-dimensional shapes.	
	Form pairs of sets; e.g., a set of squares and a set of shapes with four sides.	
	Identify the shapes that are common to both sets.	
	Talk about why the shapes are common or not common to the sets.	
	Examine examples of curves and trace the curves with a finger.	
	Draw examples of the curves.	
	Talk about the design of the curves.	
	Drop a piece of string onto a sheet of paper and trace the shape that the string forms.	
	Use a finger to make curves in the air.	

Materials	Teaching/ Learning Activities	Assessment Strategies
	The students can:	
	Examine examples of straight lines, and trace the lines with a finger.	
	Use a ruler to draw straight lines in different orientations.	
	Draw patterns consisting of curves and/or straight lines and display the patterns in the class.	
	Play 'I spy', using descriptions/words that indicate the relative positions of objects.	

MEASUREMENT

Topic	Learning Outcomes By the end of Grade 2, students should be able to:
<u>General Strategies</u> Selection of units Problem-solving	1. Select the appropriate unit to measure length, mass, and capacity. 2. Create and solve problems involving linear measurement and measurement of mass, capacity and temperature.
<u>Linear Measurement</u> Estimation and measurement of length, height, and distances using the metre Comparison of linear measurements	3. Estimate, measure, and record lengths and heights of objects using the metre as the unit of measure. 4. Estimate, measure, and record distances using the metre as the unit of measure. 5. Compare the linear measurements of two or three objects using phrases such as longer, longest, higher, highest, taller, tallest, etc.
<u>Measurement of mass</u> Estimation and measurement of mass using the kilogram Comparison of mass	6. Estimate, measure, and record the mass of objects using the kilogram as the unit of measure. 7. Describe situations in real life where the kilogram is used as a unit of measure and give reasons for these uses of the unit. 8. Compare the masses of two or three objects using phrases such as heavier, lighter, lightest, etc.
<u>Measurement of Capacity</u> Estimation and measurement of capacity using the litre Comparison of capacity	9. Estimate and measure the capacity of containers using the litre as the unit of measure. 10. Compare the capacity of two or three containers using phrases such as 'holds more', 'holds the least', etc.

Materials	Teaching/Learning Activities	Assessment Strategies
	The students can:	
Metre ruler/stick Strips of Bristol Board that are 1 metre long	Select, from among a display of measuring instruments, the instruments that could be used to measure lengths, heights, and distances.	Practical tasks
		Observation
Large household objects e.g., bookshelves, dining tables, beds	Follow demonstrations of how to use a metre ruler/strip to measure lengths, heights and distances, and talk about what they observed in the demonstrations.	Questioning
Objects in the Classroom	Use metre rulers or strips to measure parts of the classroom; e.g., the length of the floor, width of the chalkboard.	
	Use metre sticks or strips to measure distances in the school compound; e.g., the distance between the door of one classroom and the door of another classroom, the distance between the school gate and the nearest school building.	
	Work in groups to measure given distances in the schoolyard or school playground; e.g., a distance of 3 metres, a distance of 5 metres.	
	Use estimation to identify objects in their classroom or at home that are 1 metre long (or 2 metres long, or 1 metre high, etc.). Measure these objects to check the accuracy of their estimate.	
	Estimate the length/height of given objects and record their estimates, using the metre as the unit of measure. Measure the lengths/heights of these objects using a metre ruler/stick. Compare their estimate and measurement. Talk about those estimates that were close to the actual measurement, how they determined the estimate, why it was close to the measurement.	
	Talk about ways of obtaining estimates of lengths, heights, and distances.	

Topics	*Learning Outcomes* **By the end of Grade 2, students should be able to:**
Measurement of Temperature Temperature-related Vocabulary Comparison of temperature	11. Describe the temperature of an object as 'warm', 'hot', 'cold', etc. 12. Compare the temperature of two or three objects using phrases such as warmer, hotter, hottest, coldest, etc.
Time Problem-solving Time-related vocabulary Use of the calendar Time on the hour, half-hour, and quarter hour	13. Create and solve problems involving time. 14. Use time vocabulary appropriately, e.g., yesterday, today, tomorrow, next week, last week, as soon as, etc. 15. Name the days of the week and months of the year. 16. State the number of days in a week and months in a year. 17. State and write the date for the current day. 18. State and write dates of important events, e.g., their birthday, Christmas Day, Independence Day. 19. Tell time on the hour, half hour, and quarter hour in a variety of ways. 20. Represent time on the hour, half hour, and quarter hour. 21. Use the abbreviations 'a.m.' and 'p.m.' correctly. 22. Tell and write the time at which certain events occur, e.g., break time, lunch-time.
Money Problem-solving Description of the Eastern Caribbean currency	23. Create and solve problems involving money. 24. Describe the coins in circulation. 25. Represent amounts up to $5.00 using coins in a variety of combinations. 26. Describe the $5, $10, and $20 notes. 27. Represent values up to $20.00 using $1 coins and notes in a variety

	of combinations.
Representing amounts of money	28. Find the total value of a combination of notes and coins, up to a value of $20.00.
Calculations involving money	29. Read prices of items.
	30. Find the total cost of two or three items, up to a total of $1.00.
	31. Calculate change from $1.00, using counting on.

