3.1 Collecting and organizing univariate data

1 Nathan counts the number of grapes in 15 baskets.

53, 56, 59, 54, 57, 54, 54, 56, 55, 54, 58, 55, 57, 54, 58

a Find the mode, median and mean.

b Find the standard deviation and comment on the spread of the number of grapes in the baskets.

2 Poppy and Molly each twirled two square shaped spinners with the numbers 1, 2, 3 and They did this 300 times and recoded the total score.

Total score	Frequency of Poppy's scores	Frequency of Molly's scores
2	20	12
3	38	29
4	56	48
5	65	53
6	56	64
7	42	56
8	23	38

Find:

a the mode, the median and the mean of both Poppy's and Molly's scores.

b The range, standard deviation and interquartile range of both Poppy's and Molly's scores.

3 Which of the following are discrete data and which are continuous data?

A The number of green cars in a car park.

B The weight of panda bears.

C The shoe sizes of 6^{th} grade students.

D The height of the trees in a garden.

E The length of the hair of the 8^{th} grade girls.

F The number of peas in a packet.

4 The number of tomatoes in 9 baskets is:

24 21 23 24 21 20 22 21 22

a Find the mean and standard deviation.

A 10^{th} basket of tomatoes is included and the new mean is 22.2

b Find the number of tomatoes in the 10^{th} basket.

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5 The following data shows the time, in minutes, that it took 21 people to climb to the top of a small hill.

8 12 9 10 13 10 11 7 10 12 11

9 35 38 12 13 10 12 9 36 10

a Find the mode, median and mean for this data.

b Comment on whether there are any data points that distort the calculation of the mean.

c Remove these values and recalculate the mean. Discuss your answer.

6 Fifty people were asked how long they waited for the train. The results are in the table below.

Time, *x* minutes	**Frequency**
$0 < x \leq 2$	6
$2 < x \leq 4$	12
$4 < x \leq 6$	7
$6 < x \leq 8$	6
$8 < x \leq 10$	10
$10 < x \leq 12$	5
$12 < x \leq 14$	4

a Write down the modal class.

b Calculate an estimate for the mean and the standard deviation of the time waited and comment on the spread of the data.

c Explain why these calculations are just approximations.

7 Class 11 had a History test. The results are shown in the table below.

Males, %	45	39	62	84	51	92	76	28	77	58	73	64	29	85	47	60
Females, %	64	31	55	78	65	91	88	39	70	55	59	60	84	33	95	88

a Find the mean and standard deviation for the boys and the mean and standard deviation for the girls.

b Find the median score for the boys and the median score for the girls.

8 An examination paper is out of 90. The exam board has to change this to a mark out of 40.

1 One member of the board suggests to divide the marks by 3 and add 10.

2 Another suggests dividing by 2 and subtracting 5.

3 A third suggests dividing by 9 and multiplying by 4.

In the examination, Margaret has 42 out of 90, Bimal has 84 out of 90 and Meiyi has 21 out of 90.

a Calculate their marks out of 40 using the 3 methods above.

b Which method do you think is the fairest and give an explanation for your answer.

9 The mean number of mushrooms in a box is 21 and the standard deviation is 2.

Three mushrooms are added to each box.

Find the new mean and standard deviation.

10 The mean salary per month of the teachers at Bright School is $4500 and the standard deviation is $350. The Board of governors decide to increase the salary of all the teachers by 10%.

Find the new mean and standard deviation.

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Answers

1 **a** mode = 54, median = 55, mean = 55.6

b standard deviation = 1.78. This is a small value compared to the mean and so the data is not widespread.

2 **a** Poppy: mode = 5, median = 5, mean = 5.06

Molly: mode = 6, median = 6, mean = 5.49

b Polly: range = 6, standard deviation = 1.65, IQR = 6 – 4 = 2

Molly: range = 6, standard deviation = 1.66, IQR = 7 – 4 = 3

3 A discrete B continuous

C discrete D continuous

E continuous F discrete

4 **a** mean = 22, standard deviation = 1.33

b total of 9 baskets = 198

Total of 10 baskets = 222

So, 10^{th} basket contained 222 – 198 – 24 tomatoes.

5 **a** mode = 10, median = 11, mean = 14.1

b 35, 36 and 38 are much larger than the other times and so they will affect the mean.

c mean = 10.4 and this is much closer to the mode and median.

6 **a** $2 < x \leq 4$

b mean = 6.32, standard deviation = 3.68 and this is large compared to the mean – so the data is widespread.

c You do not know the raw data as you only are given the grouped frequency table.

7 **a** Males: mean = 60.625, standard deviation = 19.1

Females: mean = 65.9, standard deviation = 19.8

b Males median = 61 and females median = 64.5

8 **a** 1: Margaret = 24, Bimal = 38, Meiji = 17

2: Margaret = 16, Bimal = 37, Meiji = 5.5

3: Margaret = 19, Bimal = 37, Meiji = 9

b The third option is the fairest method since the marks remain in the same proportion.

9 mean = 24 and standard deviation = 2

10 mean = $ 4950 and standard deviation = $ 385

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