BOARD OF STUDIES
NEW SOUTH WALES

Mathematics K–6

Parent Support Document

Introducing the *Mathematics K–6 Syllabus* to
Parents and School Community Members

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Purpose and Use of this Document

The purpose of *Introducing the Mathematics K–6 Syllabus to Parents and School Community Members* is to provide information for parents and community members about the *Mathematics K–6 Syllabus* and what children will learn in Mathematics in primary school. The book can be used for parent association meetings, parent information sessions or as part of ongoing support for parents. The material is designed for presentation by school staff-members.

Ideas for presentations and activities have been included, which may need to be modified to cater for different parent audiences. Material from the syllabus and the support document may also be selected and adapted according to the needs and interests of the parents and the community.

Some parts of this booklet could be used for inclusion in school newsletters and/or made available for individual parents and community members.

The booklet is divided into three sections:

- **Section 1: Background Information** – to be read before the parent workshop information in Section 2.

  This section is also useful for parents and community members who are interested in reading about the *Mathematics K–6 Syllabus*.
- **Section 2: Parent Workshop Information** – to be used by workshop presenters.
- **Section 3: Overhead Transparencies and Handouts**

Section 1

Background Information

PART 1
Mathematics K–6 Syllabus: An Overview

What is a syllabus?

A syllabus is a document that describes, for a specific learning area, what students are expected to learn. It contains an aim, objectives, outcomes, content, and assessment requirements. Each syllabus provides teachers with an outline of what students are to be taught at particular Stages. There is a syllabus for each of the six key learning areas (KLAs) in primary school.

What is Mathematics K–6?

Mathematics is one of the six KLAs in primary school. The other five KLAs are: English; Science and Technology; Human Society and Its Environment; Personal Development, Health and Physical Education; and Creative Arts.

The *Mathematics K–6 Syllabus* builds upon the considerable learning of children before entering school and provides the foundation for further study in this KLA in secondary school. Learning in Mathematics will be influenced by children's experiences at school and in the wider community. It will be most effective when parents, caregivers and teachers work together.

Why is Mathematics important?

In addition to its practical applications, the study of mathematics is a valuable pursuit in its own right, providing opportunities for creativity, challenge and leisure.

If our children are to be prepared for life in the twenty-first century, they need to develop relevant mathematical knowledge, skills and understanding. Mathematics is important because it:

- is a powerful tool for solving problems within and beyond mathematics
- is a significant part of the cultural heritage of many diverse societies
- provides students with a powerful, precise and concise means of communication
- supports concurrent learning in other key learning areas
- builds a sound foundation for further mathematics education.

Students learn about:

- selecting and applying appropriate mental, written or calculator strategies to solve problems involving addition, subtraction, multiplication and division
- estimating and refining estimates in a variety of situations
- modelling, comparing and representing fractions and decimals
- describing and applying number patterns and relationships between numbers
- analysing data and drawing and interpreting graphs
- selecting and using appropriate units and devices to measure
- manipulating, describing and classifying two-dimensional shapes and three-dimensional objects
- interpreting and communicating information presented in numerical, geometrical, graphical, statistical and algebraic forms.

They also learn to:

- develop a positive self-concept as learners of mathematics

- appreciate the usefulness of mathematics in everyday contexts
- become self-motivated learners through inquiry and active participation in challenging and engaging experiences
- develop perseverance in understanding mathematical challenges
- make informed decisions
- ask questions about mathematics and the uses of mathematics in their world
- describe and explain mathematical ideas and procedures
- interpret and apply mathematics in a variety of contexts
- use an appropriate technological tool to investigate and solve problems, and retrieve and represent information
- critically evaluate ideas and arguments that involve mathematical concepts or that are presented in a mathematical form
- reflect on experiences and make connections with existing knowledge, skills and understanding.

What is the aim of this syllabus?

The aim of Mathematics K–6 (and Mathematics Years 7–10) is to develop students' mathematical thinking, understanding, competence and confidence in the application of mathematics, their creativity, enjoyment and appreciation of the subject, and their engagement in lifelong learning.

What are outcomes and content?

The outcomes specify the intended student learning that will result from the teaching of the syllabus. They can be considered as milestones of achievement towards which students will work. Outcomes are organised by Stages. Except for Early Stage 1, each Stage covers two years of schooling. It is expected that most students will demonstrate:

- Early Stage One outcomes by the end of Kindergarten
- Stage 1 outcomes by the end of Year 2
- Stage 2 outcomes by the end of Year 4
- Stage 3 outcomes by the end of Year 6
- Stage 4 outcomes by the end of Year 8.

The content describes the knowledge, skills and understanding to be developed by students over a Stage. Content is organised under the headings of Knowledge and Skills (students learn about) and Working Mathematically (students learn to). The outcomes and content assist teachers in planning what and how they will teach, and in assessing what each student knows and can do.

Students progress at different rates. There will be students who do not demonstrate the outcomes identified with their stage of schooling by the time they complete that Stage. In addition, there will be students who demonstrate the outcomes before the end of their stage of schooling. To cater for this group of students, Stage 4 outcomes and content have been included in the *Mathematics K–6 Syllabus* so that teachers can design learning experiences that go beyond concepts typically taught in primary schools.

Children as learners in Mathematics K–6

The way in which children participate in Mathematics learning experiences plays a crucial role in shaping the views that they have of themselves as learners of mathematics. Young learners need to learn through active involvement and concrete experiences. Play is an important means of learning in the early years.

Mathematics K–6

Mathematics learning is more effective when it is interesting, enjoyable and challenging. It should involve interaction with the physical and social environment. Mathematics learning is supported by the appropriate use of a variety of materials and equipment. Information and communication technology, including calculators and computers, is an important tool of learning. Students use these tools to explore and understand new concepts, and they also use them to solve problems, just as adults do in the workplace.

Mathematics learning involves the investigation of mathematical patterns, relationships, processes and problems. Language, including symbols and diagrams, plays an important part in the formulation and expression of mathematical ideas and serves as a bridge between concrete and abstract representation.

In Mathematics, students will have the opportunity to develop knowledge, skills and understanding related to:

- inquiry, application of problem-solving strategies including the selection and use of appropriate technology, communication, reasoning and reflection
- mental and written computation and numerical reasoning
- patterning, generalisation and algebraic reasoning
- collecting, representing, analysing and evaluating information
- identifying and quantifying the attributes of shapes and objects and applying measurement strategies
- spatial visualisation and geometric reasoning.

In relation to values and attitudes, students will be provided with opportunities to:

- appreciate mathematics as an essential and relevant part of life
- show interest in and enjoyment of inquiry and the pursuit of mathematical knowledge, skills and understanding
- demonstrate confidence in applying mathematical knowledge, skills and understanding to everyday situations and the solution of everyday problems
- develop and demonstrate perseverance in undertaking mathematical challenges
- recognise that mathematics has been developed in many cultures in response to human needs.

As well as learning mathematical ideas and skills, students learn to work mathematically by posing questions that can be explored using mathematics and by applying mathematics to solve problems. Learning to work mathematically also involves students in communicating, reasoning and reflecting.

