Statistics 2 - Measures of spread
SOLUTIONS

Section 1

1, $\bar{x} = 9.17$ (to 3 sf)

$Q_2 = 7.5$

Mode = 5

2,

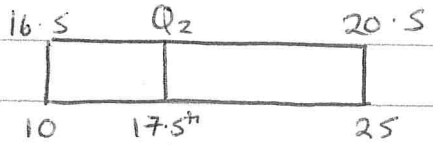
x	f
6.5 - 10.5	3
10.5 - 16.5	7
16.5 - 20.5	15
20.5 - 28.5	8
28.5 - 35.5	2

mean = 18.79 (to 2dp) (from calc.)

modal group = $16.5 \leq x < 20.5$ ($17 \leq x < 20$ fine too!)

$n = 35$

$Q_2 = \frac{35}{2} = 17.5^{th}$ → in $16.5 - 20.5^{th}$ group



$$\frac{Q_2 - 16.5}{20.5 - 16.5} = \frac{17.5 - 10}{25 - 10}$$

$Q_2 = 18.5$

Q4,

1	1 7
2	(3) 3
3	1 (4) 7
4	1 (3)
5	2 6

$n = 11$

$Q_2 = 34$

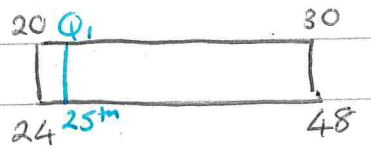
$Q_1 = \frac{11}{4} = 2.75^{th} = 3^{rd} = 23$

$Q_3 = 8.25^{th} = 9^{th} = 43$

Q3, $n = 100$

$Q_1 = 25^{th}$ → 20 - 30 group.
$Q_2 = 50^{th}$ → 30 - 40 group.
$Q_3 = 75^{th}$ → 30 - 40 group.

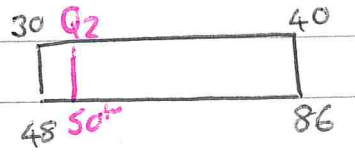
Q_1 →



$$\frac{Q_1 - 20}{30 - 20} = \frac{25 - 24}{48 - 24}$$

$$Q_1 = 20 \cdot 4$$

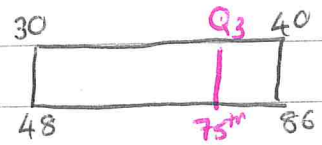
Q_2 →



$$\frac{Q_2 - 30}{40 - 30} = \frac{50 - 48}{86 - 48}$$

$$Q_2 = 30 \cdot \dot{5}$$
$$= 30 \cdot 6$$

Q_3 →



$$\frac{Q_3 - 30}{40 - 30} = \frac{75 - 48}{86 - 48}$$

$$Q_3 = 37 \cdot 5$$

Section 2

1, $n = 20$ $\quad \bar{x} = \frac{22}{20} = 1.1$ ✓ $\quad s.d = \sqrt{\frac{\Sigma x^2}{n} - \bar{x}^2}$ ✓

$$= \sqrt{\frac{55}{20} - \left(\frac{22}{20}\right)^2}$$

$= 1.24$ (to 3sf) ✓ (3)

2, a, $s.d = 2.35$ ✓ (1)

b, $\bar{x} = 5.925$ ✓

$\bar{x} + s.d = 5.325 + 2.35 = 7.675$ ✓

✓ (3)

$\therefore 5 + 2 + 1 = 8$ students

3, $\bar{x} = \frac{\Sigma x}{n}$

$163.52 = \frac{\Sigma fx}{50}$

$\Sigma fx = 50 \times 163.52$

$= 8176$ ✓ (1)

$s.d = \sqrt{\frac{\Sigma fx^2}{n} - (\bar{x})^2}$

$2.53 = \sqrt{\frac{\Sigma fx^2}{50} - 163.52^2}$

$\Sigma fx^2 = 1,337,259.565$ ✓ (1)

New $\Sigma fx = 8176 + 162 + 170$

$= 8508$

New $\bar{x} = \frac{8508}{52}$

$= 163.62$ ✓

New Σfx^2

$= 1,337259.565 + 162^2 + 170^2$

$= 1,392,403.565$

New $s.d = \sqrt{\frac{1392403.565}{52} - \left(\frac{8508}{52}\right)^2}$

$= 2.645$

$= 2.65$ ✓ (2)

4, a,

On Calc

0	7
1.5	4
3	3

$\bar{x} = 1.07$ ✓

s.d = 1.19 ✓ (2)

b, Rainfalls between 0 ✓ and 2.26 ✓ are within 1 standard deviation of the mean. (2)

$\bar{x} \pm 1.19$

$1.07 - 1.19 = -0.12$ (not possible) so = 0.

$1.07 + 1.19 = 2.26$

c, Not suitable as she only used 1 location in the UK and for 1 months, and she was wanting to investigate rainfall in UK in 2015. ✓ (1)

(- She has only done 14 days - It is not enough to just say this to get the mark

- you must comment on location & month)

d, Use more UK locations and more months from May - Oct. ✓ (1)

(Must refer to UK - not just a general statement of "more data")

5, $\bar{x} = 15$ $\quad 15 = \frac{\Sigma x}{50}$

$\Sigma x = 750$ ✓

$s.d = \sqrt{\frac{\Sigma x^2}{50} - 15^2}$

$48 = \frac{\Sigma x^2}{50} - 15^2$

Variance!!

(3)

$\Sigma x^2 = 13650$ ✓ ✓

6, $n = 20$ $\Sigma x = 100$ $\Sigma x^2 = 1240$.

$n = 25$ $\Sigma y = 144$ $\Sigma y^2 = 1600$

$\bar{x} = \frac{100 + 144}{45}$ ✓

$= 5.42$ ✓

$s.d = \sqrt{\frac{1240 + 1600}{45} - 5.42^2}$ ✓ ✓

$s.d = 5.81$ ✓ (5)

/25