

BOARD OF STUDIES
NEW SOUTH WALES

Mathematics K–6

Principal's Package

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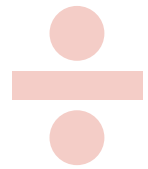
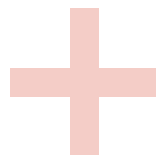
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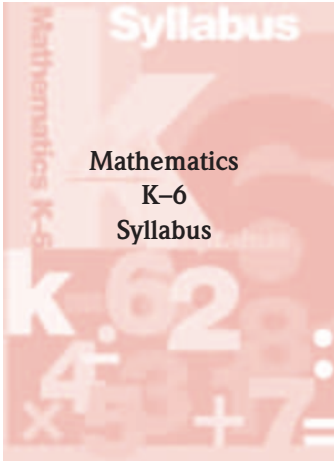
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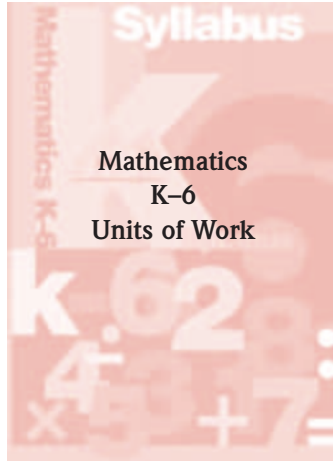


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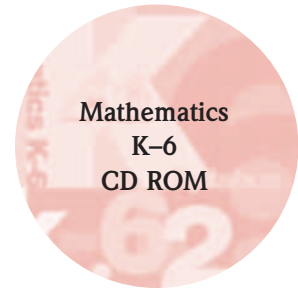
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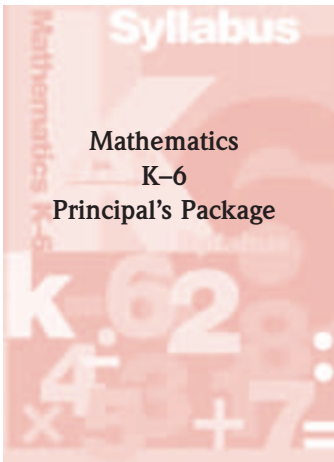


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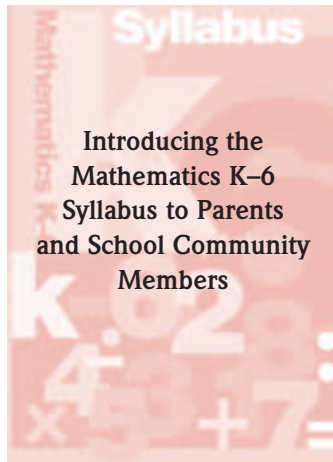


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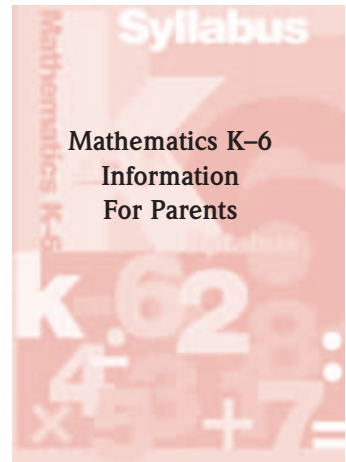


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Released for parents:

(March 2003)



On the Board of Studies' website:

- All documents that are released to schools
www.bosnsw-k6.nsw.edu.au

Documents replaced by the new Mathematics K-6 Syllabus:

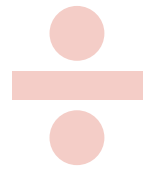
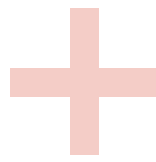
- *Mathematics K-6* (1989)
- *Mathematics K-6 Outcomes and Indicators* (1998)