Students are to be encouraged to work together to learn mathematics. Discussion of mathematical ideas, and sharing procedures and solutions to problems, encourages the use of Working Mathematically processes and enables teachers to listen to and assess students' knowledge, skills and understanding. Working together at school also prepares students for the work place, where people frequently work in teams.

Students have individual needs, interests and abilities and the *Mathematics K–6 Syllabus* provides for Students with Special Needs in a variety of ways:

- through the inclusion of outcomes and content which provide for the full range of students
- through the development of additional advice and programming support for teachers to assist students to access the outcomes of the syllabus.

Mathematics and Literacy

Students write and talk about mathematics every day. They clarify their thinking and strengthen their understanding when they put their thoughts into words. By sharing their thinking with their classmates, teachers and parents, students develop a deeper understanding of mathematical ideas, develop self-confidence in using mathematics, and are able to demonstrate their progress.

PART 2
Organisation of the *Mathematics K–6 Syllabus*

What is the content of the *Mathematics K–6 Syllabus*?

Mathematics is organised into one process strand, Working Mathematically, and five content strands, Number, Patterns and Algebra, Data, Measurement, and Space and Geometry.

Working Mathematically encompasses five interrelated processes – Questioning, Applying Strategies, Communicating, Reasoning, and Reflecting. These processes come into play when developing new skills and concepts and also when applying existing knowledge to solve problems both within and beyond mathematics. At times the focus may be on a particular process or group of processes, but often the five processes overlap. While this strand has a set of separate outcomes, it is integrated into the content of each of the five content strands in the syllabus.

Number encompasses the development of number sense and confidence and competence in using mental, written and calculator techniques for solving problems. Formal written algorithms are introduced after students have gained a firm understanding of basic concepts including place value, and have developed mental strategies for computing with two-digit and three-digit numbers.

Patterns and Algebra has been incorporated into the primary curriculum to demonstrate the importance of early number learning in the development of algebraic thinking. This strand emphasises number patterns and number relationships.

Data addresses the need for students to understand, interpret and analyse information displayed in tabular or graphical forms. Students learn to ask questions relevant to their experiences and interests and to design ways of investigating their questions. They need to recognise when information has been displayed in a misleading manner that can result in false conclusions.

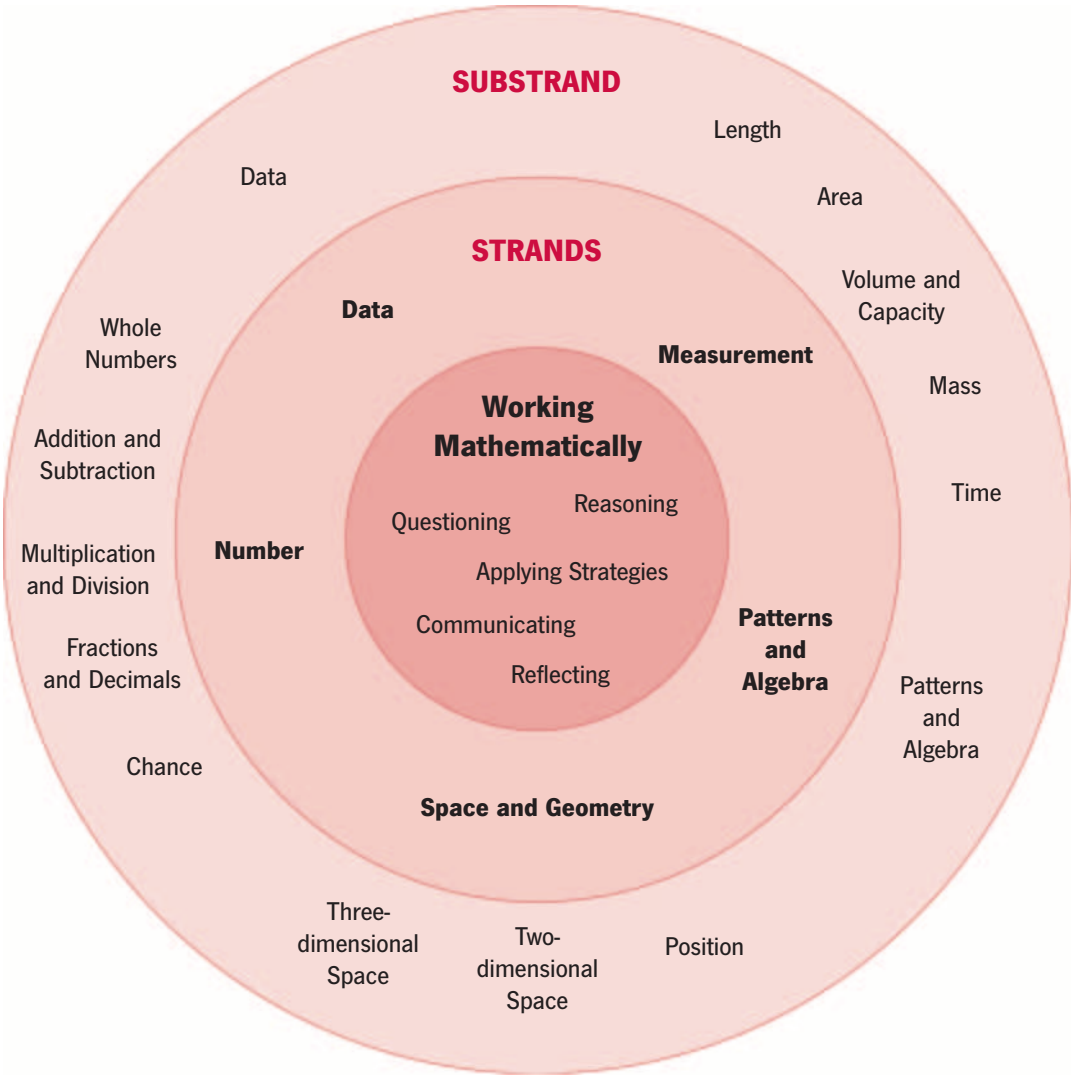
Measurement involves the identification of attributes of objects and their comparison, the use of informal units, the use of formal units, as well as consideration of applications and generalisations. Students learn to select and use appropriate units and measuring tools, and to calculate areas and volumes given particular information.

Space and Geometry is the study of spatial forms. It involves representation of shape, size, pattern, position and movement of objects in the three-dimensional world, or in the mind of the learner. Students learn to recognise, visualise and draw shapes and describe the features and properties of three-dimensional objects and two-dimensional shapes in static and dynamic situations.

Mathematics K–6

What will my child be taught in Mathematics?

The school Mathematics program deals with a wide range of concepts. These concepts are organised into five content strands. Each content strand is subdivided into substrands as shown below. The process strand, Working Mathematically, is central to mathematics learning and is embedded into each of the other strands.



What are students expected to know and be able to do in Mathematics?

Stage Statements

Stage statements describe what students typically know and can do as a consequence of having undertaken the syllabus content prescribed for the Stage.

Early Stage 1

Students who have achieved Early Stage 1 outcomes recognise numbers and shapes in their environment. They pose and explore mathematical questions using objects, actions, imagery, technology and/or trial and error. They describe mathematical situations, make conclusions and reflect on their learning using everyday language, actions and materials. Students are encouraged to use informal recordings. Many of these understandings are demonstrated in informal experiences such as play.

