



# VCE General Mathematics Units 1&2

## AT2.1 – OUTCOMES 1 and 2

Thursday Feb 9, 2023 - Period 1

You have 75 minutes to complete this test.

Calculators and notes are permitted.

### Univariate Data Test

Name: \_\_\_\_\_

Circle teacher's name:      Ms Jabeen      Mr Rossignolo      Ms Le      Ms Yang

**Note:** *The grade or score for this task is only part of the internal assessment for this Unit. Your **total** School-assessed Coursework score may change as a result of statistical moderation.*

Section A \_\_\_\_\_/15      Section B \_\_\_\_\_/30      Total \_\_\_\_\_/ 45

Satisfactory Completion? S/N: \_\_\_\_\_

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## Assessment Criteria

Students should be able to:

- Define and explain key concepts and apply a range of related mathematical routines and procedures.
- Apply mathematical processes in non-routine contexts, including situations requiring problem-solving, modelling or investigative techniques or approaches, with a view to analyse and discuss these applications of mathematics.
- Use numerical, graphical and symbolic functionalities of technology to develop mathematical ideas, produce results and carry out analysis in situations requiring problem-solving, modelling or investigative techniques or approaches.

**Instructions**

A single bound reference and a CAS and scientific calculator permitted.

Answer all questions in the spaces provided.

Round values to 2 decimal places where not specified.

In questions where more than one mark is available, appropriate working must be shown.

Multiple choice questions are worth one mark each.

**Section A****Multiple Choice Questions****15 marks**

*Circle the letter corresponding to the correct response.*

*The following information relates to Questions 1, 2, 3 and 4.*

The number of lollies in a selection of packets are recorded below:

16 21 18 15 19 17 24 15 32 13

1. The mean of the data set is:

- A. 17
- B. 17.5
- C. 18
- D. 18.5
- E. 19

2. The median of the data set is:

- A. 17
- B. 17.5
- C. 18
- D. 18.5
- E. 19

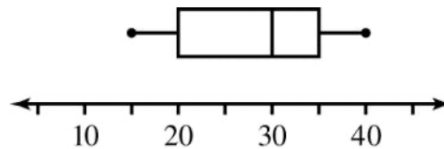
3. The standard deviation of the data set is:

- A. 5.58
- B. 5.29
- C. 19
- D. 190
- E. 3890

4. The percentage frequency of packs containing 15 lollies is:

- A. 2%
- B. 6.7%
- C. 10%
- D. 15%
- E. 20%

5. Examine the following boxplot



For the distribution shown in the boxplot **it is true** to say that:

- A. The range is 35
- B. The interquartile range is 15
- C. The mean is 20
- D. The interquartile range is 24
- E. The median = interquartile range

*The following information relates to Questions 6, 7 and 8.*

The marks gained by two classes X and Y on a test are given below:

Class X		Class Y
8 2	5	8 9
5 3 2 1	6	0 3 4 6
8 5 3 1 0	7	0 2 6 6 7
2 1 0	8	1 4 8
8 0	9	2 8

Key: 5|8 = 58

6. The interquartile range for Class X is:

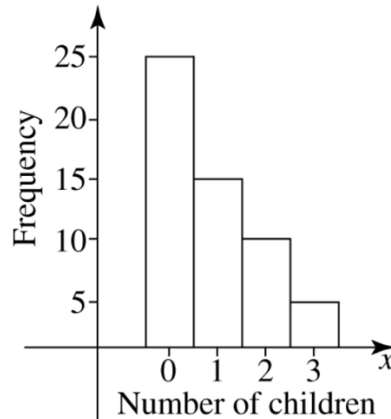
- A. 16
- B. 17
- C. 18
- D. 19
- E. 20

7. The distribution of the grades for Class Y can best be described as:

- A. Symmetric
- B. Positively skewed
- C. Negatively skewed
- D. Bimodal
- E. Clustered

*The following information relates to Questions 8 and 9.*

Consider the following graph. It displays the number of children in various households.



