

# 2024 VCE General Mathematics Examination 2

Marking guidelines and  
sample responses

## Acknowledgement

The Victorian Curriculum and Assessment Authority proudly acknowledges and pays respect to Victoria's Aboriginal and Torres Strait Islander communities and their rich and enduring cultures.

We acknowledge Aboriginal and Torres Strait Islander people as Australia's first peoples and as the Traditional Owners and custodians of the lands and waters on which we rely. We pay respect to Elders past and present of the lands where we conduct our work and recognise their ongoing contributions as the first educators on the land now known as Victoria.

Authorised and published by the Victorian Curriculum and Assessment Authority  
Level 7, 200 Victoria Parade  
East Melbourne VIC 3002

© Victorian Curriculum and Assessment Authority 2024

No part of this publication may be reproduced except as specified under the *Copyright Act 1968* or by permission from the VCAA. Excepting third-party elements, schools may use this resource in accordance with the [VCAA educational allowance](#). For more information go to <https://www.vcaa.vic.edu.au/Footer/Pages/Copyright.aspx>.

The VCAA provides the only official, up-to-date versions of VCAA publications. Details of updates can be found on the VCAA website at [www.vcaa.vic.edu.au](http://www.vcaa.vic.edu.au).

This publication may contain copyright material belonging to a third party. Every effort has been made to contact all copyright owners. If you believe that material in this publication is an infringement of your copyright, please email the Copyright Officer [vcaa.copyright@edumail.vic.gov.au](mailto:vcaa.copyright@edumail.vic.gov.au)

Copyright in materials appearing at any sites linked to this document rests with the copyright owner/s of those materials, subject to the Copyright Act. The VCAA recommends you refer to copyright statements at linked sites before using such materials.

The VCAA logo is a registered trademark of the Victorian Curriculum and Assessment Authority.

Contact us if you need this information in an accessible format, for example, large print or audio.

Telephone (03) 9032 1635 or email [vcaa.publications@education.vic.gov.au](mailto:vcaa.publications@education.vic.gov.au)

# 2024 VCE General Mathematics Examination 2

## Marking guidelines and sample responses

Marking guidelines will indicate the initial criteria that will be used to award marks.

This report provides sample responses, or an indication of what responses may have included.

### Question 1ai

Answer	1 mark
--------	--------

2.39 m      1996 value

### Question 1aii

Answer	1 mark
--------	--------

50%       $\frac{11}{22} \times 100$

### Question 1b

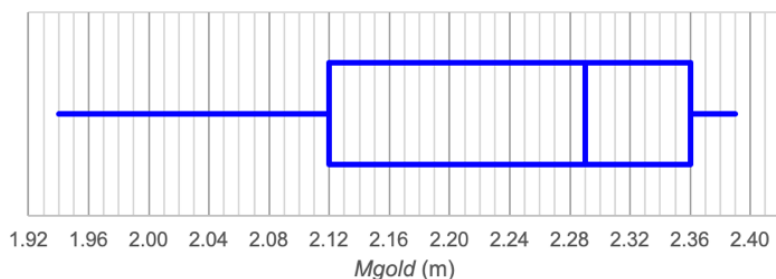
Answer	1 mark
--------	--------

0.8       $\frac{2.35 - 2.23}{0.15}$

### Question 1c

Method	1 mark
--------	--------

Answer	1 mark
--------	--------



Min: 1.94  
Q1: 2.12  
Median: 2.29  
Q3: 2.36  
Max: 2.39

## Question 1d

Method	1 mark
Answer	1 mark

$-7.97$

$0.00516$

## Question 1e

Answer	1 mark
--------	--------

85.7% of the variation in  $Mgold$  can be explained by the variation in  $year$ .

