The Open University

Faculty of Science, Technology, Engineering and Mathematics
MU123 Discovering mathematics

MU123

TMA 01 2025J

Cut-off date 11 November 2025

Submission instructions

You should submit this TMA electronically as a PDF file by using the University's online TMA/EMA service. Before starting work on it, please read the guidance for preparing and submitting TMAs, available from the 'Assessment' tab of the module website.

Special instructions

Remember that you need to explain your reasoning and communicate your ideas clearly, as described in Subsection 5.3 of Unit 1. This includes:

- explaining your mathematics in the context of the question
- the correct use of notation and units
- appropriate rounding.

Your score out of 8 for good mathematical communication (GMC) on questions 2, 3 and 4 will be recorded against Question 5b. You do not have to submit any work for Question 5b.

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PLAGIARISM WARNING – the use of assessment help services and websites

The **work that you submit for any assessment on any module should be your own**. Submitting work produced by or with another person, or a web service or an automated system, **as if it is your own** is cheating. It is **strictly forbidden** by the University.

You should not:

- provide any assessment question to a website, online service, social media platform or any individual or organisation, as this is an infringement of copyright
- request answers or solutions to an assessment question on any website, via an online service or social media platform, or from any individual or organisation
- use an automated system (other than one prescribed by the module) to obtain answers or solutions to an assessment question and submit the output as your own work
- discuss examination questions with any other person, including your tutor.

The University actively monitors websites, online services and social media platforms for answers and solutions to assessment questions, and for assessment questions posted by students. Work submitted by students for assessment is also monitored for plagiarism.

A student who is found to have posted a question or answer to a website, online service or social media platform and/or to have used any resulting, or otherwise obtained, output as if it is their own work has committed a disciplinary offence under our Code of Practice for Student Discipline. **This means the academic reputation and integrity of the University has been undermined.**

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- using text obtained from assignment writing sites, organisations or private individuals
- obtaining work from other sources and submitting it as your own.

If it is found that you have used the services of a website, online service or social media platform, or that you have otherwise obtained the work you submit from another person, this is considered serious academic misconduct and you will be referred to the Central Disciplinary Committee for investigation.

Question 1 – 10 marks

This question is based on your work on MU123 up to and including Unit 1, concentrating on good mathematical communication (GMC).

Consider the following TMA question:

TMA question

A stack of fourteen identical jigsaw puzzle boxes measures 68.5 cm high. Calculate the height of one jigsaw box. Give your answer in centimetres, correct to 1 decimal place.

Here is a student's first attempt at a solution, with the correct numerical result:

First solution

$68.5 = 68.5 / 14 = 4.9 =$ 1 box

Later, the student wrote a solution to be submitted for the TMA:

Second solution

The stack, 68.5 cm high, comprises fourteen identical jigsaw puzzle boxes.

So, the height of one box is

$$\frac{68.5}{14}\text{ cm} = 4.892\ldots\text{cm}$$
$$= 4.9\text{ cm (to 1 d.p.)}.$$

The height of one box is 4.9 cm (to 1 d.p.).

With reference to good mathematical communication (GMC), give 5 reasons why the second solution is better than the first.

You will find pages 60–64 of Unit 1, Book A useful. [*10*]

Question 2 – 30 marks

This question is based on your work on MU123 up to and including Unit 1.

(a) Alex is following a recipe to make a pavlova that uses 280 grams of sugar and 6 eggs. However, they drop one egg and so only have the five remaining eggs to use. Calculate the quantity of sugar that Alex should now use to make their pavlova. Give your answer in grams, correct to 2 significant figures. [*4*]

(b) The book *Is maths real?* by Eugenia Cheng has 336 pages. An online preview of the book includes 39 pages. Calculate the percentage of pages that are included in the online preview. Give your answer correct to the nearest whole number. [*4*]

(c) A farm has 140 sheep.

(i) 45% of these sheep are Texel sheep. Calculate the number of Texel sheep on the farm. [*3*]

(ii) Of these Texel sheep, 36 are lambs (are under 1 year old). Write the number of Texel lambs as a fraction of the total number of Texel sheep on the farm. Give your answer both as an unsimplified fraction, and as a fraction in its simplest form. [*2*]

(d) Bo, Cal and Drew are each crocheting a scarf.

(i) At one point, Bo's scarf is 87 cm long and Cal's scarf is 19% longer than Bo's. Calculate the length of Cal's scarf. Give your answer in centimetres correct to the nearest centimetre. [*4*]

(ii) At this point, Drew's scarf is $\frac{8}{11}$ of the length of Cal's scarf. Calculate the length of Drew's scarf. Give your answer in centimetres, correct to the nearest centimetre. [*5*]

(e) The price of a first class Royal Mail stamp increased in October 2024 from £1.35 to £1.65.

(i) Calculate the percentage increase in the price of a first class stamp. Give your answer correct to one decimal place. [*5*]

(ii) Explain briefly why you used the method you used to answer Question 2 part (e)(i), and why you laid your solution out as you did. [*3*]

Question 3 – 20 marks

This question is based on your work on MU123 up to and including Unit 2.

Erin is an endurance (horse) rider.

