**Purposes of assessment**¹

The purposes of assessment are to:

- promote, assist and improve student learning
- inform programs of teaching and learning
- provide information for those people — students, parents, teachers — who need to know about the progress and achievements of individual students to help them achieve to the best of their abilities
- provide information for the issuing of certificates of achievement
- provide information to those people who need to know how well groups of students are achieving (school authorities, the State Minister for Education and Training and the Arts, the Federal Minister for Education).

It is common practice to label assessment as being formative, diagnostic or summative, according to the major purpose of the assessment.

The major purpose of formative assessment is to help students attain higher levels of performance. The major purpose of diagnostic assessment is to determine the nature of students' learning, and then provide the appropriate feedback or intervention. The major purpose of summative assessment is to indicate the achievement status or standards achieved by students at a particular point in their schooling. It is geared towards reporting and certification.

**Syllabus requirements**

Teachers should ensure that assessment instruments are consistent with the requirements, techniques and conditions of the Mathematics A (2008) syllabus.

**Assessment instruments**²

High-quality assessment instruments³:

- have construct validity (the instruments actually assess what they were designed to assess)
- have face validity (they appear to assess what you believe they are intended to assess)
- give students clear and definite instructions
- are written in language suited to the reading capabilities of the students for whom the instruments are intended
- are clearly presented through appropriate choice of layout, cues, visual design, format and choice of words
- are used under clear, definite and specified conditions that are appropriate for all the students whose achievements are being assessed
- have clear criteria for making judgments about achievements (these criteria are shared with students before they are assessed)
- are used under conditions that allow optimal participation for all
- are inclusive of students’ diverse backgrounds
- allow students to demonstrate the breadth and depth of their achievements
- only involve the reproduction of gender, socioeconomic, ethnic or other cultural factors if careful consideration has determined that such reproduction is necessary.

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² Assessment instruments are the actual tools used by schools and the QSA to gather information about student achievement, for example, recorded observation of a game of volleyball, write-up of a field trip to the local water catchment and storage area, a test of number facts, the Senior External Examination in Chinese, the 2006 QCS Test, the 2008 Year 4 English comparable assessment task.
Mathematics A (2008)

Sample assessment instrument

Supervised assessment

Compiled by the Queensland Studies Authority
March 2010

This assessment instrument is reproduced with the permission of Lourdes Hill College.

About this assessment instrument

This sample demonstrates:

- the construction of a supervised assessment task
- the construction of the corresponding instrument-specific criteria sheet.

This sample assessment instrument is intended to be a guide to help teachers plan and develop assessment instruments for individual school settings.
Some formulas you may find useful:

Surface area of sphere = $4\pi r^2$

speed = distance ÷ time

Perimeter of latitude = $2\pi r \cos \theta$

radius of earth = 6 400 km

$\sqrt{s(s-a)(s-b)(s-c)}$ where $s = (a + b + c) ÷ 2$

Part A

Question 1 (K&P)

(a) Find (i) perimeter and (ii) area for both of the following shapes:

(b) A garden is created consisting of a rectangle with a length of 7.2 metres and a width of 5.0 metres, and a semi-circle on one end of the rectangle with a diameter of 5.0 metres. Determine:

(i) the cost of creating a decorative edge, which costs $45.75 per metre
(ii) the cost of mulching the garden to a depth of 10 centimetres if mulch at this thickness costs $22.50 per square metre.
Question 2 (K&P)

(a) Find the (i) volume and (ii) surface area of the cylinder.

The cylinder is closed at both ends.

(b) A grain tanker is constructed by adding conical ends to a cylinder that is 10 metres long and 2.4 metres in width so that the diameter of each cone is 2.4 metres and the height (perpendicular) of each cone is 1 metre.

Determine the capacity of the tanker in litres. (1 m$^3$ = 1000 L)

Question 3 (M&P)

Building regulations require new homes to install a rain water tank.

