



South Australian  
Certificate of Education

# Essential Mathematics 2021

## 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 15 and 22 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

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Attach your SACE registration number label here

### Graphics calculator

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

Model \_\_\_\_\_

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

Model \_\_\_\_\_



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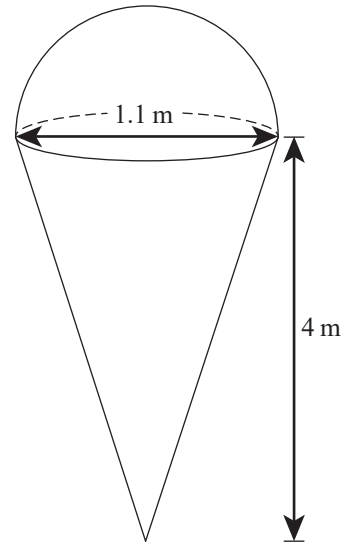
**Question 3** (6 marks)

A famous chef made an ice cream with a mass of over 1 tonne. A dairy farmer, Charlie, wishes to make an ice cream that is even larger.

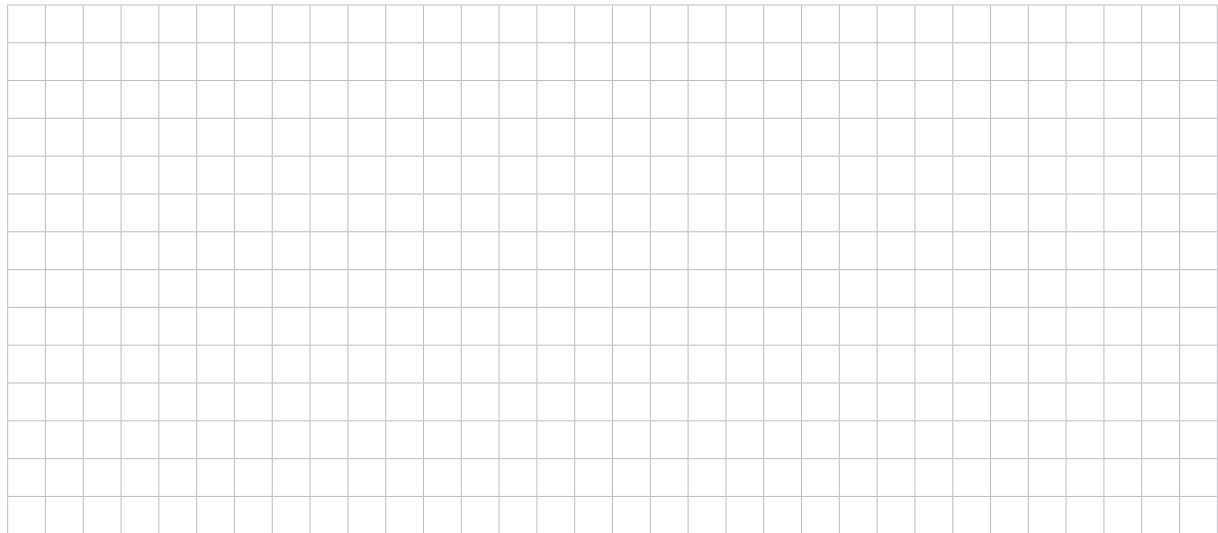
Charlie plans to make an ice cream which will have a cone that will be 4 m tall and filled with ice cream. A hemisphere of ice cream with a 1.1 m diameter will sit on top of the cone.

Note: Volume of a cone  $V = \frac{1}{3}\pi r^2 h$

Volume of a sphere  $V = \frac{4}{3}\pi r^3$



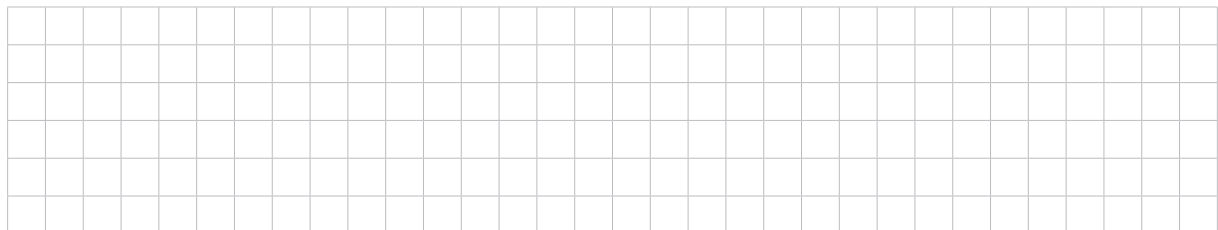
- (a) Show that the total volume,  $V$ , of ice cream required to make Charlie's ice cream is approximately  $1.62 \text{ m}^3$ .



(4 marks)

The ice cream Charlie will use has a density of  $540 \text{ kg/m}^3$ .

- (b) State if the ice cream Charlie uses will have a mass of more than 1 tonne. Justify your answer with calculations.



(2 marks)

**Question 4** (11 marks)

Table 1 below displays the life expectancy (in years) of females and males from some regions of the world in 2018. The regions surveyed had similar population sizes.

