Mathematics in the National Curriculum

Grade: 5 and 6

NATIONAL INSTITUTE OF EDUCATION

Mathematics in the National Curriculum - Key Stage 2

National Institute of Education
Ghaazee Building
Ameer Ahmed Magu
Male' 20125
Maldives
http://www.nie.edu.mv

Developed by

Mr. Ali Naseer, Education Development Centre
Mr. Ali Adam, National Institute of Education
Ms. Aishath Shiunee, National Institute of Education

Cover design

Abdulla Zaki, National Institute of Education

Layout by

Mariyam Thiseena, National Institute of Education

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Foreword

May Almighty Allah bestow His blessings and mercy upon Muhammad, His messenger (PBUH), who personified his life as a curriculum throughout his life through the exemplary conduct and behaviours. May Almighty Allah also grant blessings and mercy upon his companions and household.

The year 1979 was an insightful year as the government of Maldives strategized to mainstream the primary school education. This led to the development of the first syllabi for grades 1 to 5 in the Maldives in 1980, following the revision of the syllabi in 1982. The crafting and implementation of the 1st National Curriculum for primary grades 1-5 was done in 1984. An effort was then made to revise the curriculum in 1997 and was completed by year 2000.

The 2nd revision of the 1st curriculum commenced in 2006, during which it was realised that enormous changes were needed to the curriculum. A decision for curriculum reform was made to address the needs and demands of the country, and bring rise to the development of the 2nd national curriculum framework.

The 2nd national curriculum is developed based on the changes that have taken place in the society, from practices of the past to the current needs, with a vision for a better tomorrow. It aims to build a knowledgeable future generation, highly skilled to cater the needs of the 21st century, with a focus on nurturing attitudes and values. The curriculum also intends to inculcate the main competencies outlined, such as practicing Islam. Other competencies include self-management, critical thinking, creative thinking, human relations, healthy life styles, sustainable practices and ICT literacy. The curriculum also intends to produce students who possess the 21st century skills, and are healthy both physically and also spiritually, to be responsible towards the progression of the Maldivian society.

Science plays a key role in our life. In an ever changing global world, the importance of science cannot be undermined. Science opens the minds of children and provides a rich context to develop critical thinking and make informed decisions.

Key Stage 1 Science is focused on enabling the student to acquire knowledge, skills and attitudes so as to develop an informed and critical understanding of, environment, science and technological issues.

Science teaching intends to cultivate humane and responsible attitudes and an appreciation of the world in accordance with Islamic principles and values.

The curriculum envisions the use of variety of teaching learning approaches where students are engaged in meaningful learning experiences.

I hereby take this opportunity to extend my sincere gratitude and heartfelt appreciation to each and every individual for the tireless effort, commitment and dedication in developing the National Curriculum Framework and this syllabus. I pray that the Almighty Allah bless them for their commitment and contribution.

Last but not least, it is my sincere hope that this syllabus be beneficial for the students and teachers in the Republic of Maldives.

Adam Shareef Umar
Minister of State for Education
Ministry of Education

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Introduction

Rationale

As we embark on to the information technology era, we require individuals, who are able to think critically about complex issues, analyze and adapt to new situations, solve problems of various kinds, and communicate their thinking and ideas effectively. The study of mathematics equips students with knowledge, skills and values that are essential for successful and rewarding participation in an information technology-based society.

Learning mathematics results in more than a mastery of basic skills. It equips students with a concise and powerful means of communication. Mathematical structures, operations, processes, and language provide students with a framework and tools for reasoning, justifying conclusions, and expressing ideas clearly. To learn mathematics in an effective way, students need classroom experiences that help them develop mathematical understanding; learn important facts, skills, and procedures; develop the ability to apply the processes of mathematics; and acquire a positive attitude towards mathematics.

Through mathematical activities that are practical and relevant to their lives, students develop mathematical understanding and problem-solving skills, that they can apply in their daily lives and, eventually, in the workplace.

Mathematics is a powerful learning tool which helps the students to develop the ability to use mathematics to extend and apply their knowledge in other curriculum areas, including sciences, arts and languages.

Overview

Mathematics is one of the main Key Learning Areas identified in the National Curriculum Framework. Knowledge, skills, values and attitudes taught through this subject would be a tool for the pupils to function and excel in all aspects of life. It also helps to think logically, be creative, solve problems and appreciate the aesthetics of Allah (SWT)'s creation. Mathematics is divided into many branches such as arithmetic, geometry, algebra, and trigonometry.

Primary

At this level students learn basic mathematical knowledge, skills and understanding. These include basic understanding of the number system, computational skills, and the ability to solve simple problems related to their day to day life. Emphasis is also given to practical understanding of the ways in which information is gathered and presented.

Lower Secondary

At this level students learn basic mathematical principles and its application for problem solving. Use mathematics as a mode of communication, with special attention on the use of clarity of expressing concepts, in acquiring a base that will assist students in their further study of mathematics and in other fields. Students' confidence is developed by helping them to feel for numbers, patterns and relationships, and places a strong emphasis on solving problems and presenting and interpreting results. Students also learn how to communicate and reason using mathematical concepts.

Higher Secondary

At this level, students construct rigorous mathematical arguments and proofs through the use of precise statements, logical deduction and inference and by the manipulation of mathematical expressions, including the construction of extended arguments for handling substantial problems and hence acquiring a base that will assist students in their further study of mathematics and in other fields.

Mathematics in the National Curriculum

Along with the other subjects in the National Curriculum, mathematics curriculum contributes to the development of the student in all aspects. It aims to achieve the vision of the National Curriculum along with the eight principles identified, incorporating the key competencies and also relates to the effective pedagogical approaches emphasized in the National Curriculum.

The Vision

The Mathematics curriculum is structured in such a way that it paves the road to achieve the vision of the National Curriculum.

The National Curriculum envisions the development of:

- successful individuals who are motivated to learn and explore; who are inquisitive and eager to seek, use and create knowledge.
- confident and competent individuals who have a firm belief in Islam, a strong sense of self and cultural identity, and believe in their own capabilities; and
- responsible and productive contributors to their own family, their local community and the global society.

The main goals of mathematics education are to prepare students to:

- use mathematics confidently to solve problems
- communicate and reason mathematically
- appreciate and value mathematics
- make connections between mathematics and its applications
- commit themselves to lifelong learning
- become mathematically literate adults, using mathematics to contribute to society

Mathematics learning experiences assist students to develop and understand mathematical concepts along with process skills and the pedagogical approaches, emphasize students to participate in practical hands-on experiences, to explore and find ways to solve real life problems using mathematical knowledge and skills. During this process of solving problems, the students are required to pose questions, predict and find answers for themselves and develop themselves as successful learners who are eager to learn and explore more.

Mathematics provides ample opportunities for students to develop their critical thinking skill along with values that would build their self-confidence and self-esteem. Students will be given opportunities to relate learning beyond their classroom, such as working on authentic tasks. Engagement and involvement in these ensures that student acquire the knowledge, skills and values

to be competent citizens in the society.

A blend of the above mentioned experiences ensure that students are fully equipped to as active participants in the ever changing world.

The Principles

The National Curriculum identifies eight fundamental principles that need to be taken into account when designing and implementing learning and other school activities. Mathematics curriculum is also designed to take into account these principles.

The teaching and learning of Mathematics highly emphasizes linking Mathematics and Islam. Essentially, mathematics provides the understanding of Allah's creation and accepting the natural beauty of such creations through the study of inquiry, based on experiments and investigations. Facts, figures and theories contribute to the understanding of various mathematical concepts. Linking these to Islam strengthens the Islamic faith in students.

The Principles underlying mathematics curriculum

Mathematics curriculum recognizes that all students do not necessarily learn mathematics in the same way, using the same resources, and within the same time frames. It aims to challenge all students by including expectations that require them to use higher-order thinking skills and to make connections between related mathematical concepts and between mathematics, other disciplines, and the real world.

It is based on the belief that students learn mathematics most effectively when they are given opportunities to investigate ideas and concepts through problem solving, and are then guided carefully into an understanding of the mathematical principles involved. The acquisition of operational skills remains an important focus of the curriculum.

Process Skills

Attention to the processes that support effective learning of mathematics is also considered to be essential to a well organised mathematics program. Seven mathematical processes are identified: problem solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing, and communicating. The mathematical processes can be seen as the processes through which students acquire and apply mathematical knowledge and skills. These processes are interconnected. Problem solving and communication in Mathematics have strong links to all the other processes. A problem-solving approach encourages students to reason their way to a solution or a new understanding. As students engage in reasoning, teachers further encourage them to make conjectures and justify solutions, orally and in writing. The communication and reflection that occur during and after the process of problem solving help students not only to articulate and refine their thinking, but also to see the problem they are solving from different perspectives. This

opens the door to recognize the range of strategies that can be used to arrive at a solution. By seeing how others solve a problem, students can begin to reflect on their own thinking (a process known as "metacognition") and the thinking of others, and to consciously adjust their own strategies in order to make their solutions as efficient and accurate as possible.

The mathematical processes cannot be separated from the knowledge and skills that students acquire throughout the year. Students must solve problem, communicate, reason, reflect, and so on, as they develop the knowledge, the understanding of concepts, and the skills required in all the strands in every grade.

The development of mathematical knowledge is a gradual process. A continuous, cohesive program throughout the grades is necessary to help students develop an understanding of the

"big ideas" of mathematics – that is, the interrelated concepts that form a framework for learning mathematics in a coherent way. Similarly, in-depth understanding of Mathematical knowledge, concepts and skills ensure that students develop holistically, and relating these concepts and processes to their real life, ensuring relevance to students and preparing them for life and to reach for personal excellence.

The Key Competencies

The eight key competencies outlined in the National Curriculum encompasses knowledge, skills, values and attitudes and dispositions to be explicitly taught in various key learning areas and through various school activities.

The mathematics curriculum provides a rich context in which these key competencies can be developed. The strands in the syllabus involve a lot of opportunities for students to explore mathematical knowledge, ask questions, use higher order thinking to analyse and solve issues. In addition, the curriculum allows students to design and invent new things based on their prior knowledge and using their creative thinking. It asks students to understand abstract concepts which require a high level of cognition.

The key competency, thinking critically and creatively is very much part and parcel of the mathematics curriculum which encompasses many of the aspects highlighted. Students are expected to be adaptable to change and be equipped with thinking and creative abilities to face the challenges of the future. These include a wide range of cognitive skills and intellectual dispositions such as using a wide range of techniques to create ideas, working creatively with others, reasoning effectively, solving problems, and making judgments and decisions.

In addition, students are given many opportunities to be creative and think critically; use broad in-depth analysis of evidence to make decisions and communicate their beliefs clearly and accurately. They also use skills such as comparing, classifying, reasoning, hypothesizing, analyzing, and synthesizing which help them gain confidence in their ability to learn and make judgments. These

individuals are innovative, flexible and apply what they learn to new or different situations and solve problems in innovative ways.

At the same time, the mathematics curriculum provides many opportunities for students to Understand and manage self by developing motivation and goal setting skills. They acquire the ability to plan, implement plans and evaluate one's performances which are aspects of self-management and are essential in developing an enterprising attitude in students.

In addition, students get the opportunity to identify what is important to them and direct their attention and efforts towards those things, by setting personal goals. They also develop an eagerness to pursue personal excellence in all aspects of life.

Moreover, students are required to use language, symbols and text which is one of the most fundamental competencies individuals need to acquire in order to be active and contributing members of a society. In addition, students are required to explore and interpret symbolic representations as well as visual texts to make meaning in various contexts. Hence, there would be many opportunities to develop the key competency of making meaning.

How is Mathematics structured

In Mathematics students learn the process of enquiry, discovery and verification and to apply mathematical ideas, rules and procedures to particular situations and problems.

In this learning area, learning is structured and organized under FIVE MAIN STRANDS throughout all the key stages. They are namely, numbers, measurements, spatial sense & geometry, and chance and data.

From key stages 3 (lower secondary) onwards, an in-depth study of those strands and sub strands will be discussed with the students. In key stage 5 (higher secondary) students can choose a specific area of mathematics under 3 different branches, namely pure mathematics, statistics and mechanics.

Strand 1: Numbers

Students learn number concepts, four basic operations involving fractions, decimals, percentages, negative numbers and rate & ratio. Students will explore, estimate and manipulate numbers to carry out day to day activities.

Strand 2: Measurement

In this strand, students would learn mensuration, time and speed. This strand would equip the students to estimate, measure and calculate perimeter, area or volume of various things accurately.

Strand 3: Shape and space

Under this strand, students would master in 3D & 2D shapes, position and angles.

Geometry and trigonometry come under this strand. Students would be able to visualize spatial aspects of things and perceive them better.

Strand 4: Chance and Data

Students learn about handling data and probability under this strand. Statistics is a topic that comes under handling data. Students would be able to represent and interpret different data collected in a more meaningful manner.

Strand 5: Patterning and Algebra

Under patterning and algebra students would learn sequences, number properties, algebra and problem solving & puzzles. Students' confidence is built by helping them to develop a feel for numbers, their properties, and the relationships. Algebra is one of the very important topics that students learn in their entire schooling, which broadens their thinking skills.

Outcomes

Outcomes are statements of knowledge, understanding, skills and values expected to be achieved by students at the end of a given stage.

All outcomes are of equal importance. The presentation of the outcomes does not imply a sequence of teaching and learning activities.

Indicators

An indicator is an example of the behaviour that students may display as they work towards the achievement of the syllabus outcomes. Indicators reflect and describe aspects of knowledge, understanding, skills and values.

An indicator may describe part or all aspects of an outcome. Outcomes and indicators together assist teachers in identifying student's current achievement and in planning future learning experiences.

Planning, Teaching and Assessing Mathematics

The Planning Stage

When planning a program in mathematics, teachers must take into account considerations in a number of important areas.

The following are some key features to consider in planning mathematics education:

Teaching Approaches

Students in a mathematics class typically demonstrate diversity in the ways they learn best.

It is important, therefore, that students have opportunities to learn in a variety of ways –individually, cooperatively, independently, with teacher's direction, through hands-on experience, and through examples followed by practice. In addition, mathematics requires students to learn concepts and procedures, acquire skills, learn and apply mathematical processes.

These different areas of learning may involve different teaching and learning strategies. It is assumed, therefore, that the strategies teachers employ will vary according to both the object of the learning and the needs of the students.

In order to learn mathematics and to apply their knowledge effectively, students must develop a solid understanding of mathematical concepts. Research and successful classroom practice have shown that an investigative approach, with an emphasis on learning through problem solving and reasoning, best enables students to develop the conceptual foundation they need.

When planning mathematics programs, teachers will provide activities and assignments that encourage students to search for patterns and relationships and engage in logical inquiry.

Teachers need to use rich problems and present situations that provide a variety of opportunities for students to develop mathematical understanding through problem solving.