Mathematics K–6

INFORMATION PACK FOR PRINCIPALS

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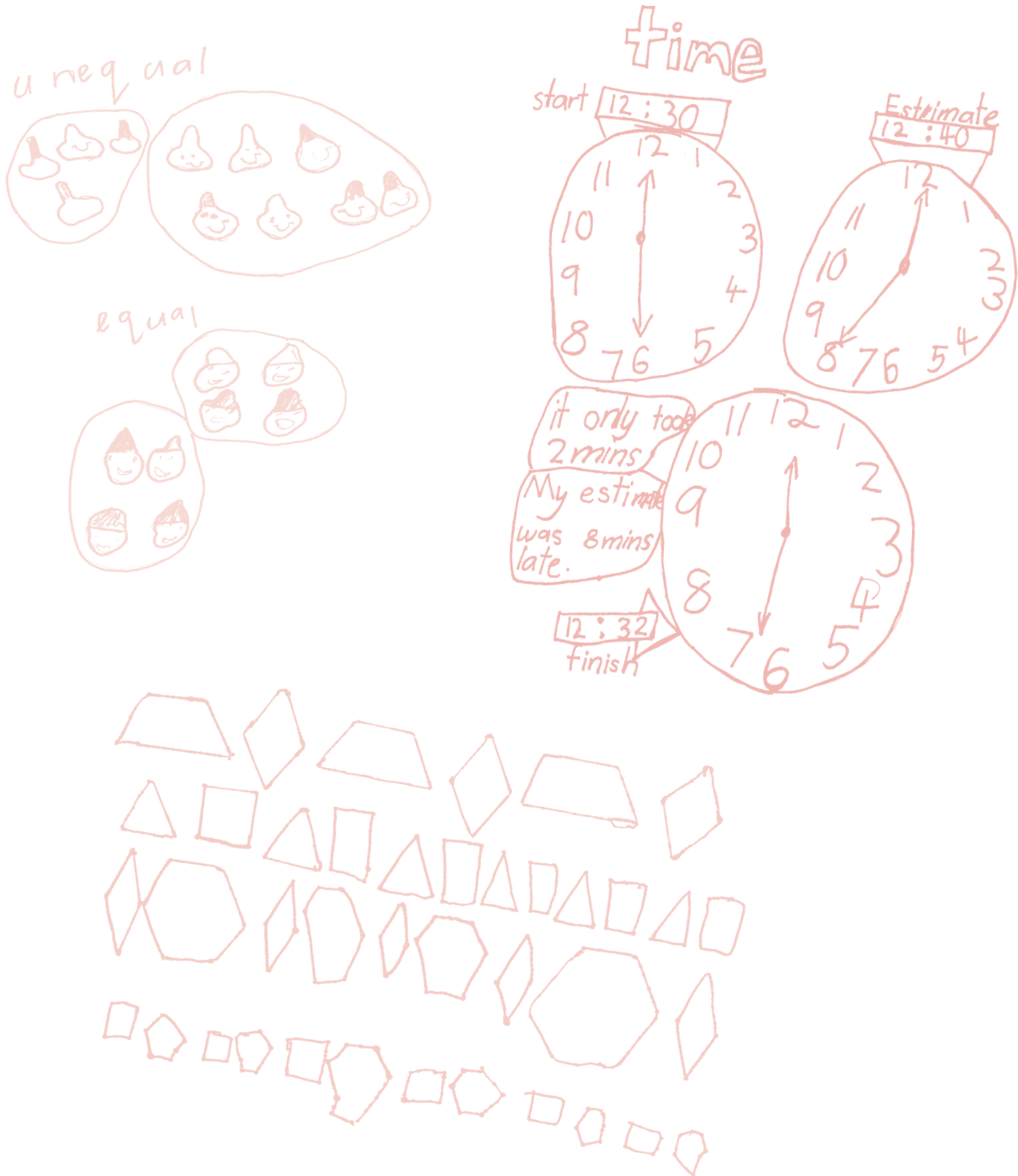
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INTRODUCTION

This package has been produced for principals to provide them with information about the *Mathematics K–6 Syllabus* (2002) and support documents. It focuses on matters considered to be of key interest to principals and their school communities.

The *Mathematics K–6 Principal’s Package* has been distributed to principals in primary schools, infants schools, central schools and K–12 schools in New South Wales. The information sheets in the package have also been published on the Board’s website: www.bosnsw-k6.nsw.edu.au



Mathematics K–6

OVERVIEW

The Syllabus

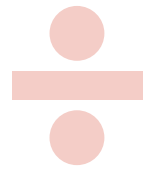
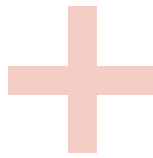
The *Mathematics K–6 Syllabus* addresses the knowledge, skills and understanding, as well as the values and attitudes that will enable students to develop an appreciation of mathematics and its application in their everyday lives. It encompasses all aspects of the development of mathematical thinking, understanding, competence and confidence, and promotes creativity, enjoyment, appreciation and engagement in lifelong learning.

The *Mathematics K–6 Syllabus* forms part of the continuum of mathematics learning from Kindergarten to Year 10. To ensure coherence and continuity, this syllabus was developed at the same time as the *Mathematics Years 7–10 Syllabus*. The Rationale, Aim and Objectives are common to both syllabuses. A K–10 Mathematics Scope and Continuum that describes the Key Ideas to be developed at each Stage, and for each strand, is also contained in both syllabuses.

The syllabus contains essential content, presented as outcomes and content statements, and additional content that teachers may choose to use to broaden and enrich students' learning in mathematics.

The syllabus provides a continuum of outcomes arranged in Stages for the process strand (Working Mathematically) and the five content strands (Number, Patterns and Algebra, Data, Measurement, and Space and Geometry). The syllabus is designed to enable schools, when planning programs, to focus on the achievement of outcomes appropriate for the needs of all students.

The outcomes presented in any particular Stage represent the knowledge, skills and understanding that are typically expected to be demonstrated by students by the end of that Stage. Students learn at different rates and in different ways, so there will be students who have not demonstrated the outcomes for the Stage/s prior to that identified with their stage of schooling. Teachers will need to identify these students and to plan learning experiences that provide opportunities for the development of understanding of earlier concepts. In addition, there will be students who demonstrate the outcomes for their Stage before the end of their stage of schooling. These students will need learning experiences that develop understanding of concepts in the next Stage. In this way, students can move through the continuum at a faster rate. In order to cater for the full range of primary school students, Stage 4 outcomes and content have been included in the K–6 Syllabus.



OVERVIEW

Support Documents

Units of Work (March 2003)

The *Mathematics K–6 Units of Work* support document has been developed to assist teachers in the use of the syllabus and to demonstrate how *assessment for learning* is integrated into teaching programs.