A new homeowner at Wynnum has installed a 3m high tank (diameter is 4m).

The tank will be ready to receive water at the end of July; the owners would like to occupy the home by the end of August.

The average monthly rainfalls are 12mm for August and 22mm for September.

The rain catchment area is effectively 22m x 34m.

The owner must decide whether to rely on rainfall or fill the tank initially from the Brisbane City Council supply.

Make a suggestion. Support it mathematically.
<table>
<thead>
<tr>
<th>Standard A</th>
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• use of mathematical reasoning to develop logical sequences in simple non-routine situations using mathematical language | • accurate and appropriate use of mathematical terminology and conventions in simple routine geometry situations |  |
Part B

Question 4 (K&P)

(a) Using the formula \( a^2 = b^2 + c^2 \), calculate the length of the unknown side \( x \):

\[
\begin{align*}
X & \quad 36 \\
52 & \quad x \\
Y & \quad x \\
Z
\end{align*}
\]

(b) A builder measures the height and width of a doorway and finds values of 2080 mm and 900 mm respectively. What measurement should he find that will prove that the doorway is "square"? What is its value?

Question 5 (K&P)

(a) Find the length of the unknown side \( s \).

\[
\begin{align*}
R & \quad 36^\circ \\
36^\circ & \quad s \\
48 & \quad s \\
S & \quad 48 \\
T
\end{align*}
\]

(b) Find the unknown angle \( \beta \).

\[
\begin{align*}
\beta & \quad 2875 \text{ m} \\
5.8 \text{ km}
\end{align*}
\]
Question 6 (K&P)

The angle of elevation to the top of a statue at a point 40 metres away is $45^0$.

Determine how much closer towards the statue the point has to be moved so that the angle of elevation to the top of the statue is $60^0$.

Question 7 (M&P)

In designing a theatre, successive rows of seats are to be attached to tiers that rise by the same amount for each row as shown in the diagram.

The back row of seats is to be 6.88 metres higher than the first row.

If the rows of seats are designated by the letters A, B, C, etc., from the front row, what will be the letter associated with the back row of seats in the theatre?
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Part C

Question 8 (K&P)

(i) Write the coordinates for the city Manila in the Philippines.

(ii) Name the city close to 35 N°, 140° E.

Question 9 (K&P)

(a) Calculate the circumference (in kilometres) of the earth along the line of latitude 40°S.

(b) An aircraft maintained a course due west from Sydney (33°S 151°E) to Cape Town (33° S 18°E).

How far did it travel?
(c) An FA18 fighter aircraft flew from its base near Newcastle (New South Wales) \((33^0 S \ 151^0 E)\)

It passed directly over Whyalla (South Australia) \((33^0 S \ 137^0 E)\) in 1 h and 20 mins.

What was the average speed for the journey in kilometres per hour?

Question 10 (K&P)

(a) Hobart is GMT + 10.

(i) What time is it in Hobart when it is 8pm GMT?

(ii) During daylight saving, time in Hobart is advanced 1 hour. What is:

(a) the time in Hobart when it is 12 noon GMT?

(b) the GMT time when it is 7am in Hobart?

(b) Perth is GMT + 8 and New York is GMT – 3.

(i) What is the time in Perth when it is 10am Tuesday in New York?

(ii) What is the time in New York when it is 7pm Saturday in Perth?

Question 12 (M & P)

Megan and Lauren both have identical sailing boats that have the ability to sail at 14 km per hour in the prevailing conditions. They both want to travel from a starting point at \(42^0 S \ 135^0 E\) to a finishing point at \(22^0 S \ 153^0 E\). Both sailors agree that they can only travel in a north-south direction or an east-west direction. On the toss of a coin, Megan chooses to travel north firstly, while Lauren must travel at first in an easterly direction.

Do they arrive at their destination at the same time?

If they do not, what is the time separation between their arrival times?
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