Students count to 30, and order, read and represent numbers in the range 0 to 20 in a variety of forms, using objects, pictures, numerals and words. They combine, separate, compare, group and share collections of objects and use everyday language to describe the collection(s) and their actions. They visualise numbers and number combinations from pictorial representations. They divide an object into two equal parts and describe the parts as halves. They recognise that there are different coins and notes in our monetary system. They recognise, describe, create and continue repeating patterns and number patterns that increase and decrease.

Students collect data and use objects or pictures to represent information about themselves and their environment. They organise the objects or pictures into a data display and interpret the information presented.

Students compare objects directly in terms of their length, area, volume, capacity and mass and use everyday and comparative language to describe these attributes. They sequence events and tell time on the hour using analog and digital clocks.

Students manipulate and sort objects and describe their size, shape, position and other features in everyday language. They represent objects and shapes using a variety of materials. They use everyday language to describe position and give and follow simple directions.

Stage 1

Students who have achieved Stage 1 outcomes show a growing awareness of the many purposes of mathematics in their daily lives. They pose questions and explore basic mathematical concepts by manipulating objects, pictures, imagery and technology applications. They describe mathematical situations and explain how answers were obtained using everyday language, actions, materials, diagrams and symbols. They give reasons to support their conclusions and link mathematical ideas and make connections with existing knowledge and understanding in relation to the content.

Students count, order, read and represent two- and three-digit numbers using numerals, words, objects and pictures. They develop place value concepts and begin to use a range of mental strategies to estimate and solve number problems involving the four operations. They are developing mental facility with number facts, number combinations and counting by ones, twos, fives and tens. They model and describe halves and quarters of objects and collections occurring in everyday situations. They sort, order, classify and count coins and perform simple monetary calculations. They recognise and describe the element of chance in everyday events. They create, represent and extend a variety of number patterns and supply missing elements. They begin to build number relationships and make simple generalisations and are able to record these in their own words.

Students gather and organise data, display the data using column and picture graphs and interpret the results.

Students use informal units to estimate and measure length, area, volume, capacity, mass and time. They compare and order objects according to these attributes and record findings. They recognise the need for formal units of length and use the metre and centimetre to measure length and distance. They compare and order the duration of events using informal units and read clocks on the half-hour.

Students manipulate, name, make, sort, describe and represent particular three-dimensional objects and two-dimensional shapes. They recognise them in pictures and in the environment. They make simple tessellating designs, identify parallel, vertical and horizontal lines and complete designs with one line of symmetry. They describe the position of objects in the immediate environment, in models and in pictures, and represent the position of objects using models and drawings.

Stage 2

Students who have achieved Stage 2 outcomes demonstrate their problem-solving skills using a range of strategies to deal with simple spatial, measurement and numerical problems. They pose questions that can be explored using mathematics. They develop and check solutions using appropriate mental or written strategies or technology. They use some mathematical terminology to describe or represent mathematical ideas and link their learning to other experiences.

Students use place value to count, order, read and record numbers up to four digits. They use estimation and employ mental strategies to solve problems. They demonstrate mental facility with multiples of numbers up to 10×10 and use informal written strategies for multiplication and division. They solve addition and subtraction problems using mental and written strategies, including the formal written algorithm. They model, compare and represent commonly used fractions and related decimals and recognise percentages in everyday situations. They perform simple calculations with money and use estimation to check their solutions. They order events from least likely to most likely and identify and record all possible outcomes for a simple chance experiment. They generate, describe and record number patterns using a variety of strategies and complete simple number sentences by calculating missing values.

Students conduct surveys, and classify and organise data to answer a specific question they have posed. They present the information in tables and graphs and interpret the results.

Students recognise the need for formal units to measure perimeter, area, volume, capacity and mass. They use particular formal units to estimate and measure to the nearest unit. They read and record time in one-minute intervals, make comparisons between time units and interpret calendars, simple timetables and timelines.

Students identify, manipulate and compare groups of three-dimensional objects and two-dimensional shapes and describe their features using appropriate mathematical terminology. They make and describe tessellating designs, identify perpendicular lines and find line/s of symmetry for a given shape. They are aware of angles in the environment and measure them using informal means. Students use coordinates to describe position and give and follow directions using compass points.

Stage 3

Students who have achieved Stage 3 outcomes extend mathematical investigations using appropriate problem-solving strategies, including the selection and use of appropriate technology. They use appropriate mathematical terminology and some conventions when representing mathematical situations and give a valid reason for supporting one possible solution to a problem over another. They are able to apply a familiar solution method to new problems. Students appreciate that mathematics involves observing, representing and generalising patterns and relationships.

Students read, write, represent and order numbers of any size using place value. They select and apply appropriate strategies for the four operations and interpret their solutions in the context of a problem. Students compare, order and perform calculations involving simple fractions, decimals and simple percentages. They assign numerical values to the likelihood of simple events occurring and order them on the number line. Students record using tables, and analyse and describe geometric and number patterns that involve one operation. Students construct, verify and complete number sentences using the four operations with a variety of numbers.

Students gather, organise, display, read and interpret data and make judgements in relation to this data. They read and interpret picture, simple line, pie and divided bar graphs with scales. They utilise data to find the average score.

Students select and use the appropriate device and unit for measuring. They convert measurements from one unit to another and record in decimal notation. They estimate and measure volume and capacity, including the volume of rectangular prisms, in cubic centimetres and cubic metres. Students use 24-hour time, am and pm notation and construct timelines and simple timetables. They use Australian time zones to solve simple problems related to time differences.

Students construct and classify three-dimensional objects and two-dimensional shapes and compare and describe their properties using strategies such as recognising symmetry and measuring angles and dimensions. They make simple calculations using scale and use a variety of mapping skills.

What is new in Mathematics K–6?

The *Mathematics K–6 Syllabus* and support documents include changes to the organisation of the previous syllabus, as well as several new features that are listed below.

- There are two new strands: Patterns and Algebra, and Data.
- The Teaching and Learning Units (Units of Work) are contained in a support document.
- The development of number concepts is strengthened with a focus on visualisation and mental computation.
- The operations of addition and subtraction are now paired as one substrand, as are multiplication and division.
- Fraction concepts are developed much further with students adding and subtracting simple fractions and multiplying fractions by whole numbers.
- Chance is included as a substrand of Number.
- Money is integrated into other substrands in the Number strand.
- Temperature is no longer a substrand of Measurement but is integrated as an application of reading linear scales and counting backwards from zero.

The syllabus has several new features:

- essential content has been written for each outcome and additional content (included as a set of suggested topics) can be used in teachers' programs to broaden and enrich students' learning in mathematics
- content pages integrate the outcomes and content, use Key Ideas to summarise the main concepts, and include additional advice under Background Information and Language
- Working Mathematically is now embedded into the content on each content page
- the K–10 Mathematics Scope and Continuum is an overview of Key Ideas to emphasise the notion of a continuum of learning
- Stage 4 outcomes and content are included to further develop students' knowledge, skills and understanding when they have demonstrated achievement of Stage 3 outcomes.

What is the nature of the Syllabus Support Document?

