



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

Complete, fold and seal
(see note 2 below)

SURNAME: Claringbald

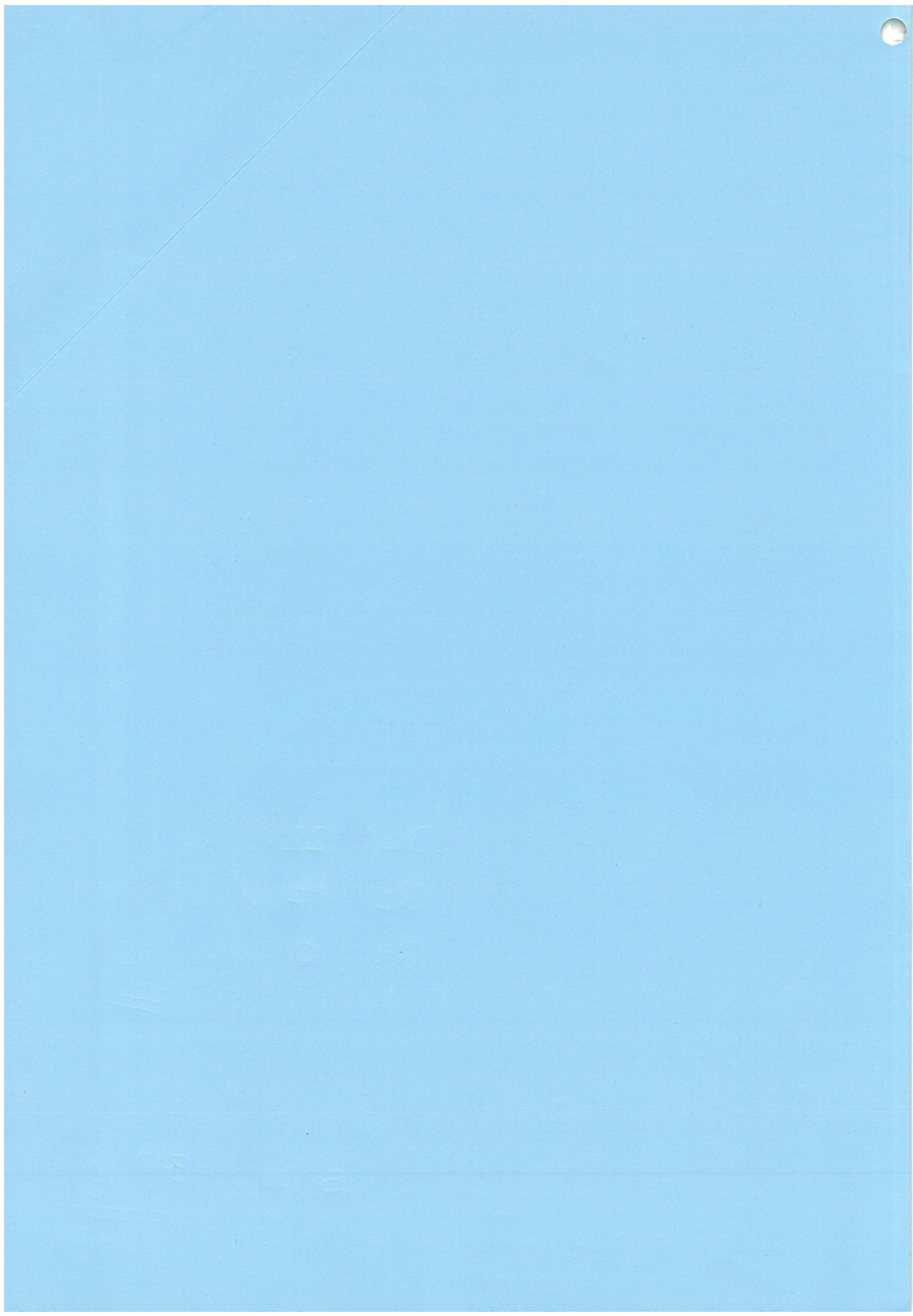
FORENAME(S): Bradley

1	Student Number	11228768
2	Title of Examination Paper	Mathematics Test 2
3	Module Code	GUEN4001
4	Date and Time of Examination	18 May 2026
5	Examination Venue	Gower College
6	Seat Number	E6
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1	22 ✓
Q2	17 ✓
Q3	0 ✓
Total	39/100 ✓

