Mathematics Department

Course: A2MAA

Topic Title: Test 1

JOHN TONKIN COLLEGE

Student Name: Solutions

Date: _____

Special Instructions: Formula Sheet and calculators Allowed

Time Allowed: 60 minutes

Marks: / 50

Question 1.
A vending machine dispenses five different types of soft drinks. Explain why the sales of each type of soft drink is an example of:

a) Categorical data. [1 mark]

Type of drink (five types) No order or ranking. ✓

b) Numerical data. [1 mark]

N° of each type sold. Counting ✓

Question 2.
The table below shows the sales of mens shoes at a local market:

Shoe size	8	9	10	11	12	13
Frequency	3	5	7	1	2	2

a) Calculate the mean shoe size. [2 marks]

$\text{Mean} = \frac{220}{20} = 11$ ✓ ✓

b) Calculate the median shoe size. [2 marks]

Median = 11 ✓✓

c) Calculate the modal shoe size. [1 mark]

Mode = 11 ✓

d) Which measure is of most use to the owner of the shoe store? [1 mark]

The mode. ✓

Question 3.

Five people have a mean weight of 67Kg. If a child weighing 43Kg was added to the group, what would the mean weight be? [3 marks]

$$\text{Mean} = \frac{(5 \times 67) + 43}{6}$$

$$= \frac{378}{6} = 63\text{kg}$$

Question 4.

Consider the frequency table shown below:

Score	Frequency
16	2
17	4
18	3
19	1
22	2
23	3
49	1

a) Calculate the mean and standard deviation of the above scores. [4 marks]

$\bar{x} = 20.94$ (2dp)

$\sigma x = 7.68$ (2dp)

b) The score of 49 has been identified as an outlier. Remove the outlier and recalculate the mean and standard deviation. [4 marks]

$\bar{x} = 19.07$ (2dp)

$\sigma x = 2.62$ (2dp)

c) What effect did this have on the mean and standard deviation and why? [2 marks]

Both mean and standard deviation decreased

Question 5.

Consider the data shown below:

32,51,63,17,44,65,69,68,73,8,74,72,35,63,52,26,56,72

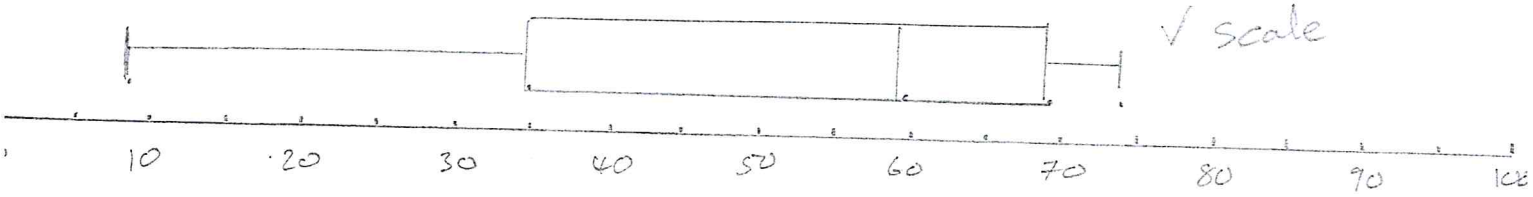
a) Use the data to construct a stem and leaf plot. [3 marks]

Stem	Leaf
0	8
1	7
2	6
3	2 5
4	4
5	1 2 6
6	3 3 5 8 9
7	2 2 3 4

b) Construct a box and whisker plot from the given data. [3 marks]

Low = 8, Q_1 = 35, Med = 59.5, Q_3 = 69, high = 74

✓ values
✓ shape
✓ scale



c) If an outlier is defined as any score more than 1.5 interquartile ranges above or below the upper and lower quartiles, identify all outliers. [2 marks]

IQR = 34

outliers = 34 × 1.5 = 51 ✓

35 − 51 = −16

69 + 51 = 120

∴ There are no outliers ✓

d) What effect will the removal of the outliers have on the shape of the box and whisker plot? [2 marks]

None ✓✓

A student from a large school is investigating the weights of boys in his year group.