## Question 2a

Answer	1 mark
--------	--------

Negatively skewed

OR

Negatively skewed with no outliers

## Question 2b

Answer	1 mark
--------	--------

1 Minimum of one value to create a whisker on boxplot

## Question 2ci

Answer	1 mark
--------	--------

$$\begin{aligned} \text{IQR} &= 2.04 - 1.85 \\ &= 0.19 \end{aligned}$$

$$\begin{aligned} \text{Lower fence} &= 1.85 - 1.5 \times 0.19 \\ &= 1.565 \end{aligned}$$

$$\begin{aligned} \text{Upper fence} &= 2.04 + 1.5 \times 0.19 \\ &= 2.325 \end{aligned}$$

## Question 2cii

Answer	1 mark
--------	--------

The minimum value is 1.67 and the maximum value is 2.06.

Both these values lie between the lower fence and the upper fence so there are no outliers.

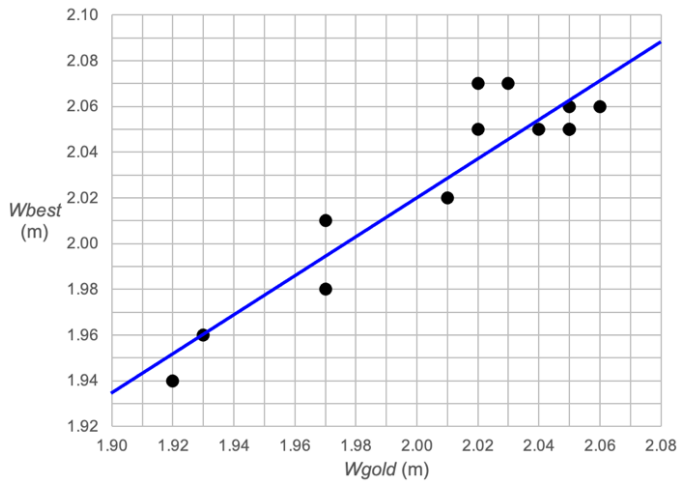
### Question 3a

Answer	1 mark
--------	--------

*W<sub>best</sub>*

### Question 3b

Answer	1 mark
--------	--------



Edge intercepts at :

left side:  $1.93 < \text{left side} < 1.94$

right side:  $2.08 < \text{right side} \leq 2.09$

Line must cover the range of  $W_{gold}$  values from 1.92 to 2.06 and extrapolate to correct edge intercepts.

### Question 3c

Answer	1 mark
--------	--------

86.8%       $(r^2 = (0.9318)^2 = 0.86825\dots)$

### Question 3d

Answer	1 mark
--------	--------

<b>Strong</b>
<b>Positive</b>

### Question 3e

Answer	1 mark
--------	--------

On average, for each 1 m increase in  $W_{gold}$ ,  $W_{best}$  increases by 0.86 m.

### Question 3f

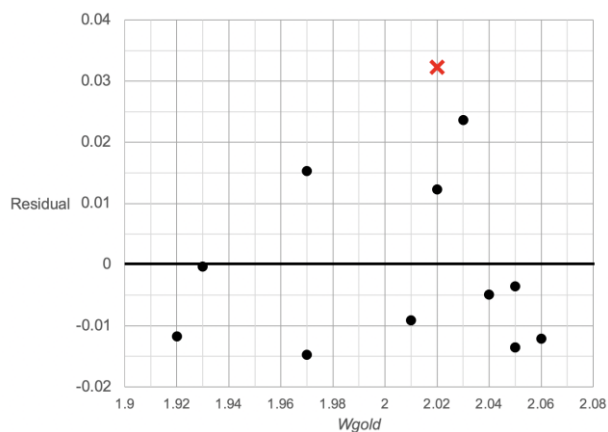
Method	1 mark
Answer	1 mark

Predicted value =  $0.30 + 0.86 \times 2.02 = 2.0372$

Residual =  $2.07 - 2.0372 = 0.0328$

### Question 3gi

Answer	1 mark
--------	--------



Actual point is (2.02, 0.0328)

### Question 3gii

Answer	1 mark
--------	--------

Yes, as the residual plot shows no clear pattern.

