General Mathematics 2019 v1.2

Units 1 and 2 sample assessment instrument

September 2018

Examination

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

Schools develop internal assessments for each senior subject, based on the learning described in Units 1 and 2 of the subject syllabus. Each unit objective must be assessed at least once.

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

1. select, recall and use facts, rules, definitions and procedures drawn from Units 1 and 2
2. comprehend mathematical concepts and techniques drawn from Units 1 and 2
3. communicate using mathematical, statistical and everyday language and conventions
4. evaluate the reasonableness of solutions
5. justify procedures and decisions by explaining mathematical reasoning
6. solve problems by applying mathematical concepts and techniques drawn from Units 1 and 2.

Queensland Government
Queensland Curriculum & Assessment Authority
For all Queensland schools
181269

Subject	General Mathematics
Technique	Examination
Unit	1 and 2
Topic	**Unit 1** 1: Consumer arithmetic 2: Shape and measurement 3: Linear equations and their graphs **Unit 2** 1: Applications of trigonometry 2: Algebra and matrices 3: Univariate data analysis

Conditions			
Response type	Short response		
Time	Paper 1: 60 minutes Paper 2: 60 minutes	**Perusal**	5 minutes
Other	• QCAA formula sheet must be provided • Notes are not permitted • Approved scientific calculator		

Instructions

- Show all working in the spaces provided.
- Write responses using black or blue pen.
- Unless otherwise instructed, give answers to **two decimal places.**

Feedback

Paper 1 (simple familiar) — total marks: 40

Question 1 (5 marks)

A salesperson at an electronic goods store is paid a retainer of $220 per week and a commission of 6.5% on their weekly sales.

Calculate their fortnightly earnings given the following sales:

Week 1 — $2500

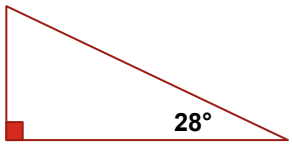
Week 2 — $4275.

Question 2 (3 marks)

The shadows of a 0.5 m high stick and a tree are found to be 1 m and 4 m respectively. Use similar triangles to determine the height of the tree.

Question 3 (3 marks)

Consider the following right-angled triangle:



104 cm

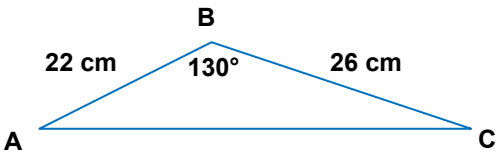
Calculate the length of the hypotenuse.

Paper 1 (simple familiar) — total marks: 40

Question 4 (3, 2 marks)

a. Calculate the length of side AC.

b. Calculate the area of the triangle.



Question 5 (4 marks)

A person is standing on the top of a cliff, 50 m above sea level. Their eye level is 1.6 m above the ground they are standing on. They look down towards a boat at an angle of depression of 11.5°.

Determine how far the boat is from the bottom of the cliff.

A diagram is required as part of your response.

Paper 1 (simple familiar) — total marks: 40

Question 6 (4 marks)

A wedding singer charges a flat ‘stage appearance’ fee plus an hourly rate.

Fees	Charge
Stage appearance fee	\$150
$0 < \boldsymbol{time} \leq 3$ hours	\$80 per hour
$3 < \boldsymbol{time} \leq 6$ hours (max.)	\$65 per hour

Display this information in the form of a step graph.

Question 7 (2 marks)

Transpose the formula $v^2 = u^2 + 2as$ to make the variable s the subject.

Question 8 (2 marks)

A student has kept a record of their assessment results in matrix form. Their marks so far are:
General Mathematics: 15, 9 and 12
Geography: 20, 16 and 18
Construct a matrix to display these results.

Paper 1 (simple familiar) — total marks: 40

Question 9 (2 marks)

Which size bag of sugar is the best value for money? Justify your response.

a. 1 kg for $3.89

b. 500 g for $1.95

c. 375 g for $1.45

Question 10 (4 marks)

A survey of 20 different city high schools was conducted. The percentage of students aged between 14 and 16 years of age who had less than 8 hours sleep per night at each school was:

90 76 85 91 65 88 75 79 78 68
48 82 56 83 74 79 79 89 84 89

Construct an ordered stem-and-leaf plot to display the data collected.

Paper 1 (simple familiar) — total marks: 40

Question 11 (2 marks)

A manufacturer advertises that a can of soft drink contains 375 mL of liquid. A sample of 16 cans yields the following contents:

357	375	366	371	351	363	360	369
379	382	362	370	360	375	356	368

Use a calculator to determine the mean and the standard deviation for this sample.

Question 12 (4 marks)

A sample of Year 11 students' average internet usage, in minutes per day, is listed below.

30 75 95 120 125 170 180 180 190 200 220 240 300

Identify any outlier/s that may be present in this list. Use statistical calculations to justify your answer.

