Ways of Assessing – Mathematics

The 'Ways of Assessing' support teachers to develop effective assessment practices in Mathematics.

The 'Ways of Assessing' complement the 'Ways of Teaching' and address the principles of assessment contained in the *Western Australian Curriculum and Assessment Outline* (the *Outline*). The *Outline* describes the assessment principles, exemplifies reflective questioning and provides assessment snapshots that support teachers to reflect on their assessment practice in relation to each of the assessment principles.

In the *Outline*, teachers will also find:

- background information for each principle
- reflective questions
- guidance for addressing the principle within their own assessment practice.

It is recommended that teachers access the Judging Standards materials in the *Outline*. (https:/k10outline.scsa.wa.edu.au/home/assessment/judgingstandards). The Judging Standards materials assist teachers to report against the Achievement Standards; provide assessment feedback to students and carers; and to explain the differences between one student's and another's achievement.

In the Western Australian Curriculum: Mathematics, the three content and four proficiency strands are interrelated and interconnected in teaching, learning and assessment. Teachers of Mathematics should plan for and develop a variety of ongoing and timely, formative and summative assessment tasks that allow students to demonstrate both their content knowledge and behaviours of the proficiencies. Assessment tasks should include opportunities for students of all abilities to, for example, identify, explain, describe, investigate, reason and problem solve with the content. The assessment tasks should contain a variety of problems and situations that allow students to draw on and make connections between a range of mathematical knowledge and skills across more than one content strand.

Assessments should cater for the variety of abilities within each class, enabling all students to demonstrate their progress toward, at, or above the standard. Timely, relevant and meaningful teacher and peer feedback, and opportunity for student self-reflection are imperative to empower students in their subsequent learning.

Summative and formative assessments should inform both teacher feedback to students and further teaching, as well as provide evidence of both individual student progress in relation to the standard and comparative information of class members. Assessment information should be collected over a year and contribute to a suite of evidence that represents a student's progress, achievement and understanding of both mathematical content and the proficiencies. The use of a variety of assessment strategies (e.g. investigative tasks, projects, visual representations, checklists etc), ensures an overview of a student's mathematical development that teachers use to make an on balance judgement to determine a student's grade.

Grades are determined through consideration of a wide range of assessment information collected over the span of a reporting period. Individual questions, tasks and assessments should not be graded. The Assessment Pointers (Judging Standards) are a useful ***guide*** to assist teachers to make judgements and provide feedback on these assessments.

Strategies for assessment

When planning an assessment, which will contribute to the student suite of evidence, teachers make decisions such as those described in the following table:

Purpose	Assessor	Recording tool	Strategy	Feedback
Formative or Summative?	Who will mark and provide feedback?	How will judgements and observations of students' behaviours be recorded?	What will the students do?	What will be shared with the student?

These considerations may result in, for example:

- In a Year 3 summative assessment, students are prompted to use a wide range of concrete materials, including various shapes, objects and collections, to model fractions and their multiples, as well as solve associated problems. The teacher, as the assessor in this case, completes an observational checklist to record evidence of the targeted behaviours and takes photographs and/or recordings of the student's work. The teacher provides feedback in the form of a summary of students' strengths and areas of focus and/or a 'score'. The photographs and feedback form part of the suite of evidence and, while the summative assessment is not graded, it will contribute to the overall judgement of the students' grades.
- In a Year 8 formative assessment, students peer review posters on features of circles and calculations of area and circumference of circles (and parts of circles) that are displayed around the room. Peers use a rubric that discriminates between observable behaviours, to outline what was demonstrated by the author/s of the poster and steps required to improve. Additional feedback may be provided in the form of verbal comments. The posters and peer feedback inform teacher judgement of current student knowledge and future teaching.

Assessment task decision-making table

The table below is not exhaustive and supports teachers in making decisions about assessment tasks.

Purpose	Formative: Assessment for Learning	Summative: Assessment of Learning

Assessor	Self	Peer	Teacher

Examples of recording tools	Rubrics	Observational Checklist	Anecdotal evidence	Marks and scores	Other

Examples of strategies	**Description**
Journals	Journals are compiled ongoing electronic or hard copy entries made by each student. These entries may include written or recorded notes, definitions and explanations, reflections on misconceptions, photos, annotations on diagrams or drawings, mind maps and summaries of key points. Journals document students' ideas, understanding and interpretation of their learning of mathematical concepts and provide an insight into their mathematical thinking and development. They allow students who find timed assessments challenging, an opportunity to demonstrate their understanding in another way.
Visual representations	Visual representations provide evidence of a student's or group of students' learning that does not rely solely on written form. As such, they provide an alternative form of expression for students and teachers to communicate learning. Venn diagrams, posters, graphs, models, infographics, demonstrations of knowledge using concrete materials and videos are examples of visual representations that may be collected as assessment evidence.
Diagnostic Tasks	Diagnostic Tasks are generally short, individual, targeted, written or manipulative tasks, designed to provide information about students' thinking. These formative tasks are designed to identify any misconceptions and inform future planning and teaching.
Investigative Tasks	Investigative Tasks allow students to solve problems or explore situations, which may be open-ended or have an expected conclusion. The context for these tasks may be theoretical or real world based. Investigative tasks provide opportunities for students to demonstrate behaviours of the proficiencies as they define and clarify the task; choose and apply the relevant Mathematics; reflect on and summarise their findings and mathematically communicate and

Examples of strategies	Description
	justify their solutions through their creation of a report, oral presentation, visual presentations or format selected by the students and/or teacher. Students may work individually or in groups.
Projects	Projects provide opportunities for in-depth study of a mathematical concept. Projects can be completed individually or in groups and can be presented as a report, an oral presentation, a visual representation, such as a model, poster or slides, or a format chosen by the student and/or teacher.
Oral assessments	Oral assessments allow students or groups of students to speak (or sign) to provide evidence of their learning. Oral assessments may be in the form of audio recordings, role play, debates, news broadcast, etc. and provide information about the student or group of students' current knowledge and/or understanding.
Assignments	Assignments are usually a series of questions designed to consolidate and extend student understanding of the content. The assignment task can consist of recently or previously learned content. Assignments are usually completed individually and are presented in a written format.
Student choice of level of difficulty of problems	Students are provided with a series of questions, regarding a particular aspect of class content, presented in order of complexity. Students choose and respond to the question(s) that they feel best depicts their knowledge and understanding of the content and. This informs both teachers and students as to where they are at in terms of the learning of this content and the use of the proficiencies and provides a pathway for further learning.
Dated work samples	Dated Work samples on the same topic are obtained at different points across the learning cycle. These samples provide opportunities for students to demonstrate both the learning that has occurred and the degree of progress. The samples should be comparable, in that they assess the same objectives and are of similar difficulty.
Tests and Quizzes	Tests and quizzes are usually timed and completed individually. They may include verbal questioning, multiple choice and short answer responses. Results can be collected orally, through the use of technology or in written form. Tests can also include extended and open-ended questions that require longer, sustained written responses and are usually marked by teacher. Quizzes are generally composed of questions that can be readily marked by either the student, a peer, the teacher or technology, allowing for immediate feedback to both teachers and students.
Standardised testing	Standardised testing is usually produced systemically (e.g., NAPLAN) or by commercial providers. The tests are administered and scored across a cohort of students in a consistent manner. The information collected from standardised testing assists in identifying individual student's achievement in relation to a large cohort. Standardised testing can also inform future teaching by identifying areas of strength and weakness in the performance of individuals, groups or classes.

Examples of feedback	Comments (written or oral)	Marks	Checklist or rubric result	Other