### Question 3h

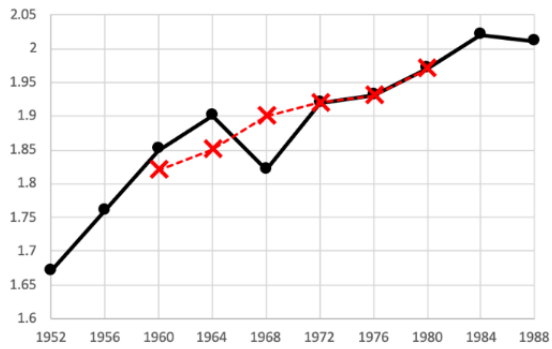
Answer	1 mark
--------	--------

The prediction is unreliable because of extrapolation.

(1.90 is outside the data range used to generate the least squares line.)

## Question 4a

Answer	1 mark
--------	--------



## Question 4b

Answer	1 mark
--------	--------

Increasing trend

Irregular fluctuations OR Random fluctuations



### Question 5a

Answer	1 mark
--------	--------

\$60

### Question 5b

Answer	1 mark
--------	--------

\$2520       $\$15\,000 - 4 \times 52 \times 60$

### Question 5c

Answer	1 mark
--------	--------

$V_0 = 15\,000$        $V_{n+1} = V_n - 60$

### Question 5d

Answer	1 mark
--------	--------

20.8%       $\frac{52 \times 60}{15000} \times 100$

## Question 6a

Answer	1 mark
--------	--------

4.95%      From interest conversion on calculator

## Question 6b

Answer	1 mark
--------	--------

It does not take into account the fortnightly compounding.

### Question 7a

Answer	1 mark
--------	--------

$$E_0 = 300\,000$$

$$E_1 = 1.003 \times 300\,000.00 - 2159.41 = 298\,740.59$$

$$E_2 = 1.003 \times 298\,740.59 - 2159.41 = 297\,477.401 = \$297\,477.40$$

### Question 7b

Answer	1 mark
--------	--------

15 years

From Finance Solver or Table of Values, calculate 180 months

### Question 7c

Answer	1 mark
--------	--------

$$3.6\% \quad (1.003 - 1.000) \times 12 \times 100$$

### Question 7d

Answer	1 mark
--------	--------

$$\$900 \quad 0.003 \times \$300\,000$$

## Question 8

Answer	1 mark
Answer	1 mark

Total cost = \$884 633.62

Number of payments = 288

N	=	288	288
I%	=	5.3	5.3
PV	=	500000	500000
PMT	=	- 3071.63	- 3071.63
FV	=	0	- 4.1773...
P/Y & C/Y	=	12	12

Total cost =  $288 \times \$3071.63 + \$4.18$

### Question 9a

Answer	1 mark
--------	--------

$\begin{bmatrix} 36 \\ 54 \\ 72 \end{bmatrix}$

### Question 9b

Answer	1 mark
--------	--------

$$[28 \ 6 \ 8] \times R^T = [1908]$$

### Question 9c

Answer	1 mark
--------	--------

$$\begin{array}{l} n = \\ p = \end{array} \begin{array}{|c|} \hline 36 \\ \hline 2.5 \\ \hline \end{array}$$

## Question 10a

Answer	1 mark
--------	--------

$$W = [2 \quad 5 \quad 10 \quad 17 \quad 26]$$

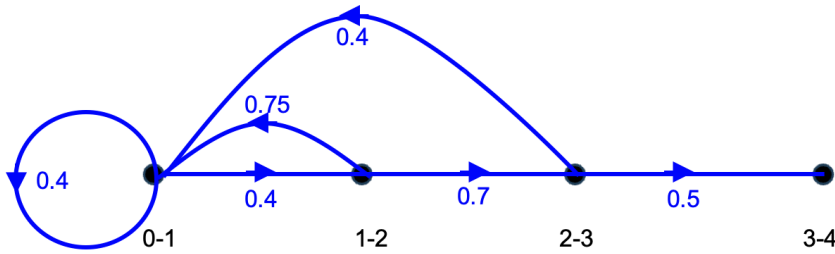
## Question 10b

Answer	1 mark
--------	--------

$$65 \qquad (1 - 8)^2 + 2 \times 8 = 49 + 16$$

### Question 11ai

Answer	1 mark
--------	--------



### Question 11aii

Answer	1 mark
--------	--------

	Age group			
	0 – 1	1 – 2	2 – 3	3 – 4
Initial population	70	80	90	40
Population after one year	124	28	56	45