All learning, especially new learning should be embedded in well-chosen contexts for learning – that is, contexts that are broad enough to allow students to investigate initial understandings, identify and develop relevant supporting skills, and gain experience with varied and interesting applications of the new knowledge. Such rich contexts for learning open the door for students to see the "big ideas", or key principles and concepts of mathematics, such as a pattern or relationship. This understanding of key principles will enable and encourage students to use mathematical reasoning throughout their lives.

Effective instructional approaches and learning activities draw on students' prior knowledge, capture their interest, and encourage meaningful practice both inside and outside the classroom.

Students' interest will be engaged when they are able to see the connections between the mathematical concepts they are learning and their application in the world around them and in

real-life situations.

Students will investigate mathematical concepts using a variety of tools and strategies, both manual and technological. Manipulatives are necessary tools for supporting the effective learning of mathematics by all students. These concrete learning tools invite students to explore and represent abstract mathematical ideas in varied, concrete, tactile, and visually rich ways. Moreover, using a variety of manipulatives help deepen and extend students' understanding of mathematical concepts. For example, students who have used only base ten materials to represent two-digit numbers may not have as strong a conceptual understanding of place value as students who have also bundled craft sticks into tens and hundreds and used an abacus.

Manipulatives are also a valuable aid to teachers. By analysing students' concrete representations of mathematical concepts and listening carefully to their reasoning, teachers can gain useful insights into students' thinking and provide support to help enhance their thinking.

Fostering students' communication skills is an important part of the teacher's role in the mathematics classroom. Through skillfully led classroom discussions, students build understanding and consolidate their learning. Discussions provide students with the opportunity to ask questions, make conjectures, share and clarify ideas, suggest and compare strategies, and explain their reasoning. As they discuss ideas with their peers, students learn to discriminate between effective and ineffective strategies for problem solving.

Students' understanding is revealed through both oral communication and writing, but it is not necessary for all mathematics learning to involve a written communication component.

Young students need opportunities to focus on their oral communication without the additional responsibility of writing. Whether students are talking or writing about their mathematical learning, teachers can prompt them to explain their thinking and the mathematical reasoning behind a solution or the use of a particular strategy by asking the question "How do you know?". And because mathematical reasoning must be the primary focus of students' communication, it is important for teachers to select instructional strategies that elicit mathematical reasoning from their students.

Promoting Positive Attitudes Towards Mathematics

Students' attitudes have a significant effect on how they approach problem solving and how well they succeed in mathematics. Teachers can help students develop the confidence they need by demonstrating a positive disposition towards mathematics. Students need to understand that, for some mathematics problems, there may be several ways to arrive at the correct answer. They also need to believe that they are capable of finding solutions. It is common for people to think that if they cannot solve problems quickly and easily, they must be inadequate. Teachers can help students understand that problem solving of almost any kind often requires a considerable expenditure of time, energy and a good deal of perseverance. Once students have this understanding, teachers can encourage them to develop the willingness to persist, to investigate, to reason and explore

alternative solutions, and to take the risks necessary to become successful problem solvers.

Cross-Curricular and Integrated Learning

The development of skills and knowledge in mathematics is often enhanced by learning in other subject areas. Teachers should ensure that all students have ample opportunities to explore a subject from multiple perspectives by emphasizing cross-curricular learning and integrated learning, as follows:

a) In cross-curricular learning, students are provided with opportunities to learn and use related content and/or skills in two or more subjects. Students can use the concepts and skills of mathematics in their science or social studies lessons. Similarly, students can use what they have learned in science to illustrate or develop mathematical understanding. For example, in Grade 6, concepts associated with the fulcrum of a lever can be used to develop a better understanding of the impact that changing a set of data can have on the mean.

b) In integrated learning, students are provided with opportunities to work towards meeting expectations from two or more subjects within a single unit, lesson, or activity. By linking expectations from different subject areas, teachers can provide students with multiple opportunities to reinforce and demonstrate their knowledge and skills in a range of settings. Also, the mathematical process expectation that focuses on connecting encourages students to make connections between mathematics and other subject areas. For example, students in Grade 2 could be given the opportunity to relate the study of location and movement in the Geometry and Spatial Sense strand of mathematics to the study of movement in the structures and Mechanisms strand in science and technology. Similarly, the same students could link their study of the characteristics of symmetrical shapes in Visual Arts to the creation of symmetrical shapes in their work in Geometry and Spatial Sense.

Recommended time allocation for teaching Mathematics Syllabus:

Key Stage	Contact Time/Weeks	Minimum Contact Time/Year
Key Stage 1 (Grade 1, 2 & 3)	225 minutes (5 periods/week)	137hrs (182 periods of 45 min)
Key Stage 2 (Grade 4,5 & 6)	225 minutes (5 periods/week)	137hrs (182 periods of 45 min)

The above table shows the allocated time for a week with 5 periods of 45 minutes for key stage 1 and 2. At key stage two, teachers need to organize learning activities by thematically connecting outcomes or indicators from various strands.

Assessment Practices

Assessment is an integral part of teaching and learning. Assessment is the ongoing systematic process of gathering and using evidence of student learning to make informed decisions regarding student achievement. Thus, the main purpose of assessment is to improve student learning.

Three major types of assessments used:

1. Assessment for learning (formative assessment)

It is used for purposes of greater achievement. Classroom assessment should provide opportunities for students to become actively involved in their learning and achievement. In this type of assessment, student knows what they need to do in order to be successful and know what is considered as 'good work'.

Assessment for learning is criterion referenced where students compare their work with a criterion. The criteria are based on the outcomes and indicators mentioned in the Mathematics Syllabi.

In addition to this, students, peers and teachers provide appropriate and ongoing feedback. Through feedback students identify their strengths and areas for improvement. This helps students to redirect their efforts and energy in making plans on ways to improve learning.

As for teachers, this provides the opportunity to change instruction in accordance with the student's needs.

2. Assessment as learning (formative assessment)

Assessment as learning is student driven whereby students are actively involved in their own learning. This is done through continuous self-assessments whereby students identify areas to improve. Students are required to reflect and critically evaluate their work.

3. Assessment of learning (summative assessment)

This is usually addressed through summative assessment. This includes topic assessment at the end of a topic and term exams. (Note: for the foundation and key stage one there will be NO term exams or tests). However, students' summative assessment can be done to check the level of understanding of the students. The information gathered through the summative process should be used formatively to enhance student progress.

In order to gather evidence of student learning the following are some of the methods that can be used:

- Informal assessment- student and teachers make judgments about their learning based on discussions.
- Formal assessment- students and teachers making judgments based on success criteria that are shared by students and the teacher before the learning task is carried out.
- Observation – use of checklists, rating scales and rubrics

- Self and peer assessment
- Quizzes
- Tests
- Sample student work
- Projects
- Reports
- Journals/Logs
- Performance reviews
- Portfolios

GRADE 5

Outcomes and Indicators

Strand: Numbers (N)

Sub-strand: Number Concept (N1)

Topic: Place Value and Ordering

Outcome	Indicators
N1.1 Recognise the value of numbers up to 6-digits (999999).	***This is evident when the student:*** a. Uses the vocabulary of comparing and ordering numbers, including symbols such as <, >, ≤, ≥ and =. b. Partitions 6-digit numbers in different ways, including into multiples of 100000, 10000, 1000, 100, 10 and 1. c. Writes numbers presented orally up to 999,999 in figures. d. Reads, writes and says number up to 6-digits in figures and words. *e.* Records numbers up to five digits using expanded notation. *(Eg: 701428 = 700000 + 1000 + 400 + 20 + 8)* f. Recognises that the position of a digit gives its value, in relation to 6-digit numbers and knows what each digit represents.

Topic: Estimating and Rounding

Outcome	Indicators
N1.2 Use the vocabulary of estimation and approximation. Round off whole numbers.	***This is evident when the student:*** a. Use vocabulary of estimation and approximation. b. Rounds integers to the nearest 10, 100 or 1000.

Sub-strand: Addition and Subtraction (N2)

Topic: Understanding Addition and Subtraction

Outcome	Indicators
N2.1 Carry out the operation of addition and subtraction using various strategies and use the related vocabulary to solve simple word problems.	***This is evident when the student:*** a. Uses appropriate vocabulary to support addition and subtraction. b. Recognises that subtraction is the inverse of addition and uses this to check the results.

c. Responds rapidly to oral or written questions, explaining the strategy used. (Eg: 3754 + 30…; Add 700 to 9764…; 18 + 30 + 29…; Add 250, 60, 40, 150 and 3…; What is the sum/total of 226 and 39? And of 13, 64 and 153? How many altogether are 121 and 345? And 61, 237 and 6? Increase 190 by 37, which three numbers could have a total of 450? Are there any others?)

d. Responds rapidly to oral or written questions, explaining the strategy used. (Eg: 127 take away 35…; Take 80 from 373…; 678 subtract 105…; Subtract 50 from 225…; 500 less than 720; What must I take from 220 to leave 55? What is the difference between 155 and 390? How many more than 952 is 1050? How many less than 305 is 94? What must I add to 720 to make 908? Decrease 92 by 78; 570 add a number is 620. What is the number? Find pairs of numbers with a difference of 599…)

e. Finds the value of the missing term(s) in addition and subtraction sentences.

f. Creates addition and subtraction stories.

g. Solve word problems involving addition and subtraction.

Topic: Rapid Recall of Addition and Subtraction facts

Outcome	**Indicators**
N2.2 Derive and recall: doubles of all numbers up to 100, and doubles of multiples of 10 or 100 up to 1000 or 10000 respectively; number pairs that totals 100, and all pairs of multiples of 50 that totals 1000; decimals (ones or tenths) with a total of 1 or 100.	***This is evident when the student:*** a. Derives and recalls doubles of all numbers from 1+1 to 100+100. *b.* Derives and recalls doubles of multiples of 10 from 10+10 to 1000+1000. *(Eg: 680 +680=1360).* *c.* Derives and recalls doubles of multiples of 100 from 100+100 to 10,000+10,000. *(Eg: 7900 +7900=15800).* d. Derives and recalls number pairs that total 100. *(Eg: 36 + 64 = 100, 83 + = 100).* *e.* Derives and recalls all pairs of multiples of 50 that total 1000. *(Eg: 250 + 750 = 1000, + 850 = 1000).* *f.* Derives and recalls decimals (tenths) with a total of 1. *(Eg: 0.3 + 0.7 = 1, + 0.2 = 1).* *g.* Derives and recalls decimals (ones and tenths) with a total of 10. *(Eg: 3.7 + 6.3 = 10; + 8.5 = 10).* h. Derives quickly related facts such as 70+90=160; 0.7+0.9=1.6; 160–90=70; 1.6–0.9=0.7

Topic: Mental Calculation Strategies of Addition and Subtraction

Outcome	Indicators
N2.3 Carry out mental calculations using various strategies such as partitioning, finding small differences and using near doubles. Derive new facts using number facts already known.	***This is evident when the student:***

a. Adds mentally: *(Eg: several small numbers, such as 3 + 5 + 7 + 2 + 9; three multiples of 10, such as 80 + 70 + 40).*

b. Partitions into H, T and U, add and subtract the most significant digits first. (HTU±HTU).

c. Finds a difference by counting up through the next multiple of 10, 100 or 1000. *(Eg: 705 – 287, 7005 – 2994).*

d. Identify near doubles, such as 1.5 + 1.6.

e. Adds/subtracts 9, 19, 29… or 11, 21, 31… by adding/subtracting 10, 20, 30… then adjusting by 1.

f. Given three or more numbers, say or write different sentences relating to these numbers. *(Eg: using only the numbers 125, 237, 352, 77, 202, 477, write as many different addition or subtraction sentences as you can).*

g. Derives quickly related facts such as: *(Eg: 70 + 90 = 160, 160 – 90 = 70, 700 + 900 = 1600, 1600 – 900 = 700, 0.7 + 0.9 = 1.6, 1.6 – 0.9 = 0.7).*

h. Uses known number facts of addition and subtraction to derive new facts.

Topic: Pencil and Paper Procedures of Addition and Subtraction

Outcome	Indicators
N2.4 Develop and refine written methods for addition and subtraction, building on mental methods.	***This is evident when the student:***

a. Uses the method of adding the most significant digits first in adding HTU&HTU, ThHTU&HTU, ThHTU&ThHTU

```
 7587
+ 675
 7000 ]
 1100 ]  add mentally
  150 ]  from top
   12 ]
 8262
```

b. Uses the method 'carrying' in adding HTU&HTU, ThHTU&HTU, ThHTU&ThHTU

```
  3587
+ 675
  4262
   111
```

c. Uses compensation (add too much, take off) method in adding HTU&HTU, ThHTU&HTU, ThHTU&ThHTU

```
  654
+ 286
  954   (654 + 300)
-  14   (286 - 300)
  940
```

d. Uses one of the above methods to add two or more decimal numbers with up to three digits and the same number of decimal places. (know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts.(Eg: 3.2 m ± 350 cm, MVR6.72 + MVR 8.56 + MVR2.30, 72.5 km + 54.6 km).

e. Uses the method counting up from the smaller to the larger number (complementary addition) in subtracting HTU&HTU, ThHTU&HTU, ThHTU&ThHTU

```
  754
- 286
  454    (754 - 300)
+  14    (since 300 - 285 = 14)
  468
```

f. Uses the standard method in subtracting HTU&HTU, ThHTU&HTU, ThHTU&ThHTU

```
   5 13 16
   6 4 6 7
-  2 6 8 4
   3 7 8 3
```

g. Uses the compensation (take too much, add back) method in subtracting HTU&HTU, ThHTU&ThHTU

```
  754                          754
- 286                        - 286
   14   to make 300             14   (300)
  400   to make 700            400   (754)
   54   to make 754            454
  468                          468
```

h. Uses one of the above methods to find the difference between two decimal numbers with up to three digits and the same number of decimal places. (know that decimal points should line up under each other). (Eg: MVR 9.42 – MVR 6.78 OR 72.5 km – 4.6 km).