Materials	*Teaching/ Learning Activities*	*Assessment Strategies*
	The students can:	
Balance scales	Estimate whether their height is less than1 metre, more than 1 metre, or equal to 1 metre.	Practical tasks
Bathroom scales	Measure their height to check their estimate.	Observation
Packages of material (e.g., sand, marbles, buttons) that have a mass of 1kg	Talk about, and demonstrate, how they would find out if one object is longer/shorter than another.	Written exercises
	Arrange a set of objects in order of length or height.	Simple projects, e.g., a bulletin
Household objects	Arrange groups of students in order of height.	board display
Objects in the classroom	Arrange strips of paper in order of length.	Preparation of a student
	Collect pictures of instruments that can be used to measure mass.	profile developed by the student.
	Hold a 1 kg mass; play with it, to obtain a sense of what 1 kg is. Collect objects that have the same mass, in the classroom.	Includes the student's height, mass, and other
	Follow demonstrations of how to use scales to measure the mass of objects, using the kilogram as the unit of measure, and talk about the procedures for using the scales.	measurements carried out by the student.
	Estimate the mass of given objects (e.g., 5 mathematics workbooks, 2 packets of beans) in kilograms. Record the estimate. Measure the mass of the objects. Talk about how close their estimate was to their measurement.	
	Use estimation to identify objects that have a mass of 2 kg (3 kg, etc.). Measure the mass of the identified objects to check whether their estimate was correct or very close to the measurement.	

Materials	Teaching/Learning Activities	Assessment Strategies
Measuring cylinders Measuring cups Teacher–made measuring cylinders: Bottles with a piece of tape to mark 1 litre Containers of various shapes and sizes	*The students can:* Carry out research at home to make up a list of household products whose mass is measured in kilograms. Work in groups to prepare a poster display to show the results of their research. Talk about, and demonstrate, how they would find out if one object is lighter or heavier than another. Determine which of a pair of objects is heavier than the other. Repeat the activity using several pairs of objects. Record their results in a table. Identify objects in the classroom that are lighter than a given object (e.g., a large dictionary), and objects that are heavier than the same given object. Use their measuring cylinders or cups to measure the capacity of various containers, e.g., bowls, bottles, and pots. Collect containers that have a capacity of 1 litre. Measure the containers to verify whether the capacity is 1 litre. Use estimation to select, from among a set of given containers, those containers that have a capacity of 2 litres (or 3 litres, or 4 litres, etc.). Measure the capacity of the selected containers. Talk about how close their estimate was to the measurement, and how they can make more accurate estimates. Compare two containers to identify which holds more. Measure the capacity of the containers to determine whether their comparison was correct. (The shape and size of the containers should be varied. E.g., 2 containers of the same shape but different sizes; a narrow tall bottle and a short wide bottle.) This activity can be repeated using three containers.	Practical tasks Observation Questioning Oral presentations

Materials	Teaching/Learning Activities	Assessment Strategies
Large and small clocks Teacher-made clock faces Worksheets Calendars	Take a walk around the school compound, and identify places that are hot (or warm, or cool). Identify the warmest or coolest places on the school compound. Relate these activities to the study of temperature in Science, by describing how the temperature of the places would change throughout the day. Tell stories, featuring activities that they engaged in at various points in time, e.g., last week, yesterday, on Tuesday, etc. Prepare a class diary in which they record important events that are to take place or that happened at school over a week (or a month). Fill in the missing days of the week in a sequence of days. E.g., Tuesday, _____, Thursday, _____, Saturday. Fill in the missing months of the year in a sequence of months. State the day that comes before or after a given day. State the month that comes before or after a given month. Prepare timelines that show the days of the week and the months of the year. Identify the months when they are on vacation. Prepare a scrapbook in which they insert pictures related to important events and record the dates of these events. Prepare a plan outlining the activities that they will engage in on a given day and the times at which they will carry out the activities. Talk about the position of the hands of the clock for time on the hour, half hour, and quarter hour.	Practical tasks Questioning Observation Pencil and paper exercises Simple projects