A support document has been written to assist teachers with the initial implementation of the *Mathematics K–6 Syllabus*. It provides advice for teachers about the organisation of the syllabus, on programming and planning, assessment, and the learning needs of particular groups of students such as Aboriginal and Torres Strait Islanders, boys and girls, students with special education needs, and those who are gifted and talented. The support document also outlines the characteristics of a learning environment that best supports the achievement of Mathematics outcomes.

A section on school planning and programming describes a process for interpreting the syllabus and translating it into teaching and learning programs that address the specific needs of students in schools. Sample units of work combine suggested syllabus content with a range of learning experiences appropriate for each Stage of primary schooling and demonstrate ideas for embedding assessment into learning experiences.

PART 3
Assessment and Work Samples

Assessment for learning

Teachers of Mathematics will provide students with opportunities to demonstrate their learning in the context of everyday classroom activities, as well as planned assessment events.

Assessment for learning:

- is an essential and integrated part of teaching and learning
- reflects a belief that all students can improve
- involves setting learning goals with students
- helps students know and recognise the standards they are aiming for
- involves students in self-assessment and peer assessment
- provides feedback that helps students understand the next steps in learning
- involves teachers, students and parents reflecting on assessment data when planning the next steps in learning. Parents may also gauge their children's confidence and competence with Mathematics through discussions and observing their children doing mathematical tasks.

Work Samples

Student work samples, which have been published in the Mathematics K–6 Support Document (March 2003), and on the CD ROM (June 2003), give teachers examples of work that students have produced when involved in learning experiences based on the outcomes and content of the syllabus.

Each work sample includes specific outcomes, a description of the learning experience and the indicators used to assist in assessing student achievement. A single work sample will not provide sufficient evidence of achievement of an outcome. Teachers will generally consider a number of samples and observations of student work in a variety of contexts when determining what students know and are able to do.

Section 2

Parent Workshop Information

Ideas for Parent Meetings

Informing parents/caregivers and the wider community about the nature and content of the *Mathematics K–6 Syllabus* is important for achieving support for and involvement in school programs. This section may need to be extended, adapted or modified in order to provide information that meets your community's needs and interests.

The following section contains information and material for conducting an introductory meeting for staff and parents. This includes:

- organisational details
- sample letters to send home to parents
- sample meeting agenda
- presenter's notes
- ideas for overhead transparencies.

Organising a meeting for parents

- Select a meeting coordinator or committee to organise the meeting. Any committee should include representatives from the school staff as well as parent and community organisations.
- Send an invitation letter to parents and community members (see sample on p 17). Translations of the invitation letter should be considered if there is an identified community need.
- Arrange support for the meeting. The principal, school counsellor and teachers may be asked to play a role at the meeting. Where there is a significant NESB parent group, consideration could be given to the provision of interpreters.
- Decide on the meeting format and procedures (see suggested agenda on p 18).
- Ensure that arrangements are made for
  - the needs of those parents from non-English speaking backgrounds
  - child-care
  - refreshments
  - any materials to be distributed at the meeting
  - the display of resources.

Sample letter for parent/community information meeting

Dear Parent/Caregiver

The Board of Studies NSW has released a new *Mathematics K–6 Syllabus* for use in primary schools in NSW.

A meeting will be held to inform parents about the content of the new Syllabus, the school's program and policies, teaching strategies and approaches for learning Mathematics, and how parents can support their child's learning of Mathematics.

This is an opportunity for parents to find out more information and ask any questions they may have about the Syllabus and how our school will implement it.

You are invited to attend an information evening to be held

on . . . . . at . . . . . .

The meeting will commence at . . . . . .

After the meeting refreshments will be available. We look forward to seeing you and sharing information. If you feel that you will need interpreter assistance at the meeting please indicate the language required on the return slip.

Yours sincerely

Principal

Please return this section to your child's teacher.

I will be attending the Mathematics meeting.

❑ YES ❑ NO

If you will require interpreter assistance please indicate language required.

Name . . . . . Child's Class . . . . . .

Signature . . . . . .

Sample meeting agenda

1 Welcome

2 What is Mathematics K–6?

3 Syllabus and Support Documents – *Mathematics K–6 Syllabus*, Teacher Support Document (March 2003) and Parent Support Document (November 2002)

4 What will your child learn in Mathematics K–6?

5 The Mathematics program and school policies

6 Teaching strategies and approaches for learning Mathematics

7 Parent/caregiver and community participation

8 How can parents/caregivers support their child's learning of Mathematics?

9 Conclusion

Refreshments

Display of Resources

Presenter's notes

1 Welcome

- Introduce yourself and other key people at the meeting.
- State that the purpose of the presentation is to introduce the new *Mathematics K–6 Syllabus*.
- Ask parents what they expect to know about Mathematics K–6 by the end of this meeting.
- List parents' expectations for the meeting on butchers' paper or a whiteboard.
- Outline the sequence of the meeting, including the expected outcomes for the evening.

2 What is Mathematics K–6?

Distribute *Parent Brochure* to address the question.

Consider each of the following questions:

- What is Mathematics K–6? (Use OHT 1)
- What is its aim? (Use OHT 2)
- Why is mathematics important? (Use OHT 3)
- What do the students learn about and learn to do in mathematics? (Use OHTs 4 and 5)

3 Syllabus and Support Documents

Show participants a copy of the:

- *Mathematics K–6 Syllabus*
- Teacher Support Document (March 2003)
- Parent Support Document (November 2002).

Explain that the *Mathematics K–6 Syllabus* and Teacher Support Document are each used by teachers for programming and planning. The Parent Support Document has been produced for those parents who wish to read about Mathematics K–6.

4 What will your child learn in Mathematics K–6?

Refer to the *Parent Brochure* outline of the one process and five content strands (Use OHT 6).

Students develop particular knowledge, skills and understanding in each strand (Use OHT 7) and they develop values and attitudes (Use OHT 8).

At this stage, specific information could be given about each of the Strands with activities that parents could use at home with their children.

5 The Mathematics program and school policies

Each teacher is responsible for planning and programming learning experiences to meet the needs of students in the class. Schools typically begin the planning process with a scope and sequence chart that maps the syllabus outcomes and content for each Stage into the terms of the school year. This is only a guide as teachers may need to review the content for earlier outcomes before beginning new work.

Show a sample of one teacher's program and the school's scope and sequence chart to demonstrate how planning and programming occurs.

6 Teaching strategies and approaches for learning Mathematics

Students learn mathematics well when they work in groups and share ideas and suggestions. Students clarify their thinking and strengthen their understanding when they put their thoughts into words. Students learn mathematics well when they manipulate mathematical material.

Activities to demonstrate the use of group work and concrete materials could be demonstrated to parents; or they could participate in the activity.

Discuss what is new in this syllabus (Use OHT 9). Mention needs to be made of the strengthening of the Number strand, the focus on mental computation and visualisation, the delay of formal written algorithms, the increased development of fractions, and the inclusion of Working Mathematically in programs for all strands.