Sub-strand: Multiplication & Division (N3)

Topic: Understanding Multiplication and Division

Outcome	Indicators
N3.1 Carry out the operation of multiplication or division using various strategies such as repeated addition, sharing, and modeling. Solve simple word problems involving four operations and explain the process.	***This is evident when the student:*** a. Uses appropriate vocabulary to support multiplication and division. b. Recognises that division is the inverse of multiplication and uses this to check the results. c. Responds rapidly to oral or written questions, explaining the strategy used. (Eg:Two twelves, Double 32, 7 times 8… 9 multiplied by 7, Multiply 31 by 8… by zero… by 1, Is 81 a multiple of 3? How do you know?, What is the product of 25 and 4?, Find all the different products you can make by using three of these: 6, 7, 8, 9, 11.) d. Responds to oral or written questions, explaining the strategy used. (Eg: Share 48 between 8; Divide 56 by 7. Divide 3 into 72. How many groups of 8 can be made from 73? What is the remainder when 74 is divided by 8? How many lengths of 20 cm can you cut from 270 cm? Is 156 divisible by 6? How do you know? What are the factors of 36? Tell me two numbers with a quotient of 100). e. Gives a quotient as a fraction when dividing by a whole number. (Eg: 43 ÷ 9 = 47⁄9). f. Gives a quotient as a decimal number when dividing by 10, 5, 4 or 2. (Eg: 351 ÷ 10 = 35; 1 61 ÷ 4 = 15.25). g. Finds the value of the missing term(s) in multiplication or division sentences. (Eg: 3 × 2 = ; × 4 = 8; × = 16; 8 ÷ = 4; ÷ 2 = 5) h. Uses the principles (but not the names) of the commutative, associative and distributive laws as they apply to multiplication: Example of commutative law: 8 × 65 = 65 × 8 Example of associative law: 14 × 12 = (2 × 7) × 12 = 2 × (7 × 12) = 2 × 84 = 168 Example of distributive law: 26 × 7 = (20 + 6) × 7 = (20 × 7) + (6 × 7) = 182, (6 × 15) + (4 × 15) = 10 × 15 = 150

i. Uses brackets: recognises that they determine the order of operations, and that their contents are worked out first. *(Eg:3 + (6 × 5) = 33, whereas (3 + 6) × 5 = 45.)*

j. Relates division and fractions. Recognises that: 1⁄3 of 24 is equivalent to 24 ÷ 3 or 24⁄3; 16 ÷ 5 is equivalent to 16⁄5 or 31⁄5.

k. Knows and applies tests of divisibility by 2, 4, 5, 10 or 100.

l. Begins to express a quotient as a fraction or as a decimal when dividing a whole number by 2, 4, 5 or 10, or when dividing Rufiyaa and Laari.

m. Rounds up or down after division, depending on the context.

n. Estimates by approximating (round to nearest 10 or 100), then check result.

o. Checks the result with the inverse operation or with an equivalent calculation.

p. Creates multiplication and division stories.

q. Solves word problems involving multiplication and division.

r. Explains how an answer to a multiplication or division problem was obtained.

s. Uses all four operations to solve simple word problems involving numbers and quantities based on 'real-life' and money using one or more steps.

Topic: Rapid Recall of Multiplication and Division

Outcome	**Indicators**
N3.2 Respond to oral or written questions and questions phrased differently. Know by heart or derive doubles and halves rapidly.	***This is evident when the student:***
	a. Responds rapidly to oral or written questions: (Eg: Nine sevens;
	b. How many eights in 48? 6 times 7, 5 multiplied by 9; multiply 9 by 6; 7 multiplied by 0; Divide 38 by 9; what is 48 shared between 8? Three divided by 5; One seventh of 35).
	c. Derives: doubles of all numbers 1 to 100; doubles of multiples of 10 up to 1000; doubles of multiples of 100 up to 10 000; and all the corresponding halves.

d. Responds rapidly to oral or written questions. (Eg: Double 71⁄2… 98… 680… 8500…; Half of 154… of 820… of 5600…; Twice 85, 1⁄2 of 920; Half of one half; What is half of Rf 162? How many millimetres is half a metre)?

e. Knows by heart and recalls multiplication tables of 2, 3, 4, 5, 6, 7, 8, 9 10, 11 and 12.

f. Knows by heart the squares of all numbers from 1 × 1 to 12 × 12.

Topic: Mental Calculations Strategies of Multiplication and Division

Outcome	Indicators
N3.3 Derive new facts, using closely related facts already known, and doubling or halving. Use known number facts and place value to multiply or divide mentally.	***This is evident when the student:***

a. Uses related facts and doubling or halving to derive new facts.

Eg: Work out the 16 times-table facts by) doubling the 8 times-table facts; double a number ending in 5, and halve the other number. ie: 16 × 5 = 8 × 10; halve an even number in the calculation; find the product, then double it. ie: 13 × 14 is equal to 13 × 7 = 91; 91 × 2 = 182; to multiply by 50; multiply by 100, then halve. ie: 36 × 50 is equal to 36 × 100 = 3600; 3600 ÷ 2 = 1800; Work out: 1 × 25 = 25 and so deduce that: 2 × 25 = 50; 4 × 25 = 100; 8 × 25 = 200, 16 × 25 = 400 …; Use combinations of these facts to work out other multiples of 25, ie: 25 × 25 = (16 × 25) + (8 × 25) + (1 × 25) = .(625

b. Explains how to find sixths by halving thirds, or twentieths by halving tenths. (Eg: one sixth of 300 is 50, one third of 300 is 100, half of that is 50, one twentieth of 900 is 45, one tenth is 90, and half of that is 45).

c. Multiplies and divides any positive integer up to 10 000 by 10 or 100 and understand the effect. (place value)

d. Uses closely related facts. (Eg: multiply by 19 or 21 by multiplying by 20 and adjusting; develop the 12 times table from the 10 and the 2 times tables).

e. Uses the distributive law and partitioning to multiply. [Eg: 47 × 6 = (40 × 6) + (7 × 6)].

f. Uses known number facts and place value to multiply or divide mentally. (Eg: Multiply a two-digit multiple of 10 by a three-digit multiple of 100. ie: 30 × 400, 40 × 700; Divide a four-digit multiple of 100 by 1000, 100 or 10. ie: 8200 ÷ 100, 3600 ÷ 10; Double any multiple of 5 up to 500; Halve any three-digit multiple of 10; Multiply a two-digit multiple of 10 or a three-digit multiple of 100 by a single-digit number; Multiply a two-digit whole number by any single-digit number).

Topic: Pencil and Paper Procedure of Multiplication and Division

Outcome	**Indicators**
N3.4 Develop and refine written methods for multiplication and division.	***This is evident when the student:***

a. Approximates the answer first and uses the written methods to calculate the answer.

b. Uses grid method in multiplying (HTU × U and TU × TU). (Eg: 346 × 9, 72 × 38).

346 × 9

×	300	40	6
9	2700	360	54

= 3114

c. Uses partitioning method in multiplying (HTU × U and TU × TU) (Eg: 346 × 9, 72 × 38).

346 leading to

300 x 9 = 2700
40 x 9 = 360
6 x 9 = 54
3114

346 x 9 = 3114
45

72 x 30 = 2160
72 x 8 = 576
2736
1

72 x 38

d. Multiply one digit number by a decimal with one decimal place. (Eg: 4.9 × 3).

4.9 x 3

4.0 x 3 = 12.0
0.9 x 3 = 2.7
14.7

e. Uses multiples of the divisor method in dividing (HTU ÷ U). (Eg: 256 ÷ 7)

f. Uses standard division method in dividing (HTU ÷ U). (Eg: 196 ÷ 6)

```
 6) 196
  - 180   30 × 6
    16
  -  12    2 × 6
     4
```

```
    32 R 4
6)196
  18
  16
  12
   4
```

Answer: 32 R 4

977 ÷ 36

977
− 360 (10 × 36)
617
− 360 (10 × 36)
257
− 180 (5 × 36)
77
72 (2 × 36)
5

Answer: $27\frac{5}{36}$

Sub-strand: Money (N4)

Topic: Money

Outcome	Indicators
N4.1 Carry out simple conversions and transactions and solve word problems by explaining the process.	***This is evident when the student:*** a. Produces the fewest of notes and coins to express a given amount. b. Represents a sum of money by two or more combinations of notes and coins. c. Uses the decimal notation and the appropriate unit to represent money amounts. d. Pays appropriate amounts and determines appropriate change in shopping. e. Converts amounts of money, Rufiyaa to Laari, and Laari to Rufiyaa. f. Adds or subtracts money amounts. g. Makes simple conversions of Rufiyaa to foreign currency *h.* Recognises which goods are cheaper. *(Eg. 3 fish for MVR 10 or 7 fish for MVR 20).* i. Makes bill for a given price list of items. j. Solves word problems in the context of money involving one or more steps, and explains how the problem was solved.

Sub-strand: Negative Numbers (N5)

Topic: Negative Numbers

Outcome	Indicators
N5.1 Orders and carry out addition and subtraction and do problem solving, using integers.	***This is evident when the student:*** a. Orders a set of integers. b. Compares two integers using the relation symbols (<, >). c. Adds, subtracts, multiplies and divides integers using cards. d. Solves problems involving (positive and negative) integers.

Sub-strand: Fractions, Decimals and Percentages (N6)

Topic: Fractions

Outcome	Indicators
N6.1 Recognise the equivalence between fractions and compare them in practical contexts, relates fraction as a part of a whole, form fraction word problems and order familiar fractions and convert one form of fraction to the other and express them in the simplest form.	***This is evident when the student:*** a. Uses fraction notation, including mixed numbers, and the vocabulary numerator and denominator. b. Recognises when two simple fractions are equivalent, including relating hundredths to tenths. (Eg. 70/100 = 7/10). c. Relates fractions to division. (Eg: Understand that finding one third is equivalent to dividing by 3, so 1⁄3 of 15 is equivalent to 15 ÷ 3; when 3 whole cakes are divided equally into 4, each person gets three quarters, or 3 ÷ 4 = 3⁄4; recognise that 12⁄3 is another way of writing 12 ÷ 3). d. Finds fractions of numbers or quantities and recognises from practical work.(Eg: one quarter is more than one eighth; one third is more than one ninth; two thirds is less than three quarters). e. Places unit fractions in order and explains the order either in objects, diagrams or words. f. Orders fractions by converting to a common denominator and positioning them on a number line. (Eg: Place these in order, smallest first: 1⁄2, 11⁄2, 2, 1⁄4, 13⁄4). g. Forms fractions to word problems such as: • What fraction of Rf 2 is 65 L? • What fraction of 1 litre is 750 ml? • What fraction of 1 day is 6 hours? I work for 8 hours and sleep for 10 hours. What fraction of the day do I sleep? What fraction of the day do I work? h. Changes an improper fraction to a mixed number and vice versa. i. Reduces a fraction to its simplest form by cancelling common factors in the numerator and denominator. j. Solves word problems involving fraction of quantities. (Eg: Riza had 48 cars. He gave away 3/4 of them. How many does he have left)?

Topic: Fraction Operations using Visualisation

Outcome	Indicators:
N6.2 Find fractions that total 1. Carry out four operations involving simple fractions.	***This is evident when the student:*** a. Finds two or more simple fractions with a total of 1 (using fraction strips or fraction circles). Uses a calculator to check the answer. Categorise their answers to 'exact' and 'approximate' answers. (Eg: 1/2+2/8+1/4 (exact), 1/2+1/5+2/12+1/8 approximation). b. Adds and subtracts two proper fractions having the same denominators. c. Adds and subtracts two simple fractions whose denominators are multiples. Eg: thirds and sixths, fifths and tenths. d. Multiplies two simple fractions. e. Divides two simple fractions.

Topic: Fractions and Decimals

Outcome	Indicators
N6.3 Reads, writes and says decimal numbers using decimal notations, and recognises the relationship between decimals and fractions and orders a set of decimal fractions.	***This is evident when the student:*** a. Recognises the place value of digits in a decimal number up to the hundredths place. b. Reads, writes and says decimal numbers up to the hundredths place. c. Relates decimal notation for tenths and hundredths to money and measurement. d. Writes the decimal number equivalent to 2/10, 5/100, 29/100, 15/100, 9/100 etc. e. Counts on or back in steps of 0.1 and 0.01. f. Positions one-place and two-place decimals on a number line. g. Orders a set of numbers or measurements with up to two decimal places. h. Gives a decimal number lying between two others Eg: between 3.4 and 3.5 i. Rounds a number with one or two decimal places to the nearest whole number. j. Investigates the equivalence between decimal numbers and fractions using base 10 apparatus, metre ruler and calculators.

k. Recognises the equivalence between the decimal numbers and fractions. Forms of one half, one quarter, three quarters and tenths and hundredths. *(Eg: 0.5 = 1⁄2, 0.25 = 1⁄4, 0.75 = 3⁄4, 0.3 = 3⁄10, 0.15 = 15/100)*

Topic: Fractions, Decimals and Percentages

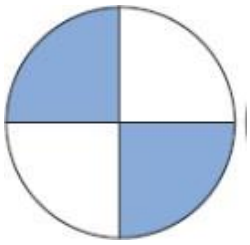
Outcome	Indicators
N6.4 Identify percentage as the number of parts in every 100, recognise the equivalence between percentages, fractions and decimals and workout simple percentages and solve simple problems.	***This is evident when the student:***

a. Begins to understand percentage as the number of parts in every 100.

b. Expresses one half, one quarter, three quarters and tenths and hundredths, as percentages. (Eg: one whole = 100%, one half = 50%, one quarter = 25%, three quarters = 75%, one tenth = 10%)

c. Recognises the equivalence of percentages, fractions and decimals. (Eg: 10% = 0.1 = 1⁄10, 25% = 0.25 = 1⁄4, 20% = 0.2 = 1⁄5, 50% = 0.5 = 1⁄2, 1% = 0.01 = 1⁄100, 75% = 0.75 = 3⁄4)

d. Expresses the shaded fraction of a shape as a percentage. Eg: What percentage of the shape is shaded?



e. Express simple fractions as percentages.

f. Finds simple percentages of small whole number quantities.

g. Finds percentages by doubling. (Eg: 10% of MVR 500 = MVR50, 20% of MVR 500 = MVR100, 40% of MVR 500 = MVR 200, 80% of MVR 500 = MVR 400)

h. Finds percentages by using halving and quartering. (Eg: To find 75% of MVR 300, 50% is one half = MR 150, 25% is one quarter = MVR 75, 75% is three quarters = MVR 225)

i. Solves simple problems involving percentages. (Eg: 35% of the children in a class are boys. What percentage are girls?, Aisha got 40 marks out of 80 in her Maths test. Ali got 45%. Who did better: Aisha or Ali?)

Sub-strand: Ratio and Proportion (N7)

Topic: Proportion

Outcome	Indicators
N7.1 Use ratios to compare two quantities, relate fractions to simple proportions and solve simple problems involving ratio and proportion.	***This is evident when the student:*** a. Uses ratios to compare two quantities. b. Relates fractions to simple proportions. c. Simplifies ratios with whole numbers. d. Solve simple problems using ideas of ratio and proportion. (Do not use the cross multiplication method). (Eg: Fish must be cooked 25 minutes for every kg. How long does it take to cook a 4 kg fish? At the restaurant there are 2 men for every 3 women. There are 15 women at the restaurant. How many men are there? There are 12 men at the restaurant. How many women are there? Shiuna uses 3 tomatoes for every 1⁄2 litre of sauce. How many tomatoes does she need for 1 litre of sauce? How much sauce can she make from 15 tomatoes? A mother cat is fed 5 fish for every 2 fish for its kitten. Ali fed the mother cat 15 fish. How many fish did its baby kitten get? Ali fed the baby kitten 8 fish. How many fish did its mother get? For every MVR 50 note Mum gives to Dad, he gives her five MVR 10 notes. Dad gave Mum twenty-five MVR 10 notes. How many MVR 50 notes did Mum give him?)