Materials	Teaching/ Learning Activities	Assessment Strategies
Examples of Eastern Caribbean (EC) currency coins Sets of 1cent, 2 cent, 5 cent, 10 cent, and 25 cent coins Sets of $1 coins Posters illustrating the EC currency notes and coins. Flyers and newspaper advertisements depicting items priced up to $20 A collection of items that cost $1 or less, prices marked on the items	*The students can:* Make clock faces, using circular and rectangular pieces of paper, and represent given times on the clack faces. Draw clock faces to represent given times. Complete worksheets, which require them to represent given times by inserting the hands of the clock on drawings of clocks. Complete worksheets, which require them to tell the time represented on drawings of clocks. Talk about situations in which the abbreviations a.m. and p.m. are used in telling time. Talk about the shape of the faces of the coins. Talk about the features on the faces of the EC currency coins in circulation. Talk about how the shapes of the faces are alike and different. Talk about how the features of the faces are alike and different. Examine examples of the $5 note ($10 note, $20 note), and make a presentation to the class describing the features of the note. Talk about how the $5, $10, and $20 notes are alike and different. Read the price of items on flyers and advertisements. Use skip counting and counting on to show how a given amount of money up to $5 can be represented with different combinations of coins. Use skip counting and counting on to show how a given amount of money up to $21 can be represented using different combinations of $1 coins and notes. Determine whether a given representation of an amount of money in a combination of coins and/or notes is correct.	Pencil and paper exercises Practical tasks

Materials	Teaching/Learning Activities	Assessment Strategies

	The students can:
	
	Prepare shopping lists containing items from the class collection, according to given directions. E.g.,
	    Prepare a list where the total cost of the items is $1.
	    Prepare a list where the total cost is more than 75 cents.
	
	Work in groups to operate a class shop with items costing $1 or less. The students take turns being cashiers and customers. Cashiers must give correct change. Customers must decide on an appropriate combination of coins to pay for the items. Customers check whether the cashiers are correct, and vice versa.	

NUMBER CONCEPTS

Topic	Learning Outcomes By the end of Grade 2, students should be able to:
General Use of appropriate strategies for investigating number concepts	1. Use a calculator, pencil and paper procedures, or mental strategies to investigate number concepts. 2. Explain how they used a selected strategy in carrying out investigations involving number concepts.
Counting Counting forward and back Counting on Skip counting Number sequences	3. Count in sequence to 100 and beyond. 4. Describe the patterns that are evident in numbers between 1 and 100 and numbers beyond 100. 5. Count by 2's, 5's, 10's, 20's, and 25's to 100 and beyond. 6. Count on from a given number. 7. Complete a sequence of numbers that involves counting by 2's, 5's, 10's, 20's, and 25's.
Whole numbers Reading and writing numbers Problem-solving Place value Expanded notation Comparison of numbers	8. Read numbers up to ninety-nine. 9. Write numbers up to ninety-nine in words and numerals. 10. Create and solve problems involving place value. 11. State the place value of the digits in any number up to ninety-nine. 12. Represent numbers up to ninety-nine in terms of a number of tens and ones, using concrete objects and diagrams. 13. State the total value of the digits in any number up to ninety-nine. 14. Write numbers up to ninety-nine in expanded notation. 15. Compare pairs of numbers (up to ninety-nine), using the symbols '<' and '>'. 16. Arrange a set of numbers (up to ninety-nine) in order of magnitude and give reasons for the arrangement.

Materials	Teaching/Learning Activities	Assessment Strategies
	The students can:	
Hundred chart	Use a hundred-chart to count to 100, count on from a given number, and to skip count.	Practical tasks
10 x 10 numeral grid with pockets	Use a calculator to count in sequence to 100 and to skip count.	Observation
Numeral cards with numerals from 1 to 150		Questioning
	Follow directions for counting; e.g., 'Start at 22 and count on to 46'.	Pencil and paper exercises
Place value materials E.g., sets of squares (2 cm by 2 cm) made out of Bristol board, cardboard etc., and strips (20 cm by 2 cm); place value charts; Popsicle sticks or other objects – singles and bundles of 10.	Place the numeral cards (1 to 100) in the correct sequence in the pockets of the numeral grid. Examine the patterns in the sequence of numerals. E.g., they can answer questions such as 'How are the rows of numerals alike and different? How are the columns of numerals alike and different?'	Simple projects Journal writing
	Use a calculator to count to 100, then continue the counting process. Use a numeral grid to count beyond 100. Talk about how counting beyond 100 is similar to counting from 1. Follow directions for counting on beyond 100.	
Calculators		
	Use a hundred-chart or numeral grid to help them continue or complete sequences of numbers (e.g., 2, 7, 12, 17, __, __ ; and 10, 20, 30, ___, ___, 60). Talk about how they obtained the missing numbers in the sequence.	
	Work in pairs: one person displays a numeral on the calculator and the other reads it and writes it in words. The students alternate roles.	
	Count a given number of objects and write the numeral for that number. Group the objects into sets of 10 and ones. Compare the number of sets of ten and ones with the digits in the numeral.	

