



South Australian  
Certificate of Education

# Essential Mathematics

## 2024

### Question booklet

**Topic 2: Measurement** (Questions 1 to 3) 30 marks

**Topic 4: Statistics** (Questions 4 to 6) 30 marks

**Topic 5: Investments and loans** (Questions 7 to 9) 30 marks

- Answer **all** questions
- Write your answers in this question booklet
- You may write on pages 11, 17, and 23 if you need more space
- Allow approximately 40 minutes for **each** topic

### Examination information

#### Materials

- Question booklet
- SACE registration number label

#### Instructions

- Show appropriate working and steps of logic in this question booklet
- Use black or blue pen
- You may use a sharp dark pencil for diagrams and graphical representations
- Approved calculators may be used — complete the box below

**Total time:** 130 minutes

**Total marks:** 90

© SACE Board of South Australia 2024

The SACE Board of South Australia acknowledges that this examination was created on Kaurna Land. We acknowledge First Nations Elders, parents, families, and communities as the first educators of their children, and we recognise and value the cultures and strengths that First Nations students bring to the classroom. We respect the unique connection and relationship that First Nations peoples have to Country, and their ever-enduring cultural heritage.

Attach your SACE registration number label here

#### Graphics calculator

1. Brand \_\_\_\_\_

Model \_\_\_\_\_

2. Brand \_\_\_\_\_

Model \_\_\_\_\_



Government  
of South Australia

**Question 1** (11 marks)

A basketball stadium has two types of wall mounting brackets for basketball backboards, as shown in Image 1 and Image 2 below.

Both types of wall mounting brackets have a supporting wire that attaches the basketball backboards to the wall.

**Image 1: Wall mounting bracket 1**



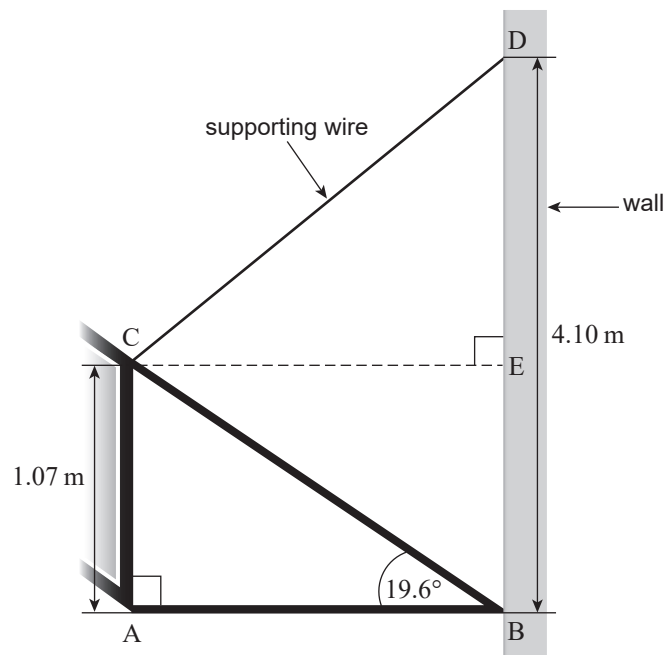
**Image 2: Wall mounting bracket 2**



Source: adapted from Grand Slam Sports Equipment, viewed 20 June 2024, [www.grand-slam.com.au](http://www.grand-slam.com.au)

Diagram 1 below shows measurements for wall mounting bracket 1.

The supporting wire is CD.



**Diagram 1**

[This diagram is not drawn to scale.]

(a) (i) Show that the length of AB is 3 m.