**Table 1**

Regions	Life expectancy (years)	
	Females	Males
A	83.8	78.6
B	78.6	72.3
C	77.8	72.9
D	77.5	70.8
E	73.8	70.2
F	71.1	68.5
G	62.9	59.4

(a) Complete Table 2 below (correct to one decimal place).

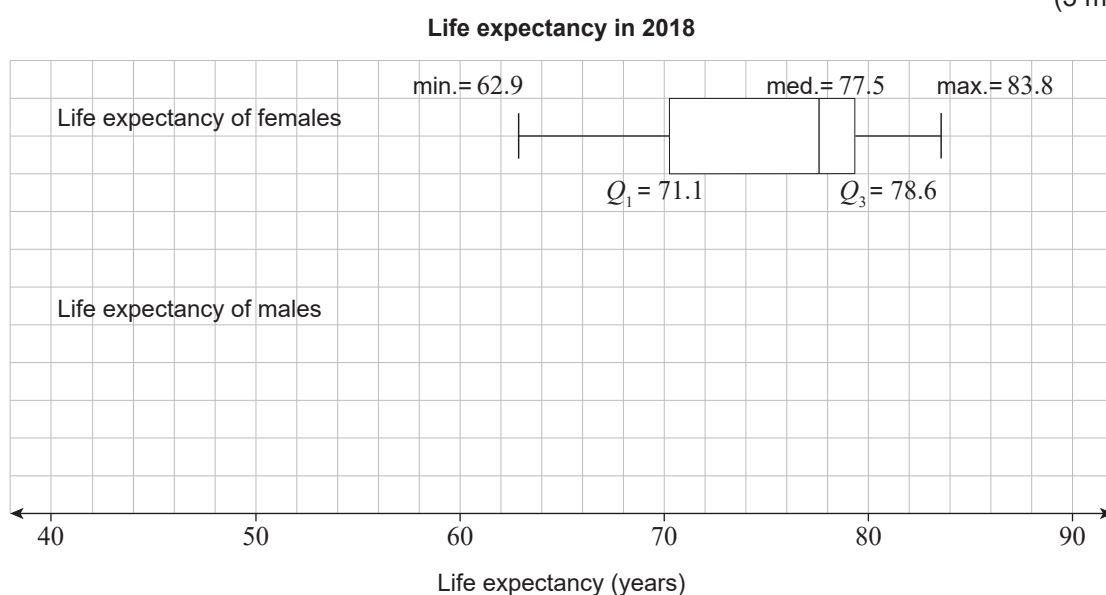
**Table 2: Statistical measures for life expectancy in 2018**

Statistical measure	Females	Males
Mean		70.4
Median		70.8
Standard deviation	6.7	
Interquartile range (IQR)	7.5	

(3 marks)

(b) Using the scale below, complete and label a box-and-whisker diagram for the male data.

(3 marks)











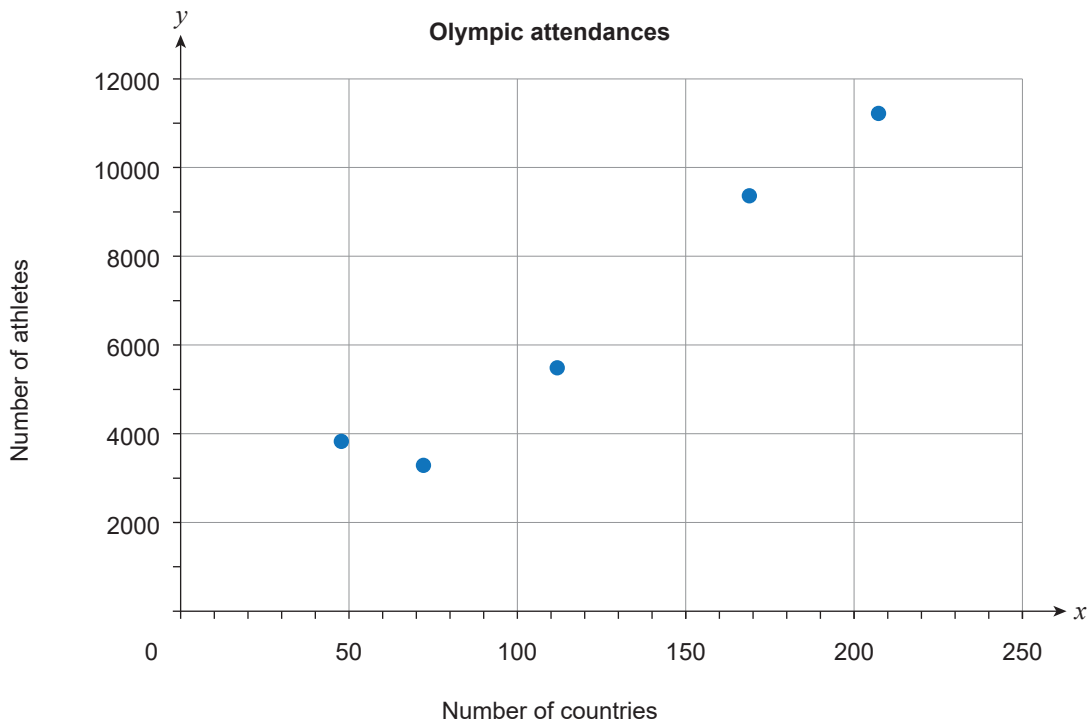
**Question 6** (13 marks)

The table below shows the number of countries and the number of athletes that competed in selected Olympic Games between 1936 and 2016.