Sample Units of Work have been written for each Stage from Early Stage 1 to Stage 3. Each unit addresses at least one outcome, and contains the relevant content, suggested learning experiences, assessment activities, and work samples. They provide a model for the development of further units of work.

In addition to the Units of Work, the support document includes information that will assist schools in developing whole school plans and approaches to teaching mathematics. A section entitled '*Meeting the Needs of All Mathematics Learners*' provides background information on a range of students' needs with appropriate advice for planning teaching programs.

CD ROM (June 2003)

A CD ROM has been developed to provide teachers with syllabus and support documents in electronic form. It contains the syllabus, units of work, assessment tasks and annotated work samples.

Parents' Package (November 2002)

A package has been developed to inform parents about the Mathematics K–6 Syllabus. It contains two documents:

- a booklet that provides detailed information about the syllabus. It includes activities and presentation materials that may be used at parent and community meetings
- a brochure that provides general information about the syllabus and some suggestions of ways that parents may support their child's learning at home.

Board of Studies' Website

All documents will be available on the Board's website (www.bosnsw-k6.nsw.edu.au) at the time they are distributed to schools.

Mathematics K–6

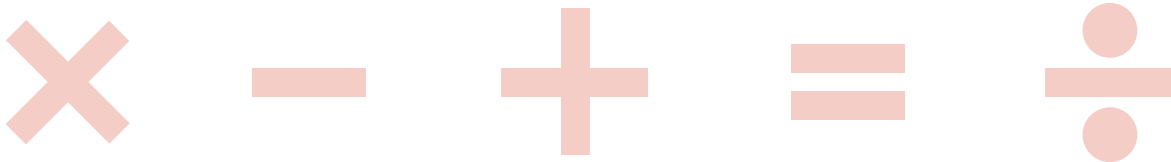
KEY QUESTIONS AND ANSWERS

1 What are the key features of the syllabus and support documents?

- **Outcomes and Content.** The syllabus expresses in clear and concise language the content for each outcome in the five content strands – Number, Patterns and Algebra, Data, Measurement, Space and Geometry.
- The process strand, **Working Mathematically**, has a set of outcomes and is embedded in the content of the other five strands. Examples of the integration of each of the five processes (Questioning, Applying Strategies, Communicating, Reasoning, and Reflecting) into the content are provided on each content page.
- **The K–10 Mathematics Scope and Continuum** is an overview of Key Ideas that summarise the main concepts developed from Early Stage 1 to Stage 5. This links the development of concepts that are typically taught in the primary classroom with content typically taught in the secondary classroom and indicates assumptions about prior learning and pathways for further learning.
- **Background Information** provides an explanation of the main concepts for particular outcomes and highlights some links to other strands and key learning areas.
- Where appropriate, advice is provided about **language** and literacy that may assist student engagement and understanding of the content.
- **Units of Work** have been developed to assist teachers in planning and programming Mathematics K–6 learning experiences. These units model *assessment for learning* through the integration of assessment into learning experiences. The units can be adapted or modified as required to suit the needs of students.
- Annotated **work samples** show what students know and can do at each Stage and will assist teachers to monitor student progress.

2 How does this syllabus differ from the previous syllabus and the Outcomes and Indicators document?

- There are **six strands** rather than the previous four. **Patterns and Algebra** has been introduced to show how pre-algebra concepts are developed from Early Stage 1. This is not new content but highlights key concepts from the previous Number and Space strands. **Data** includes the work on graphs that was previously included in the Space strand.
- The previous syllabus contained many Teaching and Learning Units that included sample activities and teaching ideas. Similar units have been written to focus on content and Working Mathematically outcomes, and are contained in a support document – **Mathematics K–6 Units of Work**.
- This syllabus strengthens the development of **number concepts** in all Stages. There is 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 than in the previous syllabus.
- **Chance** is now included as a substrand of Number while **Money** is no longer a substrand and 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 beyond zero.



The syllabus has several new features:

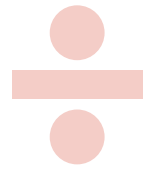
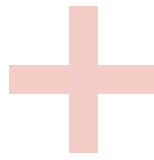
- **essential content** has been written for each outcome and **additional content** (included as a set of suggested topics) can be used in teachers' programs to broaden and enrich students' learning in mathematics
- **content pages** integrate the outcomes and content, use Key Ideas to summarise the main concepts, provide substantial information about the mathematical concepts related to each outcome, and include additional advice under Background Information and Language
- **Working Mathematically** is now embedded into each content page and includes reference to the appropriate use of technology
- **K–10 Mathematics Scope and Continuum** is an overview of Key Ideas that summarise the main concepts developed from Early Stage 1 to Stage 5 and helps 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
- **Cross-curriculum content** has been identified and incorporated into the content of the syllabus.

3 How much time is needed to teach Mathematics K–6?

- As indicated in the *K–10 Curriculum Framework*, the Board of Studies provides advice in syllabus materials on the number of hours of study that students would typically require to demonstrate the outcomes described in the syllabus. Schools, however, should consider the following when planning time for mathematics programs:
 - the outcomes and content in the syllabus require systematic and explicit teaching in a carefully sequenced program. The achievement in relation to outcomes will only be effective if adequate time is provided at each Stage to develop knowledge, skills and understanding as well as values and attitudes.
 - the primary years are an important time for the development of fundamental mathematical knowledge, skills and understanding. Adequate time needs to be available for this development if students are to be prepared for life in the twenty-first century.
 - the syllabus was developed on the understanding that students are engaged in mathematical learning for a minimum of **four and a half hours per week**.

