General Mathematics 2019 v1.2

Unit 1 sample marking scheme

April 2019

Examination

This sample has been compiled by the QCAA to model one possible approach to allocating marks in an examination. It matches the examination mark allocations as specified in the syllabus (~ 60% simple familiar, ~ 20% complex familiar and ~ 20% complex unfamiliar) and ensures that all assessment objectives are assessed.

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 all Unit 1 topics
2. comprehend mathematical concepts and techniques drawn from all Unit 1 topics
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 all Unit 1 topics.

Queensland Government
Queensland Curriculum & Assessment Authority
For all Queensland schools
190443

Task

See the sample assessment instrument for Unit 1: Examination (available on the QCAA Portal).

Sample marking scheme

Criterion	Marks allocated	Result
Foundational knowledge and problem-solving Assessment objectives 1, 2, 3, 4, 5, 6		
Total		

The annotations are written descriptions of the expected response for each question and are related to the assessment objectives.

Note: ✓ = $\frac{1}{2}$ mark

Marking scheme

Part A (simple familiar)

Question 1 (3 marks)

1. select and use rules and procedures
3. communicate using everyday language

a. $I = Pin$ ✓

$n = \frac{I}{Pi}$ ✓

b. $n = \frac{I}{Pi}$

$n = \frac{360\ ✓}{1200 \times 0.05\ ✓}$

$= 6$ ✓ years ✓

Question 2 (3 marks)

1. use rules and procedures
2. identify and symbolise relevant techniques

Decrease of 25%, multiply by 0.75 ✓ Original price × 0.75 ✓= $56.25 ✓

Original price = $\frac{56.25\ ✓}{0.75\ ✓}$

The original price was $75. ✓

Question 3 (2 marks)

1. use procedures
2. identify relevant technique

$V = s \times s \times s = 8$ cm^3

$s = \sqrt[3]{8}$ ✓

$s = 2$ cm ✓

2 cm = 20 mm

$V = 20$ mm $\times$ 20 mm $\times$ 20 mm ✓

The volume is 8000 mm³ ✓

Question 4 (3 marks)

2. comprehend relevant concepts and techniques
3. generalise to organise information in symbolic form

Cost = distance $\times$ price + flag fall

and/or

$C = dp + f$ ✓✓

$C = 20.5 \times 2.2 + 3.00$ ✓✓

$C = \$48.10$ for the trip ✓✓

Question 5 (4 marks)

2. comprehend the purpose and identify relevant techniques
3. use mathematical conventions and terminology in symbolic form

a. discount = \$2360 $\times$ 35% ✓

= \$2360 $\times$ 0.35 ✓✓

= \$826 ✓

b. discounted price = \$2360 – \$826 ✓✓

= \$ ✓1534 ✓

Question 6 (5 marks)

1. use procedures
2. make connections; articulate and symbolise concepts and techniques
3. use mathematical terminology, symbols and conventions; describe and represent mathematically
5. justify decisions by explaining mathematical reasoning

a. Cost per bead:

Brand A price = $\frac{\$7.50}{1000}$ ✓

= \$0.0075 ✓

Brand A is 0.75c/bead. ✓

Brand B price = $\frac{\$17.50}{2500}$ ✓

= \$0.007 ✓

Brand B is 0.70c/bead. ✓

Therefore, Brand B is the better buy. ✓

b. 10% discount on Brand A:

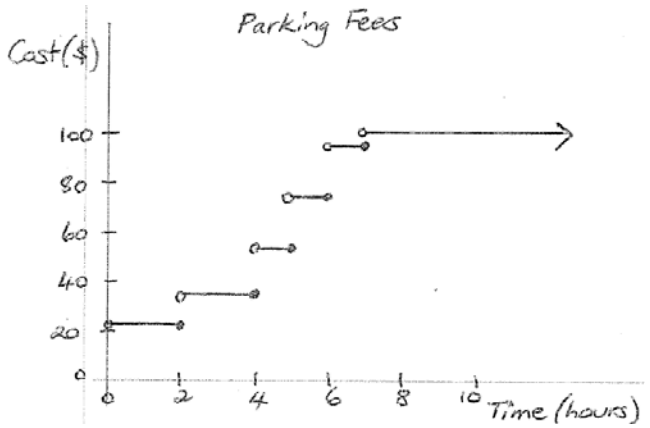
Brand A discount price = 0.0075 $\times$ 0.9 ✓