8. Based on the graph, it can be said that:

- A. 50 families were surveyed and the data is negatively skewed.
- B. 50 families were surveyed and the data is positively skewed.
- C. 55 families were surveyed and the data is negatively skewed.
- D. 55 families were surveyed and the data is positively skewed.
- E. 55 families were surveyed and the data is symmetrical.

9. Which of the following statements is NOT true regarding the distribution of children in households.

- A. Less than 50% of households had fewer than one child
- B. More than 10% of households had one child.
- C. 10% of families had 2 children.
- D. 15 families had one child.
- E. 15 families had more than one child.

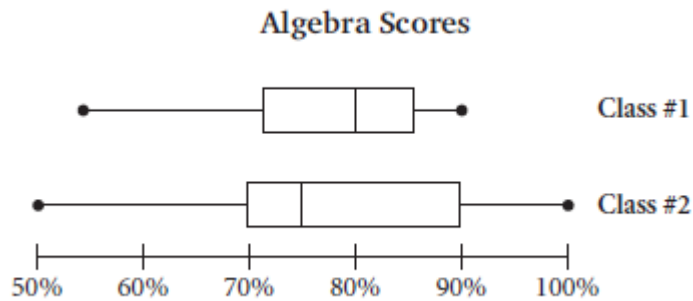
10. The level of *water usage* of 250 houses was rated in a survey as **low**, **medium** and **high**, and the *corresponding size of the houses* as **small**, **standard** or **large**.

The variables, level of *water usage* and *size of house*, as recorded in this survey are:

- A. Both nominal variables
- B. Both ordinal variables
- C. Categorical and numerical variables respectively
- D. Numerical and categorical variables respectively
- E. Neither categorical nor numerical variables.

*The following information relates to Questions 11 and 12.*

The following parallel box and whisker plot below, showing the Algebra Scores for Classes 1 and 2.



11. On the Algebra test, the students in the top half of Class 1 scored at least:

- A. 50%
- B. 72%
- C. 80%
- D. 85%
- E. 90%

12. When comparing Class 1 to Class 2, which of the following statements is **true**.

- A. The median mark of Class 2 is greater than the median mark for Class 1.
- B. The interquartile range of Class 1 is greater than the interquartile range of Class 2.
- C. The range of both classes was the same.
- D. The middle 50% of students in Class 2 did better than the top 75% of Class 1.
- E. The top 25% of students in Class 2 did better than the top students in Class 1.

13. The stem plot below shows the *height*, in centimetres, of 20 players in a junior football team.

key: 14|2 = 142 cm       $n = 20$

14		2	2	4	7	8	8	9	
15		0	0	1	2	5	5	6	8
16		0	1	1	2				
17		9							

A player with a height of 179 cm is considered an outlier because 179 cm is greater than:

- A. 162 cm
- B. 169 cm
- C. 172.5 cm
- D. 173 cm
- E. 175.5 cm

*The following information relates to Questions 14 and 15.*

800 participants auditioned for a stage musical. Each participant was required to complete a series of ability tests for which they received an overall score.

The overall scores were approximately normally distributed with a mean score of 69.5 points and a standard deviation of 6.5 points.

14. The percentage of participants who scored between 56.5 and 82.5 points is:

- A. 50%
- B. 68%
- C. 95%
- D. 99.7%
- E. 100%

15. Only the participants who scored at least 76.0 points in the audition were considered successful. Using the 68-95-99.7% rule, how many of the participants were considered unsuccessful?

- A. 127
- B. 128
- C. 272
- D. 672
- E. 673

Include working throughout.

**Question 1 (7 marks)**

A group of Year 11 students were surveyed for shoe size. Their results are listed below:

7	9	10	8	7	8	9	6	6	7
9	9	8	8	8	10	9	9	8	7

(a) Complete the following frequency table. Correct your answer to one decimal place.