4 How does this syllabus relate to other KLA syllabuses?

- The syllabus follows a similar format to *English K–6 (1998)*; *Human Society and Its Environment K–6 (1998)*; *Personal Development, Health, Physical Education K–6 (1999)*; and *Creative Arts K–6 (2000)*.
- Some aspects of mathematics content link with the knowledge, skills and understanding developed in other key learning areas (KLAs); this is highlighted in the Background Information in some substrands.
- The *Mathematics K–6 Syllabus* includes the development of students' numeracy skills that are applied and consolidated in other KLAs eg use of scale in map reading in Human Society and Its Environment.
- Cross-curriculum content includes:
 - Literacy: mathematics involves the acquisition of particular literacy skills. Some words used in everyday language have different meanings within a mathematical context.
 - Key Competencies including collecting, analysing and organising information, communicating ideas and information, planning and organising activities, working with others and in teams, using mathematical ideas and techniques, solving problems and using technology, are embedded in the *Mathematics K–6 Syllabus*. These competencies are developed in all KLAs.
- The Units of Work include content that can be linked with units and modules in other KLAs.



FACT SHEET No. 1

The Importance of Mathematics

The following key points about mathematics should be emphasised.

Mathematics is important as it:

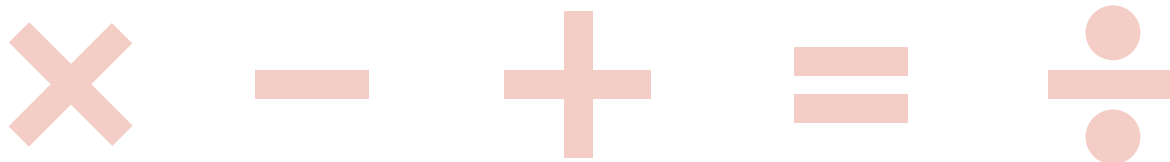
- is a powerful tool for solving problems within and beyond mathematics
- is a significant part of the cultural heritage of many diverse societies
- provides students with a powerful, precise and concise means of communication
- supports concurrent learning in other key learning areas
- builds a sound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

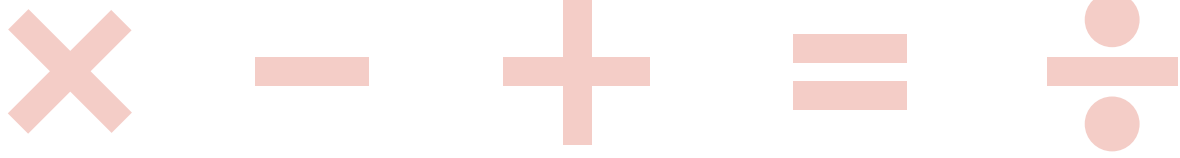


FACT SHEET No. 2

Outcomes

The following key points about the outcomes and indicators in the *Mathematics K–6 Syllabus* should be emphasised.

- The *Mathematics Years 7–10 Syllabus* was developed at the same time as the *Mathematics K–6 Syllabus*. The Rationale, Aim and Objectives are common in both syllabuses, and the outcomes and content are organised into the same six strands. Stage 4 outcomes and content are included in the *Mathematics K–6 Syllabus* for the further development of students' knowledge, skills and understanding when they have demonstrated achievement of Stage 3 outcomes.
- Each of the knowledge, skills and understanding objectives has outcomes for each Stage.
- The values and attitudes objectives in this syllabus do not have outcomes for each Stage. The same objectives, for example 'show interest and enjoyment in inquiry and the pursuit of mathematical knowledge, skills and understanding', apply across all Stages. These important objectives are embedded within the content.
- The outcomes and content provide the syllabus standards for each Stage. They describe what most students will know, and be able to do at the end of each Stage, as a result of effective teaching and learning.
- The outcomes provide a scope and sequence of student learning in mathematics. They provide a useful focus for planning units of work and reporting student achievement to parents.
- The outcomes are coded to facilitate reference throughout the syllabus. For example, NS2.3 indicates that the outcome is from the Number strand, Stage 2 and it is the third Number outcome for that Stage.
- Indicators have been provided to assist in the assessment and reporting process. They can be used as a guide for monitoring student progress within a Stage.
- **The indicators in the syllabus are examples only and do not form a comprehensive list.** Teachers may wish to develop their own indicators to reflect the ways that students in their classes may demonstrate achievement in relation to the outcomes.
- As the outcomes for Working Mathematically apply across all of the syllabus content, it has been embedded in each of the other strands. A set of indicators for each of the Working Mathematically outcomes has been developed to help teachers assess and report performance in relation to this strand.