L2

39%



x)

$$Z_1 = 3 + 7j \quad Z_2 = 4 + 5j \quad Z_3 = 2 + 6j$$

$$i) Z_1 + Z_2$$

$$(3 + 7j) + (4 + 5j) = 7 + 12j$$

1Q122/33

$$ii) Z_2 + 3Z_3$$

$$(4 + 5j) + 3(2 + 6j)$$

$$(4 + 5j) + 6 + 18j = 10 + 23j$$

2

$$iii) Z_2^2 + Z_3$$

$$(4 + 5j)^2 + (2 + 6j)$$

$$(4 + 5j)(4 + 5j) + (2 + 6j)$$

$$16 + 20j + 20j - 25 + (2 + 6j)$$

$$(-9 + 40j) + (2 + 6j) = -7 + 46j$$

3Q1a15/18

$$iv) Z_1 Z_2 Z_3$$

$$(3 + 7j)(4 + 5j)(2 + 6j)$$

$$(12 + 15j + 28j - 35)(2 + 6j)$$

$$(-23 + 43j)(2 + 6j)$$

$$-46 - 138j + 86j - 258$$

$$-304 - 52j$$

4

$$v) \frac{Z_1}{Z_2}$$

$$\frac{(3 + 7j)}{4 + 5j} \times \frac{(4 - 5j)}{4 - 5j} = \frac{12 - 15j + 28j + 35}{16 - 20j + 20j + 25}$$

$$= \frac{47 + 13j}{41}$$

5

$$= \frac{47}{41} + \frac{13}{41}j$$

$$v_i) \frac{z_1^2 - z_2^2}{z_1^2 - z_1 z_2}$$

$$\frac{-z_2^2}{1 - z_1 z_2} \quad \text{on } \times$$

$$b) 2x^2 - 6x + 9 = 0$$

$$a = 2 \quad b = -6 \quad c = 9$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(9)}}{2(2)}$$

$$\frac{6 \pm \sqrt{32 - 72}}{4}$$

$$\frac{6 \pm \sqrt{-40}}{4} = \frac{6 \pm 40j}{4}$$

$$\frac{3}{2} \pm \frac{20}{2}j$$

Correct Method
E.C.F

$$\frac{3}{2} = 1.5$$

$$\frac{20}{2} = 10$$

$$\text{or } \frac{-20}{2} = -10$$

$$\sqrt{1.5^2 + 10^2} = 10.11$$

$$\sqrt{1.5^2 + (-10)^2} = 10.11$$

correct method
E.C.F

$$\tan^{-1} \frac{10}{1.5} = 81.46^\circ$$

$$\tan^{-1} \frac{-10}{1.5} = -81.46^\circ = 278.54^\circ \quad \text{E.C.F}$$

$$x = 10.11 \angle 81.46^\circ$$

$$\text{or } x = 10.11 \angle 278.54^\circ$$

Qab

3/9

$$(c) (5 + 3j)^6$$

$$\sqrt{5^2 + 3^2} = 5.83 \checkmark$$

$$\tan^{-1} \frac{3}{5} = 30.96 \checkmark$$

$$5.83^6 \angle 6(30.96) \checkmark$$

4
show workings.

$$5.83^6 (\cos 6(30.96) + j \sin 6(30.96))$$

$$5.83^6 (30.79 + j 3.25) = ??$$

?

Q1C

4/6

22

A

$$\begin{array}{c|ccc|cc} 1 & 1 & 3 & 3 & 1 & 3 \\ & 0 & 5 & 4 & 0 & 5 \\ & 5 & 2 & 6 & 5 & 2 \end{array}$$

$$1 \times 5 \times 6 = 30$$

$$3 \times 4 \times 5 = 60$$

$$3 \times 0 \times 2 = 0$$

$$\underline{90}$$

$$5 \times 5 \times 3 = 75$$

$$2 \times 4 \times 1 = 8$$

$$6 \times 0 \times 3 = 0$$

$$\underline{83}$$

$$90 - 83 = 7$$

C

$$\begin{array}{c|cc} 2 & 5 & 4 \\ & -2 & 6 \end{array}$$

$$5 \times 6 = 30$$

$$4 \times -2 = -8$$

$$30 - (-8) = 38$$

3) AB

$$\begin{array}{c|ccc|cc} & 1 & 3 & 3 & 3 & 5 \\ & 0 & 5 & 4 & 2 & -2 \\ & 5 & 2 & 6 & 1 & 1 \end{array} = \begin{array}{c|cc} & 12 & 2 \\ & 5 & -6 \\ & 25 & 27 \end{array}$$