Strand: Measurement (M)

Sub-strand: Length (M1)

Topic: Length

Outcome	Indicators
M1.1 Recognise and use relationships between familiar units and draw lines and measure them with accuracy using appropriate equipment, suitable units and solve problems. Estimate and record length/distance to a suitable degree of accuracy.	***This is evident when the student:*** a. Uses vocabulary related to measures (length). *b.* Estimates and check lengths and distances using standard units of measurements. *(Eg: how wide/ high the front fence of the school is, the thickness of a set of playing cards)* c. Suggests suitable units and measuring equipment to estimate or measure length. d. Measures and draws lines to the nearest millimetre. e. Recognises that a mile is a bit more than 1.5 km (about 1600 metres). f. Uses the abbreviations km, m, cm, mm correctly. g. Reads a scale to the nearest marked division. h. Records estimates and readings from scales to a suitable degree of accuracy. i. Converts larger to smaller units and vice versa. *(Eg: km to m, m to cm or mm).* j. Chooses appropriate number operations and calculation methods to solve measurement word problems and explains how the problem was solved.

Sub-strand: Mass (M2)

Topic: Mass

Outcome	Indicators
M2.1 Recognise and use relationships between familiar units and measure objects with accuracy using appropriate equipment, suitable units and solve problem. Estimate and record mass to a suitable degree of accuracy.	***This is evident when the student:*** a. Uses vocabulary related to measures (mass). b. Estimates and checks masses of objects using standard units of measurements such as the total weight of three similar parcels. c. Suggests suitable units and measuring equipment to estimate or measure mass. *d.* Recognises and uses the relationship between units of mass. *(Eg: 1 kg = 1000 g, 1 g = 1000 mg).*

e. Uses the abbreviations kg, g and mg correctly.

f. Reads and records a scale to the nearest marked division.

g. Records estimates and readings from scales to a suitable degree of accuracy.

h. Converts larger units to smaller units. *(Eg: kg to g and g to mg).*

i. Chooses appropriate number operations and calculation methods to solve measurement word problems and explains how the problem was solved.

Sub-strand: Capacity (M3)

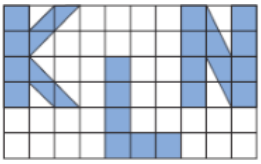
Topic: Capacity

Outcome	Indicators
M3.1 Recognise and use relationships between familiar units and measure capacity with accuracy using appropriate equipment, suitable units and solve problems. Estimate and record mass to a suitable degree of accuracy.	***This is evident when the student:*** a. Uses vocabulary related to measures (capacity) b. Estimates and checks, the capacity of containers using standard units, measurements such as the amount of rainfall collected in a week c. Suggests suitable units and measuring equipment to estimate or measure capacity. *d.* Recognises and uses the relationship between units of capacity. *(Eg: 1 litre = 1000 ml =1000 cm^3).* e. Uses the abbreviations l, ml, cm^3 correctly. f. Reads and records a scale to the nearest marked division. g. Records estimates and readings from scales to a suitable degree of accuracy. *h.* Converts larger units to smaller units. *(Eg: l to ml).* i. Chooses appropriate number operations and calculation methods to solve measurement word problems and explains how the problem was solved.

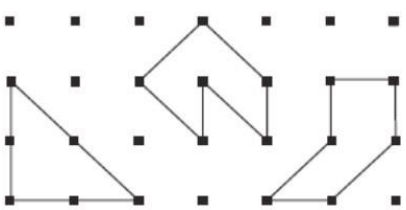
Grade 5

Sub-strand: Perimeter, Area and Volume (M4)

Topic: Perimeter

Outcome	Indicators
M4.1 Recognise and use the vocabulary related to perimeter. Calculate the perimeter of simple shapes using the formula. Solve problems involving perimeter of simple shapes.	***This is evident when the student:*** a. Uses vocabulary related to perimeter. b. Measures and calculate perimeters of simple shapes and regular polygons. c. Draws some shapes on squared paper. Measures the perimeters to the nearest mm.  d. Expresses the formula for the perimeter of a rectangle as 'twice length, twice breadth'. e. Solves problems involving perimeter of rectangles/ squares and simple shapes. (Eg: The perimeter of a rectangle is 72 cm. The shortest side is 9 cm. What is the length of the longest side?)

Topic: Area and Perimeter

Outcome	Indicators
M4.2 Use the vocabulary related to area. Measure and calculate the area of compound shapes. Explore the relationship between the area of rectangles and squares. Apply and use the appropriate formula to calculate area. Investigate and solve problems involving perimeter and area.	***This is evident when the student:*** a. Uses vocabulary related to area. b. Makes a metre square using newspaper. Finds that 1 square metre is 10 000 cm^2. c. Calculates the areas of compound shapes that can be split into simple shapes. d. Identifies and explains the relationship between area of rectangles and right-angled triangles. e. Uses formulae to calculate the areas of squares, rectangles and triangles. f. Uses the abbreviations km, m, cm, mm, km^2, m^2, cm^2, mm^2 correctly. g. Draws different shapes on dot paper that have the same area. Finds which shape has the longest perimeter.  h. Designs and makes a rectangle, and a square that has equal area.

i. Suggests areas you would measure in m^2, cm^2, mm^2

j. Uses knowledge of perimeter and area to investigate and solve a given problem. Explain methods and reasoning ued to solve the problem.

Topic: Volume

Outcome	Indicators
M4.3 Know the meaning of volume. Understand and use the vocabulary related to volume. Estimate, measure or calculate the volume of regular and irregular objects.	***This is evident when the student:*** a. Uses vocabulary related to volume. b. Selects a cube with a volume of one centimetre cube from a collection of other cubes. c. Estimates the volume of 3D objects represented in photographs and isometric drawings in cubic centimetres and checks by building and counting. d. Measures and calculates the volumes of boxes (cubes and cuboids). e. Calculates the volume of an irregular object (Eg, potato) by submerging it in water and measuring the displaced water. f. Uses formulae to calculate the volume of cubes and cuboids. g. Records volume using the abbreviations cm^3 and m^3.

Sub-strand: Time (M5)

Topic: Time

Outcome	Indicators
M5.1 Use vocabulary related to time. Estimate the duration of an event in time units. Read, tell and record time using a 24-hour clock. Read calendar and find the relationship between the units of time. Solve word problems involving time. Read and interpret time tables.	***This is evident when the student:*** a. Uses vocabulary related to time. b. Uses units of time; read the time on a 24-hour digital clock and uses 24-hour clock notation, such as 19:53. Uses timetables. c. Converts between 24-hour notation and am/pm. d. Recognises and uses that 1 millennium = 1000 years, 1 century = 100 years, 1 decade = 10 years, 1 year = 12 months or 52 weeks or 365 days, 1 leap year = 366 days, 1 week = 7 days, 1 day = 24 hours, 1 hour = 60 minutes, 1 minute = 60 seconds e. Estimates using standard units of time. (Eg: the total hours of darkness in a month, how long it takes to run a marathon, the time you spend on sleeping, eating, praying… etc). f. Uses a stop watch or other timers to measure and compare the times of events.

g. Suggests a unit to estimate or measure. (Eg: how long does it take to grow a Banyan (Nika) tree, the age of an old Conifer (Fithuroanu) tree).

h. Responds to oral and written questions: (Eg: Would you expect: to roast a chicken in 2 hours, 5 hours or 10 hours, to walk a kilometre in 10 min, 50 min or 90 min? ,Have you lived more or less than 3650 days?/100 000 hours?)

i. Reads and interprets school time tables. (Eg: What is the duration of a period? Which subject gets the most time? How many hours do you spend in school for a week? How much time you spend on Maths each day, each week, each term, each year?)

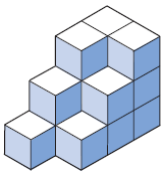
j. Carry out addition and subtraction of time. (Hr, min and sec)

k. Solves word problems involving time.

Strand: Shape and Space (SS)

Sub-strand: 3D Shapes (SS1)

Topic: 3D Shapes

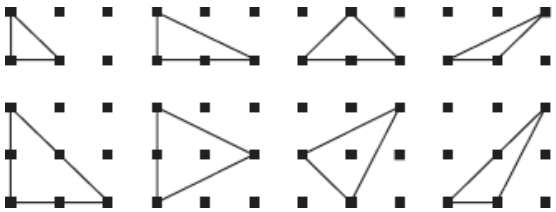
Outcome	Indicators
SS1.1 Recognise, name, sort, and make models of 3D objects. Describe them using everyday language. Identify 3D shapes from pictures of them. Sketch all faces of 3D shapes on paper. Make double layered solids as in pictures using cubes. Make skeleton models of 3D shapes. Begin to identify the cross section of prisms. Visualise 3 dimensions from 2D drawings. Identify and sketch different nets.	***This is evident when the student:*** a. Uses mathematical vocabulary to describe 3D objects (cubes, cuboids, cylinders, spheres, hemisphere, cones, tetrahedron, prism, pyramid and polyhedron). b. Counts the number of faces and edges. Recognises properties such as that, all pyramids have an even number of edges; the number of straight edges in a prism is a multiple of 3; the number of faces of a pyramid is one more than the number of edges of the base; the number of faces of a prism is two more than the number of edges of an end face. c. Recognises that in a polyhedron: each face is a flat surface and is a polygon: an edge is the straight line where two faces meet: a vertex is the point where three or more edges meet. d. Classifies solids according to properties such as: the shapes of the faces; the number of faces, edges, vertices; whether or not any face is right-angled; whether the number of edges meeting at each vertex is the same or different. e. Recognises that a prism has two identical end faces and the same cross-section throughout its length. f. Visualises 3-D shapes from 2-D drawings. g. Finds the least number of unit cubes needed to turn this shape into a cuboid.  h. Makes skeleton models of cubes, cuboids, tetrahedron, prism, pyramid and polyhedron using eakles (iloshi) and modelling clay. i. Sketches top, front and side views of cuboids, cylinders, spheres, hemisphere, cones and tetrahedron

j. Sketches 3D objects (cubes, cuboids, prisms and pyramids) using isometric dot paper.

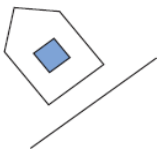
k. Identifies and sketches different nets for closed cubes and cuboids.

Sub-strand: 2D Shapes (SS2)

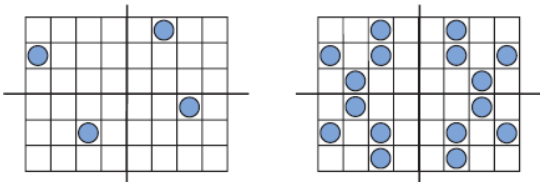
Topic: 2D Shapes

Outcome	Indicators
SS2.1 Recognise, name, sort, and draw 2D shapes. Describe them using everyday language. Recognise properties of rectangles. Sketches the reflection of a simple 2-D shape. Construct parallel lines. Identify and draw lines of symmetry. Know the position of a shape after translation. Investigate about familiar shapes.	***This is evident when the student:*** a. Uses mathematical vocabulary to describe 2D shapes (circles, semi circles, triangles, equilateral triangles, isosceles triangles, scalene triangles, quadrilaterals, rectangles, squares, oblongs, polygons, pentagons, hexagons, heptagons and octagons). b. Recognises that a diagonal is a straight line drawn from a vertex of a polygon to a non-adjacent vertex. c. Recognises properties of rectangles such as: • all four angles are right angles • opposite sides are equal • the diagonals bisect one another. d. Classifies triangles using criteria such as: • equal sides and equal angles • lines of symmetry. • Displays them on a Venn or Carroll diagram. e. Builds up various shapes by using all seven pieces of tangram. f. Uses a pin board to make shapes. (Eg: make different triangles on 3 × 3 pin board and different squares on a 5 × 5 pin board. Discusses properties such as which of these triangles are scalene, or which has the greatest area.)  g. Constructs parallel lines using setsquares and compasses. h. Identifies and draws all lines of symmetry of given 2D shape. i. Investigates the lines of symmetry in regular polygons. Discovers that the number of lines of symmetry in a regular polygon is equal to the number of sides. Eg: a square has four lines of symmetry and an equilateral triangle has three.

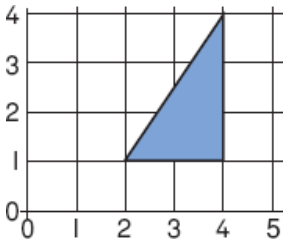
j. Sketches the reflection of a simple shape in a mirror line parallel to one edge, where the edges of the shape are not all parallel or perpendicular to the mirror line.



k. Recognises where a shape will be after a translation.



l. Makes and investigates a general statement about familiar shapes by finding examples that satisfy it.



m. Completes symmetrical patterns with two lines of symmetry at right angles.

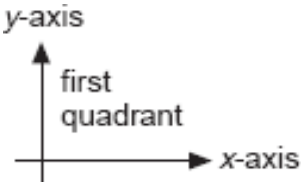
n. Sketch the position of a simple shape after it has been translated, say, 2 units to the left.

Sub-strand: Positions and Directions (SS3)

Topic: Position and Direction

Outcome	Indicators
SS3.1 Describe positions and directions. Give directions and follow short paths, draw simple paths and in formal maps. Read and plot co-ordinates. Interpret and describe location and direction using grid references.	***This is evident when the student:***

a. Reads and plots co-ordinates in the first quadrant.

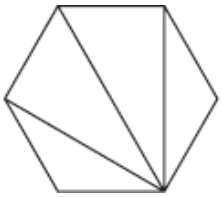


b. Responds to questions such as: (Eg: These points are the co-ordinates of the vertices of a shape: (1, 5), (2, 5), (4, 3), (2, 1), (1, 1). What is the name of the shape?, Three of the vertices of a square are (2, 1), (2, 4) and (5, 4). What are the co-ordinates of the fourth vertex?)

c. Recognises that: perpendicular lines are at right angles to each other, parallel lines are the same distance apart.

d. Recognises and identifies parallel and perpendicular lines in the environment and in regular polygons such as the square, hexagon and octagon.

e. Recognises that a diagonal is a straight line drawn from a vertex of a polygon to a non-adjacent vertex. Eg: Draw all the diagonals of a shape such as a pentagon or an octagon.



3 of the 9 diagonals of a hexagon

f. Draws a rough sketch of a path travelled.

g. Makes rough sketches of maps which show a sense of scale.

h. Describes the path from one place to another.

Sub-strand: Angles (SS4)

Topic: Angles

Outcome	Indicators
SS4.1 Approximately measure angles using a paper protractor. Identify types of angles, estimate or measure to the nearest 5°. Calculate angles on a straight line. Rotate and make patterns. Bisect the given line.	***This is evident when the student:***

a. Knows that angles are measured in degrees.