Topic	Learning Outcomes By the end of Grade 2, students should be able to:
<u>Fractions</u> Problem-solving Unit fractions Proper fractions Comparison of fractions Representation of fractions	17. Create and solve problems involving fractions of a whole. 18. Identify a unit fraction ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{8}$) of a whole. 19. Compare unit fractions. 20. Represent a unit fraction of a whole. 21. State and write, in words and numerals, the unit fraction that corresponds to a pictorial or concrete representation of a unit fraction of a whole. 22. Identify a proper fraction of a whole (e.g., $\frac{2}{3}$, $\frac{3}{4}$ etc.). 23. Represent a proper fraction of a whole, using concrete objects or diagrams. 24. State and write, in words and numerals, the proper fraction that corresponds to a pictorial or concrete representation of a fraction of a whole. 25. Describe real life situations that involve fractions of a whole.

Materials	Teaching/Learning Activities	Assessment Strategies
	The students can: Talk about, and demonstrate, how they can use the place value materials to represent numbers up to ninety-nine. Talk about, and demonstrate, how they would use diagrams to illustrate their place value representations of given numbers. Work in pairs: one student uses place value materials to represent a given number, the other student writes the numbers in several ways (e.g., 27, 2 tens and 7 ones, 20 + 7). Represent given numbers in as many ways as possible, using place value materials, diagrams, words, numerals, expanded notation. Use place value materials and one-to-one matching to determine which of two numbers is bigger (smaller) than the other. Talk about how they can use the place value of the digits in a numeral to determine which of two numbers is smaller (bigger) than another. Work in small groups to arrange a set of numbers in order of magnitude. The group leader shuffles a set of numeral cards, and then selects three or four cards at random. The other members of the group arrange the numeral cards in order of magnitude and state why they think it is a correct arrangement. The group leader decides if the arrangement is correct. The students in the group take turns at being the group leader. Examine examples of representations of unit fractions and talk about what the various unit factions mean (e.g., one out of two equal parts, one out of three equal parts, etc.). Identify examples of $\frac{1}{2}$ from among a set of shapes that have been divided into two parts, some equal and some unequal. Repeat the activity using other unit fractions.	Oral presentations Portfolio assessment; entries could include illustration of the student's understanding of place value, diagrams depicting unit fractions, problems that they have solved.

Materials	*Teaching/Learning activities*	*Assessment Strategies*
Paper cut-outs of common geometric shapes Sets of paper strips of the same length Fraction charts Charts with representations of unit and proper fractions	*The students can:* Use paper cut-outs to represent unit fractions. Shade parts of diagrams to represent given unit fractions, and write the corresponding fractional numeral. Take a set of cut-outs of the same shape and size. Divide one of the cut-outs into halves, another thirds, etc., and colour one-half, one third, etc. Place the coloured pieces one on the other to compare the size of the unit fractions. Use their coloured pieces and a fraction chart to answer questions such as the following: Which is larger, $\frac{1}{4}$ or $\frac{1}{8}$? Which is the smallest: $\frac{1}{3}$, $\frac{1}{8}$, or $\frac{1}{5}$? Examine examples of proper fractions (e.g.: $\frac{2}{3}$, $\frac{3}{5}$, $\frac{5}{8}$), and talk about what the fractions represent. Identify examples of a given proper fraction from among a set of representations of proper fractions. Use paper cut-outs to represent given proper fractions. Shade parts of diagrams to represent given proper fractions. Draw diagrams to represent given proper fractions. Examine a set of diagrams (or concrete representations) of proper fractions. State and write, in words and numerals, the proper fraction that each diagram (or concrete representation) represents. Talk about situations (e.g., games, household activities, shopping) that involve the use of fractions. Illustrate these situations, using concrete materials and diagrams. Work in groups and use these situations to develop problems. Exchange the problems among the groups. Each group solves the problems that they did not develop, and checks the solutions of the problems that they developed.	Oral presentations Practical tasks Pencil and paper exercises

COMPUTATION

Topic	*Learning Outcomes* *By the end of Grade 2, students should be able to:*
General Use of computation strategies	1. Identify and describe situations in which it is appropriate to use mental strategies, pencil and paper procedures, and calculators to add subtract, multiply or divide whole numbers. 2. Use mental strategies, pencil and paper procedures, or a calculator, as appropriate, to add, subtract, multiply and divide whole numbers.
Addition of whole numbers Problem-solving Basic facts Addition without and with regrouping Addition-related vocabulary	3. Create and solve problems involving addition of whole numbers, with totals up to 99. 4. Use several strategies to recall the basic facts for addition. 5. Explain their strategies for recalling the basic facts for addition. 6. Add a two-digit number to a one-digit number, without and with regrouping, totals up to 99. 7. Add two-digit numbers, without and with regrouping, totals up to 99. 8. Carry out addition with numerals presented in a horizontal or vertical format.