Paper 2 (simple familiar, complex familiar and complex unfamiliar) — total marks: 40

Question 1 (1.5, 2.5 marks) SF

If $A = \begin{bmatrix} 1 & -2 \\ 4 & -1 \end{bmatrix}, B = \begin{bmatrix} 3 & 0 & 2 \\ -1 & 4 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, find the value of:

a. $3A + C$

b. AB

Justify solutions by showing calculations.

Question 2 (4 marks) SF

Use the following word list to fill in the blanks in the following sentences. (Note: Not all words are used.)

categorical, numerical, nominal, ordinal, discrete, continuous

a. The area of a house block in a new estate is an example of a numerical variable that is _____.

b. A survey collects opinions from people in the street on their favourite TV show. The data collected is classified as _____.

c. Data is being collected on the number of cars that pass through a street each day. This data is classified as _____ and the variable is identified as _____.

Paper 2 (simple familiar, complex familiar and complex unfamiliar) — total marks: 40

Question 3 (5 marks) CF

Calculate the values of x and y if

$$3\begin{bmatrix} y & 4 \\ 6 & x-1 \end{bmatrix} + \begin{bmatrix} 3 & -7 \\ -14 & y \end{bmatrix} = \begin{bmatrix} 6x & 5 \\ 4 & 6 \end{bmatrix}.$$

Question 4 (6 marks) CF

A block of land is surrounded by four fences. Two fences are at right angles and are 45 m and 60 m long. The remaining two fences form an equilateral triangle with the hypotenuse of the first two fences.

Determine the area of the block.

A diagram is required as part of your response.

Paper 2 (simple familiar, complex familiar and complex unfamiliar) — total marks: 40

Question 5 (6 marks) CU

Two sculptures, one a sphere and the other a cube, both have a volume of 10 m^3.
Which sculpture's surface would cost less to paint?
Show calculations to justify your response.

Paper 2 (simple familiar, complex familiar and complex unfamiliar) — total marks: 40

Question 6 (5 marks) CF

A photographer wants to buy a certain model of camera online. A shop in London sells it for GBP345.85, a shop in New York sells it for USD588 and a shop in Australia sells it for AUD620. Postage is included in all three prices.

Using the information in the foreign exchange table below, determine which country the photographer should buy the camera from for the lowest price.

Country	Code	Buying	Selling
Great Britain	GBP	0.6835	0.6205
USA	USD	1.1002	1.0997

Show calculations to justify your response, stating any observations and assumptions.

Question 7 (5 marks) CU

A spider spins a single thread of web inside a square-based rectangular box, from the top left-hand corner at the front of the box to the bottom right-hand corner at the back. The thread is 58 cm long and the base of the box has a side length of 40 cm.

If the angle of depression the web makes with the top of the box is greater than 15°, the web will break.

Will the web break or hold? Justify your decision by explaining your mathematical reasoning.

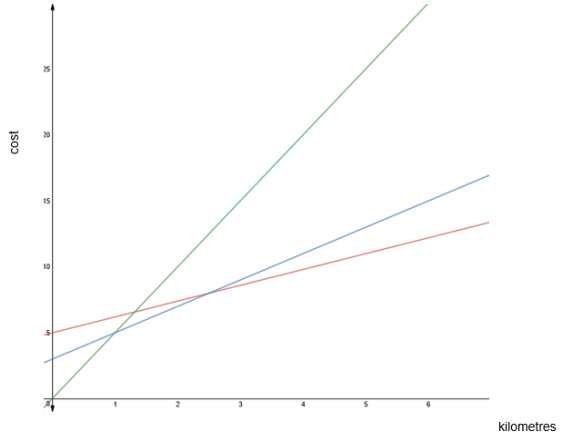
Paper 2 (simple familiar, complex familiar and complex unfamiliar) — total marks: 40

Paper 2 (simple familiar, complex familiar and complex unfamiliar) — total marks: 40

Question 8 (5 marks) CU

Three pet-walking companies charge various call-out fees and rates per km walked as follows:
Company 1 — $5 call-out fee plus $1.20 per km your pet is walked
Company 2 — $3 call-out fee plus $2.00 per km your pet is walked
Company 3 — $5.00 per km your pet is walked.

You have graphed the information below but have not labelled the graphs.



Determine when it is cheaper to use Company 2.
Justify all procedures and decisions by explaining your mathematical reasoning.

Paper 2 (simple familiar, complex familiar and complex unfamiliar) — total marks: 40

Student results summary

Paper 1

Question number	Simple familiar (SF)	Complex familiar (CF)	Complex unfamiliar (CU)
1	5		
2	3		
3	3		
4	5		
5	4		
6	4		
7	2		
8	2		
9	2		
10	4		
11	2		
12	4		
Totals	**40**	**0**	**0**

Paper 2

Question number	Simple familiar (SF)	Complex familiar (CF)	Complex unfamiliar (CU)
1	4		
2	4		
3		5	
4		6	
5			6
6		5	
7			5
8			5
Totals	**8**	**16**	**16**