



Mathematics K-6

Sample Units of Work

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Mathematics K-6

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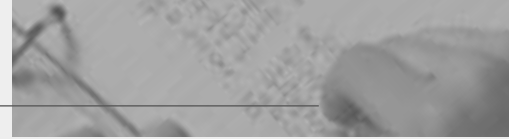
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1 Introduction

This support document has been developed to assist teachers to use and understand key aspects of the *Mathematics K–6 Syllabus*. It contains a range of sample units of work that can be incorporated into teaching and learning programs. It shows how these programs should be underpinned by the principles of *assessment for learning* (*Mathematics K–6 Syllabus* p 138) that aim to support students in their learning.

Sample units of work have been prepared for each Stage from Early Stage 1 to Stage 3. They do not address all syllabus outcomes. They will assist teachers in initial planning for implementation of the new syllabus and provide a model for planning other units of work. The units include relevant outcomes, content and a variety of teaching and learning experiences. Assessment activities have been designed for and integrated into each unit. These sample units may be modified or amended to suit the needs, interests and abilities of students.



2 Advice on programming

2.1 Establishing a scope and sequence

The *Mathematics K-6 Syllabus* requires all Strands and Substrands to be taught in each year of primary schooling. Developing a scope and sequence will involve identifying the outcomes to be addressed, the strategies for gathering evidence of student learning, the content and learning experiences, and when and for how long the content will be studied. Essentially it involves mapping the syllabus outcomes and suggested Key Ideas for each Year and is probably best undertaken by teachers working together in Stage and Year groups. They will need to discuss and resolve issues relating to duplication, revision and progression. It should reflect, at a glance, how the requirements of the school plan are to be covered for that Year and Stage group.

The K-10 Mathematics Scope and Continuum (pp 27-37) could be used to assist with developing the scope and sequence as it provides a summary of the key concepts that should be developed from Early Stage 1 to Stage 5. In addition, Working Mathematically outcomes need to be explicit in the content taught and therefore should be built into units across the scope and sequence.

The standards described in the syllabus were developed on the understanding that students are engaged in mathematical learning for a minimum of four and a half hours per week. These indicative hours will provide the basis for programming decisions. In any particular Stage, some students may achieve the standard sooner than the majority of their cohort, while others may require additional time.

2.2 Assessment for learning

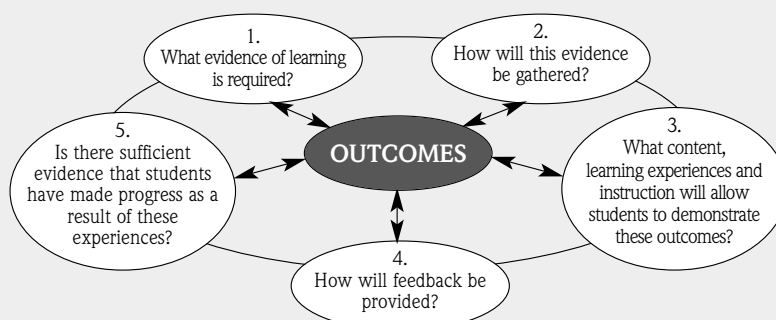
The syllabus promotes the concept of *assessment for learning* as integral to teaching and learning in a standards-referenced framework and is an essential component of good teaching. Assessment for learning involves teachers planning how and when they will gather evidence of learning at the same time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

The following diagram summarises a model for developing integrated assessment activities. It emphasises that outcomes are central to the decisions teachers make about the learning to be undertaken and the evidence of learning that needs to be collected. This evidence enables teachers to provide students with feedback on their learning and to determine how well students are achieving in relation to these outcomes.

Evidence of learning will assist teachers and students to decide whether they are ready for the next phase of learning or whether further learning experiences are needed to consolidate students' knowledge, skills and understanding.





2.3 Planning units of work for effective learning and assessment

The syllabus acknowledges that students learn in different ways and at different rates. Teachers therefore may need to incorporate a range of activities to accommodate the different ways students learn and to cater for the range of levels of students' current knowledge, skills and understanding in mathematics. In Year 3, for example, while there may be a majority of students working within Stage 2 content, other students may be working within Stage 1, or perhaps within Early Stage 1 or Stage 3.

The syllabus reflects the hierarchical nature of most learning in mathematics. New learning builds upon prior learning in the same, or a related, substrand from the syllabus. In this way, it is possible that students may have met content related to the unit of work previously. If the targeted outcomes have been partially achieved, the unit should focus on consolidating and extending the student's knowledge, skills and understanding.

Teachers can program for related topics from different Stages to be taught sequentially or concurrently in a particular Year. For a small school or multi-grade class, the teacher may decide to teach a unit on Two-dimensional Space using Polygons as the focus. The teacher may set up teaching/learning situations where each Stage would use shapes applicable to the content in their Stage. For example:

- Early Stage 1 students would look at squares, rectangles and triangles
- Stage 1 students would also look at hexagons, rhombuses and trapeziums
- Stage 2 students would also look at pentagons, octagons and parallelograms
- Stage 3 students would also look at isosceles, equilateral and scalene triangles.

