Assessing learning

Assessment is the purposeful, systematic and ongoing collection of evidence for use in making judgments about students' demonstrations of learning and is an integral part of the learning and teaching process.

Evidence of demonstrations of students' learning should be gathered from different sources across a range of contexts, and be recorded over time using a variety of assessment techniques and recording instruments. Assessment techniques should be selected to best suit the context in which the learning is being demonstrated and the type of evidence required. The evidence gathered should be relevant to the learning being assessed and be collected in a focused and systematic way.

Students should be made aware of what is being assessed, how and when they will be assessed, and how judgments will be made about their demonstrations of learning.

The table on page 71 of the syllabus, Examples of ways to gather and record evidence from a variety of sources contains possible sources of evidence of mathematics learning, descriptions of assessment techniques and suggestions of recording instruments that teachers could use.

Teachers make judgments about a student's demonstrations of learning when satisfied that they have sufficient evidence.

Examples of assessment opportunities

The following examples of assessment opportunities have been drawn from the Mathematics investigations developed to support the implementation of the Mathematics syllabus. They show different ways teachers may plan to assess and monitor students' learning.

In the investigations, information to support teachers in monitoring and assessing learning is included, in most instances, at the end of each phase. It includes possible sources of evidence from activities in that phase and descriptions about what students are expected to know and to do to demonstrate their learning.

Examples 1, 2 and 3 expand on the assessment opportunities referred to at the end of each phase of some of the Queensland Studies Authority Mathematics investigations.

Example 4 illustrates assessment strategies that could be used in a range of contexts and as an auditing tool to ensure evidence is gathered by using a variety of assessment techniques from a number of sources and is recorded using different recording instruments.

Example 5 could be used by students to monitor their learning. It could also be used by teachers to track students' progress through an investigation or to begin making judgments about students' learning.

Example 6 promotes thinking, reasoning and working mathematically and could be used by students in the early years of schooling to monitor their progress through an investigation.

Example 7 provides a tool for tracking students' progress as judgments are made about their learning in a range and balance of contexts.

A blank form for each example has been included.

Example 1

Investigation: Making a dream mat	**Level 1**	
This investigation is connected to The Arts sourcebook module, *The dream-maker.* The class is going to create a 'dream mat' for everyone to sit on during sharing time. The mat must have the same number of pieces in it as there are students in the class, and be large enough for the whole class to sit on. Your job is to decide what shape and how big the pieces will be and to create the mat. You will also investigate 'recipes' for dreams, and design a personal 'cloth of dreams'.	**Strands**	**Topics**
	Number Measurement Space	Addition and subtraction Length, area, mass and volume Shape and line
	Outcomes N 1.2, M 1.1, S 1.1	

Assessment technique	**Possible sources of evidence**	**Evidence** Has the student:	**Possible recording instruments**
Observation	• discussions about shapes	• identified everyday shapes in quilts or mats that have geometric patterns?	• observation notes
	• shape hunt	• used geometric names to describe representations of circles, triangles and rectangles (including squares)?	
	• play and experimentation in the dream factory	• selected appropriate non-standard units to measure the perimeter of the dream mat • used non-standard units to measure ingredients in the dream factory?	• checklists
Consultation	• order in which containers are placed	• compared and ordered the sizes of containers according to the quantity it takes to fill them?	• checklists • digital photographs
Focused analysis	• list of properties of 2D shapes	• identified 2D shapes used in quilts or mats and described them using geometric terms and properties?	• worksheets
	• recipes	• solved addition problems to calculate the quantities of ingredients for dreams?	• annotated work samples

Example 2

Investigation: Town planning You are a town planner and one of your tasks is to design and build a model of the centre of a planned city. The centre must meet the needs of a small community, be useful to its citizens and use a variety of shapes to provide an interesting landscape. You will be required to present your design and model to an audience.	**Level 5**	
	Strand	**Topics**
	Space	Shape and line Location, direction and movement
	Outcomes S 5.1, S 5.2	