$$1 \times 3 = 3$$

$$3 \times 2 = 6$$

$$3 \times 1 = 3$$

$$\underline{12}$$

$$0 \times 3 = 0$$

$$5 \times 2 = 10$$

$$4 \times 1 = 4$$

$$\underline{5}$$

$$5 \times 3 = 15$$

$$2 \times 2 = 4$$

$$6 \times 1 = 6$$

$$\underline{25}$$

$$1 \times 5 = 5$$

$$3 \times -2 = -6$$

$$3 \times 1 = 3$$

$$\underline{2}$$

$$0 \times 5 = 0$$

$$5 \times -2 = -10$$

$$4 \times 1 = 4$$

$$\underline{-6}$$

$$5 \times 5 = 25$$

$$2 \times -2 = -4$$

$$6 \times 1 = 6$$

$$\underline{27}$$

Q2

17/33

Q2a

11/17

4) AD

$$\begin{array}{c|c|c} 1 & 3 & 3 \\ \hline 6 & 5 & 4 \\ \hline 5 & 2 & 6 \end{array} \begin{array}{c|c|c} 0 & 2 & 2 \\ \hline 3 & 5 & 1 \\ \hline 5 & 1 & 4 \end{array} = \begin{bmatrix} 24 & 20 & 17 \\ 35 & 29 & 21 \\ 36 & 26 & 36 \end{bmatrix}$$

$$\begin{array}{lll} 1 \times 0 = 0 & 1 \times 2 = 2 & 1 \times 2 = 2 \\ 3 \times 3 = 9 & 3 \times 5 = 15 & 3 \times 1 = 3 \\ 3 \times 5 = 15 & 3 \times 1 = 3 & 3 \times 4 = 12 \\ \hline & 20 & 17 \end{array}$$

$$\begin{array}{lll} 0 \times 0 = 0 & 0 \times 2 = 0 & 0 \times 2 = 0 \\ 5 \times 3 = 15 & 5 \times 5 = 25 & 5 \times 1 = 5 \\ 4 \times 5 = 20 & 4 \times 1 = 4 & 4 \times 4 = 16 \\ \hline & 29 & 21 \end{array}$$

$$\begin{array}{lll} 5 \times 0 = 0 & 5 \times 2 = 10 & 5 \times 2 = 10 \\ 2 \times 3 = 6 & 2 \times 5 = 10 & 2 \times 1 = 2 \\ 6 \times 5 = 30 & 6 \times 1 = 6 & 6 \times 4 = 24 \\ \hline & 26 & 36 \end{array}$$

5 Not Possible

$$6) \quad w = \begin{bmatrix} x & 3 & -4 \\ 4 & 4 & 2 \\ -2 & 5 & (x+2) \end{bmatrix} \quad w = 4$$

$$x = \begin{bmatrix} w & 3 & -4 \\ 4 & 4 & 2 \\ -2 & 5 & (w+2) \end{bmatrix} = \begin{bmatrix} 4 & 3 & -4 \\ 4 & 4 & 2 \\ -2 & 5 & 6 \end{bmatrix}$$

$$\begin{array}{c|c} 4 & 3 & -4 \\ \hline 4 & 4 & 2 \\ \hline -2 & 5 & 6 \end{array} \begin{array}{c|c} 4 & 3 \\ \hline 4 & 4 \\ \hline -2 & 5 \end{array}$$

$$\begin{aligned}
 4 \times 4 \times 6 &= 96 \\
 3 \times 2 \times -2 &= -12 \\
 -4 \times 4 \times 5 &= \underline{-80} \\
 &4
 \end{aligned}$$

$$\begin{aligned}
 -2 \times 4 \times -4 &= 32 \\
 5 \times 2 \times 4 &= 40 \\
 6 \times 4 \times 3 &= \underline{72} \\
 &144
 \end{aligned}$$

$$\begin{aligned}
 4 - 144 &= -140 \\
 \Delta C &= -140
 \end{aligned}$$

$$b) A = \begin{vmatrix} 6 & 3 & 1 \\ 2 & 0 & 5 \\ 4 & 2 & 3 \end{vmatrix}$$

$$\begin{vmatrix} 6 & 3 & 1 & 63 \\ 2 & 0 & 5 & 20 \\ 4 & 2 & 3 & 42 \end{vmatrix}$$

$$\begin{aligned}
 6 \times 0 \times 3 &= 0 \\
 3 \times 5 \times 4 &= 60 \\
 1 \times 2 \times 2 &= \underline{4} \\
 &64
 \end{aligned}$$