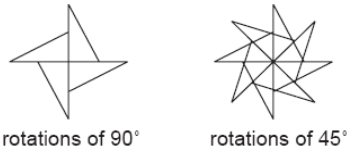
b. Makes a paper protractor which shows 15° divisions. Uses the paper protractor to measure angles approximately.

c. Says which of these angles are acute, and which are obtuse. Estimates the size of each angle to the nearest 5°.

d. Use a protractor to measure and draw acute and obtuse angles to the nearest 5°.

e. Calculate angles in a straight line.

f. Make patterns by rotating shapes.



rotations of 90° rotations of 45°

g. Bisects a given line.

Strand: Chance and Handling Data (CH)

Sub-strand: Handling Data (CH1)

Topic: Handling Data

Outcome	Indicators
CH1.1 Solve a given problem by organising, representing and interpreting data in simple tables or diagrams. Construct and interpret bar charts, bar line charts or line graphs. Find the mode of a set of data, and begin to find the range.	***This is evident when the student:*** a. Uses two way Venn and Carroll diagrams to display information about polygons, using criteria such as number of right angles, whether or not they are regular, symmetry properties. b. Solves a given problem by organising, representing and interpreting data in simple tables or diagrams. Constructs and interpret bar charts, bar line charts or line graphs. Find the mode of a set of data, and begin to find the range. c. Constructs bar graphs and bar line charts. Intervals labeled in 2s, 5s,10s, 20s or 100s. d. Discusses questions such as: (Eg: Which number was rolled most often?, Was this what you would have expected? Why? Do you think the next time you roll the dice you are more likely to roll a 2 than a 6? Why? What do you think will happen if you roll the dice 50 more times? Now try it and see). e. Draws and interprets a line graph. Understands that intermediate points may or may not have meaning. (Eg:Temperature of an air-conditioned Hall). f. Finds the mode of a set of data. Begins to find the range of a set of data.

Sub-strand: Probability (CH2)

Topic: Probability

Outcome	Indicators
CH2.1 Use the language associated with probability to generate discussion. Order chance events and conduct simple experiments.	***This is evident when the student:*** a. Uses the language of chance eg certain, uncertain, likely, unlikely, possible, impossible, less/more likely, maybe. b. Discusses the chance or likelihood of particular events.

Eg: Discuss statements like: I doubt whether I will catch the 7 o'clock ferry; Snakes and Ladders is not a fair game because the first player has the best chance of winning; There is high risk of catching a cold these days; Match one of these words to each of the statements below:

CERTAIN LIKELY UNLIKELY IMPOSSIBLE

I will watch television tonight.

It will rain next July.

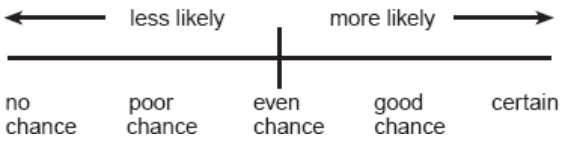
I will grow taller than my mother.

It will get dark tonight.

I will see my father on my way home.

c. Makes simple predictive statements about everyday events using the language of chance. (Eg: 'Maldivian National Football team has "good chance" of winning SAFF championship').

Place the statements on this scale:



d. Orders chance events from least likely to most likely. (Eg: for a die with faces 1, 1, 2, 2, 2, 3 state that a 2 is most likely, 1 is next and 3 is least likely).

e. Conducts simple experiments using a coin, a dice, or a spinner, and records the results. (Eg: How many heads and how many tails might turn up if a coin is tossed 10 times, 20 times, 30 times...)?

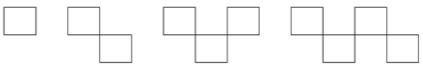
Strand: Patterning and Algebra (PA)

Sub-strand: Sequences and Properties of Numbers (PA1)

Topic: Number Sequences

Outcome	Indicators
PA1.1 Describe, copy, predict and extend simple patterns. Create simple patterns using familiar materials. Describe the term to term rule for a simple number sequence.	***This is evident when the student:***

a. Makes and records different stick patterns and predicts the number of sticks and corners for later terms. Eg:



Squares	1	2	3	4	5	6
Sticks	4	8	12	16		
Corners	4	7	10	13		

Triangles	1	2	3	4	5	6
Sticks	3	6	9	12		
Corners	3	5	7	9		

b. Describes and extends number sequences such as. Eg:

- 24, 14, 4, -6, __, __, _
- The rule is : -10
- -5, 0, 5, __, __, _
- The rule is _____
- 3, 6, 9, 12,____,____, ____
- The rule is _____
- 7, 14, 21, 28,____,____, ____
- The rule is _____

c. Describes and extends simple number involving decimal numbers.

Eg:

- 0.1, 0.2, 0.3, 0.4,____,_____, _____
- The rule is _____
- 0.2, 0.4, 0.6, 0.8,____,____, _____
- The rule is _____
- 0.4, 0.8, 1.2, 1.6,____,_____, _____
- The rule is _____
- 0.5, 1, 1.5, 2,____,_____, _____
- The rule is _____

	d. Makes three number sequences (one easy, one medium and one hard) for someone else to solve. e. Create as many numbers in the given sequence in one minute Eg: The first number of the sequence is 509. This increases by 16 and decreases by 9. Eg: 509, 525, 516, 532, 523, 539, ... The first number of the sequence is 295. This decreases by 11 and increases by 15. Eg: 295, 284, 299, 288, 303, 292,..

Topic: Properties of Numbers

Outcome	Indicators
PA1.2 Makes a general statement about odd and even numbers regarding some of their properties. Find prime numbers. Recognises square numbers.	***This is evident when the student:*** a. Makes general statements about odd or even numbers, including the outcome of sums and differences. b. Finds the lowest common multiple of two small numbers. c. Finds all the pairs of factors of any number up to 100. d. Finds prime numbers less than 50 using Sieve of Eratosthenes method. e. Recognises squares of numbers to at least 12×12.

Sub-strand: Algebraic Techniques (PA2)

Topic: Algebraic Techniques

Outcome	Indicators
PA2.1 Model algebraic expressions and carry out addition and subtraction.	***This is evident when the student:*** a. Models algebraic expressions using objects. Eg: %%%%= 4% !!!!!!!!= 8! b. Uses objects to add and subtract simple algebraic expressions. Eg: ff + fff = 2f + 3f = 5f 11j – 7j = 4j

c. Adds and subtracts simple algebraic expressions. Eg:
b + b + b + b + b + b + b + b + b = 9b
2a + 3a = 5a
8x – 5x = 3x

d. Completes number sentences such as:
12 + ? = 20
? × 5 = 125
3 + ? = 5 + 3
48 ÷ 6 = ? × 8
5 + ? = 12 - 4
3 + ? = -7

Sub-strand: Investigations, Puzzles and Problems (PA3)

Topic: Investigations Puzzles and Problems

Outcome	Indicators
PA3.1 Describe and solve simple mathematical problems and puzzles and explain the process.	***This is evident when the student:*** a. Solves mathematical problems and puzzles, recognises and explains patterns and relationships, generalises and predicts. b. Explains the method used by reasoning orally and in writing. c. Suggests extensions by asking, What if?

GRADE 6

Outcomes and Indicators

Strand: Numbers (N)

Sub-strand: Number Concept (N1)

Topic: Place Value and Ordering

Outcome	Indicators
N1.1 Recognise the value of numbers up to 7-digits (999999).	***This is evident when the student:*** a. Writes numbers presented orally up to 9,999,999 in figures. b. Reads, writes and says number up to 7-digits (millions) in figures and words. c. Recognises that the position of a digit gives its value, in relation to 7-digit numbers and knows what each digit represents.

Topic: Estimating and Rounding

Outcome	Indicators
N1.2 Use the vocabulary of estimation and approximation. Round off whole numbers.	***This is evident when the student:*** a. Uses vocabulary of estimation and approximation. b. Rounds an integer to the nearest 10, 100 or 1000. (consolidation)

Sub-strand: Addition and Subtraction (N2)

Topic: Understanding Addition and Subtraction

Outcome	Indicators
N2.1 Carry out the operation of addition and subtraction using various strategies and use the related vocabulary to solve simple word problems.	***This is evident when the student:*** a. Uses appropriate vocabulary to support addition and subtraction. b. Responds rapidly to oral or written questions, explaining the strategy used. (Eg: Add 4250 to 3536… 66 add 314 add 750…, Add 1200, 400, 600, 1200 and 15; What is the sum/total of 753 and 227? And of 93, 62 and 25? How many altogether are 854 and 622? And 91, 88 and 6? Increase 250 by 420; Which three numbers could have a total of 1? Are there any others)?

c. Responds rapidly to oral or written questions, explaining the strategy used. (Eg: 750 take away 255… Take 300 from 1240…, 3500 subtract 2050…; Subtract 2250 from 8500…; 1700 less than 2500…; 3000 less than 10 220…; What must I take from 8.4 to leave 2.6? What is the difference between 2.2 and 6.5? How much more than 23.4 is 24.9? How much less than 6.8 is 4.2?; What must I add to 5.4 to make 9.3? Decrease 5.6 by 1.9; 2.8 add a number is 4.3. What is the number? Find pairs of numbers with a difference of 13.5…)

d. Finds the value of the missing term(s) in addition and subtraction sentences.

e. Creates addition and subtraction stories.

f. Solve word problems involving addition and subtraction.

Topic: Mental calculation strategies of addition and subtraction

Outcome	Indicators
N2.2 Carry out mental calculations using various strategies such as partitioning, finding small differences and using near doubles. Derive new facts using number facts already known.	***This is evident when the student:*** *a.* Adds mentally three or more multiples of 10, such as *80 + 70 + 40 + 90.* *b. Finds a difference by counting up through the next multiple of 10, 100 or 1000. (Eg: 8000 – 2785)* *c. Adds/subtracts 0.9, 1.9, 2.9… or 1.1, 2.1, 3.1… by adding or sub*tracting 1, 2, 3… then adjusting by 0.1.

Topic: *Pencil and paper procedures of Addition and Subtraction*

Outcome	Indicators
N2.3 Develop and refine written methods for addition and subtraction, building on mental methods.	***This is evident when the student:*** a. Uses the method adding the most significant digits first in adding ThHTU&ThHTU, then numbers with any number of digits.

```
   6584
+  5848
  11000 ]
   1300 ]  add mentally
    120 ]  from top
     12 ]
  12432
```

b. Uses the method 'carrying' in adding ThHTU&ThHTU, then numbers with any number of digits.

```
   6584
+  5848
  12432
  111
```

c. Uses compensation (add too much, take off) method in adding ThHTU&ThHTU, then numbers with any number of digits.

```
   6467
+  2684
   9467  (6467 + 3000)
   -316  (2684 - 3000)
   9151
```

d. Uses one of the above methods to add two or more decimal numbers with up to four digits and either one or two decimal places. (Know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts such as 14.5 kg ± 750 g). *(Eg: 124.9 + 7.25; 401.2 + 26.85 + 0.71)*

e. Uses the method counting up from the smaller to the larger number (complementary addition) in subtracting ThHTU&ThHTU, then numbers with any number of digits.

```
   6467                    or    6467
-  2684                        -  2684
     16  (2700)                    16  (2700)
    300  (3000)                   300  (3000)
   3467  (6467)                  3467  (6467)
   3000                        3783
    700
     70
     13
   3783
```

f. Uses the compensation (take too much, add back) method in subtracting ThHTU&ThHTU, then numbers with any number of digits.

```
   6467
-  2684
   3467  (6467 - 3000)
   +316  (since 3000 - 2684 = 316)
   3783
```

g. Uses the standard method in subtracting ThHTU&ThHTU, then numbers with any number of digits.

h. Uses one of the above method to subtract two or more decimal numbers with up to three digits and either one or two decimal places (know that decimal points should line up under each other). *(Eg: 324.9 – 7.25; 14.24 – 8.7)*

Grade 6

Sub-strand: Multiplication & Division (N3)

Topic: Understanding Multiplication and Division

Outcome	Indicators
N3.1 Carry out the operation of multiplication or division using various strategies such as repeated addition, sharing, and modeling. Solve simple word problems involving four operations and explain the process.	***This is evident when the student:*** a. Uses appropriate vocabulary to support multiplication and division. b. Recognises that division is the inverse of multiplication and uses this to check the results. *c.* Responds rapidly to oral or written questions, explaining the strategy used. *(Eg: Two nineteens; Double 75; 11 times 8… 9 multiplied by 8; Multiply 25 by 8… by zero… by 1; Is 210 a multiple of 6? How do you know? What is the product of 125 and 4? Find all the different products you can make using two of these: 0.2, 1.4, 0.03, 1.5, 0.5.)* *d.* Responds to oral or written questions, explaining the strategy used. *(Eg: Share 108 between 9; Divide 112 by 7. Divide 15 into 225; How many groups of 16 can be made from 100? What is the remainder when 104 is divided by 12? How many lengths of 25 cm can you cut from 625 cm? Is 156 divisible by 8? If so explain. What are the factors of 98? Tell me two numbers with a quotient of 0.5.)* *e.* Gives a quotient as a fraction when dividing by a whole number. *(Eg: 90 ÷ 7 = 126⁄7)* *f.* Gives a quotient as a decimal number when dividing by a whole number. *(Eg: 676 ÷ 8 = 84.5 612 ÷ 100 = 6.12; rounds where appropriate to 1 decimal place: 85 ÷ 7 = 12.1 to 1 decimal place).* g. Uses the principles (but not the names) of the commutative, associative and distributive laws as they apply to multiplication: Example of commutative law - 95 × 78 = 78 × 95, Example of associative law4 × 10) × 10.4 = 40 × 10.4 -) or (10.4 × 10) × 4, Example of distributive law× 46 - 4600 = (2 × 46) – (100 × 46) = (2 – 100) × 46 = 98 4508 = 92 – h. Uses brackets and recognises that they determine the order of operations, and that their contents are worked out first. {Eg: 3 + (6 × 5) = 33, whereas (3 + 6) × 5 = 45}.

i. Relates division and fractions. Recognises that: 1⁄8 of 72 is equivalent to 72 ÷ 8 or 72⁄8; 4 ÷ 7 is equivalent to 4⁄7; 13 ÷ 7 is equivalent to 16⁄7.

j. Knows and applies tests of divisibility by 2, 3, 4, 5, 6, 9, 10 or 100.

k. Expresses a quotient as a fraction or as a decimal rounded to one decimal place.

l. Rounds up or down after division, depending on the context.

m. Estimates by approximating (round to the nearest 10, 100 or 1000), then checks result.

n. Checks the result with the inverse operation or with an equivalent calculation.

o. Creates multiplication and division stories.

p. Solves word problems involving multiplication and division

q. Explains how an answer to a multiplication or division problem was obtained.

r. Uses appropriate operations (including combinations of operations) to solve word problems involving numbers and quantities.

