

Section A: Analysing Data

Q1)

12 13 14ⁱⁱ 14 14 15ⁱⁱⁱ 16 18 18 19 23 40

a)

$$i) \frac{12 + 13 + 14 + 14 + 14 + 15 + 16 + 18 + 18 + 19 + 23 + 40}{12}$$

$$= \frac{216}{12}$$

$$= 18$$

ii) 14

$$iii) \frac{15 + 16}{2}$$

$$= \frac{31}{2}$$

$$= 15.5$$

$$b) \frac{12 + 13 + 14 + 14 + 14 + 15 + 16 + 18 + 18 + 19 + 23}{11}$$

$$= \frac{176}{11}$$

$$= 16$$

Removing the outlier of 40 decreases the mean by 2.

Q2)

a) Mean

b) Median

c) Mode

Q3) 1 2^{Q1} 4 4 5^{Q2} 7 9^{Q3} 11 40

a)

$$i) 40 - 1 = 39$$

$$ii) Q_2 (\text{median}) = 5$$

$$Q_1 = \frac{2+4}{2}$$

$$= \frac{6}{2}$$

$$= 3$$

$$Q_3 = \frac{9+11}{2}$$

$$= \frac{20}{2}$$

$$= 10$$

$$IQR = Q_3 - Q_1$$

$$= 10 - 3$$

$$= 7$$

Q3) (Continued)

b) The interquartile range is the best representation of the spread of this data as it is not affected by outliers because it measures the ~~range of Q1-Q3~~ spread of data between Q1-Q3 only. This is especially important for this data as the difference between the outlier and the second largest number is so high ($40 - 11 = 29$).

Q4) 17 17 | 19 19 | 19 20 | 20 20 | 21 22 |
 22 23 | 25 25 | 26 26 | 27 28 | 28 29
 D_1 D_2 D_3 D_4 D_5
 D_6 D_7 D_8 D_9

$$\begin{aligned} a) D7 &= \frac{25 + 26}{2} \\ &= \frac{51}{2} \\ &= 25.5 \end{aligned}$$

$$\begin{aligned} b) P90 &= D9 = \frac{28 + 28}{2} \\ &= \frac{56}{2} \\ &= 28 \end{aligned}$$

Q5) Using the statistical mode on my calculator, the population standard deviation (sxc) of this data is 7.1.

Q6) An outlier is a score that is either:
* less than $Q1 - 1.5 \times IQR$ or
* greater than $Q3 + 1.5 \times IQR$

$$Q1 = 51$$

$$Q3 = 57$$

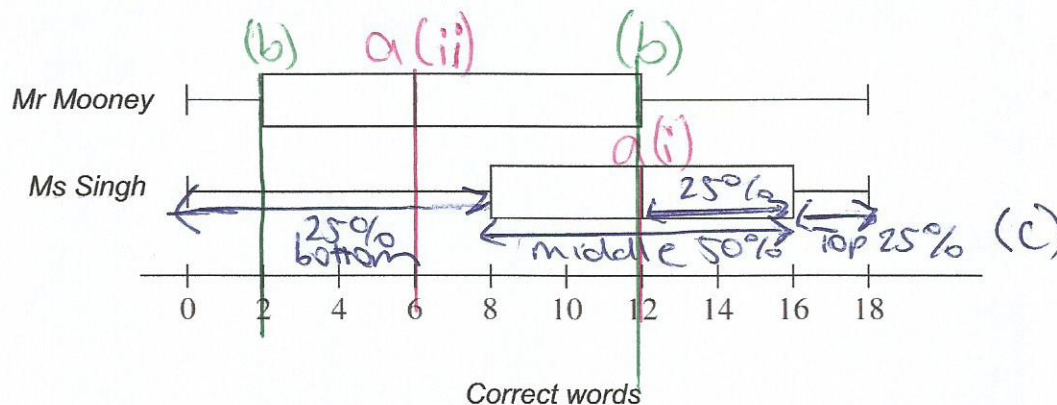
$$\begin{aligned} IQR &= Q3 - Q1 \\ &= 57 - 51 \\ &= 6 \end{aligned}$$

$$\begin{aligned} &Q1 - (1.5 \times IQR) \\ &= 51 - (1.5 \times 6) \\ &= 51 - 9 \\ &= 42 \end{aligned}$$

$$\begin{aligned} &Q3 + (1.5 \times IQR) \\ &= 57 + (1.5 \times 6) \\ &= 57 + 9 \\ &= 66 \end{aligned}$$

With this data, a score is an outlier if it is less than 42 or greater than 66, therefore B (41) is an outlier.