(2 marks)

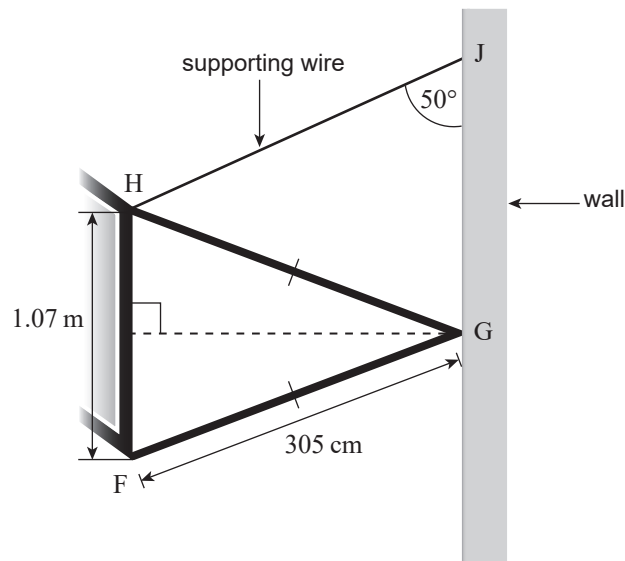
(ii) Calculate the length of the supporting wire CD.



(2 marks)

**Question 1 continues on page 4.**

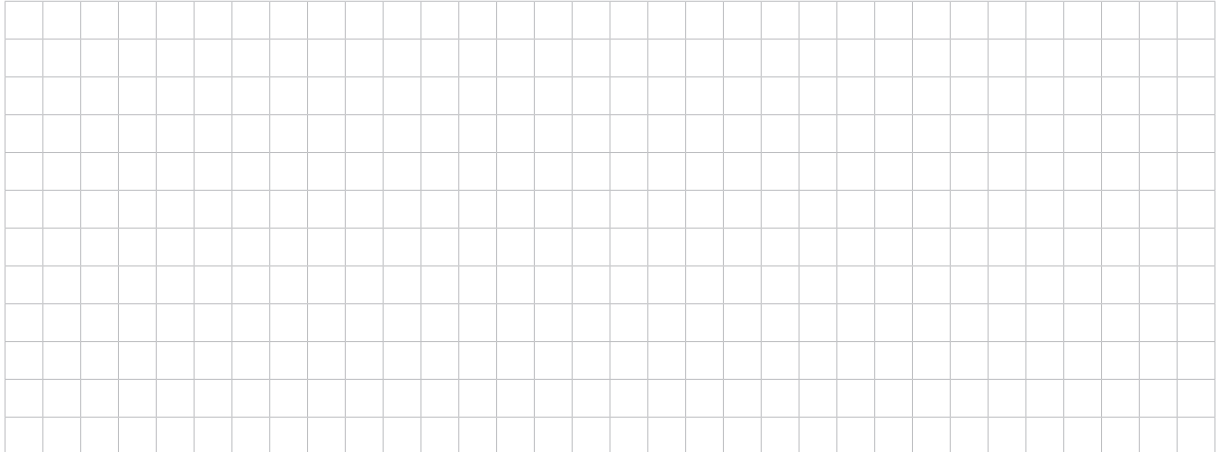
Diagram 2 below shows measurements for wall mounting bracket 2.  
The supporting wire is HJ.



**Diagram 2**

[This diagram is not drawn to scale.]

(b) (i) Show that angle HGF is  $20.2^\circ$ .

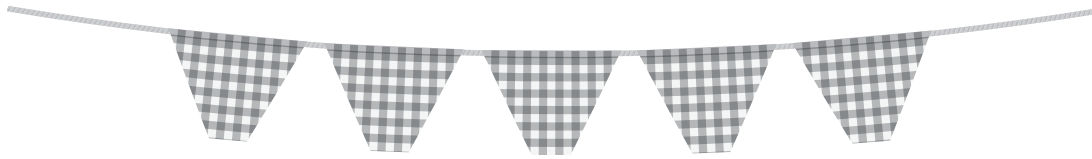


(3 marks)