(a) Circle the best **two** of the four methods outlined below to pick a fair and unbiased sample of boys to weigh from his year group. [2 marks]

A. Choose the first five of his friends he talks to.

B. Randomly pick the names of 20 students from a list of all students in his year group.

C. During a year assembly, ask for 20 students to volunteer.

D. Stand at the main school entrance before school starts and write down the name of every third boy from his year group who arrives.

The student weighed 24 students and their weights, in kg to one decimal place, are listed below.

65.2, 60.0, 62.8, 63.8, 58.9, 65.9, 69.0, 65.5, 67.9, 62.7, 58.4, 69.4

73.2, 66.3, 65.5, 64.4, 56.5, 63.4, 60.1, 56.3, 59.9, 64.7, 61.9, 63.6

(b) For these 24 weights, determine the range. [2 marks]

$73.2 - 56.3 = 16.9\text{kg}$

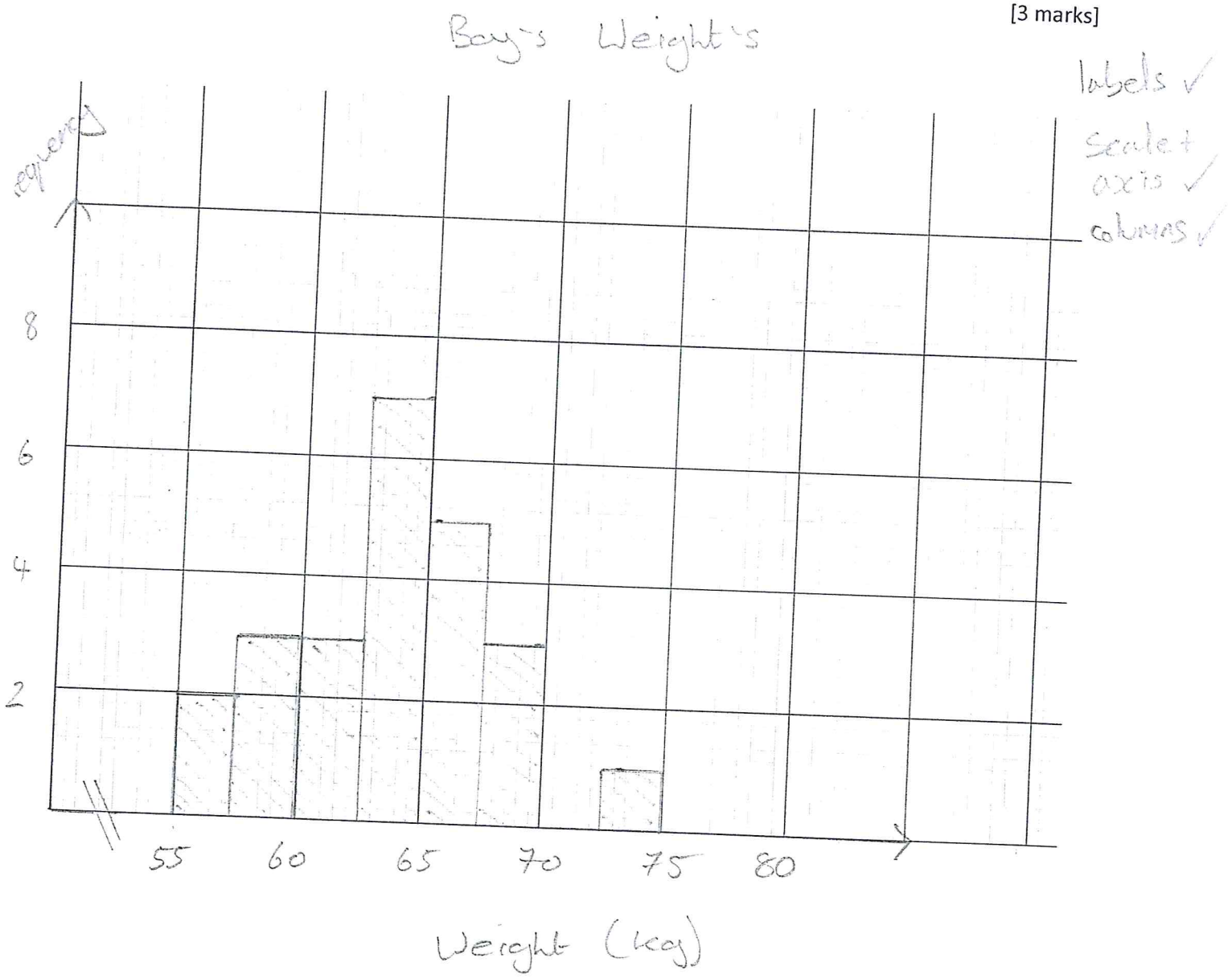
(c) Group this data, using the class intervals in the table below. [3 marks]