- 7 The box plots below show the summary results of two primary school classes in a spelling test consisting of 20 very difficult words.



- What is the median number of correct words for the students in
 - Ms Singh's class?
 - Mr Mooney's class?
- What is the interquartile range for Mr Mooney's class?
- What percentage of students in Ms Singh's class answered 12-18 words correctly?
- Which of the data sets shown is negatively skewed? Give a reason for your answer.
- Which class had the better results? Give reasons referring to the medians **and** relevant percentages.

See answers to above questions on pages 6-7

Q7)

a)

i) 12

ii) 6

b) $Q_1 = 2$ $Q_3 = 12$

$$\begin{aligned} IQR &= Q_3 - Q_1 \\ &= 12 - 2 \\ &= 10 \end{aligned}$$

c) $25 + 25 = 50\%$

d) The data set of Ms Singh's class is negatively skewed as the tail points towards the left and the lower scores.

e) Mr Mooney

Lower extreme = 0

 $Q_1 = 2$ $Q_3 = 12$

Upper extreme = 18

Median = 6

Ms Singh

Lower extreme = 0

 $Q_1 = 8$ $Q_3 = 16$

Upper extreme = 18

Median = 12

~~Q7~~ Q7) (Continued)
e)

Mr Mooney's IQR

$$= 12 - 2$$

$$= 10$$

Ms Singh's IQR

$$= 16 - 8$$

$$= 8$$

Ms Singh's class had the better results as the median was 12 compared to 6 for Mr Mooney's class. Although Mr Mooney's class had the larger IQR and more students scored higher in the top 25%, 50% of Ms Singh's class spelt more words correctly than 50% of Mr Mooney's class.

Q8)

Hourly Wage	Class Centre	Frequency
14-18	16	44
19-23	21	35
24-28	26	13
29-33	31	8

$$\frac{14+18}{2}$$

$$= \frac{32}{2}$$

$$= 16$$

$$\frac{19+23}{2}$$

$$= \frac{42}{2}$$

$$= 21$$

$$\frac{24+28}{2}$$

$$= \frac{52}{2}$$

$$= 26$$

$$\frac{29+33}{2}$$

$$= \frac{62}{2}$$

$$= 31$$

Q8) (continued)

8

1mm Squares

$$b) 44 + 35 + 13 + 8 \\ = 100$$

c) With a frequency of 44, 14-18 is the modal class.

d)

Hourly Wage	Class Centre (x)	Frequency (f)	(fx)
14-18	16	44	704
19-23	21	35	735
24-28	26	13	338
29-33	31	8	248
TOTALS	=	100	2025

$$\text{Mean} = \frac{2025}{100} \\ = \$20.25$$

Section B: World Locations & Times

Q1)

a) $0^{\circ}, 0^{\circ}$

b) $0^{\circ}, 25^{\circ}E$

Q2)

a) $34^{\circ}S - 31^{\circ}S = 3^{\circ}$

b) North

Q3)

a) Boston & Sofia.

b) Santiago

c) $71^{\circ} + 23^{\circ} = 94^{\circ}$

Q4) Melbourne ($37^{\circ}S, 145^{\circ}E$)

4° due east of Melbourne

$$145 + 4 = 149$$
$$= 37^{\circ}S, 149^{\circ}E$$

Q5)

a) 1140 = 11:40 am

b) 2215 = 10:15 pm

Q6) Movie starts - 9:04pm
 Movie finishes - 10:48pm

$$10:00 - 9:04 = 56 \text{ mins}$$

$$10:48 - 10:00 = 48 \text{ mins}$$

$$56 + 48 = 104 \text{ mins}$$

The movie is 104 mins long.