7 Parent/caregiver and community participation

Suggested strategies for promoting parent and community participation:

- create a committee of interested teachers, parents/caregivers and community members
- consider Mathematics and the wider school program
- use written and social communication between the school, parents/caregivers and the school community network. Interaction in parents' first language is an important consideration
- publicise school events
- invite parents/caregivers to experience classroom activities at parent information evenings
- involve parents/caregivers in classroom activities
- encourage parents to ask questions or raise any concerns with the classroom teacher or the principal.

8 How can parents/caregivers support their child's learning of Mathematics?

Refer to the *Parent Brochure* (Use OHT 10).

Introduce a discussion based on each point. Reinforce the idea that parents' values, attitudes and expectations have an enormous influence on the way in which students grow as individuals and as members of society. Because of this, parent participation in Mathematics is especially important. A close partnership between parent, teacher and child will help the school develop an effective program and will help students develop knowledge, skills, and understanding, as well as appropriate values and attitudes.

9 Conclusion

Provide an opportunity for additional questions and discussion. For any concerns that need further clarification, parents may be referred to their child's class teacher or appropriate school support staff.

For more general information direct parents to the Board of Studies website (www.boardofstudies.nsw.edu.au) which contains the documents and general information about resources.

Activities for Parent Meetings

Early Stage 1 Activities

Strand: Measurement **Substrand: Area**

Handprint Detective

Preparation: You will need to trace or print a handprint for each group of 4 parents. They do not need to be the same size.

The facilitator presents the following scenario:

'This morning I found a handprint in the classroom. I have made copies of the handprint so that we can find who it belongs to.'

Possible questions include:

– can you work out if your hand is bigger, smaller or about the same area as the handprint?

Parents superimpose their hand onto the handprint.

Parents explain how they checked if their hand was a match, and if not, whether their hand is bigger or smaller than the handprint.

Strand: Number **Substrand: Multiplication and Division**

Rows of Teddy Bears

Preparation: You will need enough teddy bear counters, or similar, for the group.

Parents are given 12 small plastic teddy bears or other small objects.

Possible questions include:

– can you arrange the teddy bears into equal rows?
– how many different ways can you arrange the teddy bears into equal rows?

Parents record and share their solutions.

This activity could be repeated with a smaller or a larger collection of objects.

Strand: Number **Substrand: Whole Numbers**

Number Lines

Preparation: You will need enough small squares of paper, for the group.

Parents each write a number in a given range (eg 10 to 20) on a small square of paper. The facilitator selects a parent randomly to peg their number on a string hung across the room, or on the chalkboard or whiteboard. Parents discuss the placement of the numbers.

A second parent is selected to peg their number on the string considering its placement in relation to the first number.

This is repeated for all parents, discussing where each number should go, before placement.

eg 

Possible questions include:

– what number comes immediately before/after 17?
– what numbers go between 14 and 17?
– where do you think 11 will go?

Stage 1 Activities
Strand: Space and Geometry **Substrand: Two-dimensional Space**

Tiling the Bathroom Floor

Preparation: You will need pattern blocks or similar material, paper and pencils.

In small groups, parents select a shape (eg square, circle, triangle, hexagon, rhombus, trapezium) to investigate whether it tessellates.

Parents draw a floor plan for their bathroom and then trace around the shape and slide it to a new position, attempting to cover the surface without leaving gaps.

Parents share their drawings. They group the shapes according to those that tessellate and those that do not.

Strand: Patterns and Algebra **Substrand: Patterns and Algebra**

Calculator Count

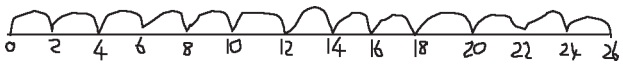
Preparation: You will need one calculator for every two parents, paper and pencils.

In pairs, parents are given a calculator and are shown how to make it count by repeatedly adding the same number.

For example, on some calculators parents enter

	+	2	=	=	
or	+	+	2	=	=

Parents read the numbers displayed on the screen and record on an empty number line.



Possible questions include:

- what pattern do you see on the number line?
- how many numbers did you land on? How many numbers did you jump over?
- what would happen if you made your calculator count by fours?

Strands: Number **Substrand: Addition and Subtraction**
Working Mathematically

Dice Game

Preparation: You will need one pair of large dice.

The parents are seated in a circle so they can all see the dice as the facilitator rolls them. The facilitator chooses a parent to be 'in'. This parent stands behind another parent and works their way around the outside of the circle in this way. The facilitator rolls the dice and the parent who is 'in' and the person they are standing behind have to call out the answer. You may decide beforehand whether to practise adding or subtracting. The faster parent is then 'in', and moves behind the next person in the circle. The other parent takes their place in the circle. The parent who gets 5 answers correct in a row then becomes the 'roller'.

Possible questions include:

- what strategy did you use to find your answer?
- is there a faster way to work out the answer?

Stage 2 Activities

Strand: Number **Substrand: Whole Numbers**

Wipe-Out

Preparation: You will need one calculator for every two parents, Base 10 material

Parents are asked to enter a four-digit number into the calculator eg 2657.

The facilitator then asks the student to 'wipe out' one digit ie change it to a zero.

In the example, 'wiping out the 5' would require a parent to change the number to 2607 and the operation required would be subtraction of 50. Parents could demonstrate the procedure using Base 10 material.

Possible questions include:

- what did we learn?
- what would we do?
- what information does this convey about student learning?

Strand: Space and Geometry **Substrand: Position**

Directions from A and B

Preparation: You will need grid paper marked with coordinates, pencils, compass (optional).

Parents are asked to draw a map of the room or playground using grid paper marked with coordinates. They are asked to include an arrow on their map to indicate North.

Parents choose two room or playground features and label them A and B.

Parents determine the set of coordinates for A and B and use directional language to describe the location of other room/playground features in relation to A or B.

Parents identify and explain different ways of getting from A to B.

In groups, they brainstorm the positional language required to complete the activity.

Strand: Measurement **Substrand: Area**

'What could it be?'

Preparation: You will need grid paper marked with coordinates, pencils.

The facilitator poses the question 'I have measured a surface in this room and found that it has an area of 12 square centimetres. What could it be?'

The facilitator provides parents with a square centimetre grid overlay. Parents then use the grid overlay to identify items that match the facilitator's description. Parents, in pairs, compare and record the different-shaped items that have an area of 12 square centimetres.

Possible questions include:

- how many items did you find that have an area of 8 square centimetres?
- was the area of some items easier to measure than others? Why?

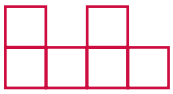
Stage 3 Activities

Strand: Space and Geometry **Substrand: Three-dimensional Space**

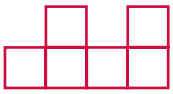
Views of Models

Preparation: You will need a 4×4 grid marked on paper, interlocking cubes

Parents are given a side view and a front view of a model made with cubes.



side view



front view

They make a model that conforms to those views on a 4×4 grid.

Possible questions include:

– what is the most/least number of cubes you can use to make the model?
– have you made the only possible model? How do you know?

Strand: Number **Substrand: Fractions and Decimals**

Bulls-eye on the calculator

Preparation: You will need one calculator for every two parents.

In pairs, parents are given a number less than 100. They take turns estimating what number to multiply this number by to get an answer between 100 and 101. They test their estimation on the calculator.

eg Parents are given the number 24.