= \$0.00675 ✓

Now, Brand A is 0.675c/bead. Therefore, Brand A is now the better buy. ✓

1. recall procedures
2. understand and make connections
3. use mathematical conventions, represent in graphical form

Question 7 (5 marks)



Title ✓

Axes labels ✓✓

Scales ✓✓

Graph lines ✓✓

Used a ruler ✓

Closed/open circles ✓✓

1. select procedures
2. articulate relevant techniques
3. use everyday language

Question 8 (2 marks)

$\$A \times$ sell rate ✓ $= 650 \times 0.9799$ ✓

$=$ Singapore \$636.935 ✓

(rounded down to nearest 5 cents)

Kate will receive \$636.90 ✓ in Singapore dollars.

Question 9 (4 marks)

1. use rules
2. articulate and symbolise
3. use mathematical terminology

a. Porch length on plan = 6.7 cm ✓
…. Real length = 6.7 cm $\times$ 100 = 670 cm = 6.7 m ✓✓
Porch width on plan = 2 cm ✓
…. Real width = 2 cm $\times$ 100 = 200 cm = 2 m ✓✓

b. Area = length $\times$ width
= 6.7 m $\times$ 2 m ✓
= 13.4 m^2 ✓

Question 10 (2 marks)

1. recall facts and procedures
2. identify critical elements

Equation	gradient	y-intercept
$y = 4x + 2$	4 ✓	2 ✓
$y = -7x$	–7 ✓	0 ✓

1. select procedures
2. identify and make connections
3. organise and present information

Question 11 (5 marks)

Monday

$19.5(6 - 0.5)$ ✓ $= \$107.25$ ✓

Thursday

$19.5(7.5 - 0.5)$ ✓ $= \$136.50$ ✓

Saturday

$19.5(2)2$ ✓ $= \$78.00$ ✓

TOTAL

$107.25 + 136.5 + 78$ ✓✓✓

$= \$321.75$ ✓

1. use procedures
2. identify and symbolise critical elements of techniques, make connections
3. use mathematical symbols and conventions, describe mathematical models

Question 12 (4 marks)

$y = x - 6$ Eq. 1

$x = 4y$ Eq. 2

Substitute Eq. 2 into Eq. 1

$y = 4y - 6$ ✓

$6 = 4y - y$ ✓

$6 = 3y$ ✓

$y = 2$ ✓

Substitute y = 2, into Eq. 2

$x = 4y$ ✓

$x = 4(2)$ ✓

$x = 8$ ✓

Solution: (8,2) ✓

Part B (complex familiar)

Question 13 (6 marks)

2. comprehend mathematical techniques
3. organise and present information in symbolic form, defining variables, describe and represent mathematically
4. evaluate the reasonableness of solutions
6. translate information into a mathematical format

Let l = price of lemonade ice-blocks.

Let c = price of chocolate-coated ice-creams.

$7l + 12c = 38.60$ ✓ Eq. 1

$11l + 8c = 34.60$ ✓ Eq. 2

$(38.6 - 4 = 34.6)$

$14l + 24c = 77.2$ ✓ (Eq. 1×2) Eq. 3

$33l + 24c = 103.8$ ✓ (Eq. 2×3) Eq. 4

$19l = 26.6$ ✓ (Eq. 4 – Eq. 3)

$l = \frac{26.6}{19}$ ✓

$l = 1.4$ ✓

Substitute $l = 1.4$ into Eq. 1

$7(1.4) + 12c = 38.6$ ✓

$12c = 28.8$ ✓

$c = 2.4$ ✓

Solution:

Lemonade ice-blocks: \$1.40 each ✓

Chocolate-coated ice-creams: \$2.40 each ✓

These prices give reasonable solutions.