$$\begin{aligned}
 4 \times 0 \times 1 &= 0 \\
 2 \times 5 \times 6 &= 60 \\
 3 \times 2 \times 3 &= \underline{18} \\
 &78
 \end{aligned}$$

$$\begin{aligned}
 64 - 78 &= -14 \\
 \text{Adj } A &= -14
 \end{aligned}$$

$$\begin{aligned}
 &\cancel{6(0 \times 3 - 5 \times 2) - 3(2 \times 3 - 5 \times 4) + 1(2 \times 2 - 0 \times 4)} \\
 &\cancel{6(0 - 10) - 3(6 - 20) + 1(4 - 0)} \\
 &\cancel{6(-10) - 3(-14) + 1(4)} \\
 &\cancel{-60 + 42 + 4 = -14}
 \end{aligned}$$

$$\begin{bmatrix} 6 & 3 & 1 \\ 2 & 0 & 5 \\ 4 & 2 & 3 \end{bmatrix} = \begin{bmatrix} -6 & 2 & -4 \\ 3 & 0 & 5 \\ -1 & 5 & -3 \end{bmatrix} = \text{Adj } A$$

$$A^{-1} = \frac{1}{-14} \begin{bmatrix} -6 & 2 & -4 \\ 3 & 0 & 5 \\ -1 & 5 & -3 \end{bmatrix}$$

Q2b

2/10

$$\begin{aligned}
 \text{c)} \quad & 2x - y - 2z = -2 \\
 & -x + y + z = 0 \\
 & x - 2y + z = 8
 \end{aligned}$$

Q2C

$$\begin{bmatrix} 2 & -1 & -2 \\ -1 & 1 & 1 \\ 1 & -2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -2 \\ 0 \\ 8 \end{bmatrix}$$

4/6

$$\left| \begin{array}{ccc|cc} 2 & -1 & -2 & 2 & -1 \\ -1 & 1 & 1 & 1 & 1 \\ 1 & -2 & 1 & 1 & -2 \end{array} \right|$$

$$2 \times 1 \times 1 = 2$$

$$1 \times 1 \times -2 = -2$$

$$-1 \times 1 \times 1 = -1$$

$$-2 \times 1 \times 2 = -4$$

$$-2 \times 1 \times -2 = 4$$

$$1 \times 1 \times -1 = -1$$

$$5 - (-7) = 12$$

$$\text{x)} \quad \begin{bmatrix} -2 & -1 & -2 \\ 0 & 1 & 1 \\ 8 & -2 & 1 \end{bmatrix}$$

$$-2(1 \times 1 - 1 \times -2) - (-1)(0 \times 1 - 1 \times 8) + (-2)(0 \times 2 - 1 \times 8)$$

$$-2(1 + 2) + 1(-8) - 2(-8)$$

$$-2(3) + 1(-8) - 2(-8)$$

$$-6 - 8 + 16 = 2$$

$$\text{y)} \quad \begin{bmatrix} 2 & -2 & -2 \\ -1 & 0 & 1 \\ 1 & 8 & 1 \end{bmatrix}$$

$$2(0 \times 1 - 1 \times 8) - (-2)(-1 \times 1 - 1 \times 1) + (-2)(-1 \times 8 - 0 \times 1)$$

$$2(0 - 8) + 2(-1 - 1) - 2(-8)$$

$$-16 - 4 + 16 = -4$$

$$2) \begin{bmatrix} 2 & 1 & -2 \\ -1 & 1 & 0 \\ 1 & -2 & 8 \end{bmatrix}$$

$$2(1 \times 8 - 0 \times -2) - 1(-1 \times 8 - 0 \times 1) + (-2)(-1 \times -2 - 1 \times 1)$$