<i>Shoe Size</i>	<i>Frequency</i>	<i>Percentage Frequency</i>
6		
7		
8		
9		
10		
Total		

3 marks

(b) Draw a bar chart for the data on the grid below:



3 marks

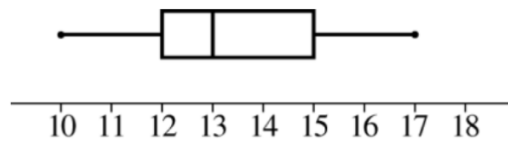
(c) What percentage of students had a shoe size greater than 7? Round your answer to the nearest whole number.

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1 mark

**Question 2 (10 marks)**

The VCE student population at St Leonard’s college were surveyed for the number of hours spent on homework (rounded to the nearest whole hour) for the week beginning 1 February 2023. The mean of the data is 13.2 and the mode is 13. The number of hours spent on completing the homework is summarised in the boxplot below:



(a) Write down the five-number summary for the data.

- $X_{\min}$  \_\_\_\_\_
- $Q_1$  \_\_\_\_\_
- $Q_2$  \_\_\_\_\_
- $Q_3$  \_\_\_\_\_
- $X_{\max}$  \_\_\_\_\_

5 marks

(b) Find the value of the interquartile range (IQR)

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1 mark

(c) Write down the percentage of students who spent more than 12 hours on homework in that week.

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1 mark

(d) Given that 166 students spent between 12 and 15 hours on homework, how many students were surveyed?

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1 mark



(e) Determine the upper fence and the lower fence for this boxplot.

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2 marks

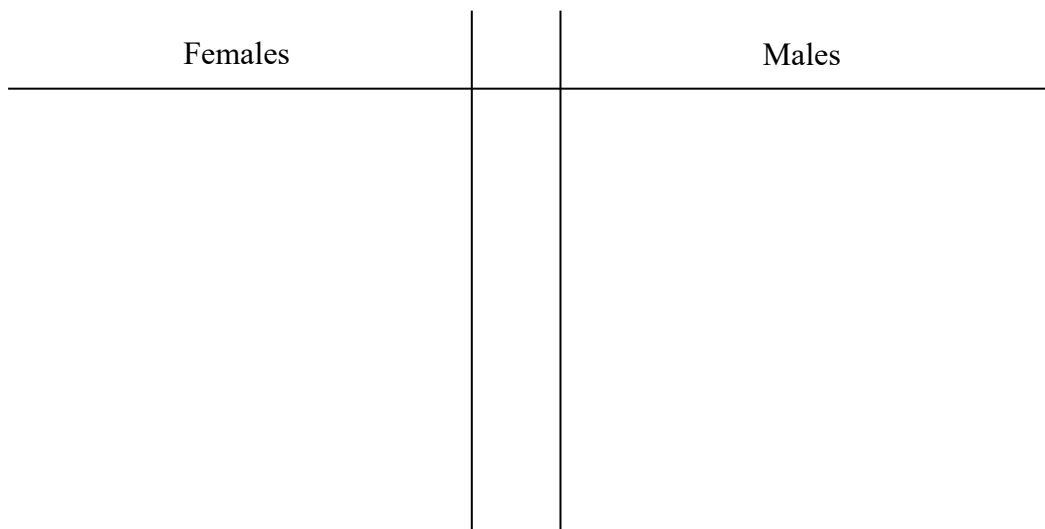
**Question 3 (13 marks)**

The *age* of the patients (in years) admitted to a small hospital during one week, and their *gender* were recorded:

**Females:** 9, 10, 15, 27, 31, 37, 40, 43, 50, 79

**Males:** 13, 16, 21, 24, 25, 26, 27, 34, 40, 47

(a) Construct a back-to-back stem and leaf plot of these data sets by using the key given.



Key: 2|1=21

4 marks

(b) Determine the median for:

Females: \_\_\_\_\_.

Males: \_\_\_\_\_.

2 marks

(c) Determine the IQR for:

Females: \_\_\_\_\_

Males: \_\_\_\_\_.

2 marks

(d) Calculate the percentage of patients who were admitted to the hospital aged over 40, for both genders.

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2 marks

(e) Do the back-to-back plots support the contention that the age of the patients is associated with their gender? Write a brief explanation that compares the distributions in terms of centre and spread.

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3 marks

**END OF TEST**