Player 1 estimates 3.8.	Test: 24×3.8 = 91.2
Player 2 estimates 4.35.	Test: 24×4.35 = 104.4
Player 1 estimates 4.1.	Test: 24×4.1 = 98.4
Player 2 estimates 4.2.	Test: 24×4.2 = 100.8. This player is the winner.

Parents could repeat the activity using other numbers less than 100.

Possible questions include:

– what strategies did you use?
– what did you need to know to do this activity successfully?

Strand: Number **Substrand: Multiplication and Division**

Comparing Mental and Written Strategies

Preparation: You will need paper and pencils.

Parents estimate and multiply three- and four-digit numbers by one-digit numbers to compare mental or written strategies when solving problems.

For example, 'There are 334 students in a school. If each student watches 3 hours of television per day, how many hours of television is this altogether?'

Parents share their strategies and determine which is the most efficient.

Possible questions include:

– how did your estimation help?
– can you describe your strategy?
– is your strategy efficient? Why?
– did your answer make sense in the original situation?
– how can you check whether your answer is correct?

Section 3

Overhead Transparencies
and Handouts

OVERHEAD TRANSPARENCY 1

What is Mathematics K–6?

Mathematics K–6:

- is one of the six Key Learning Areas in primary school
- builds upon the considerable mathematical learning that students acquire before entering school
- provides the foundation for further study in mathematics
- develops mathematical concepts from Early Stage 1 to Stage 4
- promotes self-motivated learners through inquiry and active participation
- prepares students to be problem solvers and effective users of mathematics
- helps students to make informed decisions, interpret and apply mathematics, and critically evaluate ideas and arguments that involve mathematical concepts.

OVERHEAD TRANSPARENCY 2

What is the aim of Mathematics K–6?

The aim of Mathematics K–6 (and Mathematics Years 7–10) is to develop students' mathematical thinking, understanding, competence and confidence in the application of mathematics, their creativity, enjoyment and appreciation of the subject, and their engagement in lifelong learning.

OVERHEAD TRANSPARENCY 3

Why is Mathematics important?

Mathematics is important because it:

- is a powerful tool for solving problems within and beyond mathematics
- is a significant part of the cultural heritage of many diverse societies
- provides students with a powerful, precise and concise means of communication
- supports concurrent learning in other key learning areas
- builds a sound foundation for further mathematics education.

OVERHEAD TRANSPARENCY 4

What do students learn about?

Students learn about:

- selecting and applying appropriate mental, written or calculator strategies to solve problems involving addition, subtraction, multiplication and division
- estimating and refining estimates in a variety of situations
- modelling, comparing and representing fractions and decimals
- describing and applying number patterns and relationships between numbers
- analysing data and drawing and interpreting graphs
- selecting and using appropriate units and devices to measure
- manipulating, describing and classifying two-dimensional shapes and three-dimensional objects
- interpreting and communicating information presented in numerical, geometrical, graphical, statistical and algebraic forms.

OVERHEAD TRANSPARENCY 5

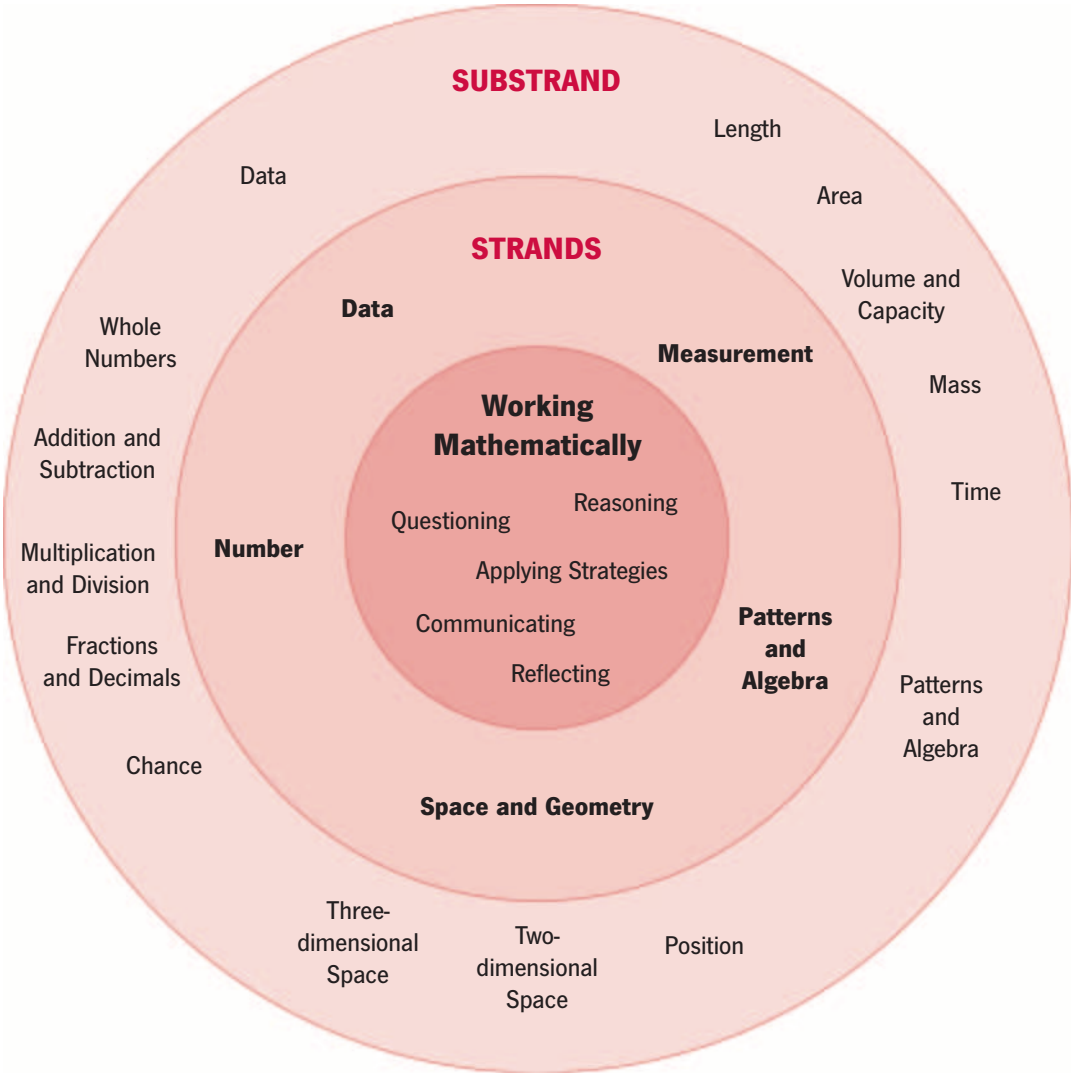
What do students learn to do?

Students learn to:

- develop a positive self-concept as learners of mathematics
- appreciate the usefulness of mathematics in everyday contexts
- become self-motivated learners through inquiry and active participation in challenging and engaging experiences
- develop perseverance in undertaking mathematical challenges
- make informed decisions
- ask questions about mathematics and the uses of mathematics in their world
- describe and explain mathematical ideas and procedures
- interpret and apply mathematics in a variety of contexts
- use an appropriate technological tool to investigate and solve problems, and retrieve and represent information
- critically evaluate ideas and arguments that involve mathematical concepts or that are presented in a mathematical form
- reflect on experiences and make connections with existing knowledge, skills and understanding.