$$2(8) - 1(-8) - 2(2 - 1)$$

$$16 + 8 - 2 = 22 \quad \times \quad \underline{0}$$

$$x = 2$$

$$y = 4$$

$$z = 22$$

$$2x - y - 2z = -2$$

$$2(2) - 4 - 2(22)$$

Q3

0/34

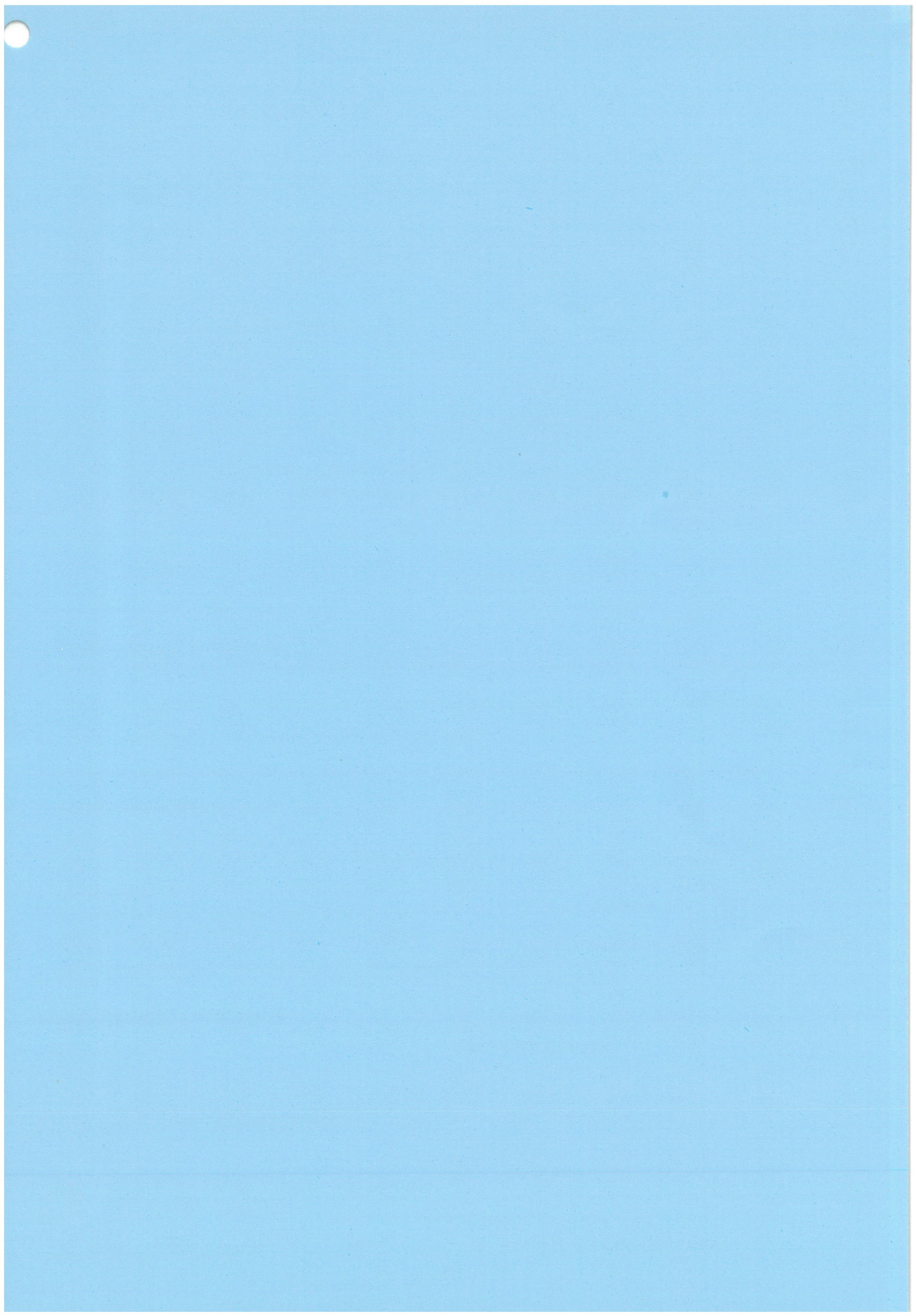


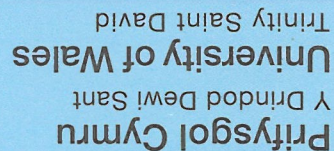
Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn





12 Tüdalen

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn y lle a ddarparwyd ar y dde, plygwch et a'i setio i lawr (gan ddefnyddio'r label a ddarparwyd i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llawysgriften ddarlennadwy. Gall yr Arholwyr naill ai anwybyddu sgrifft annarllennadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.
4. Ysgrifennwch eich atebion mewn inc.
5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddyn.

5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw ffrs nodiadau yn y llyfr atebion a thynnu llinell dryddyn.
6. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.
7. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyllwyr.

8. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchiadau.

7	Nifer y Llyfrau Atebion a gyflwynwyd	
6	Rhif Sedd	
5	Lleoliad yr Arholiad	
4	Dyddiad ac Amser yr Arholiad	
3	Cod y Modwl	
2	Teitl y Papur Arholiad	
1	Rhif Myfyrwr	

[illegible]

(See the other side for English version)

Llenwch, plygwch a seliwch
(gweler nodyn 2 isod)

CYFENN:

ENW(AU) CYNTAF:

ENW(AU) CYNTAF: