MATHEMATICS APPLICATIONS

YEAR 11 - UNIT 2

TEST 3 - 2021

SECTION ONE – CALCULATOR FREE

MARKS: 31 marks
TIME: 20 mins

STUDENT'S NAME: Solutions

CIRCLE YOUR TEACHER'S NAME:

Dr Duan	Mr Riemer	Mr Stillitano
Mr Galbraith	Ms Thompson	Mr Hamilton-Brown

- No calculators or Classpads are allowed during this section of the test.
- Show all necessary working in order to obtain full marks.
- A formula sheet will be provided.

Question 1

[1, 1, 1, 1, 1, 1 = 6 marks]

Classify the following data as either continuous, discrete, ordinal or nominal.

(a) Colours of cars parked at Southlands shopping centre. Nominal ✓

(b) The number of possible combinations of a Rubik's Cube. Discrete ✓

(c) The blood type of your favourite celebrity. Nominal ✓

(d) The number of views on a YouTube video. Discrete ✓

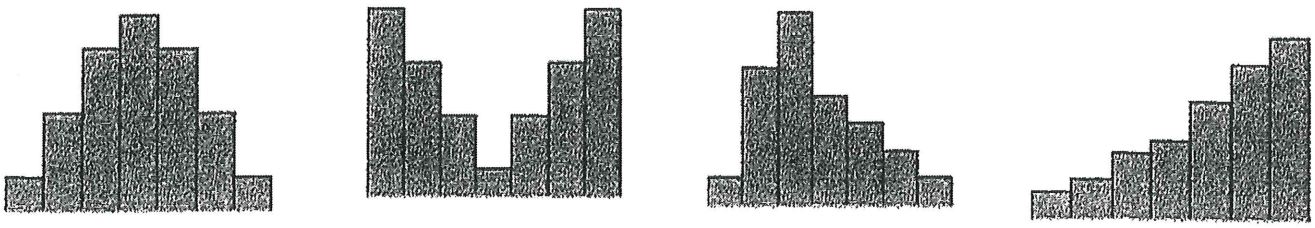
(e) The length of your phone charging cable. Continuous ✓

(f) Socio economic status. Ordinal ✓

Question 2

[3, 2 = 5 marks]

The histograms of four different sets of data are as shown below.



A B C D

(a) Complete the following table by indicating with a (tick) whether the statement is correct for each set of data.

✓✓✓ -1/error

	A	B	C	D
The data is positively skewed			✓	
The data is unimodal	✓		✓	✓
The mean is greater than the median			✓	
The mean is the same as the median	✓	✓		

(b) Given the four sets of data are drawn on the same scale, which set would have the **largest** standard deviation? Justify.

Set B as it has a greater spread.

✓ ✓

Question 3

[3, 3, 3, 2 = 11 marks]

The following numbers are listed in ascending order and represent the number of goals scored by an AFL player over 10 rounds. The median is 3.5, the range is 12 and the interquartile range is 3.

a 1 (2) 3 3 | b 5 (c) 8 12

(a) Find the values of **a**, **b** and **c**.

$a = 0$ ✓

$b = 4$ ✓

$c = 5$ ✓

(b) Are there any outliers? Justify.

$1.5 \times (5-2) = 4.5$ ✓

Upper limit $= 5 + 4.5$

$= 9.5$

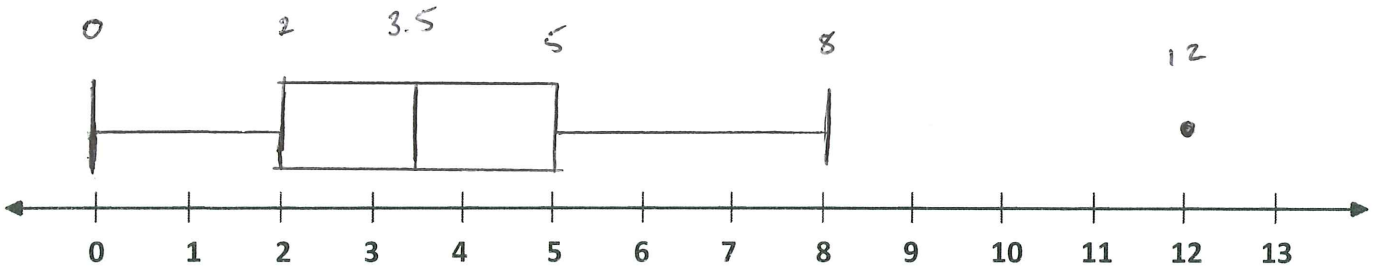
Lower limit $= 2 - 4.5 = -2.5$ ✓

$\Rightarrow 12 > 9.5$

$\therefore$ 12 is an outlier ✓

(c) Draw a boxplot of the data below, including any possible outliers.

✓✓✓ -1/error.



(d) Is the mean or the median a more accurate representation of this player's goal kicking? Justify your response.

✓Median is more accurate, as the outlier of 12 will affect the mean. ✓

(11)

Question 4

[5 marks]

A JB Hi Fi store is analysing their daily CD sales over the past month and the following findings have been noted.

The lowest number of sales per day during the last month is 40 sales.

The middle 50% of sales is between 76 and 110 sales.

Half of the time the store sold more than 95 CD's per day.

On one day the number of CD sales could just be considered an outlier and it was their maximum number of sales for a day.

Determine the five-number summary for this information.

Min = 40
Q_1 = 76
Med = 95
Q_3 = 110
✓✓✓ -1/error

Max = $Q_3 + 1.5 \times IQR$ ✓
$= 110 + 1.5 \times 34$
$= 110 + 51$
$= \underline{161}$ ✓

Question 5

[2, 2 = 4 marks]

The following set of 10 positive integers is arranged in ascending order and has a mean of 10.

m 4 4 5 5 10 10 12 20 **n**

(a) Determine an algebraic expression for possible values of **m** and **n**.

$m + n + 70 = 100$

$\therefore \underline{m + n = 30}$ ✓✓

(b) Determine the smallest possible value for the range.

Largest possible value of m is 4.

$\therefore 4 + n = 30$
$\Rightarrow n = \underline{26}$.

Smallest range $= 26 - 4$
$= \underline{22}$ ✓

✓(values for m and n)

End of Section 1

MATHEMATICS APPLICATIONS

YEAR 11 - UNIT 2

TEST 3 - 2021

SECTION TWO – CALCULATOR ALLOWED

MARKS: 26 marks
TIME: 30 mins

STUDENT'S NAME: Solutions

CIRCLE YOUR TEACHER'S NAME:

Dr Duan	Mr Riemer	Mr Stillitano
Mr Galbraith	Ms Thompson	Mr Hamilton-Brown

- Scientific calculators and Classpads are allowed during this section of the test.
- One single-sided A4 sheet of notes allowed.
- Show all necessary working in order to obtain full marks.
- A formula sheet will be provided.

Question 6

[6, 4 = 10 marks]

The state Government is deciding where to allocate more funds for families in need. The following data is collected for two of the suburbs being considered.

Weekly family income	Number of families in Suburb A	Number of families in Suburb B
$0 - < $200	4	4
$200 - < $400	9	13
$400 - < $600	10	11
$600 - < $800	9	10
$800 - < $1000	7	8
$1000 - < $1200	8	7
$1200 - < $1400	6	5
$1400 - < $1600	5	3
$1600 - < $1800	5	3
$1800 - < $2000	3	2
$2000 +	0	0

(a) Complete the following table for both suburbs:

	Suburb A	Suburb B
Mean	$893.94	$781.82
Modal class interval	$400 - $600	$200 - $400
Median class interval	$800 - $1000	$600 - $800
Standard deviation	$508.08	$469.66

✓✓✓ ✓✓✓ -1 error.

(b) Compare and contrast the two suburbs based on the data collected and hence determine which suburb best qualifies for extra funding.

Suburb B ✓ (gives at least 3 reasons ✓✓✓)

Example:

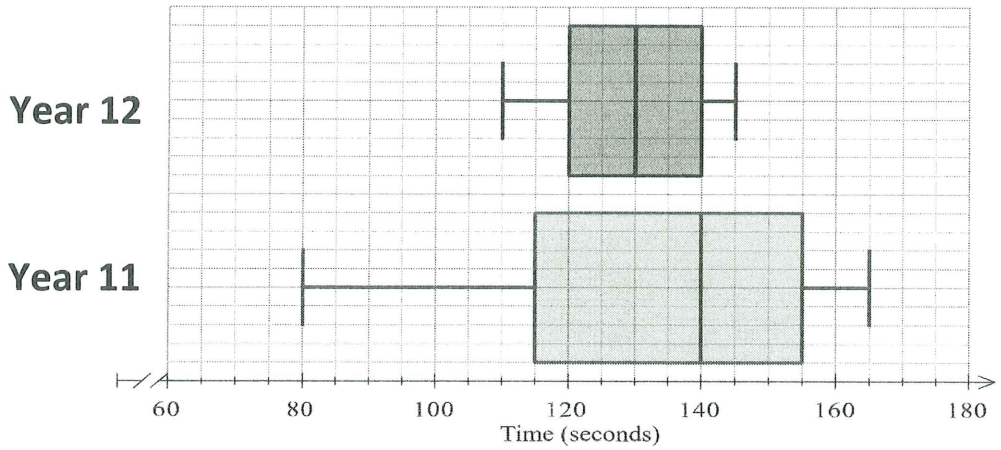
- Suburb B has a lower mean and median ✓
- Suburb B has a lower modal class ✓
- Lower SD of suburb B (people are more consistently low income earners). ✓
- Thus, suburb B best qualifies for extra funding ✓

10

Question 7

[1, 2, 3 = 6 marks]

The data below shows the time taken to run 400 metres by the Year 11 and Year 12 running squads. Each time has been rounded to the nearest second.