Q7)

a) Next available train at Epping after Ali arrives at 5:45am is the 5:47am train. If Ali catches this train he will get to Strathfield at 6:09am.

b) James arrives at Burnwood at 6:56am
 $06:56 - 06:35 = 21 \text{ mins}$

c) $07:12 - 29 \text{ mins} = 06:43 \times$
 $07:08 - 29 \text{ mins} = 06:39 - \text{West Ryde}$
 $06:56 - 29 \text{ mins} = 06:27 \times$
 $06:53 - 29 \text{ mins} = 06:24 - \text{West Ryde}$
 $06:38 - 29 \text{ mins} = 06:09 - \text{West Ryde}$
 $06:27 - 29 \text{ mins} = 05:58 \times$
 $06:23 - 29 \text{ mins} = 05:54 - \text{West Ryde}$
 $05:56 - 29 \text{ mins} = 05:27 \times$
 $05:53 - 29 \text{ mins} = 05:24$

West Ryde

Q7) (Continued)

c) $05:27 - 29 \text{ mins} = 04:58 \times$

$05:23 - 29 \text{ mins} = 04:54 - \text{West Ryde}$

$04:28 - 29 \text{ mins} = 03:59 \times$

Rahul got on the train at West Ryde Station.

d) The next train from Eastwood to Central is at 5:50am.

$0556 - 0533 = 23 \text{ mins}$

$0623 - 0550 = 33 \text{ mins}$

~~This journey~~ $33 - 23 = 10 \text{ mins}$

This journey was 10 mins longer compared to the 5:33am train journey.

Q8) Western Australia does not participate in daylight saving time, this means WA is 3 hours behind NSW on December 3.

Therefore $8:30 \text{ am} - 3 \text{ hours}$
 $= 5:30 \text{ am}$

It is 5:30am in WA.

Q9) Sydney is +10 hours from UTC
 New York is -5 hours from UTC
 Time difference = $10 + 5$
 $= 15$ hours

New York is 15 hours behind Sydney.

Sydney, 11:30am on Thursday.

$$11:30 - 11.5 \text{ hrs} = 00:00 \text{ Thurs}$$

$$15 - 11.5 \text{ hrs} = 3.5 \text{ hrs}$$

$$00:00 - 3.5 \text{ hrs} = 2030 \text{ Wed}$$

It is 2030 (8:30 pm) on Wednesday
 in New York.

Q10)

a) 1:10 pm Tuesday = 1310

$$00:00 \text{ (Wed)} - 13:10 \text{ (Tues)} = 10 \text{ hrs, } 50 \text{ mins}$$

$$08:45 \text{ (Wed)} - 00:00 \text{ (Wed)} = 8 \text{ hrs, } 45 \text{ mins}$$

$$50 \text{ mins} + 45 \text{ mins} = 95 \text{ mins}$$

$$= 1 \text{ hr, } 35 \text{ mins}$$

$$10 \text{ hrs} + 8 \text{ hrs} + 1 \text{ hr} + 35 \text{ mins}$$

$$= 19 \text{ hours, } 35 \text{ mins}$$

Q1b) (Continued)

b) Arrival time in Sydney time is 0845.

Sydney is +10 hours from UTC

Athens is +2 hours from UTC

Time difference = $10 - 2$

= 8 hours

Greece is 8 hours behind Sydney.

$0845 - 8 \text{ hours} = 00:45$

The local time in Athens when Christos arrives is 12:45 am on Wednesday.

Q11) Vancouver is -8 hours from UTC

Tokyo is +9 hours from UTC

Time difference is $8 + 9 = 17$ hours

Vancouver is 17 hours behind Tokyo.

Vancouver, 6:00 am, Friday

$0600 + 17 \text{ hours} = 2300$

= 11:00 pm

Akira should log on to chat to Emiko at 11:00 pm.