Materials	Teaching/Learning Activities	Assessment Strategies
	The students can:	
Manipulatives such as shells, stones, buttons, etc.	Write problems that involve situations requiring addition. Talk about how they could solve the problem. Estimate the answer to the problems, and explain how they obtained their estimate. Record their estimates.	Practical tasks Observation
Place value materials: e.g., sets of squares (2 cm by 2 cm) made out of Bristol board, cardboard etc., and strips (20 cm by 2 cm); place value charts; Popsicle sticks or other objects – singles and bundles of 10.	Use place value materials or a calculator to carry out the required addition to solve the problems. Describe how they used their materials or calculator to solve the problems. Compare their estimates to the actual answers, and determine which was the best estimate.

Talk about the similarities and differences in the ways in which different students used the place value materials. Record the steps they carried in using their place value materials, using expanded notation

Demonstrate how they would use place value materials to add with regrouping. Talk about their procedures, and identify the correct procedures. Talk about the regrouping process, e.g., when it is necessary, how it is carried out. Use place value materials to carry out addition with regrouping. | Questioning Pencil and paper exercises |
| Calculators | Record the steps they carried out in using their place value materials to add with regrouping. | |
| Squared paper | | |
| Flash cards | Explore strategies for adding numbers, with totals up to 99, mentally. Talk about the steps involved in each strategy, and practise using the strategies.

Use squared paper and place value charts to practise aligning addends vertically.

Practise strategies such as counting up and counting down to recall the basic facts for subtraction. | |

Topics	Learning Outcomes By the end of Grade 2, students should be able to:
<u>Subtraction of whole numbers</u> Basic facts Problem-solving Subtraction without and with regrouping Subtraction-related vocabulary	9. Create and solve problems involving subtraction of whole numbers up to ninety-nine. 10. Use several strategies to recall the basic facts for subtraction. 11. Explain their strategies for recalling the basic facts for subtraction. 12. Subtract a one-digit number from a two-digit number, without and with regrouping. 13. Subtract a two-digit number from a two-digit number, without and with regrouping. 14. Explain the procedures they use for addition and subtraction, using appropriate vocabulary such as 'add', 'sum', 'difference', 'minus', etc. 15. Carry out subtraction with numerals presented in a horizontal or vertical format.
<u>Multiplication of whole numbers</u> Problem-solving Multiplication-related vocabulary Multiplication of one-digit numbers Properties of multiplication Basic facts	16. Create and solve simple problems involving multiplication. 17. Interpret multiplication statements and number sentences, using terms such as 'sets of', 'times', 'product', etc. 18. Calculate the product of two one-digit numbers, with products up to 60. 19. Explain the properties of multiplication (e.g., any number times 1 equals the number, the product of two numbers is the same even if their order is changed, $3 \times 4 = 4 \times 3 = 12$). 20. Use several strategies (e.g., concrete objects, skip counting, properties of multiplication) to develop the multiplication basic facts for the 2, 3, 5, and 10 times table.

Materials	Teaching/Learning Activities	Assessment Strategies
	The students can:	
Worksheets with problems, some involving addition and some involving subtraction	Write problems that involve situations requiring subtraction. Talk about how they would solve the problems. Estimate the answers to the problems, and record the estimates. Talk about how they obtained their estimate.	
Activity Sheets	Use place value materials to solve the problems. Talk about how they solved their problems, and why they think their answer is correct. Compare their answers with their estimates. Follow demonstrations of how place value materials may be used to carry out subtraction with regrouping. Talk about, and demonstrate, how to use place value materials to carry out subtraction with regrouping. Use diagrams to carry out subtraction. Use expanded notation to carry out subtraction. Read a problem provided on a worksheet. Talk about the problem and decide whether the solution requires addition or subtraction. Repeat with other problems. Read problems or number sentences and decide whether they can obtain the answer by using mental computation or pencil and paper. Use their selected strategy to obtain the answer. Work in groups of three to complete number sentences. For each number sentence, one student uses mental computation, another uses pencil and paper, and the other uses a calculator to obtain the answer. The students check each other's answer to determine if it is correct. The students take turns using the various computation strategies.	

Topics	Learning Outcomes *By the end of Grade 2, students should be able to:*
<u>Division of whole numbers</u> Division as repeated subtraction	21. Create and solve simple problems involving division. 22. Illustrate division as repeated subtraction, in a variety of ways: using objects, a number line, or numerals.
Division-related vocabulary	23. Use appropriate division vocabulary, e.g., number of groups, number of objects in each group, etc. 24. Write number sentences to represent division.
<u>Addition of fractions</u> Addition of unit fractions Problem-solving	25. Add two or more unit fractions with like denominator, totals up to 1. 26. Create and solve problems involving addition of unit fractions.

Materials	Teaching/Learning Activities	Assessment Strategies
Work cards with problems that involve multiplication	*The students can:* Read problems which involve situations requiring multiplication. Talk about how they would solve the problems. Illustrate the steps for solving the problems using concrete materials and/or diagrams.	Simple projects Pencil and paper exercises

Work cards with problems that involve division.
 	