Assessment technique	**Possible sources of evidence**	**Evidence** Has the student:	**Possible recording instruments**
Observation	• presentation of model to the class – explanation • class discussions (responses to questions)	• used appropriate scale to develop the model • described aspects of the plan using similarity and congruence?	• digital photographs of the model • video tape of presentation • checklists and anecdotal records
Consultation	• classification of shapes of buildings	• used the relationship between the properties of shapes, lines and angles to classify buildings and explain which are similar and which are congruent?	• checklists • annotated work sample
Focused analysis	• representation of a city centre	• accurately used scale to create the plan for the model of the city centre • created representations of geometric objects (e.g. buildings) that satisfy design specifications?	• journals • annotated work samples • student folios
Self- and peer-assessment	• presentation of the model – explanation	• accurately described the scale used to create the model • justified the shapes used for buildings?	• peer- and self-assessment sheets

Example 3

Investigation: Top places to live The editor of a travel magazine wants to include an article about the best countries to live in. Your job is to present information that compares the standard of living in Australia with that of three other countries on three different continents. Use a variety of methods including data displays, data analyses and maps to support your conclusions.	**Level 4**	
	Strands	**Topics**
	Number Chance and Data Space	Number concepts Data Location, direction and movement
	Outcomes N 4.1, CD 4.2, S 4.2	

Assessment technique	**Possible sources of evidence**	**Evidence** Has the student:	**Possible recording instruments**
Observation	• discussions with students	• interpreted maps with reference to conventions to identify locations of chosen countries?	• observation notes • checklists
Consultation	• plans for the investigation • data record templates	• planned a data collection • designed a data record template • accessed statistical data from relevant sources (e.g. Australian Bureau of Statistics)?	• anecdotal records • annotated work samples
Focused analysis	• data displays • notes for presentation • student journals	• chosen and constructed data displays for making comparisons of the standards of living in different countries • used measures of location (mean, median and mode) to inform judgments about the standards of living in different countries • made connections between key percentages and fractions?	• student folios and feedback sheets • annotated work samples

Blank form — Examples 1, 2 and 3

Investigation:	**Level**	
	Strands	**Topics**
	Outcomes	

Assessment technique	**Possible sources of evidence**	**Evidence** Has the student:	**Possible recording instruments**
Observation			
Consultation			
Focused analysis			
Self- and peer-assessment			

Example 4

Investigation: A visit to the museum

The class is planning a trip to the museum. You want to see as many displays as possible in the time you have available so you will need to plan your visit carefully. Develop an itinerary for the day including when the bus leaves school and its return, and how much time you can spend at each exhibit or display in the museum. You will need to gather information about the history of one exhibit to create a timeline.

Level 3

Strands	**Topics**
Measurement Space	Time Location, direction and movement
Outcomes M 3.2, S 3.2	

Assessment opportunity The student may:	**Evidence** Has the student:	**Sources of evidence**		**Assessment technique**	**Recording instruments**	
• discuss the floor plan of the museum • discuss the map showing the route to the museum • discuss calendars • interpret local transport timetables • present the itinerary to audience	• described locations using major compass points, angles and grids • given directions using major compass points, angles and grids • interpreted calendars • recorded and calculated with 12-hour time • interpreted and created maps and plans?	• discussion between students • games • observation of written work in progress • student explanation of work in progress • questioning led by teacher or student • student presentations	 ✔ ✔ ✔ ✔	Observation	• anecdotal records • checklists • observation notes • audiotaping • videotaping	✔ ✔ ✔
• use a map of the school grounds to describe pathways, angles of turn, orientation to north, symbols, keys and legends • read the time on the classroom clock at different times of day	• used a range of mapping conventions • read 12-hour time?	• concept map • plans of approach to investigation • questioning led by teacher or student • explanation of work in progress • whole or small group discussions • discussion with student	 ✔	Consultation	• anecdotal records • annotated work samples • checklists • feedback sheets • video recording • teacher journal	✔ ✔
• create a floor plan of a familiar place using an alphanumeric grid • use a map of the school grounds to show: – pathways – symbols – keys and legends – north • read and record digital and analogue time • record events on a calendar • construct timelines to show a familiar event, the history of one exhibit	• interpreted and created maps and plans • used a range of mapping conventions • read, recorded and calculated with 12-hour time • interpreted calendars?	• computer-generated presentations • student journals or learning logs • written work samples • projects/assignments • reports (e.g. on investigation) • sketches and drawings • diagrams • student folios • working notes and jottings • written tests (including Years 3, 5 and 7 test reports) • digital photographs	 ✔ ✔ ✔ ✔ 	Focused analysis	• annotated work samples • feedback sheets • folios • learning logs • checklists • reports of test results • statements of anticipated evidence • criteria sheets • worksheets	✔ ✔ ✔
• provide feedback to another student about their plans for the excursion	• interpreted the timetable accurately • accurately calculated durations • given clear directions?	• presentations • brainstorming activities • discussions • debates and challenges • games • student explanations of work in progress • video recordings or digital photographs	✔ ✔ ✔	Self- and peer-assessment	• self-assessment sheets • reflection sheets • reflection journals • feedback sheets • diaries	 ✔