OVERHEAD TRANSPARENCY 6

Content: Strands and Substrands



OVERHEAD TRANSPARENCY 7

Knowledge, Skills and Understanding

In Mathematics, students will have the opportunity to develop knowledge, skills and understanding related to:

- inquiry, application of problem-solving strategies including the selection and use of appropriate technology, communication, reasoning and reflection
- mental and written computation and numerical reasoning
- patterning, generalisation and algebraic reasoning
- collecting, representing, analysing and evaluating information
- identifying and quantifying the attributes of shapes and objects and applying measurement strategies
- spatial visualisation and geometric reasoning.

OVERHEAD TRANSPARENCY 8

Values and Attitudes

In relation to values and attitudes, students will be provided with opportunities to:

- appreciate mathematics as an essential and relevant part of life
- show interest in and enjoyment in inquiry and the pursuit of mathematical knowledge, skills and understanding
- demonstrate confidence in applying mathematical knowledge, skills and understanding to everyday situations and the solution of everyday problems
- develop and demonstrate perseverance in undertaking mathematical challenges
- recognise that mathematics has been developed in many cultures in response to human needs.

OVERHEAD TRANSPARENCY 9

What is new in Mathematics K–6?

- two new strands – Patterns and Algebra, and Data
- development of Number concepts is strengthened
- greater focus on visualisation and mental computation
- Addition and Subtraction paired as one substrand
- Multiplication and Division paired as one substrand
- Fraction concepts developed much further
- Chance is included as a substrand of Number
- Money is integrated into other substrands of Number
- Temperature is no longer a substrand but is integrated as an application of reading scales

New features:

- 'essential content' and 'additional content'
- content pages integrate the outcomes and content
- Working Mathematically is embedded into the content
- K-10 Scope and Continuum – an overview of Key Ideas
- Stage 4 outcomes and content are included.

OVERHEAD TRANSPARENCY 10

How Can You Support Your Child's Learning of Mathematics?

- Show an interest in your child's school work
- Expect your child to succeed
- Share a positive attitude towards mathematics with your child
- Support your child's interest in mathematics
- Talk about mathematics and solving problems
- Be prepared to discuss mathematical ideas
- Point out how mathematics is used every day
- Ask your child what they have learnt in mathematics
- Be positive about your child's efforts and encourage them to practise skills
- Support the school's mathematics program

The most important thing you can do is to take the time to discuss mathematical thinking with your child and show how you value your child as a learner of mathematics.

Parent Handout

How can I support the school program at home?

The following are examples of activities that you may choose to do with your child at home. These ideas support learning in Mathematics at school. The activities are organised under the six strands in the *Mathematics K–6 Syllabus*.

Parents/caregivers need to make a judgement about the appropriateness of particular activities for their child. Parents who are seeking additional guidance on the developmental appropriateness of particular activities may refer to the syllabus Stage Statements.

Suggested Activities To Do With Your Child

Working Mathematically

Working Mathematically includes: asking questions; using a range of strategies to solve problems; using appropriate language and symbols to describe and represent mathematical ideas; exploring relationships as well as checking and justifying solutions; and reflecting on learning and making connections between mathematical ideas. The following activities will help to encourage development of these important processes.

- Encourage your child's curiosity about the use of numbers and measurements in the world around them. Listen to their many questions and ask your own questions. Discuss with them how you might find answers to these questions.
- Play games together (eg cards, board games, computer games), and discuss how mathematical ideas can be used to play, as well as to develop successful strategies.
- Discuss how mathematics is used every day. The applications of mathematics and technology are numerous. In the kitchen, for example, ingredients are measured and digital timers and clocks are used on microwave ovens.
- Solve problems together and discuss strategies and solutions. Encourage your child to find all possible solutions, as many problems have more than one answer. They should also be encouraged to justify their solutions. Many internet sites have suitable problems and investigations for primary school students. Another source of mathematical problems is children's magazines and puzzle books.
- Encourage your child to try different strategies when solving everyday problems.
- Provide opportunities for your child to use technology to investigate mathematical ideas.
- Connect to the internet at home or at a local library, and help your child (or let your child help you) locate websites that provide information and ideas about mathematics and technology.
- Discuss the mathematics your child is learning at school. Ask them to explain what they have learnt in mathematics lessons this week, and how they can use these ideas. If they express concern about what they are doing, this gives you an opportunity to look at their work and help them if appropriate, or to encourage them to seek extra guidance from their teacher.
- Watch television programs about mathematics with your child. Discuss the contents of the programs and how it relates to the mathematics taught at school.

Students who feel confident about Working Mathematically feel confident about themselves as learners of mathematics.

Number

Number includes: counting forward and backwards and understanding place value; using the four operations (addition, subtraction, multiplication and division); interpreting and doing simple calculations with fractions, decimals and percentages; and understanding the language used in chance. The following activities will help to encourage the development of Number concepts.

- Count with your child whenever possible. Play counting games while travelling in the car and sing counting rhymes. Remember to count forward and backwards starting from different numbers.
- Look for numbers in your local area (eg house numbers, prices, speed signs, Roman numerals) and discuss how the numbers are used.
- Play board games as a family and discuss the chance of throwing a particular number on a die in order to win the game.
- Encourage your child to use money. Support your child's efforts to calculate change.
- Discuss with your child how to use the telephone book. Write a list of people from the family, school and community, together with their telephone numbers and addresses. Put the list in an accessible place eg near the telephone or in a notebook, for your child to refer to and use.
- Play oral games such as Race to 10. Starting at 0 take turns and add either 1 or 2 to the last number said. The player who gets to 10 first wins.

eg	A says	B says
	1	3
	4	6
	7	8
	10	

  A wins this game. Note the game has a winning strategy.

  Discuss mental strategies for working these out quickly. You can play to any number depending on your child's ability.
- When your car pulls up behind the car in front, you might have a competition to see how many different answers children can make using the numbers from the car number plate. For example, if the number plate is ABC 152 the children might say

  $1 \times 5 + 2 = 7$, or $1 + 5 + 2 = 8$, or $(1 + 5) \times 2 = 12$.
- A pack of playing cards can be used to play mathematical games that involve the recall of number facts.

  For example, Addition, Subtraction or Multiplication Snap involves turning over two cards from the top of the pack with the first person to say the sum/difference/product of the cards scoring one point. The game continues until all of the cards in the pack have been used. The winner is the player who has scored the most points.

  The game can be made easier by including only some numbers from the pack (eg 2, 3, 4, 5, and a picture card to represent 10), or it can be made more challenging by turning over more than two cards.
- Develop mental computation strategies with your child by doing calculations in your head. Share your strategies and think of different ways of calculating the answer.

  For example, to calculate $75 - 32$, you can do $75 - 30 = 45$ and then $45 - 2 = 43$.

  Another possibility is to do $70 - 30 = 40$ and then $5 - 2 = 3$, so the answer is $40 + 3 = 43$.

  Now consider $75 - 38$.

  This can be done as $75 - 40 = 35$ and then $35 + 2 = 37$.