Question 14 (3 marks)

1. use accurate procedure
3. use mathematical symbols
6. make decisions and develop a solution

The number of shares isn't used as we are calculating the percentage gain.

Buy:

$7.55 \times (1 + 0.025) = 7.73875$ ✓

Sell:

$9.56 \times (1 - 0.025) = 9.321$ ✓

Percentage gain:

$\frac{9.321 - 7.73875 \text{ ✓}}{7.73875 \text{ ✓}} \times 100$ ✓

The percentage gain is 20.4458%. ✓

1. use rules
2. understand relevant techniques, making connections
3. use mathematical terminology, symbols and conventions
5. explain mathematical reasoning
6. make decisions about the technique used to solve a problem

Question 15 (5 marks)

First, use the volume to calculate the radius:

$V = \frac{4}{3}\pi r^3$ ✓

$\frac{110 \times 3}{4\pi}$ ✓$= r^3$ ✓

$\frac{330}{4\pi} = r^3$ ✓

$r = \sqrt[3]{\frac{330}{4\pi}} = \sqrt[3]{26.2606} = 2.972$ ✓

Then, use the radius to calculate the surface area of the sphere:

$SA = 4\pi r^2$

$SA = 4 \times \pi \times 2.972^{\,2}$ ✓✓

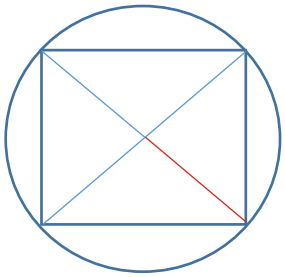
$SA = 111.02$ mm^2 ✓✓

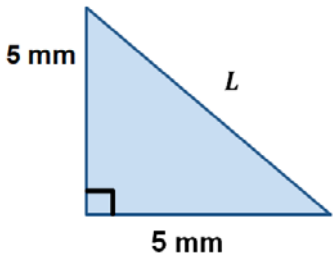
Part C (complex unfamiliar)

Question 16 (5 marks)

4. check calculations using knowledge of relevant facts
5. describe mathematical thinking using clarity and precision
6. analyse the context and make decisions about the technique to solve the problem

The circle radius is 5 mm, marked in red. First, find the length of L. ✓





✓

$L = \sqrt{(5^2 + 5^2)}$ ✓✓

$L = \sqrt{50}$ ✓

Substitute the value for L to find the perimeter of the square. ✓

$P = 4L$ ✓

$P = 4\sqrt{50}$ ✓

$P = 28.28$ mm ✓✓

Question 17 (5 marks)

1. use procedures
4. check calculations using knowledge of relevant facts and procedures, consider alternative methods
5. provide reasons for choices made and conclusions reached
6. analyse the context of the problem, make decisions

Volume of large cube:

$V_L = 2.5^3$ ✓

$V_L = 15.625\ m^3$ ✓✓

Volume of smaller cube:

$V_s = 1.25^3$ ✓

$V_s = 1.953\ m^3$ ✓✓

Volume of large cube minus small cube:

$V_L - V_s = 15.625 - 1.953 = 13.67 m^3$ ✓✓

They require at least 13.67 m^3 more concrete. ✓✓

Question 18 (4 marks)

5. explain mathematical reasoning; construct mathematical arguments; use rigorous mathematical reasoning
6. translate information into a mathematical format

Using cost C, kWh k and supply charge x:

$C = 0.22238k + x$ ✓

If the family used no electricity then their bill would be just the fixed supply charge x. ✓

$526.02 = 0.22238(901) + x$ ✓✓

$x = 526.02 - (0.22238 \times 901)$ ✓✓

$x = 325.65562$ ✓

The charge if no electricity was used would be $325.66. ✓