Blank form — Example 4

Investigation:	**Level**	
	Strands	**Topics**
	Outcomes	

Assessment opportunities — The student may:	**Has the student:**	**Sources of evidence**		**Assessment technique**	**Recording instruments**	
		• discussion between students • games • observation of written work in progress • student explanation of work in progress • questioning led by teacher or student • student presentations	✓	**Observation**	• anecdotal records • checklists • observation notes • audiotaping • videotaping	✓
		• concept map • plans of approach to investigation • questioning led by teacher or student • explanation of work in progress • whole or small group discussions • discussion with student		**Consultation**	• anecdotal records • annotated work samples • checklists • feedback sheets • video recordings • teacher journal	
		• computer-generated presentations • student journals or learning logs • written work samples • projects/assignments • reports (e.g. on investigation) • sketches and drawings • diagrams • student folios • working notes and jottings • written tests (including Years 3, 5 and 7 test reports) • digital photographs		**Focused analysis**	• annotated work samples • feedback sheets • folios • learning logs • checklists • reports of test results • statements of anticipated evidence • criteria sheets • worksheets	
		• presentations • brainstorming activities • discussions • debates and challenges • games • student explanations of work in progress • video recordings or digital photographs		**Self- and peer-assessment**	• self-assessment sheets • peer assessment sheets • reflection sheets • reflection journals • feedback sheets • diaries	

Example 5

Self-assessment sheet **Student's name** _____

Investigation: Getting to know us

An international exchange student from Brazil will be visiting the class next year. The student has requested information about the students in our class and the environment in which he will be staying to determine what time of year he will visit, what clothes to pack, and living costs. How can we collect and present this information?

Levels 4 and 5

Strand	**Topic**
Chance and Data	Data

Outcomes CD 4.2, CD 5.2

Assessment opportunity Have I:	**Self-check** ✔	**Evidence** Did I:	**Teacher check** ✔	**Level/s**
• planned a data collection		• consider the purpose for collecting data • decide what data needs to be collected • identify whether the data will be discrete or continuous • decide how the data will be collected and recorded (circle items that show what you've used): – observation experiment survey – recorded on a spreadsheet – extracted from an existing data source – recorded on a template of my own design • classify the data • identify categories suitable for discrete and continuous data and give reasons for my choices • group the data		4/5 5
• carried out the data collection		• carry out a trial collection • check for errors • change the collection method, if necessary, to make responses clearer or to avoid errors • use consistent units for my data collections • collect enough data		4/5
• chosen and constructed appropriate data displays		• group the data for display • select the best displays to represent discrete and continuous data • present the data on (circle items that show what you've used): – pie charts bar graphs dot-plots line graphs two-way tables lists – two-way tables compound bar graphs histograms stem and leaf plots		5 4/5 4 5
• compared and analysed the data?		• use measures of location to compare the data (circle items that show what you've used): – mean median mode • explain the purposes of measures of location • explain the limitations of measures of location • use other features of data to compare and analyse information: (circle items that show what you've used): – spread range shape • compare different displays of the same data • explain variations between sets of data?		4/5 4 4/5 5 4/5
Teacher's name:			Date:	
Teacher's comment:				

Blank form: Example 5

Self-assessment sheet **Student's name** _____

	Level/s	
	Strand	**Topic**
	Outcomes	

Assessment opportunity Have I:	**Self-check** ✔	**Evidence** Did I:	**Teacher check** ✔	**Level/s**
•	•	•	•	
•	•	•	•	
•	•	•	•	
•	•	•	•	

Teacher's name:	Date:
Teacher's comment:	