(a) Erin completes a training ride of 28.5 kilometres in 2 hours and 45 minutes. Calculate their average speed for this ride, giving your answer in kilometres per hour (km/h) correct to one decimal place. [*4*]

(b) The first bridlepath (horse riding trail) on Erin's training ride measures 34.6 cm on a map which has a scale of 1 : 16 000. Calculate the corresponding distance covered on the ground. Give your answer in kilometres, correct to two significant figures. [*5*]

(c) Erin competes in the young rider category; young riders are aged 14 years old to 25 years old, inclusively.

Let y represent the age of a competitor, in years.

(i) Explain what the inequality $y \geq 14$ means in this practical context. [*1*]

(ii) Draw a number line to illustrate the range of ages for a young rider. [*1*]

(iii) Write down a double inequality, using y, to describe this range of ages. [*3*]

(d) Erin enters a competition, a novice Graded Endurance Ride of 35 kilometres. The ride must be completed at an average speed of between 8 and 15 km/h. Calculate the maximum time that Erin can take to complete the ride without being eliminated. Give your answer in hours and minutes, correct to the nearest 5 minutes. [*6*]

Question 4 – 20 marks

This question is based on your work on MU123 up to and including Unit 2.

After a storm, the water level in the river Derwent near Fu's home is rising steadily. At 9:00 pm the water is 25 cm above the normal level. The water then rises at a rate of 15 cm each hour, for the next 12 hours.

(a) Using this information, complete a copy of the table below.

Time, T, in hours after 9 pm	0	1	3	4	6	9	12
Height of water, H, in centimetres above the normal level	25	40	70				

[2]

(b) Mark the points from part (a) on a graph, with the vertical axis showing H, the height of water above the normal level in centimetres, and the horizontal axis showing T, the time in hours after 9 pm. Draw a line through these points.

You will find the tips for drawing graphs on page 96 of Unit 2 useful. [6]

You can draw your graph either by hand (using graph paper) or by using a computer.

(c) Fu's garden floods when the water level exceeds 190 cm above the normal level. Explain how you could use your graph to find the time in hours after 9 pm when Fu's garden starts to flood. What time is this? [3]

(d) Fu's home is at risk of flooding when the water level exceeds 240 cm above the normal level. They decide to go to sleep as normal and not move any of their belongings upstairs. In your opinion, was Fu's decision to go to sleep as normal sensible? Explain your answer with reference to your answers to parts (a) to (c). [2]

The formula

$$H = h + rT$$

gives the height of the water, H, in centimetres above the normal level, of the river Derwent at time, T, in hours after 9 pm, if the level at 9 pm is h cm and the level is rising steadily at a rate of r cm each hour.

(e) Explain how you would use this formula to calculate the height of the water if the level is falling steadily by 20 cm each hour. [2]

(f) Use the formula to find the height of the water, H, in centimetres above the normal level, of the river Derwent at 4am when the level at 9 pm was 140 cm and the level is falling steadily at a rate of $r = -4.3$ cm each hour.

Show each step of your working clearly. Give your answer correct to three significant figures. [5]

Question 5 – 10 marks

This question concerns the important theme of ***good mathematical communication (GMC)****.*

Copy *both* sections of the form below and complete Section (a). Your tutor will complete Section (b).

(a)(i)	Read over Subsection 5.3 of Unit 1 (pages 60–64, Book A). Write down two points about good mathematical communication that you have tried to put into practice in writing your answers in this TMA.	[*1*]
(ii)	For each point that you mentioned in part (a)(i), give a specific example (e.g. Question 3(b)) from this TMA where you have put the point into practice. Give a separate example for each point from part (i).	[*1*]
(b)	Your tutor will award up to eight marks for good mathematical communication in Questions 2, 3 and 4 of this TMA, and will comment on your mathematical communication below. ***Please leave at least half a page blank here for your tutor's comments.***	[*8*]

Question 6 – 10 marks

This question is about planning and completing your work for the next assignment.

You are encouraged to use the form on the next page for your answers to this question. Alternatively, you can construct your own similar form.

(a) Write down the cut-off date for MU123 TMA 02. [*1*]

(b) Describe one factor that will affect how you plan your work on MU123 between now and the cut-off date for TMA 02. How do you intend to take this factor into account?

For example, this could include other commitments, such as family or work, or factors resulting from your work on TMA 01 or iCMA 41. [*3*]

(c) TMA 02 covers work from Unit 3 (Numbers), Unit 4 (Statistical summaries) and Unit 5 (Algebra). Look quickly through these units so that you get an idea of what to expect.

Which of the following statements apply to you? You can choose one or more.

A: I am fairly confident that I can complete the TMA on time.

B: I am concerned that I may not have enough time to complete the TMA on time.

C: I am concerned that I may not be able to cope with some of the maths in Units 3, 4 and 5.

D: None of the three statements A, B and C, above applies to me. [*1*]

(d) Write a brief explanation of your choice of options in part (c). [*2*]

(e) Describe the benefits you hope studying MU123 will bring, in your studies, personally, or in your workplace. [*3*]

(a)	The cut-off date for TMA 02 is:
(b)	One factor that will affect how I plan my work on MU123 between now and the cut-off date for TMA 02. How I intend to take this factor into account.
(c)	My choice of option is: A ☐ B ☐ C ☐ D ☐
(d)	My reasons for choosing the option(s) in part (c).
(e)	The benefits I hope studying MU123 will bring.