**Question 2** (7 marks)

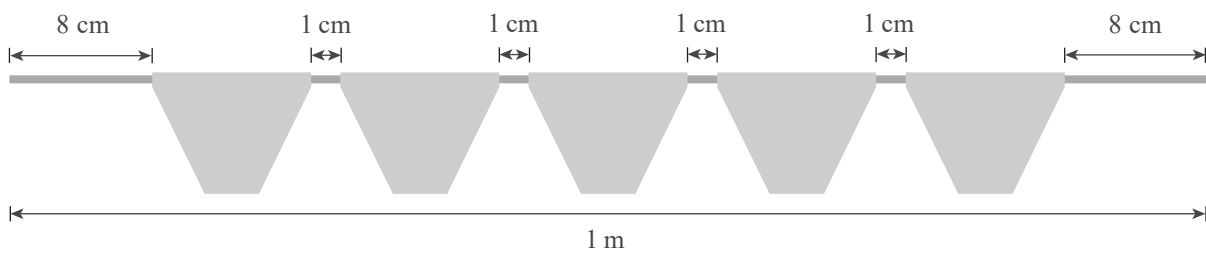
Bunting can be made from individual flags held together with rope, as shown below.



Source: adapted from © \_human | istockphoto.com

Diagram 3 below shows five identical flags on a 1 m length of rope.

There is a 1 cm gap between each flag and 8 cm at each end of the rope to tie the bunting on display.

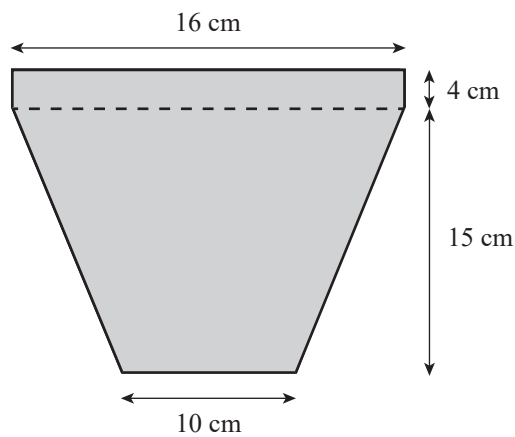


**Diagram 3**

[This diagram is not drawn to scale.]

The material for one flag consists of two shapes, a rectangle and a trapezium.

Diagram 4 below shows the shapes and dimensions of one flag.



**Diagram 4**

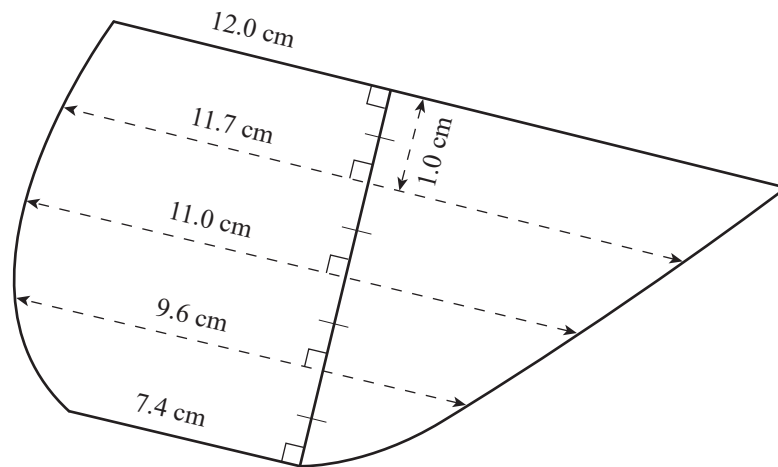
[This diagram is not drawn to scale.]







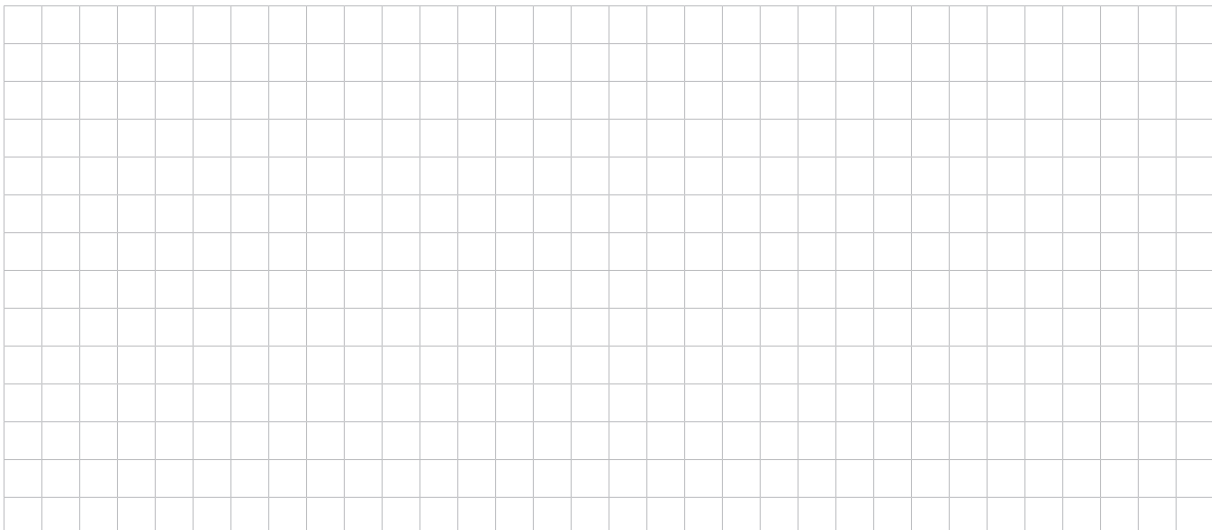
- (b) The uniform cross-section area of the scoop can be approximated using the measurements shown below in Diagram 8.



**Diagram 8**

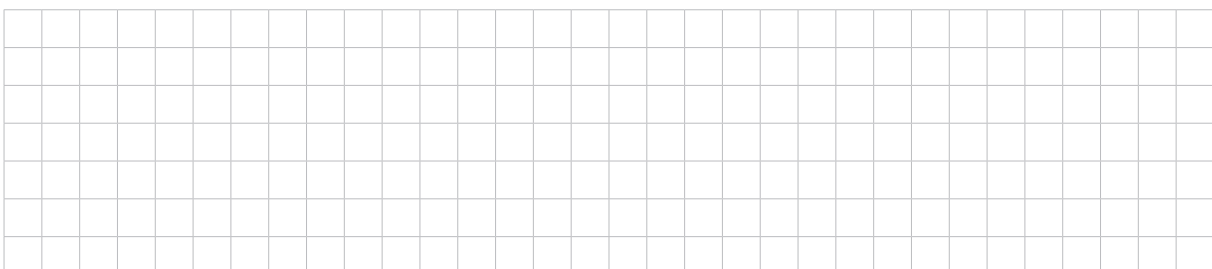
[This diagram is not drawn to scale.]

- (i) Using Simpson's rule, show that the approximate uniform cross-section area of the scoop is  $42.2 \text{ cm}^2$ .



(3 marks)

- (ii) Calculate the approximate volume of the scoop, using the area obtained in part (b)(i) and information in Diagram 6 on page 8.



(1 mark)



You may write on this page if you need more space to finish your answers to any questions in Topic 2. Make sure to label each answer carefully (e.g. 3(b)(i) continued).