The activities could include open-ended tasks such as students organising a presentation about their polygons, Barrier Games, constructing a picture using the shapes, and the use of computer drawing programs to draw their shapes and make pictures, patterns or tessellations.

Substrands from different strands may be integrated, for example, Chance and Data. Appropriate learning experiences could be:

- Stage 1 students might pose the question 'What rubbish will we find in the playground after lunch?' Students make predictions, and then visit the playground to collect data. The data can then be organised into a data display.
- Stage 2 students might conduct simple experiments with random generators such as coins, dice or spinners to inform discussion about the likelihood of outcomes. For example, students roll a die fifty times, keep a tally and graph the results.
- Stage 3 students might use samples to make predictions about a larger 'population' from which the sample comes eg predicting the proportion of cubes of each colour in a bag after taking out a sample of the cubes. Students could graph predictions and the results of the draw and compare.

The Patterns and Algebra and Number strands could be programmed together to enable students to make important links between number patterns and relationships and the four operations.



2.4 Using the sample units of work

The sample units of work contained in Sections 3 to 6 (pp 11-156) have been developed to demonstrate ways in which teachers can build a teaching/learning program containing units of work to ensure coverage of the syllabus.

The sample units illustrate how to:

- be explicit about the outcomes and content to be addressed
- be explicit about the evidence required to demonstrate student learning
- adapt teaching and learning programs to students' demonstrated needs
- modify future teaching and learning programs in the light of students' demonstrated needs.

Each unit includes the specific content outcome(s) that provide the main focus of the unit as well as the Key Ideas, knowledge and skills statements, and Working Mathematically statements from the syllabus. The page reference to the relevant content page in the syllabus is also provided.

WM Working Mathematically

The Working Mathematically outcomes are listed so that teachers consider the development and assessment of these outcomes as well as the content outcomes. Learning Experiences and Assessment Opportunities that provide opportunities for students to develop and demonstrate one or more of the five Working Mathematically processes (*Questioning, Applying Strategies, Communicating, Reasoning, Reflecting*) have been labelled with **WM**.

The units of work contain examples of the types of activities teachers might employ to cover the content in the *Mathematics K-6 Syllabus*. The units of work are not mandatory. It is expected that teachers and schools will adapt the units according to the needs of their students, the availability of or preference for particular resources and the nature of school policies and priorities. This might mean that teachers and schools:

- implement all of the units as outlined plus additional school-designed units to cover all syllabus requirements
- implement some of the units and develop school-designed units to complement them
- use the Outcomes and Content sections of the *Mathematics K-6 Syllabus* as the basis for planning, making use of their own units.



Features of the Sample Units of Work

The following sample page has been constructed to highlight the features included in the units of work.

Learning Experiences and Assessment Opportunities

Timetables

Students access timetables on the Internet or the teacher provides students with a variety of timetables eg bus, plane, train, ferry, theme parks, movies. Students describe any visible patterns eg 'Buses leave every 15 minutes on weekday mornings.' Students calculate the duration of different journeys or events using start and finish times. They develop an itinerary for a given time-frame eg 4 hours.

Students plan their 'ultimate' 24-hour itinerary. Students record their itinerary in 12-hour time using am and pm notation, and 24-hour time. Students discuss which timetables use 24-hour time and why it is important.

WM Stopwatches

Students read digital stopwatch displays showing time from left to right in minutes, seconds and hundredths of a second.

2:34:26

Students use stopwatches to time various events and order them according to the time taken. Students discuss cases where accurate timing is important eg athletics, swimming, television advertisements.

Extension: Students research the world records of different sports. They then record and order them.

Matching Times

In pairs, students are given two blank cards. They record the time in am or pm notation on one card and 24-hour time on the other. The teacher collects the cards, shuffles them and redistributes the cards to the class.

Each student has to find their partner by asking other students questions to identify the matching time.

Students can only answer 'yes' or 'no'.

Possible questions include:

- do you have an o'clock time?
- is your time ten minutes after 7:15 am?
- is your time 2130 in 24-hour time?

Students then group themselves into am and pm times. Each group then orders their cards.

Timing Experiments

Students estimate the amount of time selected events will take and then check by timing the events with a stopwatch eg

- the time for a ball dropped from the top floor of a building to reach the ground
- the time for a car seen in the distance to reach a chosen point.

Students record the times in a table and order the events.

Activities with this symbol specifically target one or more of the five Working Mathematically processes

	minutes	seconds	hundredths
1st	0	29	21
2nd	0	0	
3rd	0	1	
4th	0	33	
5th	4	17	97

Examples of student's work exemplify and clarify activities

WM A Day In My Life

Students list at least eight things they do on a particular day of the week with the time they do each activity.