Number lines
	Write problems involving multiplication. Exchange the problems among their classmates and solve the problems. Display the solutions in the classroom, and check each other's solutions.
	
	Talk about the meaning of multiplication statements: e.g., 3 sets of 2 = ? ; 4 sets of 3 = 12; 3 x 5 = 15; 4 x 4 = ?
	Illustrate the statements, using a variety of materials and diagrams.
	Complete activity sheets that guide them to discover properties of multiplication. E.g., the students can complete several statements of the following form and talk about the patterns in their answers.
	
	    3 x 4 = 4 x 3 =
	    5 x 6 = 6 x 5 =
	    2 x 7 = 7 x 2 =
	
	Make bulletin board or poster displays, using a variety of materials, to illustrate the basic facts. E.g., some students can use concrete objects glued onto paper to illustrate all the facts with a product of 12; another group of students can use squared paper to show the facts for the two times table.
	
	Work in small groups to prepare flash cards for the various multiplication tables, and use these cards in activities. E.g., students can work in pairs; one student completes the number sentence on one face of the card and the other student uses the answer on the other side of the card to check whether his/her partner's answer is correct.
	
	Role-play situations that involve sharing.
	Talk about how the sharing was done, whether the objects were shared equally or not.
	Identify situations where things are shared equally.
		Journal writing

Materials	Teaching/ Learning Activities	Assessment Strategies
	The students can:	
	Read problems which involve division, and talk about what they understand in the problem.	
	Illustrate the situations in the problem, using concrete materials, number lines, squared paper.	
	Use the various materials to solve the problems.	
	Change their word problems into short statements that use division vocabulary. E.g., '6 cupcakes are to be shared equally among 3 persons. Each person gets _____ cupcakes.'	
	Compare pairs of word statements with number statements, and talk about how the number statement represents the word statement. Example of a pair:	
	Paul shares 12 cookies equally among his 3 friends. Each friend gets _____ cookies.	
	Number statement $12 \div 3 = ?$	
	Write the number sentences that could be used to solve division problems.	
	Write word problems for given number sentences.	
	Use concrete materials of their choice to solve problems involving addition of unit fractions.	
	Talk about how they used the materials to determine the answer to the problem.	
	Write number sentences to represent the solution to their problems.	
	Write problems that involve addition of unit fractions, and exchange the problems among the class. Classmates solve the problems. Each person checks whether the solutions to the problems that he/she wrote are correct.	
	Examine a set of examples of number sentences involving addition of unit fractions; e.g.,	
	$\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ $\qquad$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$ $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{4}{5}$	
	Talk about how the answers were obtained.	
	Write a journal entry in which they explain how to obtain the sum of two or more unit fractions.	

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: Generate questions that may be answered through data collection; collect simple sets of data through observation and interviews; and use number statements to record collected data.

Level 2: Generate questions that may be answered through data collection; collect simple sets of data through observation and interviews; use number statements to record collected data; record collected data in tables; represent collected data by completing pictographs or bar graphs; and read the data in simple tables, pictographs and bar graphs.

Level 3: Generate questions that may be answered through data collection; collect simple sets of data through observation and interviews; use number statements to record collected data; record collected data in tables; select appropriate means to graphically represent collected data; represent collected data by completing pictographs or bar graphs; read and interpret the data in simple tables, pictographs and bar graphs; describe how to collect data through observation and interviews; and identify similarities and differences between observation and interviewing.

Level 4: Generate questions that may be answered through data collection; collect simple sets of data through observation and interviews; use number statements to record collected data; record collected data in tables; select appropriate means to graphically represent collected data; represent collected data by completing pictographs or bar graphs; read and interpret the data in simple tables, pictographs and bar graphs; describe how to collect data through observation and interviews; identify similarities and differences between observation and interviewing; describe how data are represented in pictographs and bar graphs; and explain the benefits of presenting data in tables and graphs.

Geometry

Level 1: Identify the faces of three-dimensional shapes; identify the sides of two-dimensional shapes; identify and name squares, rectangles, and circles.

Level 2: Identify the faces of three-dimensional shapes; describe the faces of three-dimensional shapes in terms of two-dimensional shapes; classify three-dimensional shapes on the basis of their attributes; identify the sides of two-dimensional shapes; identify and name squares, rectangles, circles, and triangles; describe two-dimensional shapes in terms of the number and length of their sides; classify two-dimensional shapes on the basis of their attributes; describe and compare groups formed from classification exercises; and describe the relative position of objects.