(a) Which year group had the fastest median time?

Year 12 ✓

(b) Determine the interquartile range for each year group.

Year 12 = 140 − 120

= 20 ✓

Year 11 = 155 − 115

= 40 ✓

(c) By comparing the two box plots, justify which year group was the fastest.

Year 12 is faster ✓ (at least two reasons) MPA ✓✓

Example:

- Year 12's had a faster median time.
- 75% of Year 12 students ran a faster time than 50% of Year 11 students. ✓
- Hence, Year 12s were faster overall.

(6)

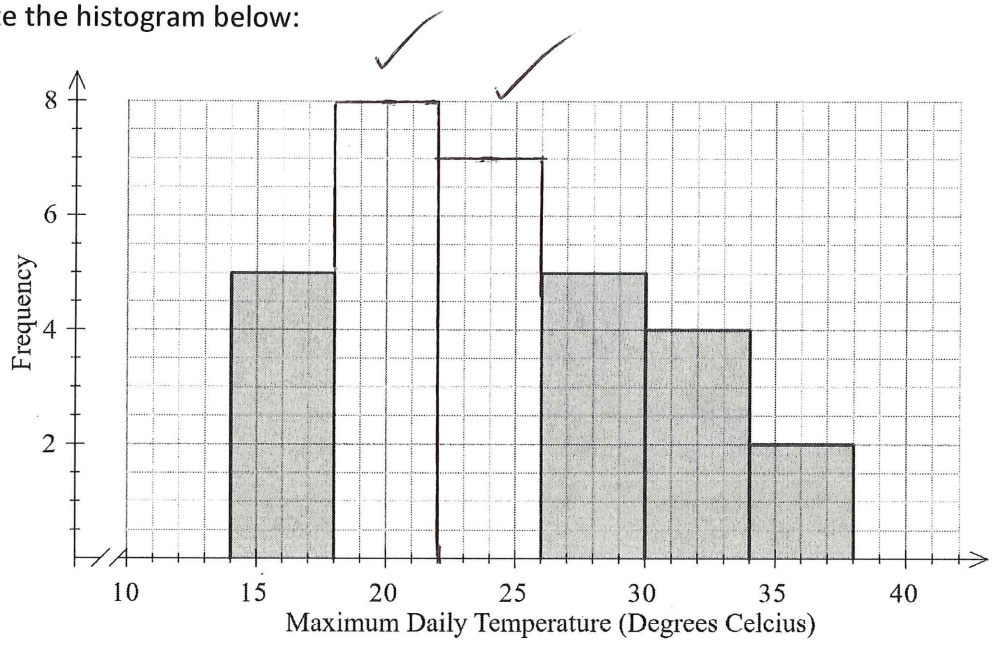
Question 8

[2, 3 = 5 marks]

Below are the maximum daily temperatures for an Australian city in the month of March in 2021.

Maximum Temperature (°C)	Frequency
14 - < 18	5
18 - < 22	8
22 - < 26	7
26 - < 30	5
30 - < 34	4
34 - < 38	2
38 - < 42	0

(a) Complete the histogram below:



(b) Describe the distribution of daily temperatures with reference to location, spread and shape.

Location - estimate of $\bar{x}$ is 24.129°C.
- Median class interval is 22-<26.

Spread - SD is 5.879 (fairly low ⇒ not too much variation).

Shape - clustered around two classes (18-26)
- positive skew.

(5)

Question 9

[5 marks]

A farmer is trying to determine whether or not a new fertiliser is increasing the growth of his crops.

He has two separate fields where he is growing 10 crops and uses the new fertiliser on only one of the fields. He records the heights of all the crops and analyses the statistics.

The heights of the ten crops, rounded to the nearest metre, are shown in the table below.

Field A

Crop	1	2	3	4	5	6	7	8	9	10
Height (m)	5	8	12	14	16	6	5	8	18	6

Field B

Crop	1	2	3	4	5	6	7	8	9	10
Height (m)	5	6	5	7	8	7	8	5	4	6

The farmer concludes that the fertiliser **does** work but that it is **not consistent.**

Use statistical measures for reasoning to back up the farmer's conclusion and state which field would be the one which received the new fertiliser.

Field A: vs Field B:

$\bar{x} = 9.8$ $\bar{x} = 6.1$ ✓ both means

$SD = 4.58$ $SD = 1.3$ ✓ both SD's.

Field A most likely has new fertiliser. ✓

because ... Field A has higher mean ✓ and higher SD which accounts for the inconsistency the farmer noticed. ✓

End of Section 2

(5)