They then record these times on a sheet of clock faces. Students convert the times to 24-hour time.

They use the 24-hour times and activities to draw a timeline using an appropriate scale.

Possible questions include:

- how could you order the events according to the time taken?

Reading a Timeline

The teacher displays a timeline related to real life or a literary text. Students write what they can interpret from the timeline.

Assessment for learning activities are integrated into the teaching/learning sequence

Resources

Resources that could be used in this unit are listed

atlases, class timetable, food packaging, copies of clock faces, stopwatches, television programs, blank cards, timetables (bus, plane, train, theme parks, movies)

Links

Position
Length
HSIE

Possible links to other KLAs and Mathematics K-6 strands

Language

Language expected to be used by students in this unit

timetable, timeline, scale, time zones, daylight saving, 24-hour time, am and pm notation, duration of events, converting, arrive, depart, timetable, timeline, decade, century, millennium, latitude, longitude, elapsed time



The learning experiences provide suggestions to support teaching and learning of the substrand. Teachers are encouraged to choose experiences appropriate for their students, and to develop additional learning experiences when necessary. The assessment activities also provide suggestions for teachers to use where appropriate. Each unit will need to be adapted to meet the needs of particular students. The units suggest a preferred hierarchy of learning experiences, but allow for teachers to add to them or extend and revise where necessary.

Advice regarding the appropriate use of technology, links to other substrands and strands, suitable resources, and language and literacy considerations are also provided. The resources include suggested references to support the Learning Experiences.

Teachers will need to plan how to implement the units of work. The units of work provided will not cover all the content for the Stage. Teachers may need to develop further learning experiences for their students, based on the Key Ideas and content for each outcome in the Scope and Continuum.

The activities are organised in a hierarchical sequence of learning allowing for a range of achievement as students work towards the outcome. It is expected that schools and teachers will write further units of work based on the needs of their students.

The sample units of work have been developed by:

- identifying the outcomes that will be highlighted in the unit of work
- deciding on the subject matter or focus of the unit
- deciding on the evidence of learning required and how students will demonstrate this in relation to the outcomes, and how this evidence will be gathered and recorded
- selecting the relevant syllabus content or Key Ideas for the identified outcomes relating to the knowledge, skills and understanding that students will develop
- ensuring that the Working Mathematically processes are identified when developing new skills and concepts and also when applying existing knowledge
- planning learning experiences and identifying those that will provide evidence of learning
- ensuring a range of assessment strategies is used
- providing opportunities for the teacher to reflect on student progress and plan future learning experiences accordingly.

2.5 Designing effective learning and assessment

Effective learning experiences and the type of activity selected should allow evidence of learning to be gathered. Methods of gathering evidence of learning could include teacher observation, questioning, self-assessment and peer assessment as well as more formalised assessment activities. Assessment should be an integral part of the unit of work and support student learning.

Teachers should consider whether the assessment:

- has explicitly stated purposes and addresses the outcomes
- is integral to the teaching and learning program
- shows a clear relationship between the outcomes and content being assessed
- allows students to demonstrate the extent of their knowledge, skills and understanding
- focuses on what was taught in class and what students were informed would be assessed
- provides opportunities to gather information about what further teaching and learning is required for students to succeed
- provides valid and reliable evidence of student learning
- is fair
- encourages learners to reflect, question and plan for future learning.



2.6 Effective feedback to students

The aim of feedback is to communicate to students how well their knowledge, skills and understanding are developing in relation to the outcomes. Students are then given opportunities to improve and further develop their knowledge, skills and understanding. Feedback enables students to recognise their strengths and their areas for development, and to plan with their teacher the next steps in their learning.

Students should be provided with regular opportunities to reflect on their learning. Teacher feedback about student work in relation to outcomes is essential for students and is integral to the teaching and learning process. Student self-reflection and peer evaluation will also provide valuable feedback to students.

Feedback should:

- focus on the activity and what was expected
- be constructive
- provide meaningful information to students about their learning
- correct misunderstanding
- identify and reinforce students' strengths
- state clearly how students can improve.

Forms of feedback include:

- discussion with the class, groups or individual students
- written annotations
- general comments to the class about those aspects of the activity in which students excelled and those aspects that still need addressing
- examples of good responses
- peer and self-evaluation.

2.7 Recording evidence for assessment

Recording student performance needs to be manageable. It need not occur after each assessment for learning activity. Teachers should make decisions about when student performance on an assessment activity should be recorded, which aspects to record and in what format. The teacher can use this information to ascertain where students are up to, what to teach next and at what level of detail, and to form a snapshot of student achievement at key points.

Record keeping should reflect the reporting processes of the school and may take the form of individual comments or notations for the tasks, marks, grades or visual representations.