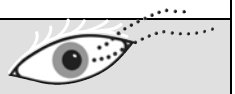
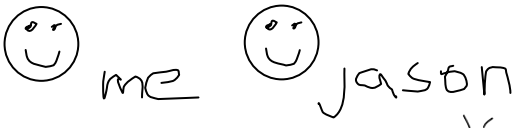
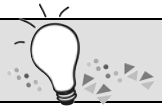
Example 6

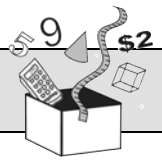
Thinking, reasoning, working mathematically

Self-assessment sheet **Student's name** _____

Insert: *a stamp,*  *a digital photo,* 

a drawing,  *or, write about what you did.*

Did I:	**Identify** 
• talk about the maths in the investigation?	
• remember maths that will help me?	
Did I:	**Describe** 
• tell a friend what the investigation is about?	
• think about how I will do the investigation?	
• tell someone else about what strategies I will use?	
Did I:	**Understand** 
• find new information?	
• explain what I have learned?	
• look for patterns or think of other things I know that could help me?	No I didn't need to

Did I:	**Apply** 
• test my new ideas?	
• use maths I already know?	
• try to find another way to do it?	
Did I:	**Communicate** 
• present my ideas to someone else?	
• describe how I did the investigation?	
Did I:	**Justify** 
• ask questions about why other people's ideas were different from mine?	
• show a friend why I think my solution is right?	
• think about what I learned in the investigation?	

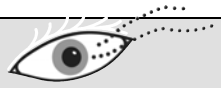
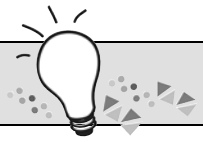
Blank form – Example 6

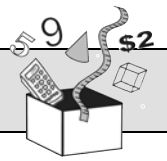
Thinking, reasoning, working mathematically

Self-assessment sheet **Student's name** _____

Insert: *a stamp,*  *a digital photo,* 

a drawing,  *or, write about what you did.*

Did I: **Identify** 	
• talk about the maths in the investigation?	
• remember maths that will help me?	
Did I: Describe 	
• tell a friend what the investigation is about?	
• think about how I will do the investigation?	
• tell someone else about what strategies I will use?	
Did I: Understand 	
• find new information?	
• explain what I have learned?	
• look for patterns or think of other things I know that could help me?	



Did I:	**Apply**
• test my new ideas?	
• use maths I already know?	
• try to find another way to do it?	

Did I:	**Communicate**
• present my ideas to someone else?	
• describe how I did the investigation?	

Did I:	**Justify**
• ask questions about why other people's ideas were different from mine?	
• show a friend why I think my solution is right?	
• think about what I learned in the investigation?	

Example 7

Metropolitan Middle School

Student profile
Mathematics key learning area

Student: Harvey James Dolittle

The student has demonstrated learning outcomes in the following topics and levels:

Level	F	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	B6
Strands/Topics								
Number (N)								
Number concepts		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Addition and subtraction		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**
Multiplication and division		**1.3**	**2.3**	**3.3**	**4.3**	**5.3**	**6.3**	**DB6.3**
Patterns and Algebra (PA)								
Patterns and functions		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Equivalence and equations		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**
Measurement (M)								
Length, mass, area and volume		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Time		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	
Chance and Data (CD)								
Chance		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Data		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**
Space (S)								
Shape and line		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Location, direction and movement		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**
Comments:								

Key	
	demonstrated
	working towards

Blank form — Example 7

Student profile

Mathematics key learning area

Student: _____

The student has demonstrated learning outcomes in the following topics and levels:

Level	F	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	B6
Strands/Topics								
Number (N)								
Number concepts		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Addition and subtraction		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**
Multiplication and division		**1.3**	**2.3**	**3.3**	**4.3**	**5.3**	**6.3**	**DB6.3**
Patterns and Algebra (PA)								
Patterns and functions		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Equivalence and equations		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**
Measurement (M)								
Length, mass, area and volume		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Time		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	
Chance and Data (CD)								
Chance		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Data		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**
Space (S)								
Shape and line		**1.1**	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**DB6.1**
Location, direction and movement		**1.2**	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**DB6.2**

Comments:

Key	
	demonstrated
	working towards