### Question 11b

Answer	1 mark
--------	--------

5 years       $131 < 0.5 \times 280$

### Question 12a

Answer	1 mark
--------	--------

14%

Number of foremen in 2025 = 43

$$\text{Percentage decrease} = \frac{50 - 43}{50} \times 100 = 14\%$$

### Question 12b

Answer	1 mark
--------	--------

0

$T^n \times S_{2023}$ , (for very large  $n$ ) gives 390 as having left

### Question 12c

Answer	1 mark
--------	--------

101

$$V_{2024} = \begin{bmatrix} 332 \\ 146 \\ 13 \\ 89 \end{bmatrix}, \text{ extra staff} = 190 - 89$$

### Question 12d

Answer	1 mark
--------	--------

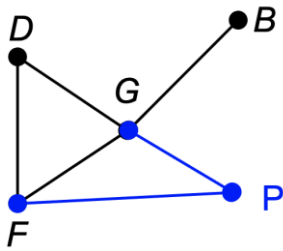
2027 OR the fourth year

Number of foremen in 2027 = 200.54



### Question 13a

Answer	1 mark
--------	--------



### Question 13bi

Answer	1 mark
--------	--------

Bakery OR B

$P - F - D - G - B$

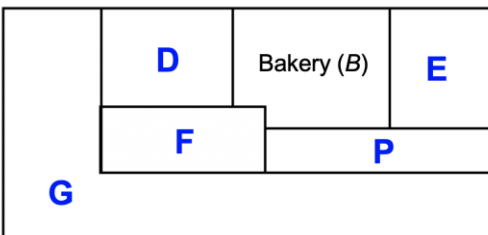
### Question 13bii

Answer	1 mark
--------	--------

Hamiltonian path

### Question 13c

Answer	1 mark
--------	--------



### Question 14a

Answer	1 mark
--------	--------

46      $13 + 18 + 6 + 9$

### Question 14b

Answer	1 mark
--------	--------

37     Minimum cut =  $13 + 5 + 11 + 8$

### Question 14c

Answer	1 mark
--------	--------

R

S

### Question 15a

Answer	1 mark
--------	--------

$A - C - H - J$

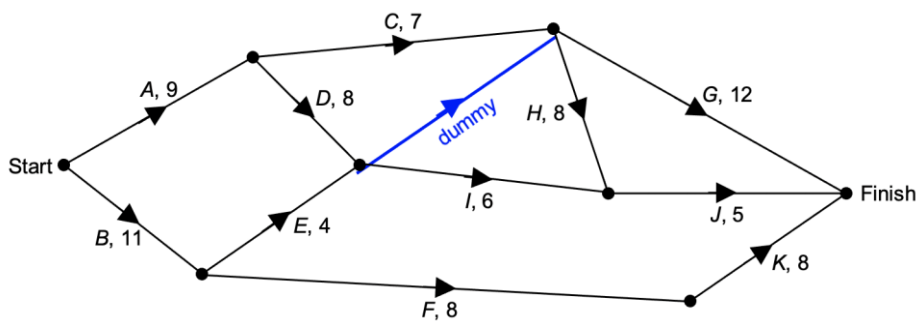
### Question 15b

Answer	1 mark
--------	--------

E E can be delayed by 3 weeks

### Question 15c

Answer	1 mark
--------	--------



### Question 15d

Answer	1 mark
--------	--------

30 weeks New critical path is  $A - D - H - J$

### Question 15e

Answer	1 mark
--------	--------

\$50 000

Activities reduced (weeks): A (-2), D (-1), H (-1), B (-1)

Total cost =  $5 \times \$10\,000$