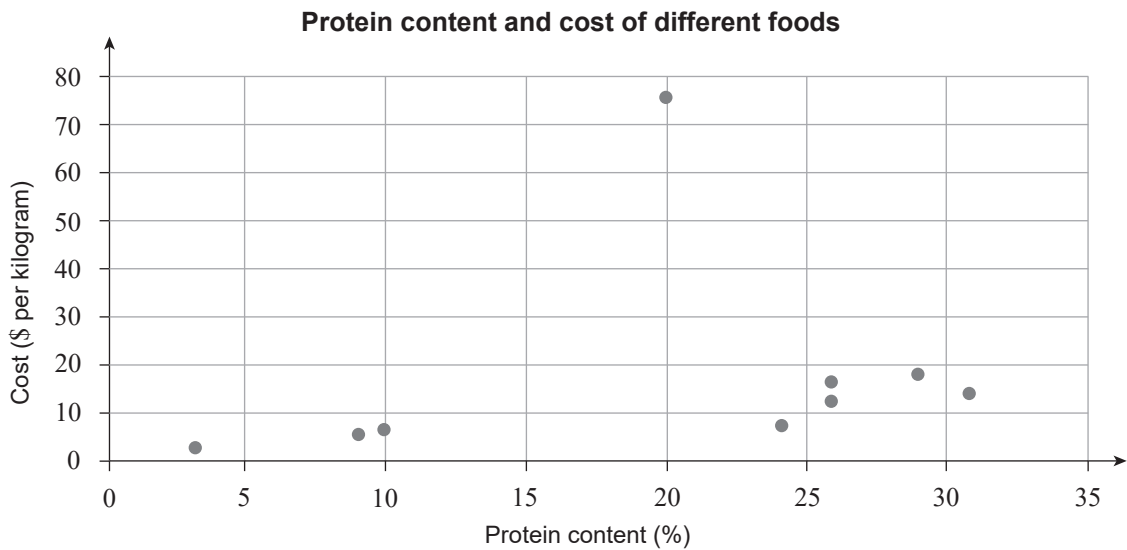


**Question 5** (12 marks)

A study was conducted to find the most cost-effective sources of protein that can be included in a healthy diet. Table 2 below shows the protein content (%) and cost (\$ per kilogram) of 10 different foods.

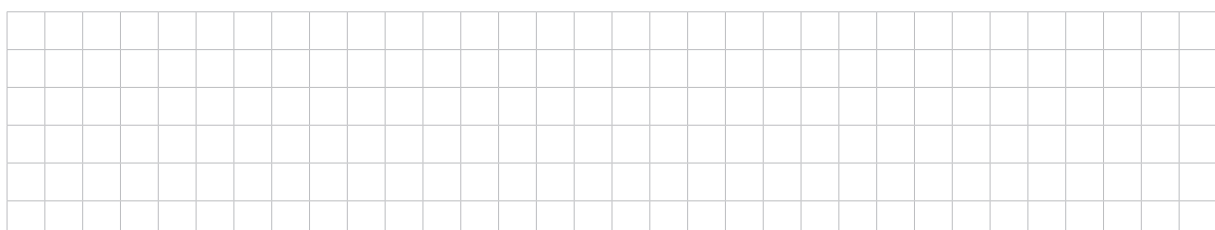
**Table 2**

<i>Food type</i>	<i>Protein content (%)</i>	<i>Cost (\$ per kilogram)</i>
Peanuts	24	7
Beef	26	16
Lobster	20	75
Yoghurt	10	6
Tuna	26	12
Lentils	9	5
Turkey	29	18
Salmon	23	40
Milk	3	3
Chicken	31	14



(a) On the graph above, plot the data value for salmon. (1 mark)

(b) Calculate the coefficient of determination ( $r^2$ ) and state the strength of the relationship between protein content and the cost per kilogram.