Year	Number of countries ( $x$ )	Number of athletes ( $y$ )
1936	49	3 963
1956	72	3 314
1968	112	5 516
1980	80	5 179
1992	169	9 356
2004	201	10 625
2016	207	11 238

Source: adapted from Statista n.d., 'Number of men and women athletes participating at the Summer Olympics from 1896 to 2020', Statista, viewed 24 August 2021, statista.com

- (a) The scatter plot below is missing the data points for 1980 and 2004. Plot these data points on the scatter plot.

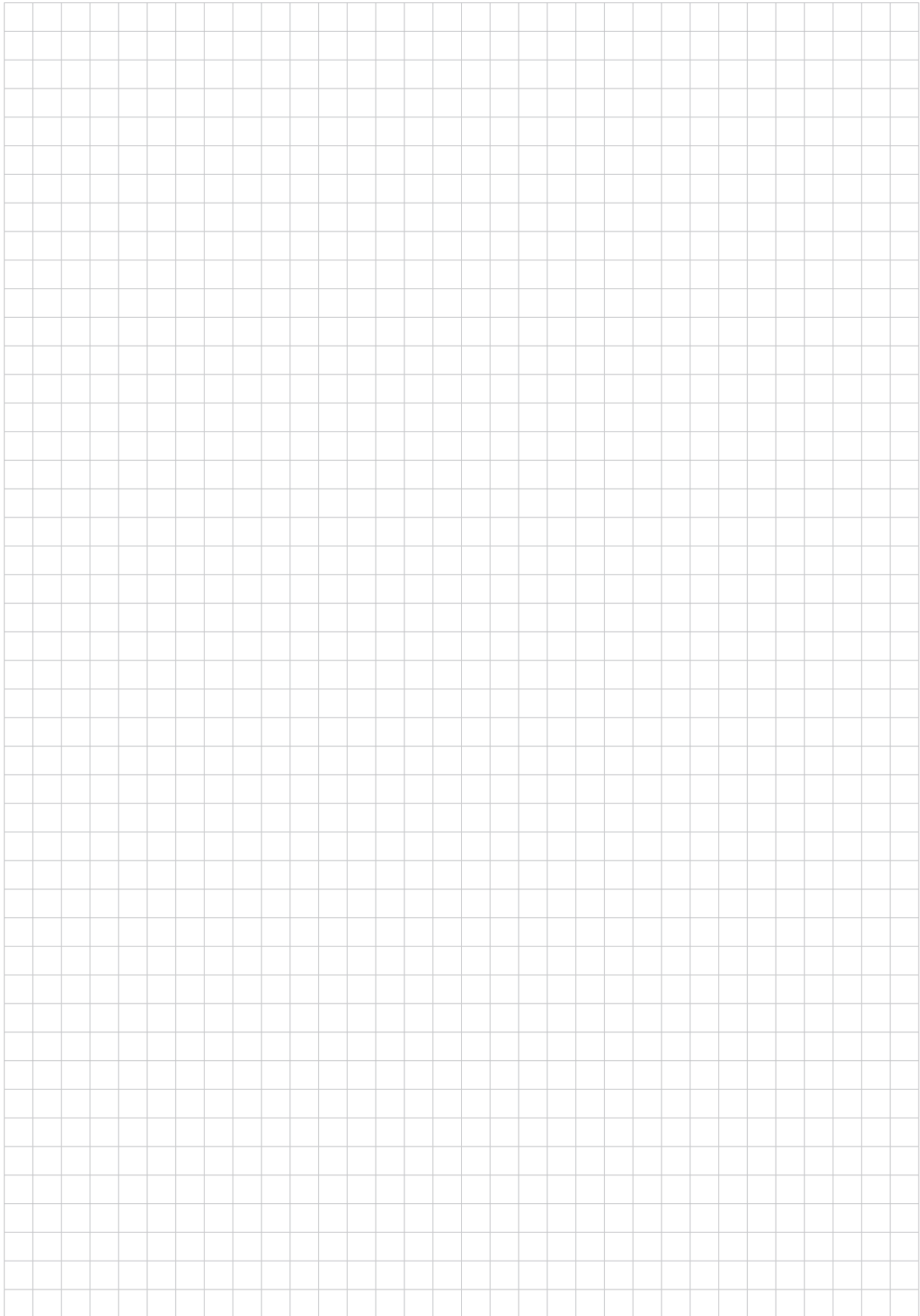


(2 marks)





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

















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

A large grid of graph paper, consisting of 20 columns and 30 rows of small squares, intended for writing answers to questions in Topic 5.