Level 3: Identify the faces of three-dimensional shapes; describe the faces of three-dimensional shapes in terms of two-dimensional shapes; classify three-dimensional shapes on the basis of their attributes; identify and name examples of cubes, cuboids and spheres; identify the sides of two-dimensional shapes; identify and name squares, rectangles, circles, and triangles; describe two-dimensional shapes in terms of the number and length of their sides; classify two-dimensional shapes on the basis of their attributes; describe and compare groups formed from classification exercises; describe the relative position of objects; represent descriptions of the relative position of objects using drawings; and draw curves and straight lines.

Level 4: Identify the faces of three-dimensional shapes; describe the faces of three-dimensional shapes in terms of two-dimensional shapes; classify three-dimensional shapes on the basis of their attributes; identify and name examples of cubes, cuboids and spheres; identify the sides of two-dimensional shapes; identify and name squares, rectangles, circles, and triangles; describe two-dimensional shapes in terms of the number and length of their sides; classify two-dimensional shapes on the basis of their attributes; describe and compare groups formed from classification exercises; describe the relative position of objects; represent descriptions of the relative position of objects using drawings; draw curves and straight lines; and sketch squares, rectangles, triangles, circles and other two-dimensional shapes.

Measurement

Measurement – Length, mass, capacity, and temperature

Level 1: Estimate, measure and record lengths, heights and distances, using the metre; and describe the temperature of an object.

Level 2: Use appropriate units to estimate, measure and record lengths, heights and distances; estimate, measure and record the mass of objects; describe the temperature of an object; compare measurements of length; and compare the temperature of objects using appropriate vocabulary.

Level 3: Use appropriate units to estimate, measure and record lengths, heights and distances; estimate, measure and record the mass and capacity of objects; describe the temperature of an object; compare measurements of length; compare the masses of two or three objects; compare the temperature of objects using appropriate vocabulary; and describe situations in real life where the kilogram is used as a unit of measure.

Level 4: Use appropriate units to estimate, measure and record lengths, heights and distances; estimate, measure and record the mass and capacity of objects; describe the temperature of an object; compare measurements of length; compare the masses of two or three objects; compare the capacity of two or three containers; compare the temperature of objects using appropriate vocabulary; and describe situations in real-life where the kilogram is used as a unit of measure.

Measurement – Time

Level 1: Use time vocabulary appropriately; name the days of the week and months of the year; state the number of days in a week and months in a year; state and write the date for the current day; and tell and represent time on the hour.

Level 2: Use time vocabulary appropriately; name the days of the week and months of the year; state the number of days in a week and months in a year; state and write the date for the current day and important events; and tell and represent time on the hour and half hour.

Level 3: Use time vocabulary appropriately; name the days of the week and months of the year; state the number of days in a week and months in a year; state and write the date for the current day and important events; and tell and represent time on the hour, half hour, and quarter hour.

Level 4: Use time vocabulary appropriately; name the days of the week and months of the year; state the number of days in a week and months in a year; state and write the date for the

current day and important events; tell and represent time on the hour, half hour, and quarter hour; tell and write the time at which given events occur; and use the abbreviations 'a. m.' and 'p. m.'.

Measurement – Money

Level 1: Describe the coins in circulation; describe the $5 and $10 notes; and represent amounts of money up to 50 cents in a variety of combinations.

Level 2: Describe the coins in circulation; describe the $5, $10, and $20 notes; represent amounts of money up to $1 in a variety of combinations; read the prices of items; find the total cost of a number of items up to a total of 50 cents; and calculate change from amounts up to 50 cents using counting on.

Level 3: Describe the coins in circulation; describe the $5, $10, and $20 notes; represent amounts of money up to $5 in a variety of combinations; read the prices of items; find the total cost of a number of items up to a total of $1; and calculate change from $1 using counting on.

Level 4: Describe the coins in circulation; describe the $5, $10, and $20 notes; represent amounts of money up to $5 in a variety of combinations; read the prices of items; find the total cost of a number of items up to a total of $1; calculate change from $1 using counting on; represent values up to $20 using $1 coins and notes in a variety of combinations; and find the total value of a combination of notes and coins up to a value of $20.

Number Concepts

Number Concepts – Counting

Level 1: Count in sequence to 100 and beyond, and count by 2's, 5's, and 10's to 100.

Level 2: Count in sequence to 100 and beyond; count by 2's, 5's, 10's, and 20's to 100 and beyond; and count on from a given number.

Level 3: Count in sequence to 100 and beyond; count by 2's, 5's, 10's, 20's, and 25's to 100 and beyond; count on from a given number; and complete sequences of numbers that involve skip counting.

Level 4: Count in sequence to 100 and beyond; count by 2's, 5's, 10's, 20's, and 25's to 100 and beyond; count on from a given number; complete sequences of numbers that involve skip counting; and describe the patterns that are evident in numbers between 1 and 100 and numbers beyond 100.

Number Concepts – Whole numbers

Level 1: Read numbers up to ninety-nine, and write numbers up to ninety-nine in words and numerals.