Topic: Rapid Recall of Multiplication and Division

Outcome	Indicators
N3.2 Respond to oral or written questions and questions phrased differently. Know by heart or derive rapidly doubles and halves.	***This is evident when the student:***
	a. Responds rapidly to oral or written questions. *(Eg: Nine eights; How many sevens in 35? 8 times 8; 6 multiplied by 7; Multiply 11 by 8; 7 multiplied by 0.8… by 0; Multiply 0.9 by 0.6… by 0; Divide 3.6 by 9… by 1; What is 88 shared between 8? Divide 6 into 39; 9 divided by 4; 0.6 times 7… times 2; One twentieth of 360).*
	b. Derives: *(Eg: doubles of two-digit whole numbers or decimals; doubles of multiples of 10 up to 1000; doubles of multiples of 100 up to 10 000; and all the corresponding halves).*
	c. Responds rapidly to oral or written questions. *(Eg: Double 371⁄2… 3.7… 0.59…; Twice 2.6; 1⁄2 of 9.5; Half of one eighth; What is half of Rf 8.50? What fraction of 1 cm is half a millimeter)?*
	d. Knows by heart and recalls multiplication tables of 2, 3, 4, 5, 6, 7, 8, 9 and 10.
	e. Knows by heart the squares of all numbers from 1 × 1 to 12 × 12.

Grade 6

Topic: Mental Calculations Strategies of Multiplication and Division

Outcome	Indicators
N3.3 Derive new facts, using closely related facts already known, and doubling or halving. Use known number facts and place value to multiply or divide mentally.	***This is evident when the student:*** a. Uses related facts and doubling or halving to derive new facts. (Eg: Work out the 24 times-table facts by doubling the 6 times-table facts and doubling again; Double a number ending in 5, and halve the other number; Halve/double one number in the calculation, find the product, then double/halve it; multiply by 25, multiply by 100, then divide by 4 ie: 39 × 25 is equal to 39 × 100 = 3900 3900 ÷ 4 = 975) Work out: 1 × 32 = 32 and so deduce that 2 × 32 = 64 4 × 32 = 128 8 × 32 = 256 16 × 32 = 512 … b. Use combinations of these facts to work out other multiples of 32. c. Explains how to find sixths and twelfths by halving thirds, or twentieths by halving tenths. [Eg:one twelfth of 300 is 25 (one third of 300 is 100, half is 50, half again is 25); one twentieth of 150 is 71⁄2 (one tenth is 15, and half of that is 71⁄2]. d. Multiplies and divides decimals by 10 and 100, and integers by 1000, and explains the effect. (place value) e. Uses closely related facts for example, multiply by 49 or 51 by multiplying by 50 and adjusting. f. Uses the distributive law and partitioning to multiply. [Eg: 87 × 6 = (80 × 6) + (7 × 6), 3.4 × 3 = (3 × 3) + (0.4 × 3)]. g. Uses known number facts and place value to multiply or divide mentally. (Eg: Multiply a decimal number with one or two decimal places by 10 or 100. ie: 3.27 × 10, 5.4 × 100; Divide a one- or two-digit whole number by 100 or 10. ie: 84 ÷ 100, 3 ÷ 10, 7 ÷ 100; a decimal number less than 1 with one or two decimal places; Halve a decimal number less than 1 with one or two decimal places; Multiply a decimal number such as 0.6 by a single digit number; Multiply a two-digit whole number or decimal fraction by any single-digit number).

Topic: Pencil and Paper Procedure of Multiplication and Division

Outcome	Indicators
N3.4 Develop and refine written methods for multiplication and division.	***This is evident when the student:***

a. Approximates the answer first and uses the written methods to calculate the answer.

b. Uses grid method in multiplying (ThHTU × U and HTU × TU). *(Eg: 4346 × 8, 372 × 24)*

4346 × 8

×	4000	300	40	6	
8	32000	2400	320	48	= 34768

c. Uses partitioning method in multiplying (ThHTU × U and HTU × TU). *(Eg: 4346 × 8, 372 × 24)*

```
          4346                          4346
        ×    8                        ×    8
4000 × 8  32000   leading to          34768
 300 × 8   2400                       2 3 4
  40 × 8    320
   6 × 8     48
           34768
```

d. Multiply one to two digit numbers by a decimal with up to two decimal place. *(Eg: 4.92 × 3, 4.92 × 73)*

4.92 × 3 is about 5 × 3 = 15.

```
4.92 × 3    4.00 × 3 = 12.00
            0.90 × 3 =  2.70
            0.02 × 3 =  0.06
                       14.76
```

e. Uses multiples of the divisor method in dividing (HTU ÷ TU) Eg: 972 ÷ 36

f. Uses standard division method in dividing (HTU ÷ TU) Eg: 972 ÷ 36

```
36) 972                                  27
  - 720    20 × 36                   36) 972
    252                                - 72
  - 252     7 × 36                     252
      0                              - 252
Answer:    27                            0
```

g. Divides decimal with up to two decimal places by a 1-digit divisor. Eg: 87.5 ÷ 7

```
 7) 87.5
  - 70.0    10 × 7
    17.5
    14.0     2 × 7
     3.5
     3.5     0.5 × 7
     0.0
 Answer:   12.5
```

Grade 6

Sub-strand: Money (N4)

Topic: Money

Outcome	Indicators
N4.1 Carry out simple conversions, transactions and foreign ex change and solve word problems explaining the process.	***This is evident when the student:*** a. Produces the fewest of notes and coins to express a given amount. b. Represents a sum of money by two or more combinations of notes and coins. c. Uses the decimal notation and the appropriate unit to represent money amounts. d. Pays appropriate amounts and determines appropriate change in shopping. e. Converts amounts of money, Rufiyaa to Laari, and Laari to Rufiyaa. f. Multiplies or divides money amounts. g. Makes simple conversions from one currency to another. h. Recognises which goods are cheaper. (Eg. 500 ml water for MVR 3 or 1500 ml water for MVR 5). i. Makes bill for a given price list of items. j. Solves word problems in the context of money involving one or more steps, and explains how the problem was solved.

Sub-strand: Negative Numbers (N5)

Topic: Negative Numbers

Outcome	Indicators
N5.1 Order and carry out addition and subtraction and do problem solving, using integers.	***This is evident when the student:*** a. Orders a set of integers. b. Compares two integers using the relation symbols (<, >). c. Adds, subtracts, multiplies and divides integers. d. Solves problems involving (positive and negative) integers.

Sub-strand: Fractions, Decimals and Percentages

Topic: Fractions

Outcome	Indicators
N5.2 Recognise the equivalence between fractions and compare them in practical contexts, relate fraction as a part of a whole, form fraction word problems and order familiar fractions and convert one form of fraction to the other and express them in simplest form.	***This is evident when the student:*** a. Recognise relationships between fractions: for example, that 1/10 is ten times 1/100, and 1/16 is half of 1/8. b. Relate fractions to division. (Eg: understand that finding one tenth is equivalent to dividing by 10, so 1⁄10 of 95 is equivalent to 95 ÷ 10; when 9 whole cakes are divided equally into 4, each person gets nine quarters, or 9 ÷ 4 = 21⁄4; recognise that 60 ÷ 8 is another way of writing 60⁄8, which is the same as 74⁄8). c. Find fractions of numbers or quantities. d. Compares and orders simple fractions by converting them to a common denominator. e. Order fractions by converting to a common denominator and position them on a number line. (Eg: Place these in order, smallest first: 21⁄10, 13⁄10, 21⁄2, 11⁄5, 13⁄4). f. Form fractions to word problems such as: What fraction of MVR 18 is 95 L? What fraction of 4 kg is 250 g? What fraction of one year is: one week; one day; July? I work for 8 hours and sleep for 10 hours. What fraction of the day do I sleep? What fraction of the day do I work? g. Changes an improper fraction to a mixed number and vice versa. h. Reduces a fraction to its simplest form by cancelling common factors in the numerator and denominator. i. Solves word problems involving fraction of quantities. (Eg: Riza had 48 cars. He gave away 3/4 of them. How many had he left?)

Grade 6

Topic: Fraction Operations using Visualisation

Outcome	Indicators
N5.3 Find fractions that total 1. Carry out four operations involving simple fractions.	***This is evident when the student:*** a. Finds two or more simple fractions with a total of 1 (using fraction strips or fraction circles). Uses a calculator to check the answer. Categorises their answers to 'exact' and 'approximate' answers. (Eg: 1/2+2/8+1/4 (exact), 1/2+1/5+2/12+1/8 approximation). b. Adds and subtracts two simple fractions whose denominators are multiples. (Eg: sevenths and fourteenths, ninths and eighteenths). c. Multiplies two simple fractions. d. Divides two simple fractions.

Topic: Fractions and Decimals

Outcome	Indicators
N5.4 Read, write and say decimal numbers using decimal notations, and recognise the relationship between decimals and fractions and order a set of decimal fractions.	***This is evident when the student:*** a. Recognises the place value of digits in a decimal number up to thousandths place. b. Reads, writes and says decimal numbers up to thousandths place. c. Writes the decimal number equivalent to: 2/10, 5/100, 9/1000, 7/100, 16/1000, 217/1000 etc. d. Counts on or back in steps of 0.1, 0.01 and 0.001. e. Positions one-place, two-place and three-place decimals on a number line. f. Orders a mixed set of numbers or measurements with up to three decimal places. g. Gives a decimal number lying between two others. (Eg: between 4.16 and 4.17). h. Rounds a number with one to three decimal places to the nearest tenths, hundredths or to the nearest whole number. i. Investigates the equivalence between decimal numbers and fractions using calculators. Predicts the result before confirming and describes their findings. (Eg: 1⁄1000 = 0.001; 1⁄8 = 0.125; 1⁄3 = 0.3333333; 2⁄3 = 0.6666666; 2/9 = 0.2222222; 7/9 = 0.7777777; 4/11 = 0.363636; 8/11 = 0.727272 1/12 = 0.083333; 5/12 = 0.4166666).

j. Recognises the equivalence between the decimal numbers and fractions. Forms of one half, one quarter, three quarters, one eighth and tenths, hundredths and thousandths. (Eg: 0.5 = 1⁄2; 0.25 = 1⁄4; 0.75 = 3⁄4; 0.125 = 1/8; 0.3 = 3⁄10; 0.15 = 15/100; 0.475 = 475/100).

k. Uses a calculator to compare fractions. Eg: Compare using > , <: 7⁄8 or 4⁄5, 3⁄4 or 11⁄14 Place these fractions in order: 7⁄20, 6⁄15, 13⁄40, 8⁄25

l. Expresses a quotient as a fraction or as a decimal rounded to one decimal place.

m. Converts simple fractions to decimals using division.

Topic: Fractions, Decimals and Percentages

Outcome	**Indicators**
N5.5 Identify percentage as the number of parts in every 100, recognise the equivalence between percentages, fractions and decimals and workout simple percentages and solve simple problems.	***This is evident when the student:*** a. Understands percentage as the number of parts in every 100. b. Expres simple fractions such as one half, one quarter, three quarters, one third, two thirds, and tenths and hundredths, as percentages. c. Recognises that roughly. (Eg: one third = 33%, two thirds = 67%) d. Recognises the equivalence of percentages, fractions and decimals. (Eg: 53% = 0.53 = 53⁄100; 36% = 0.36 = 9⁄25). e. Express simple fractions as percentages. f. Finds simple percentages of small whole number quantities. g. Find percentages by using halving and quartering. (Eg: To find 12.5% of MVR 36 000, ie: 50% = MVR 18000 so 25% = MVR 9000, hence 12.5% = MVR 4500). h. Solves simple problems involving percentages and percentage of quantities. (Eg: A school party of 50 is at a nearby island. 52% are girls. 10% are adults. How many are boys? A football team played 15 games. They won 60%. How many games did they lose? Niyaz scored 60 out of 80. Rashfa scored 148 out of 200. Who did better: Niyaz or Rashfa? A coat costs Rf 350. It has a 10% discount in a sale. What is its sale price? 10 red sweets are 25% of the total in a jar. How many sweets altogether are in the jar?)

Grade 6

Sub-strand: Ratio and Proportion (N6)

Topic: Proportion

Outcome	Indicators
N6.1 Use ratios to compare two quantities, relates fractions to simple proportions and solve simple problems involving ratio and proportion.	***This is evident when the student:*** a. Uses ratios to compare two or more quantities. b. Relates fractions to simple proportions. c. Simplifies ratios with whole numbers. d. Solve simple problems involving ratio and proportion. (do not use the cross multiplication method). (Eg: Rafa shares out 12 sweets. She gives Nufail 1 sweet for every 3 sweets she takes. How many sweets does Nufail get? At the Quran class there are 2 boys for every 3 girls. There are 30 children at the Quran class. How many boys are there? Ahmed mixes 1 tin of red paint with 2 tins of white. He needs 9 tins of paint altogether. How many tins of red paint does he need? There are 5 toffees to every 2 chocolates in a box of 28 sweets. How many chocolates are there in the box)?

Strand: Measurement (M)

Sub-strand: Length (M1)

Topic: Length

Outcome	Indicators
M1.1 Recognise and use relationships between familiar units and draw lines and measure them with accuracy using appropriate equipment, suitable units and solve problems. Estimate and record length/distance to a suitable degree of accuracy.	***This is evident when the student:*** a. Uses vocabulary related to measures (length). b. Estimates and check, lengths and distances using standard units, measurements. (Eg: the distance of longest road in the island or the perimeter; the thickness of a paper ream). c. Suggests suitable units and measuring equipment to estimate or measure length. d. Knows the approximate equivalence between commonly used imperial units and metric units. e. 8 kilometres approximately equal to 5 miles 1 litre approximately equal to 2 pints (more accurately, 1 3⁄4 pints) f. 4.5 litres approximately equal to 1 gallon or 8 pints g. 1 kilogram approximately equal to 2 lb (more accurately, 2.2 lb) h. Uses, reads and writes standard metric units of length, km, m, cm and mm including their abbreviations. i. Records, estimates and readings from scales to a suitable degree of accuracy. j. Converts smaller to larger units Eg: m to km, cm or mm to m and vice versa. k. Rounds a measurement to the nearest whole unit or tenth of a unit. l. Chooses appropriate number operations and calculation methods to solve measurement word problems and explains how the problem was solved.

Grade 6

Sub-strand: Mass (M2)

Topic: Mass

Outcome	Indicators
M2.1 Recognise and use relationships between familiar units and measure objects with accuracy using appropriate equipment, suitable units and solve problem. Estimates and record mass to a suitable degree of accuracy.	***This is evident when the student:*** a. Uses vocabulary related to measures 'mass' (weight). (Eg: heaviest, lightest). b. Uses vocabulary related to measures (mass). c. Estimates and checks, masses of objects using standard units, measurements such as: the weight of an egg. d. Suggests suitable units and measuring equipment to estimate or measure mass. e. Recognises and uses the relationship between units of mass. (Eg: 1 kg = 1000 g, 1 tonne = 1000 kg). f. Uses, reads and writes standard metric units of mass; g, kg and tonne including their abbreviations. g. Reads and records a scale to the nearest marked division. h. Records, estimates and readings from scales to a suitable degree of accuracy. i. Convert smaller to larger units. (Eg: g to kg, kg to t and vice versa). j. Rounds a measurement to the nearest whole unit or tenth of a unit. k. Chooses appropriate number operations and calculation methods to solve measurement word problems and explains how the problem was solved.