Weight of boy (kg)	Frequency
$55 \leq x < 57.5$	2
$57.5 \leq x < 60$	3
$60 \leq x < 62.5$	3
$62.5 \leq x < 65$	7
$65 \leq x < 67.5$	5
$67.5 \leq x < 70$	3
$70 \leq x < 72.5$	0
$72.5 \leq x < 75$	1

(d) Which is the modal class for the data in the frequency table? [1 mark]

$62.5 \leq x < 65$ ✓

(e) Use the grouped data from (c) to construct a frequency histogram on the axes below. [3 marks]

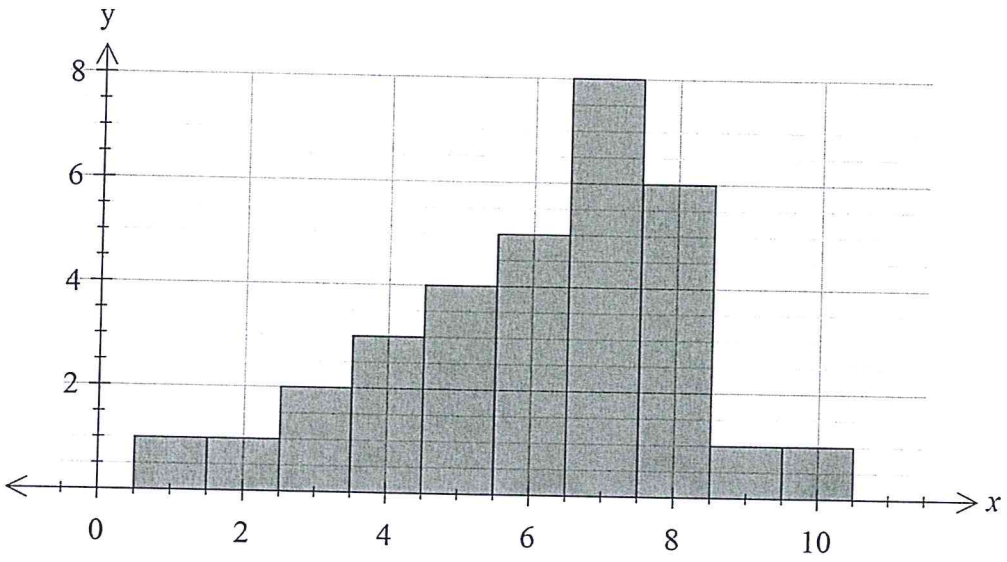


(f) Describe two features of the spread of weights shown in the histogram. [2 marks]

clustered around 62.5 to 67.5 kg

gap at 70kg to 72.5kg etc...

Consider the frequency histogram below. It shows the tooth length (to the nearest mm) in a particular species of fish.



a) Calculate the mean for the data shown above. [2 marks]

$\bar{x}$ = 6.06 mm ✓✓

b) Explain why your answer to a) is only an estimate of the mean. [1 mark]

The data has been grouped. ✓

c) Describe the distribution (location, spread, shape etc...) of the data provided. [3 marks]

Median = 5.5
Mode = 7
Data is negatively skewed. ✓✓
Range = 9

or similar.