  Another possibility is $75 - 30 = 45$, $45 - 5 = 40$, and then $40 - 3 = 37$.

  There are often many different ways to do calculations mentally. Children need to experience different ways so that they can develop a range of mental strategies.

- Discuss fractions as part of a whole when cutting up fruit or a cake.

  For example, 'How many pieces will we need? … Therefore each piece should be one quarter.'

  If your child plays sport, discuss fractions of the playing surface eg two halves of a soccer field, three thirds of a netball court.

  Discuss fractions as part of a collection of objects.

  For example, share a packet of sweets between 4 children. If there are 20 sweets, then they will each receive one quarter, which is the same as five twentieths of the packet of sweets.
- Let your child help plan a family holiday. They can plan the route, determine the overall distance, propose the number of kilometres to drive each day, and work out the amount of time it will take. They could help calculate an appropriate budget for the holiday to include expenses like souvenirs, accommodation, meals and petrol. If you have a computer, they could record the expenses on a spreadsheet.
- Ask your child to work out how much longer you will be travelling if you are driving at 80 kilometres per hour with 130 kilometres to go. Ask your child to explain how they solved the problem. Share with your child the methods you used to solve this problem.
- Visit local shops and discuss prices for similar products. Determine the best value. Estimate weekly shopping costs.
- Discuss the use of percentages in the media.
- Discuss the use of the language associated with chance in everyday situations eg 'no chance', 'fifty fifty', 'pigs might fly', 'it's a possibility'.

Patterns and Algebra

Patterns and Algebra includes the investigation of repeating patterns, number patterns, and relationships between numbers.

Repeating patterns are explored in Early Stage 1 and can be created using numbers, letters, shapes, sounds and actions.

For example:

A, B, C, A, B, C, …
1, 2, 1, 2, …
□, □, ●, □, □, ●, …
clap hands, touch shoulders, clap hands, touch shoulders, and so on.

Number patterns can increase or decrease (eg 2, 4, 6, …; 25, 20, 15, …) and they can include fractions and decimals eg $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, …; 1.0, 1.2, 1.4, …

Students are encouraged to continue patterns, to find a missing element in a pattern, to describe how a pattern has been created, and to create their own patterns.

Number relationships involve writing number sentences that connect number facts.

For example, if a student knows that $2 + 4 = 6$, then they should also know that $4 + 2 = 6$ and also that $6 - 4 = 2$ and $6 - 2 = 4$.

The same relationships can be created for multiplication and division facts.

Students also learn to find missing values in number sentences eg find the missing number in $50 - \square = 31$.

The following activities will help to develop concepts in Patterns and Algebra.

- Use a calculator to count by ones, twos, threes, and so on.

  Press the keys '0' '+' '1' '=' and the display will show 1. If you continue to press '=', the calculator will count by ones. This can be repeated, replacing '1' by '2' for counting by twos.

  After counting for a while, ask your child to predict the number that will come up next, and then press the '=' key to verify the prediction. Try other numbers.

Encourage your child to write down the numbers that are displayed on the calculator and to describe the pattern to you.

- From a collection of buttons, ask your child to create a repeating pattern and to describe the pattern to you. You could create a repeating pattern with the buttons that includes one button that is misplaced. Ask you child to find the error in the pattern and to correct it.
- Make up mathematical games with your child and join in as they experiment with different rules eg create number sentences from the digits on car number plates.

  For example, if the number plate on a car was ABC 123, this could lead to the sentences

  $1 + 2 = 3$, $2 + 1 = 3$, $3 - 1 = 2$, $3 - 2 = 1$.
- Play 'guess my rule' games. This involves listing a set of numbers that form a pattern and asking your child to describe the 'rule' used to make the pattern. Encourage your child to create a number pattern for you to find the 'rule' eg 2, 4, 7, 11, ...
- Create number sentences with a missing number and encourage your child to find the missing number eg $17 + \square = 30$.

  Ask questions like 'What is the missing number?', 'How did you find it?', 'How do you know you are correct?', 'I think the answer is 23. Am I correct? How can we check this?'

  Similar questions like this can be created in words eg 'I am thinking of a number so that when I double it the answer is 5. What is the number?'

Data

This strand includes collecting, organising and analysing data as well as interpreting data when it is presented in a variety of forms including picture, column, line and pie graphs. Students also learn to create graphs. The following activities will help to develop concepts in Data.

- Create a graph of your child's growth over time.
- Use tally marks to score in a game, or count days to a special event.
- Discuss and interpret graphs and tables used in the media.
- Explain information presented in the media that uses the term 'average' eg 'the average temperature in December was 24 degrees'.
- Identify misleading representations of data in the media.

Measurement

Measurement includes length, area, volume and capacity, mass and time. The following activities will help to develop concepts in Measurement.

- Collect small jars and containers of different sizes and shapes. Ask your child to sort them from smallest to largest capacity. Check by filling the 'smallest' with uncooked rice. If it really is the smallest, the rice should fit into the next container. If so, add more rice and pour it into the next container. Continue this process to check the ordering of the containers. Discuss why the tallest container may not hold the most.
- Join your child in working out measurements for cooking, building, craft or sewing.
- Encourage your child to estimate how long it will take to perform a common task (eg tying their shoe laces, saying the alphabet, making a tower from 30 coins). Time the task to check and review estimates.
- Estimate how many times your child can complete an action in 10 seconds, 30 seconds, or 1 minute eg bouncing a ball, skipping with a rope, running around the backyard.
- Read and interpret timetables with your child eg train, bus, TV guides.

Pose questions like 'Which bus would we need to take to the station to catch the 9:15 train?' 'What time is your favourite TV show on? How long does it go for?'

- Discuss the sporting achievements of athletes in competitions like the Olympic and Commonwealth Games eg long jump distances, high jump and pole vault heights, running and swimming race times.

  Measure long jump distances on the ground and high jump heights on a wall.
- When painting the house let your child help to work out how much paint will be needed to cover the area, how much the paint will cost, and how long the painting will take.
- Visit local leisure areas regularly and discuss the angles and heights of slippery dips and swings, mass and balance on a see saw, area and length of a football field or netball court, and how many laps of the pool equals 1 kilometre.

Space and Geometry

In Space and Geometry, students learn about two-dimensional shapes (eg squares, rectangles, circles, triangles), three-dimensional objects (eg cubes, prisms, pyramids), and position. The following activities will help to develop concepts in Space and Geometry.

- Encourage your child to find shapes and objects used in their environment eg in buildings, parks, schools, shops, as well as in your home. Discuss why some shapes and objects are used more than others.
- Discuss three-dimensional objects with your child using their geometric names eg cone, cylinder (drink can), cube, sphere (ball), rectangular prism (tissue box). Let your child go on a hunt for these shapes and point them out by name. Ask questions like 'Which ones do you see most often?' 'Why?'
- Solve Tangram Puzzles - a tangram consists of seven pieces cut from a square. See if you and your child can use all, or some of the pieces to make a square, triangle, parallelogram and pentagon.

- Identify symmetry in the environment. Sort leaves and flowers on the basis of symmetry.
- Find examples of tessellating shapes in the community eg pavements, buildings.