Sub-strand: Capacity (M3)

Topic: Capacity

Outcome	Indicators
M3.1 Recognise and use relationships between familiar units and measure capacity with accuracy using appropriate equipment, suitable units and solve problem. Estimates and record mass to a suitable degree of accuracy.	***This is evident when the student:*** a. Uses vocabulary related to measures (capacity). b. Estimates and checks, capacity of containers using standard units, measurements such as: the quantity of droplet of water from a pipette. c. Suggests suitable units and measuring equipment to estimate or measure capacity.

d. Recognises and uses the relationship between units of capacity. *(Eg: 1 litre = 1000 ml =1000 cm³).*

e. Uses, reads and writes standard metric units of capacity. *(Eg: l, ml or cm³ including their abbreviations).*

f. Reads and records a scale to the nearest marked division.

g. Records estimates and readings from scales to a suitable degree of accuracy.

h. Converts smaller to larger units. *(Eg: cm³ or ml to l and vice versa.)*

i. Rounds a measurement to the nearest whole unit or tenth of a unit.

j. Chooses appropriate number operations and calculation methods to solve measurement word problems and explains how the problem was solved.

Sub-strand: Perimeter, Area and Volume (M4)

Topic: Perimeter

Outcome	Indicators
M4.1 Recognise and use the vocabulary related to perimeter. Calculate the perimeter of compound shapes. Solve problems involving perimeter of simple shapes.	***This is evident when the student:*** a. Uses vocabulary related to perimeter. b. Calculates the perimeter of simple compound shapes that can be split into rectangles. c. Understands and uses formula in words 'length × breadth' for the area of a rectangle. d. Solves problems involving perimeter of rectangles/ squares and compound shapes.

Topic: Area and Perimeter

Outcome	Indicators
M4.2 Measure and calculate the area of compound shapes. Explore the relationship between the area of rectangles and squares. Apply and use the appropriate formula to calculate area. Investigate and solve problems involving perimeter and area.	***This is evident when the student:*** a. Uses vocabulary related to area. b. Draws a centimetre square. Finds that: 1 square centimetre is 100 mm². c. Calculates the area and perimeter of compound figures made up of squares, rectangles and triangles.

	d. Uses correctly the abbreviations km, m, cm, mm, km^2, m^2, cm^2, mm^2.
	e. Discovers and recognises that there is no relation between perimeter and area of shapes.
	f. Designs and makes a rectangle, a square and a triangle that has equal area.
	g. Measures and calculates surface area of different boxes (cuboids).
	h. Suggests areas you would measure in km^2, m^2, cm^2, mm^2.
	i. Uses knowledge of perimeter and area to investigate and solve a given problem. Explain methods and reasoning.

Topic: Volume

Outcome	**Indicators**
M4.3 Know the meaning of volume. Understand and use the vocabulary related to volume. Estimate, measure or calculate the volume of regular and irregular objects.	***This is evident when the student:***
	a. Uses vocabulary related to volume.
	b. Estimates in cubic centimetres the volume of 3D objects represented in photographs and isometric drawings, and checks by building and counting.
	c. Measures and calculates the volumes of boxes (cubes and cuboids).
	d. Compares and orders objects by volume, using liquid displacement.
	e. Uses formulae to calculate the volume of cubes and cuboids.
	f. Records volume using the abbreviations cm3 and m3.
	g. Designs and makes a cube and a cuboid to each hold 1000 cm^3.

Sub-strand: Time (M5)

Topic: Time

Outcome

M5.1 Use vocabulary related to time. Estimate the duration of an event in time units. Read, tell and record time using a 24-hour clock. Read calender and find the relationship between the units of time. Solve word problems involving time. Reads and interprets time tables.

Indicators

This is evident when the student:

a. Uses vocabulary related to time.

b. Uses a world time chart to answer questions such as:

- It is 12:00 noon in Maldives. What time is it in Colombo, Trivandrum, Kuala Lampur, Singapore, Mecca?
- It is 4:36 am in Daka. What time is it in Katmandu?

c. Converts between 24-hour notation and am/pm.

d. Recognises and use: 1 millennium = 1000 years; 1 century = 100 years; 1 decade = 10 years; 1 year = 12 months or 52 weeks or 365 days; 1 leap year = 366 days; 1 week = 7 days; 1 day = 24 hours; 1 hour = 60 minutes; 1 minute = 60 seconds.

e. Uses a stop watch or other timers to measure and compare times of events.

f. Completes tables such as,

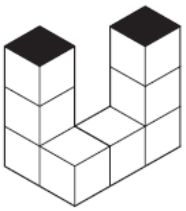
Seven o'clock in the evening	19:00 hrs	7:00 PM
Quarter to ten in the morning		
	14:20 hrs	
	22:15 hrs	
Midnight		
17 minutes past 4 in the afternoon		

g. Solves word problems involving time.

Strand: Shape and Space (SS)

Sub-strand: 3D Shapes (SS1)

Topic: 3D Shapes

Outcome	Indicators
SS1.1 Describe and visualises properties of solid shapes. Use Euler's formula and investigate. Sketches all faces of 3D shapes on paper. Make double layered solids as in pictures using cubes. Make skeleton models of 3D shapes. Begins to identify the cross section of prisms. Visualise 3 dimensions from 2D drawings. Identify and sketch different nets.	***This is evident when the student:*** a. Describes and visualises properties of solid shapes such as parallel or perpendicular faces or edges. b. Investigates the relation (F+V–E=2) between faces, vertices and edges using 3D objects and verifies Euler's formula (F+V–E=2) for simple polyhedra. c. Recognises the cross-sectional face of a prism. d. Visualise 3-D shapes from 2-D drawings. e. Finds and justify the least number of cubes needed to cover and join the shaded faces.  f. Sketches top, front and side views of cuboids, cylinders, spheres, hemisphere, cones, tetrahedron, prism, pyramid (square & rectangular based). g. Sketches 3D objects. h. Sketches different nets for cubes, cuboids and prisms. i. Make models of 3D shapes.

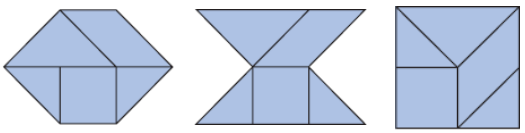
Sub-strand: 2D Shapes (SS2)

Topic: 2D Shapes

Outcome	Indicators
SS2.1 Recognise, name, sort, and draw 2D shapes. Describe them using everyday language. Sketches the reflection of a simple 2-D shape. Identify and draw lines of symmetry. Know the position of a shape after translation. Investigate about familiar shapes.	***This is evident when the student:*** a. Uses mathematical vocabulary to describe 2D shapes (circles, semi circles, oblongs, triangles; equilateral triangles, isosceles triangles, scalene triangles, right angled triangles, , polygons; pentagons, hexagons, heptagons and octagons, quadrilaterals; rectangles, squares, , parallelograms, trapezium, rhombus, , kite).

b. Classifies quadrilaterals, using criteria such as:
   - parallel sides
   - equal angles, and equal sides.
   - Lines of symmetry.
   - Displays them on a Venn or Carroll diagram.

c. Investigates the different polygons that can be made using tangram pieces.

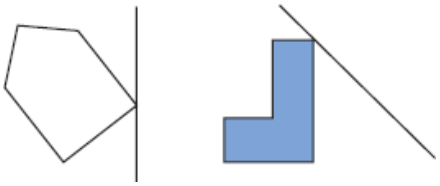


d. Makes polygons using pinboards, constructs polygons by paper folding and discuss properties such as lines of symmetry.

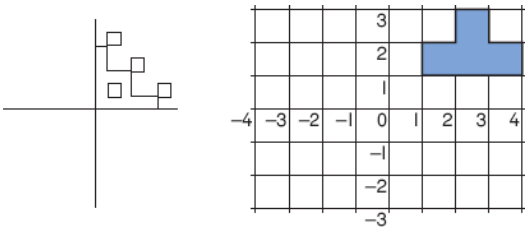
e. Constructs quadrilaterals (square, rectangle, parallelogram, trapezium, kite and rhombus) to given dimensions.

f. Identifies and draws all lines of symmetry of given 2D shape.

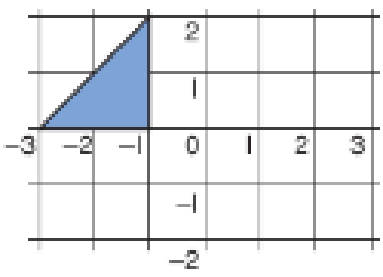
g. Sketches the reflection of a simple shape in a mirror line touching it at one point, where the edges of the shape are not necessarily parallel or perpendicular to the mirror line.



h. Sketches the reflection of a simple shape in two mirror lines at right angles, where the sides of the shape are parallel or perpendicular to the mirror line.



i. Sketch the position of a simple shape after it has been translated, say, 3 units to the right, and then 2 units down.



j. Recognises where a shape will be after two translations.

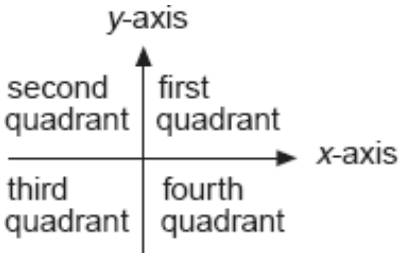
k. Makes and investigates a general statement about familiar shapes by finding examples that satisfy it.

Sub-strand: Positions and Directions (SS3)

Topic: Position and Direction

Outcome	Indicators
SS3.1 Describe positions and directions. Give directions and follow short paths, draw simple paths and informal maps. Read and plot co-ordinates. Interpret and describe location and direction using grid references.	***This is evident when the student:***

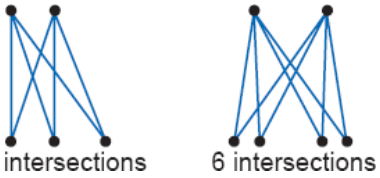
a. Recognise Read and plot co-ordinates in all four quadrants.



Responds to questions such as:

The points (–1, 1), (2, 5) and (6, 2) are three of the four vertices of a square. What are the co-ordinates of the fourth vertex?

b. Draw a polygon with each vertex lying in the first quadrant. Plot its reflection in the y-axis, and name the co-ordinates of the reflected shape.



c. Recognises parallel and perpendicular lines in quadrilaterals.

d. Recognises that two lines that cross each other are called intersecting lines and the point at which they cross is an intersection. *(Eg: Identify all the intersections of lines drawn from 2 points to, say, 3, 4, 5… other points).*

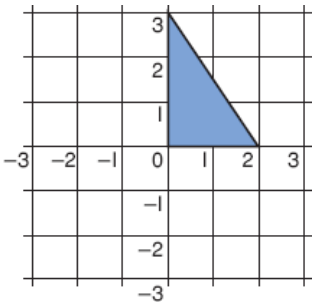
e. Predict the number of intersections from 2 points to 10 points.

f. Makes rough sketches of maps which show a sense of scale.

g. Describes the path from one place to another.

Sub-strand: Angles (SS4)

Topic: Angles

Outcome	Indicators
SS4.1 Estimate and measure angles to the nearest degree. Know and calculate the sum of the angles in a triangle. Calculate angles at a point. Explore a regular polygon. Sketche the position of a simple shape after a rotation about a vertex. Bisect the given angle.	***This is evident when the student:*** a. Estimates in degrees the size of each of a set of angles. b. Uses a protractor to measure and draw angles less than 180º to nearest degree. c. Check that the sum of the angles in a triangle is 180º. Eg: by measuring or paper folding. d. Calculates the third angle of a triangle, given the other two. e. Calculate angles around a point. f. Explores the interior angles of some regular polygons (equilateral triangles, squares, hexagons, octagons) using tesselations. g. Explores the external angle properties of regular polygons. h. Sketches the position of a simple shape after a rotation of 90° or 180° about a vertex.  i. Bisects a given angle.

Strand: Chance and Handling Data (CH)

Sub-strand: Handling Data (CH1)

Topic: Handling Data

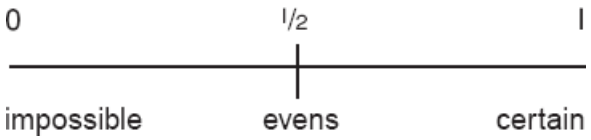
Outcome	Indicators
H1.1 Solve a given problem by organising, constructing and interpreting bar charts or bar line charts. Begin to interpret simple pie charts. Find the mode and range of a set of data. Begin to find the median and mean.	***This is evident when the student:*** a. Constructs bar graphs and bar line charts. Intervals labeled in 2s, 5s, 10s, 20s or 100s. b. Discuss questions such as: c. What was the most common score in the test? d. How many children took the test? Estimate how many of them got fewer than half marks. e. The children who took the tables test practise recalling their tables each day for a week. They then take the same test again. Sketch a graph showing how you think the marks in the second test will be distributed. f. Begins to interpret simple pie charts. (Eg: Ages of the population of an island). g. Answers questions such as: h. What fraction (percentage) of the population of the island is 16 or under? 60 or over? i. Why do you think there are more people aged 16 or under than aged 60 or over, living in the island? j. Finds the mode and range of a set of data. Begins to find the median and mean of a set of data.

Sub-strand: Handling Data (CH1)

Topic: Probability

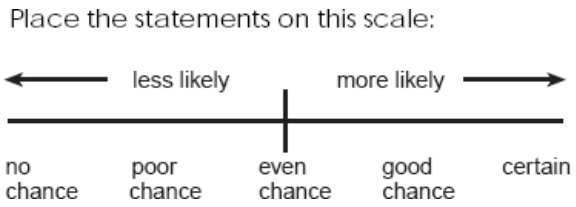
Outcome	Indicators
CH1.2 Use the language associated with probability to generate discussion. Identify and record all possible outcomes of an event.	***This is evident when the student:*** a. Uses the language associated with probability to discuss events, including those with equally likely outcomes. b. Discuss events which might have two equally likely outcomes. (Eg: a new baby is equally likely to be a boy or a girl; if I drop a picture postcard there is an even chance it will land picture side up; if I roll a dice I am just as likely to roll an even number as an odd number).

c. Discuss events with two or more equally likely outcomes. (Eg: Consider a 1 to 6 dice. What is the probability of: a. rolling a 4; b. rolling an even number; c. rolling a number greater than 2; d. rolling zero; e. rolling a number lying between 0 and 7? Place each probability on this scale).



d. Places the chance of familiar events such as 'raining tomorrow' on a numerical scale from 0 to 1.

e. Makes simple predictive statements about everyday events using the language of chance. (Eg: 'Maldivian National Football team has "good chance" of winning SAFF championship').



f. Identifies and records all possible outcomes when 2 dice are tossed.