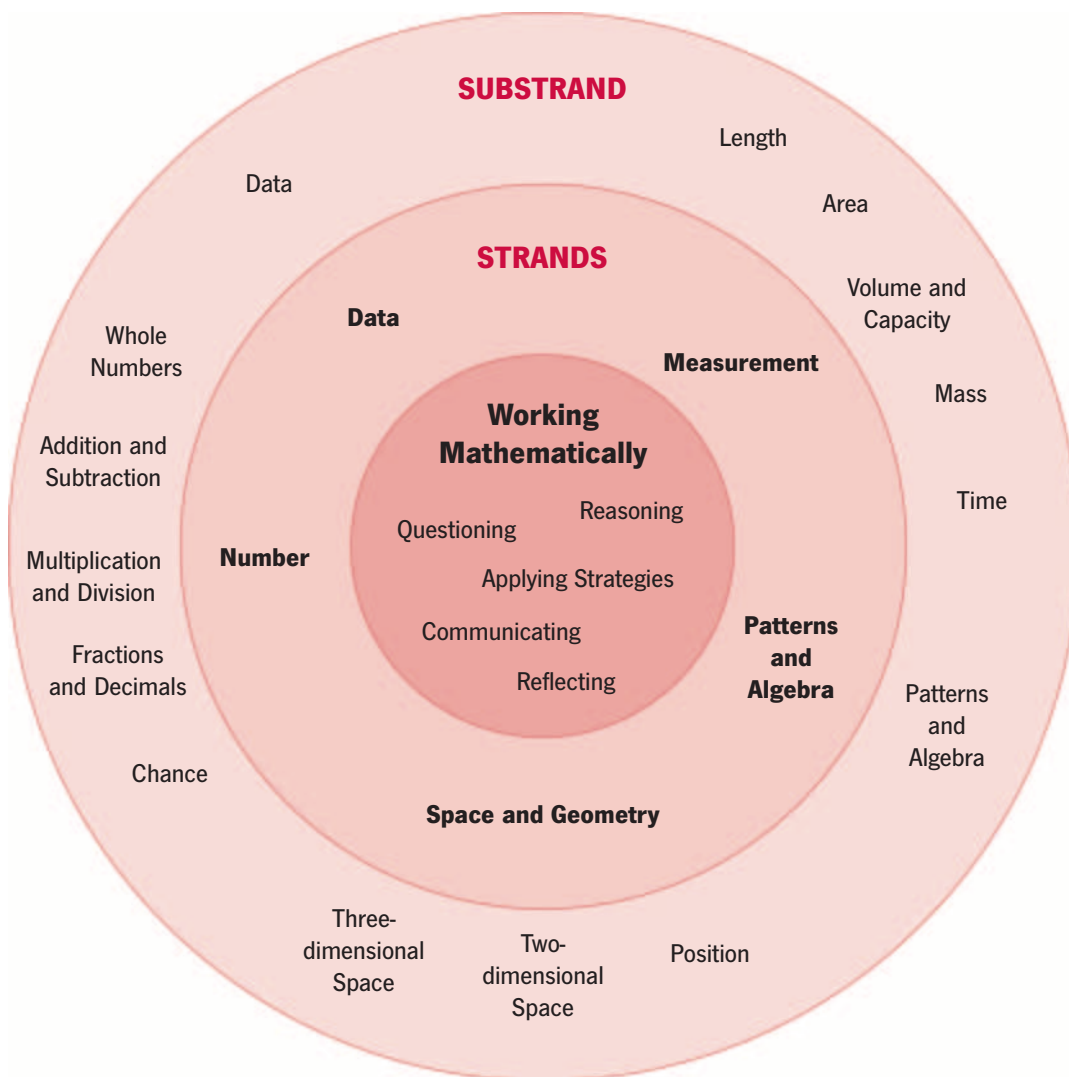


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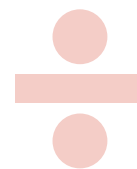
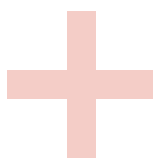
Content

The following key points about the content of the *Mathematics K–6 Syllabus* should be emphasised.

- The content in the syllabus is organised into five strands and fifteen substrands.
- Each of these strands and substrands should be treated within each Stage. Experiences in each of the strands and substrands provide a basis for participation in a broad range of mathematical activities.
- Working Mathematically encompasses a set of five key processes that are embedded into the other five strands through the content. The following provides a diagrammatic representation of this relationship for Early Stage 1 to Stage 3.



- Values and attitudes form an important part of the syllabus. They emphasise the need to develop students' appreciation of mathematics as an essential and relevant part of life. They are embedded in the content, particularly through the processes in Working Mathematically.



FACT SHEET No. 4

The Content Pages

The content pages in the *Mathematics K–6 Syllabus* are designed with particular features to assist teachers with planning and programming experiences for students.

The following annotated sample from the Measurement strand highlights these features.