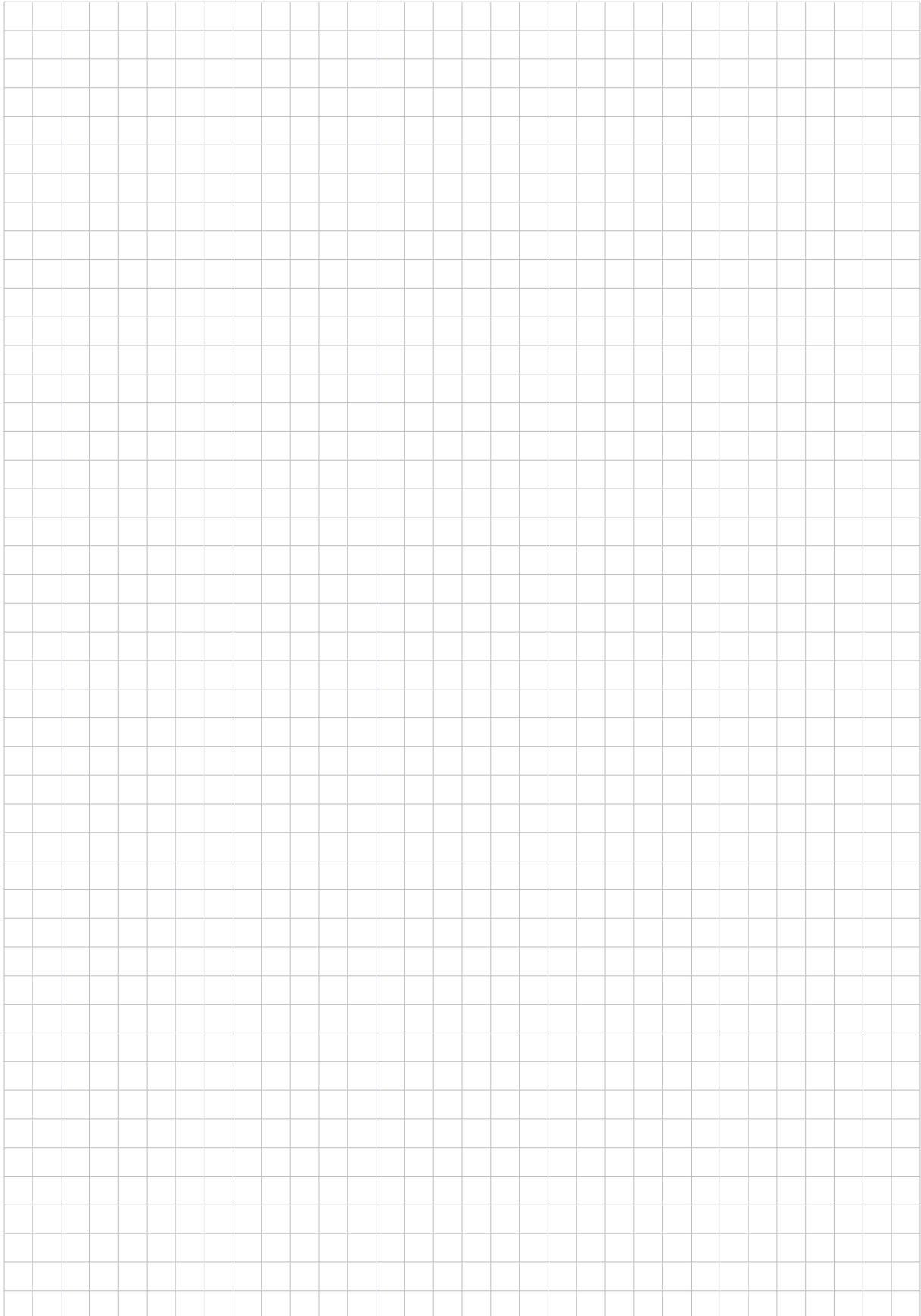
(2 marks)







You may write on this page if you need more space to finish your answers to questions on Topic 4.  
Make sure to label each answer carefully (e.g. 4(b)(i) continued).









Derek is only able to make the increased repayments of \$2800 for the first 5 years. Assume the interest rate remains at 4.94% per annum, compounded monthly, and the amount borrowed remains the same.

- (c) (i) Calculate the outstanding debt after 5 years if he pays the increased repayments. Assume the loan rate and amount borrowed remain the same.


(2 marks)

After 5 years, Derek can only afford the minimum monthly repayments of \$2265.

- (ii) Calculate the remaining time (in years) to repay the loan if Derek makes the minimum monthly repayments after the 5 years.


(2 marks)

- (d) Consider the following:

**Scenario 1:** Derek makes the increased monthly repayments in the first 5 years of the loan, as calculated in part (c).

**Scenario 2:** Derek makes the increased monthly repayments for 5 years after 10 years of the loan term had passed.

Explain whether Derek would take more or less time to repay the loan if he is making increased payments under Scenario 2 compared to making increased payments under Scenario 1.


(2 marks)



You may write on this page if you need more space to finish your answers to questions on Topic 5. Make sure to label each answer carefully (e.g. Question 8(b)(ii) continued).