Strand: Patterning and Algebra (PA)

Sub-strand: Sequences and Properties of Numbers (PA1)

Topic: Number Sequences

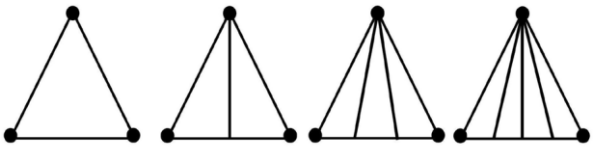
Outcome

PA1.1 Describe, copy, predict and extend simple patterns. Create simple patterns using familiar materials. Describe the term to term rule for a simple number sequence.

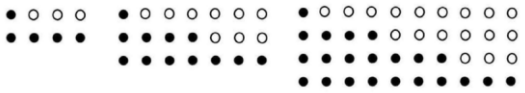
Indicators

This is evident when the student:

a. Makes and records different dot patterns and predicts the number of dots and other related 'items' for later terms. Eg:



Pattern	1	2	3	4	5	6
Dots	3	4	5	6		
Triangles	1	3	6	10		



Pattern	1	2	3	4	5
Total no. of dots	8	21	40		
No. of black dots	5	12	22		
No. of white dots	3	9			

b. Describes and extends number sequences such as. Eg:

2, 4, 8, 16, __, __, The rule is: ×2

5, 15, 45, 135, __, __, __ The rule is ___
128, 64, 32, 16, 8, __, __, __ The rule is ___
1000, 100, 10, 1, __, __, __ The rule is ___

-16, -9, -2, __, __, The rule is ___
5, 8, 12, 17, 23, __, __, __ The rule is ___

c. Describes and extends simple number involving decimal numbers beyond zero. Eg:
- 0.8, 0.6, 0.4, 0.2, __, __, The rule is ___
- 0.5, 1, 1.5, 2, __, __, The rule is ___
- 2, 1.5, 1, 0.5, __, __, The rule is ___
- 0.25, 0.5, 0.75, 1, 1.25, __, __, __ The rule is _

d. Makes three number sequences (one easy, one medium and one hard) for someone else to solve.

e. Creates as many numbers in a given sequence in one minute. (Eg: The first number of the sequence is 0.8. Numbers increase by 0.4; The first number of the sequence is 302. This decreases by 7 and increases by 17).

Topic: Properties of Numbers

Outcome	Indicators
PA1.2 Makes a general statement about odd and even numbers regarding some of their properties. Find prime numbers. Recognises square numbers.	***This is evident when the student:*** a. Makes general statements about odd or even numbers, including the outcome of products. b. Finds the lowest common multiple of two numbers. c. Factorises numbers to 100 into prime factors. d. Finds prime numbers less than 100 using Sieve of Eratosthenes method. e. Recognises and extend sequences of square numbers. f. Derives quickly squares of multiples of 10 to 100, such as 20×20, 80×80. g. Recognises and extends sequences of triangular numbers.

Sub-strand: Algebraic Techniques (PA2)

Topic: Algebraic Techniques

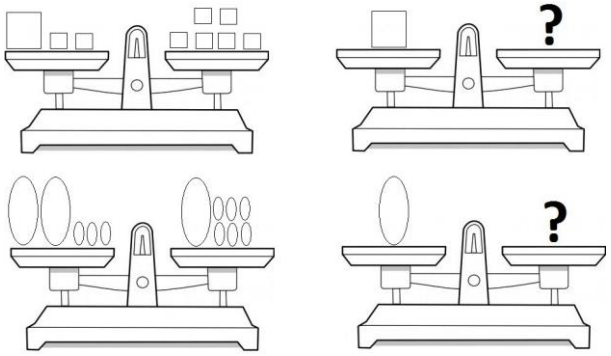
Outcome	Indicators
PA2.1 Model algebraic expressions and carryout operations. Write algebraic expressions and evaluate them by substitution. Simplify simple expressions. Solve simple linear equations.	***This is evident when the student:*** a. Uses objects to add and subtract simple algebraic expressions. (Eg: ff + fff = 2f + 3f = 5f; 11j – 7j = 4j; µµ+,,, = 2µ+3; È + ÈÈ – 7 = 3È – 7) b. Adds and subtracts algebraic expressions involving 1-3 terms (exclude terms with exponents). (Eg: w + 13 + w; 11s – 9t – 16s). c. Multiplies algebraic expressions involving 1-2 terms (exclude terms with exponents). [(Eg: 3 × m; –2b × 3a; (8y) (–3z)].

d. Translates a simple word statement into an algebraic statement and vice versa. (Eg: 7 times m = 7m; Divide 2 by k = 2/k ; Subtract 8 from t = t – 8; b + 10 = 10 more than a number b; q – 25 = a number q decreased by 25).

e. Evaluates simple algebraic expressions by substitution (exclude terms with exponents). (Eg: If a = 3, find the value of 5a; If m = 5 and n= 1, find the values of: –2n, 6mn; If x = 2, y = 1 and z = 3, find the values of: y + z, xyz, –10xy, z + y –x)

f. Simplifies simple expressions with parenthesis. [(Eg: 4(r – 3); 3x(5 – 2y); –p(–2s – 3t)].

g. Solves simple linear equations using concrete materials, such as balance, cup and counters, stressing the notation of doing the same thing to both sides of an equation.



h. Solves simple linear equations (using algebraic methods). (Eg: a + 2 = 3; 2c = 12; m/2 = 4; –2 + 2u = –6).

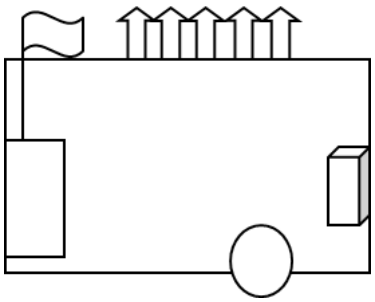
Sub-strand: Investigations, Puzzles and Problems (PA3)

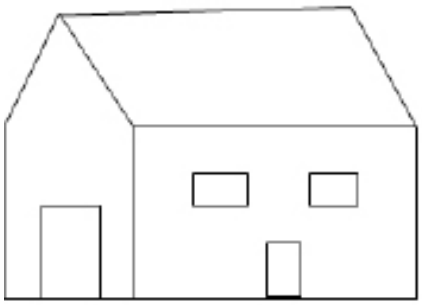
Topic: Investigations Puzzles and Problems

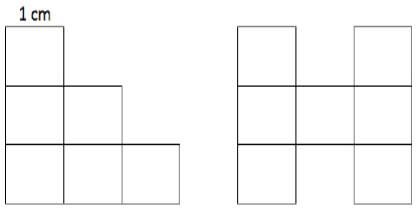
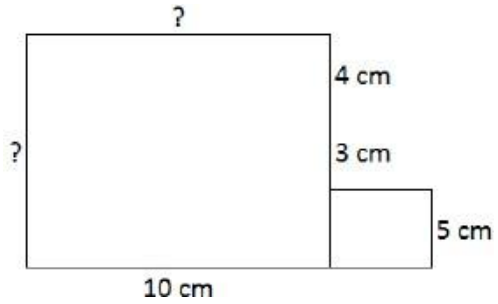
Outcome	**Indicators**
PA3.1 Solve simple mathematical problems and puzzles and explain the process with reasoning.	***This is evident when the student:***
	a. Solves mathematical problems and puzzles, recognises and explains patterns and relationships, generalises and predicts.
	b. Explains the method and reasoning orally and in writing.
	c. Suggests extensions by asking, What if?

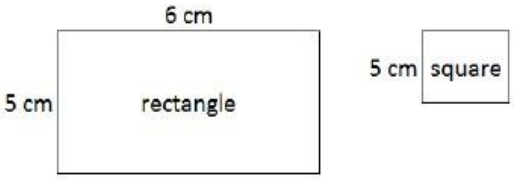
Planning, Teaching and Assessment Examples

Subject: Mathematics	**Grade** : 5 (Duration 90 minutes)
Strand: Measurement	**Sub – strand**: Perimeter
Key competencies: - Thinking critically & creatively. - Relating to people. - Understanding and managing self. - Sustainable practice. - Making meaning.	**Shared values** - Values related to self. - Values related to others.
Prior Knowledge - Use mathematical vocabulary to describe shapes. Eg: - triangle, table top, polygons etc. - Mathematical operation.	**Learning outcomes M4.1** - Recognise and use the vocabulary related to perimeter. - Calculate the perimeter of simple shapes using the formula. - Solve problems involving perimeter of simple shapes
Learning indicators. - Measure and calculate perimeter of rectangles and regular polygons. - Draw some shapes on squared paper. - Measure the perimeter to the nearest mm.	**Materials needed** - Different objects. Eg:- exercise books, windows, table top, white board etc. - Sample toy house, ruler, thread, wool, measuring tape etc.

Duration	Teaching & Learning	Resources / materials needed	Differentiated learning
8 min	**Introduction** - Bring the students down to the compound or take them to an open area where they can find different objects. (When they come down let them bring their exercise books) - Group the students equally. (5 or 6 students in each group.) - Let them walk around the compound in a line and introduce the topic 'perimeter 'saying that, that is the perimeter of the compound.  - Discuss by asking questions. - How can we find the perimeter of this compound? (critical thinking) - How would you measure the door of the room? (Critical thinking & sustainable practice.) - What can we use to find the perimeter of the compound and the door? (critical thinking) - Make students realize that they need to find the measurement if they want to put glass on the windows or if they want to put carpet in their room and its important in daily life. (Making meaning) - With the help of the teacher, let them measure the length and breadth of the compound using the measuring tape. - Find the perimeter by adding all the sides with the help of the teacher.	- School compound - Exercise book - Thread - Wool - Measuring tape	

8 min	**Recall prior knowledge** - Trace the outline of the book. - Name 3 examples of the place where one might find the shape. - Discuss how they can find the perimeter of the exercise book. - Discuss which operation they can use to find the perimeter of their exercise book.	Exercise books	Students who have difficulty, let them understand the question, guide them and let them understand by making the question simple.
8 min	**Share learning intention with students.** - Use mathematical vocabulary to describe shape. (triangle, table top, polygons) - Measure and calculate the perimeter of different objects. - Use mathematical unit for perimeter. Eg;- cm, m, sqm 		
10 min	**Negotiate the success criteria with the students.** - I will be a high -flyer if I can - Measure the length and the breadth of the objects correctly - Use the correct formula to find the perimeter - Use the correct unit for the perimeter. Eg;- cm, mm, etc. - Find the perimeter of the given object correctly		Provide opportunity for mixed ability group work which helps (English language learners) students who have difficultu working collaboratively using flexible grouping strategies.

	Developmental activities. **Activity 1** - Give about 20 cubes to each group and brain storm students. - Name the type of the shapes they can make using the cubes they got. - How can we find the perimeter of the shape they form? - What will be the unit used?  - Ask them to work out. - Discuss the above questions in groups. - Let them each group form 2 shapes using the given cubes and find the perimeter and present it to the class. (communicating, reasoning and providing reflecting)	cubes Different objects	Let students make the shapes using the cubes and direct them by encouraging their work. Help students with cognitive challenges
15 min	**Activity 2** - Give different cut outs to the groups. (one for each group) - Let them find the missing side and then find the perimeter of the given shape and present it to the class. - When presenting, let them stick their object on the board and then explain.  	Ruler Exercise book Board	Allow additional time for students who need it as well as enrichment activities for those who finish early. It helps those with cognitive challeges.

15 min	**Activity 3** - Using the formula let the students find the length and the breadth of their exercise book. Teacher writes the length and the breadth on the board. - Ask the students, whether they know the formula to find the perimeter of the rectangle. Introduce the formula of rectangle and square. **Perimeter of rectangle.** P= 2l + 2b P= 2 (l+ b) **Perimeter of square.** P= 4l - Let the students find the perimeter of the exercise book using the formula with the help of the teacher. - Do few examples.  P = 2l + 2b = 2 x 6 + 2 x 5 = 12 + 10 = 22 cm P = 4l = 4 x 5 = 20 cm - In pairs let them find the length and breadth of their table top and find the perimeter of the table top.	Cards with scissors, eraser and glue stick	

11 min	**Closure** **Play a game** - Give each group 20 points before starting the game. - Paste scissors, eraser, glue stick upside down on the board. - Tell them that if the group takes scissors, they can cut 5 points from another group. - Eraser, they erase 5 points from their own group. - Glue stick, they can add 5 points to any group. - Paste 5 shapes on the board with measurement and let them find the perimeter using the formula (one from each group will get the chance to do it on the board.) - If the answer is correct they will get a chance to turn over one of the papers (scissors, eraser or the gum bottle.) on the board. - Then continue till each group get 3 or 4 chances.		

Glossary

Abacus	A simple device for calculating, consisting of a frame with rows of wires or grooves along which beads are slid.
Analogue clocks	A clock which has moving hands and hours marked from 1 to 12 to show you the time.
Arbitrary	Non standard
Associative principle	4 + 1 + 5 is same as (4 +1) + 5 or (5 + 4) + 1
Commutative principle of addition	3 + 4 is same as 4 + 3
Complementary addition	10 – 4 =?, how much added to 4 will make 10; i.e. 6
Decimals	Relating to or using powers of 10 or base 10.
Decomposition	Breaking a number into smaller parts.
Fractions	A ratio of two integers or any number that can be expressed as such a ratio, m/n, where m is not a multiple of n, and n is not zero or one.
Geometry	The elementary study of the properties and relations of constructible plane figure.
Half turn	Refers to performing a 180 degree rotation.
Hefting	Lift or carry (something heavy)
Indicators	An example of the behavior that students may display as they work towards the achievement of syllabus outcomes. Indicators reflect and describe aspects of knowledge, understanding, skills and values.
Journal	Somebody's written daily record of personal experiences, rather more elaborate and detailed than a diary.
Logs	Any detailed record of events.
Negative numbers	All the real numbers which are less than 0.
Ordinal numbers	A number defining the position of something in a series, such as 'first', 'second', or 'third'. Ordinal numbers are used as adjectives, nouns, and pronouns.
Outcomes	Statements of knowledge, understanding, skills and values expected to be achieved by most students at the end of a given stage.

Partitioning	Divide into parts. E.g.: partition 9 into 5 and a bit is same as 5 and 4.
Percentages	A proportion, ratio or rate expressed with a denominator of 100.
Portfolios	A collection of drawings, paintings or other pieces of work by an artist, photographer etc.
Positive numbers	All the real numbers which are greater than 0.
Probability	The probability of an outcome (or event) is a measure of how likely that outcome is.
Skip counting	Counting with specific intervals, e.g.; 2, 4, 6.
Symmetrical	Made up of exactly similar parts facing each other or around an axis; showing symmetry.
Tangram	A Chinese geometrical puzzle consisting of a square cut into seven pieces which can be arranged to make various other shapes.
Trigonometry	The branch of mathematics concerned with the properties of the trigonometric functions and their application to the determination of the sides and angles of triangles, used surveying navigation.
Turn	Move or cause to move in a circular direction wholly or partly around an axis or point. E.g.; 360^0