Level 2: Read numbers up to ninety-nine; write numbers up to ninety-nine in words and numerals; state the place value of the digits in any number to ninety-nine; and represent numbers up to ninety-nine using objects and diagrams.

Level 3: Read numbers up to ninety-nine; write numbers up to ninety-nine in words and numerals; state the place value of the digits in any number up to ninety-nine; represent numbers up to ninety-nine using objects and diagrams; state the total value of the digits in any number up to ninety-nine; write numbers up to ninety-nine in expanded notation; and compare two numbers (up to ninety-nine) using the symbols '<' and '>'.

Level 4: Read numbers up to ninety-nine; write numbers up to ninety-nine in words and numerals; state the place value of the digits in any number up to ninety-nine; represent numbers up to ninety-nine using objects and diagrams; state the total value of the digits in any number up to ninety-nine; write numbers up to ninety-nine in expanded notation; compare two numbers (up to ninety-nine) using the symbols '<' and '>'; and arrange a set of numbers (up to ninety-nine) in order of magnitude.

Number Concepts – Fractions

Level 1: Identify a unit fraction of a whole; represent a unit fraction of a whole; and state/write in words and numerals the unit fraction that corresponds to a given concrete or pictorial representation of a unit fraction.

Level 2: Identify a unit fraction of a whole; represent a unit fraction of a whole; state/write in words and numerals the unit fraction that corresponds to a given concrete or pictorial representation of a unit fraction; and compare unit fractions.

Level 3: Identify a unit fraction of a whole; represent a unit fraction of a whole; state/write in words and numerals the unit fraction that corresponds to a given concrete or pictorial representation of a unit fraction; compare unit fractions; represent a proper fraction of a whole; and state/write in words and numerals the proper fraction that corresponds to a concrete or pictorial representation of a fraction of a whole.

Level 4: Identify a unit fraction of a whole; represent a unit fraction of a whole; state/write in words and numerals the unit fraction that corresponds to a given concrete or pictorial representation of a unit fraction; compare unit fractions; represent a proper fraction of a whole; state/write in words and numerals the proper fraction that corresponds to a concrete or pictorial representation of a fraction of a whole; identify a fraction of a whole; and describe situations that involve fractions of a whole.

Computation

Level 1: Recall the basic facts for addition and subtraction; add numbers up to ninety-nine, without regrouping, totals up to 99; carry out subtraction involving numbers up to ninety-nine, without regrouping.

Level 2: Recall the basic facts for addition and subtraction; add numbers up to ninety-nine, without and with regrouping, totals up to 99; and carry out subtraction involving numbers up to ninety-nine, without and with regrouping.

Level 3: Recall the basic facts for addition and subtraction; add numbers up to ninety-nine, without and with regrouping, totals up to 99; carry out subtraction involving numbers up to ninety-nine, without and with regrouping; explain the procedures for addition and subtraction; use the vocabulary related to multiplication appropriately; calculate the product of two one-digit numbers (products up to 60); and illustrate division as repeated subtraction in a variety of ways.

Level 4: Recall the basic facts for addition and subtraction; add numbers up to ninety-nine, without and with regrouping, totals up to 99; carry out subtraction involving numbers up to ninety-nine, without and with regrouping; explain the procedures for addition and subtraction; use the vocabulary related to multiplication appropriately; calculate the product of two one-digit numerals (products up to 60); explain the properties of multiplication; use several strategies to recall the basic facts for multiplication by 2, 3, and 5; illustrate division as repeated subtraction in a variety of ways; write number sentences to represent division; use the vocabulary related to division appropriately; and add two or more unit fractions with totals up to 1.

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 Measurement. Similar checklists may be prepared for each of the content strands by using the competencies listed in Level 4 to generate the items for the checklist.

For each of the competencies, place a tick (√) 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 ***Measurement of length, mass, capacity and temperature***	*Yes*	*No*

The student can:
 	
1. Use appropriate units to estimate
    a) Lengths.
    b) Heights.
    c) Distances.
 	
2. Use appropriate units to measure
    a) Lengths.
    b) Heights.
    c) Distances.
 	
3. Use appropriate notation to record estimates and measurements of
    a) Length.
    b) Height.
    c) Distance.
 	
4. Use appropriate units to estimate the mass of objects.
 	
5. Use appropriate units to measure the mass of objects.
 	
6. Use appropriate notation to record estimates and measurements of the mass of objects.		

7. Use appropriate units to estimate the capacity of containers.

8. Use appropriate units to measure the capacity of containers.

9. Use appropriate notation to record estimates and measurements of the capacity of containers.

10. Describe the temperature of an object.

11. Compare measurements of length.

12. Compare the masses of two or three objects.

13. Compare the capacity of two or three containers.

14. Compare the temperature of objects using appropriate vocabulary.

15. Describe situations in real life where the kilogram is used as a unit of measure.

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	vv
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 2

Designed by Emma Mc Farlane & Beverly Pierre