Stage 3	
<p>Mass</p> <p>MS3.4 Selects and uses the appropriate unit and measuring device to find the mass of objects</p>	<p>Key Ideas Recognise the need for tonnes Convert between kilograms and tonnes Select and use the appropriate unit and device to measure mass Record mass using decimal notation to three decimal places</p>
<p style="text-align: center;">Knowledge and Skills</p> <p>Students learn about</p> <ul style="list-style-type: none"> ■ choosing appropriate units to measure mass ■ recognising the need for a unit larger than the kilogram ■ using the tonne to record large masses eg sand, soil, vehicles ■ using the abbreviation for tonne (t) ■ converting between kilograms and tonnes ■ selecting and using the appropriate unit and device to measure mass ■ recording mass using decimal notation to three decimal places eg 1.325 kg ■ relating the mass of one litre of water to one kilogram 	<p style="text-align: center;">Working Mathematically</p> <p>Students learn to</p> <ul style="list-style-type: none"> ■ solve problems involving different units of mass eg the total mass of three items weighing 50 g, 750 g and 2.5 kg (<i>Applying Strategies</i>) ■ associate gram measures with familiar objects eg a standard egg has a mass of about 60 g (<i>Communicating</i>) ■ find the approximate mass of a small object by establishing the mass of a number of that object eg ‘The stated weight of a box of chocolates is 250 g. If there are 20 chocolates in the box, what does each chocolate weigh?’ (<i>Applying Strategies</i>)
<p>Background Information Gross mass is the mass of the contents and the container. Nett mass is the measure of the contents only.</p>	
<p>Language ‘Mass’ and ‘weight’ have become interchangeable in everyday usage.</p>	

Outcomes and content are linked in tables to assist teachers with planning and programming

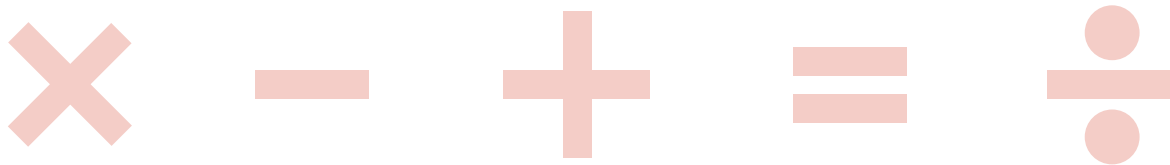
Key Ideas summarise the main concepts for the substrand. These also appear in the K–10 Scope and Continuum

Explicit content is expressed as *students learn about* (Knowledge and Skills) and *students learn to* (Working Mathematically) in a consistent format

Working Mathematically, described as five interrelated processes, is embedded in the content as *learn to* statements

Advice on language and literacy is provided to assist students to engage with and understand the content

Background information is provided about the main concepts, along with links to other strands and key learning areas

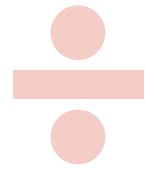
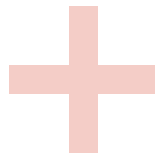


FACT SHEET No. 5

K–10 Mathematics Scope and Continuum

The following key points about the K–10 Mathematics Scope and Continuum in the *Mathematics K–6 Syllabus* should be emphasised.

- The K–10 Mathematics Scope and Continuum is an overview of Key Ideas that summarise the main concepts developed from Early Stage 1 to Stage 5.
- The K–10 Mathematics Scope and Continuum is organised into the five content strands Number, Patterns and Algebra, Data, Measurement, and Space and Geometry. Working Mathematically is a process strand that is embedded in the five content strands and does not appear in the K–10 Scope and Continuum.
- In Early Stage 1 to Stage 3, the K–10 Scope and Continuum is further organised into substrands. In Stages 4 and 5, the Scope and Continuum is organised into topic areas. This shows the link with content typically taught in the primary classroom to that typically taught in the secondary classroom and indicates assumptions about prior learning and pathways for further learning.
- The Key Ideas that are included in the K–10 Scope and Continuum correspond to the Key Ideas on the relevant content pages in the syllabus.
- The mathematical concepts are developed across the Stages to show how understanding in the early years needs to precede understanding in later years. The Scope and Continuum is an overview of the sequence of learning for concepts that build upon the knowledge, skills and understanding developed in earlier Stages.
- Teachers need to identify students who have not achieved outcomes at the appropriate stage of schooling and to plan learning experiences that provide opportunities to develop understanding of concepts.
- The Scope and Continuum is not a checklist of teaching ideas. It does not include examples of opportunities for Working Mathematically. A variety of learning experiences, that include Working Mathematically, need to be planned and programmed to meet the needs of all students in the classroom.
- Students need time to explore, experiment and engage with the underpinning concepts and principles of what they are to learn.



FACT SHEET No. 6

Working Mathematically

The following key points about Working Mathematically in the *Mathematics K–6 Syllabus* should be emphasised.

- There is a set of outcomes associated with Working Mathematically, but as it is a process strand there is no specific content for this strand. The strand is embedded in the content of the other five strands.
- Working Mathematically encompasses five interrelated processes.

Questioning

Students ask questions in relation to mathematical situations and their mathematical experiences. Encouraging students to ask questions builds on and stimulates their curiosity and interest in mathematics. ‘I wonder if’ and ‘what if’ types of questions encourage students to make conjectures and/or predictions.

Applying Strategies

Students develop, select and use a range of strategies, including the selection and use of appropriate technology, to explore and solve problems.

Communicating

Students develop and use appropriate language and representations to formulate and express mathematical ideas in written, oral and diagrammatic form.

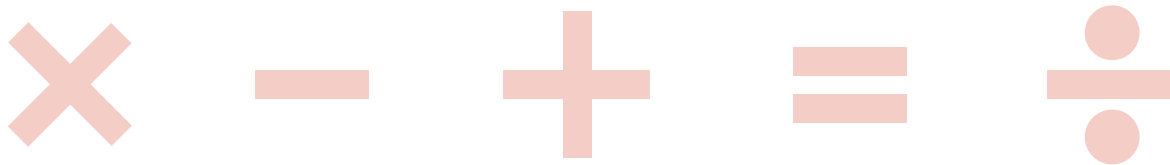
Reasoning

Students develop and use processes for exploring relationships, checking solutions and giving reasons to support their conclusions. Students also need to develop and use logical reasoning, proof and justification.

Reflecting

Students reflect on their experiences and critical understanding to make connections with, and generalisations about, existing knowledge and understanding. Students make connections with the use of mathematics in the real world by identifying where, and how, particular ideas and concepts are used.

- Examples of the integration of each of the five processes into the content are provided on each content page in the right-hand column. Teachers are encouraged to extend this list of statements by creating their own Working Mathematically experiences for students.
- Working Mathematically provides opportunities for students to engage in genuine mathematical activity and to develop skills to become flexible and creative users of mathematics.
- The processes involved in Working Mathematically may be applied at all stages of teaching and learning when developing new concepts and skills, when consolidating ideas and when applying mathematics.



FACT SHEET No. 7

Number

The following key points about Number in the *Mathematics K–6 Syllabus* should be emphasised.

- From Early Stage 1 there is an emphasis on the development of number sense, and confidence and competence in using mental strategies.
- Formal written algorithms are introduced after students have gained a firm understanding of basic concepts including place value. For addition and subtraction, formal written algorithms are introduced in Stage 2, and for multiplication and division, formal written algorithms are introduced in Stage 3.
- Prior to the introduction of written algorithms, students should develop informal methods to record their thinking related to a calculation.
- Approximation is important and the systematic use of estimation is to be encouraged at all times.
- Students need to develop skills in using calculators, and be able to determine when it is more efficient to use mental or written strategies than a calculator.
- The Number strand is organised into five substrands.

Whole Numbers

This substrand includes counting strategies, number relationships and the concept of place value.

Addition and Subtraction

These operations are paired to emphasise the importance of developing awareness of inverse relationships.

Multiplication and Division

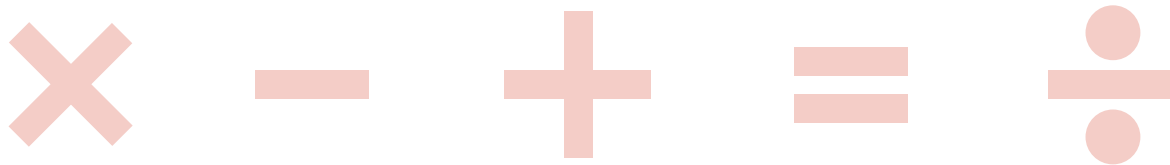
These operations are paired to emphasise the importance of developing awareness of inverse relationships; however, showing the relationships between all four operations is also important.

Fractions and Decimals

Students are introduced to the concept of a fraction through everyday experiences and modelling the division of a whole and a collection of objects into equal parts. This leads to equivalence relationships and simple operations including addition and subtraction of fractions where one denominator is a multiple of the other and multiplication of fractions by whole numbers. Students also develop an understanding of decimals, perform calculations with decimals up to three-decimal places and interpret percentages in everyday contexts.

Chance

Chance has been included from Stage 1 to enable the development of understanding of chance concepts from an early age. The use of informal language associated with chance is introduced, followed by simple experiments to produce data so students can make comparisons of the likelihood of events occurring and begin to order chance expressions on a scale from zero to one.



FACT SHEET No. 8

Patterns and Algebra

The following key points about Patterns and Algebra in the *Mathematics K–6 Syllabus* should be emphasised.

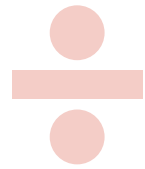
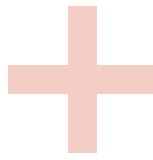
- Patterns and Algebra has been introduced to show how pre-algebra concepts are developed from Early Stage 1. It demonstrates the importance of early number learning in the development of algebraic thinking. This strand links with the Number strand and should be taught in conjunction with the development of number concepts.
- Patterns and Algebra emphasises number patterns and number relationships leading to an investigation of the way that a quantity changes relative to another.
- Algebraic thinking develops students' ability to replicate, complete, continue, describe, generalise and create repeating patterns and number patterns that increase or decrease.
- Repeating patterns are explored in Early Stage 1 and can be created using sounds, actions, shapes, objects, stamps, pictures and other materials. Students are encouraged to label and describe their repeating patterns using numbers.
- Number patterns that increase or decrease are introduced in Early Stage 1 and can be formed using rhythmic and skip counting. This leads to the creation of a wide variety of number patterns in subsequent Stages with students describing patterns in their own words.
- In Stage 3, students build a simple geometric pattern or create a number pattern, record the pattern in a table of values, describe the pattern, and determine a rule that will enable them to readily determine larger values for the pattern.

At this Stage, students need to connect the value of a particular term in the pattern with its position in the pattern. This is best achieved through a table of values. For example, if a student creates the pattern 3, 6, 9, 12, 15, ... this can be recorded in a table as follows:

Position in the Pattern	1	2	3	4	5	10	100
Value of the Term	3	6	9	12	15	–	–

Students need to see a connection between the two numbers in each column and might describe the pattern as 'you multiply the top number by three'.

- Algebraic thinking develops students' ability to recognise and use number relationships and to make generalisations.
- Algebraic thinking is associated with the concept of equality and the need to develop an understanding that the equals sign also means 'is the same as'.

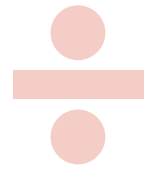
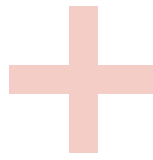


FACT SHEET No. 9

Data

The following key points about Data in the *Mathematics K–6 Syllabus* should be emphasised.

- Students need to be able to understand, interpret and analyse information displayed in tabular or graphical forms.
- The Data strand includes the collection, organisation, display and analysis of data.
- Early experiences are based on real-life contexts using concrete materials. This leads to data collection methods and the display of data in a variety of ways.
- In Stage 3, students need to investigate the advantages and disadvantages of different displays of the same data.
- Tools such as spreadsheets and other software packages will be used where appropriate to organise, display and analyse data.
- Students are encouraged to ask questions relevant to their experiences and interests and to design ways of investigating their questions.
- Students should be aware of the extensive use of statistics in society and should be encouraged to explore the use of statistics in the media and on the internet.
- Students need to recognise how information may be displayed in a misleading manner resulting in false conclusions.
- This strand provides many opportunities for students to collect information about a variety of areas of interest and can be readily linked with other key learning areas such as *Human Society and Its Environment* and *Science and Technology*.

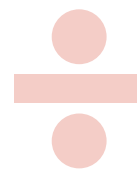
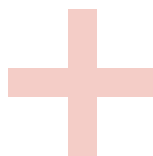


FACT SHEET No. 10

Measurement

The following key points about Measurement in the *Mathematics K–6 Syllabus* should be emphasised.

- Measurement enables the identification and quantification of attributes of objects so that they can be compared and ordered.
- Measurement provides students with the opportunity to develop an understanding of approximation and estimation. Accuracy in estimated measurement is obtained through extensive practice using a variety of units of measure and in a variety of contexts.
- An important component of this strand is that students develop strategies to select and use the appropriate unit and device to measure any particular attribute.
- The Measurement strand is divided into five substrands:
 - Length
 - Area
 - Volume and Capacity
 - Mass
 - Time
- The development of measurement knowledge and skills progresses through the following processes:
 - identifying attributes and comparison – students recognise that objects have attributes that may be measured and develop the language used to describe the attributes.
 - informal units – students develop key understandings of measurement including the need to use appropriate repeated units that do not change.
 - formal units – students become familiar with the relative size of formal units, the degree of accuracy required, the appropriateness of the unit of measurement and the measuring device, and conversion between units.
 - applications and generalisations – students apply their knowledge in a variety of contexts and generalise their methods to calculate perimeters, areas and volumes.



FACT SHEET No. 11

Space and Geometry

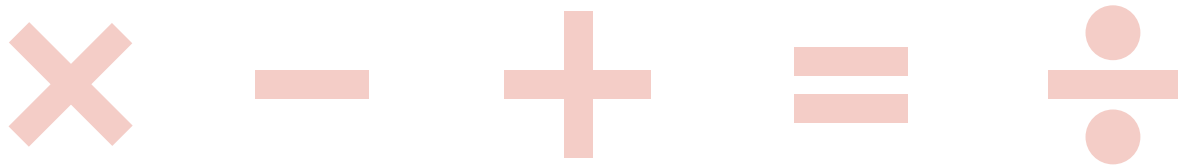
The following key points about Space and Geometry in the *Mathematics K–6 Syllabus* should be emphasised.

- Space and Geometry involves representation of shape, size, pattern, position and movement of objects in the three-dimensional world or in the mind of the learner.
- The Space and Geometry strand is organised into three substrands:
 - Three-dimensional Space
 - Two-dimensional Space
 - Position.
- Critical skills for students to acquire are those of recognising, visualising and drawing shapes and describing the features and properties of three-dimensional objects and two-dimensional shapes in static and dynamic situations.
- Features are generally observable whereas properties require mathematical knowledge eg ‘a rectangle has four sides’ is a feature and ‘a rectangle has opposite sides of equal length’ is a property.
- Manipulation of a variety of real objects and shapes is critical to the development of appropriate levels of imagery, language and representation.
- In Stage 2, students manipulate, compare and describe prisms and pyramids as separate groups whereas in Stage 3, they identify and name particular prisms and particular pyramids.
- Students need to be able to identify two-dimensional shapes presented in different orientations. Teachers need to continually present shapes in different ways.

eg



- Developing angle concepts begins as students compare corners of shapes, identify the arms and vertex of an angle, and consider the amount of turn from one arm to the other.
- Students are encouraged at all Stages to identify shapes and objects in their environment and to describe their functions.



FACT SHEET No. 12

Assessment for Learning

The *Mathematics K–6 Syllabus* follows the broad learning outcomes established in the Board of Studies NSW *K–10 Curriculum Framework* and is part of a continuum of learning from Kindergarten to Year 12 that supports sustained, sequential, high quality learning.

Built into the syllabus is the concept that *assessment for learning* is integral to teaching and learning in a standards-referenced framework. The syllabus promotes assessment for learning as an essential component of good teaching. *Assessment for learning* involves teachers planning how and when they will gather evidence of learning at the same time that they plan the work that students will do. It recognises the importance of assessment for student motivation and self-esteem, and promotes the active involvement of students in their own learning.

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.