

Box Plots - Worksheet

Skill

Group A - Drawing box plots given key values

Draw box plots for the following:

1)

Lowest value	12
Lower quartile	19
Median	30
Upper quartile	36
Highest value	43

2)

Lowest value	23
Lower quartile	32
Median	40
Upper quartile	45
Highest value	48

3)

Lowest value	-9
Lower quartile	-2
Median	0
Upper quartile	13
Highest value	24

4)

Lowest value	6
Lower quartile	13
Median	25
IQR	18
Highest value	52

Group B - Drawing box plots to represent sets of data

Calculate the median and quartiles, then draw box plots:

1)

12	14	15
16	17	17
19	20	23
24	25	25
28	30	31

2)

23	26	29
31	32	34
34	37	38
39	42	44
45	47	55

3)

2	2	3
3	4	4
4	4	5
5	6	6
7	7	7
8	10	12

4)

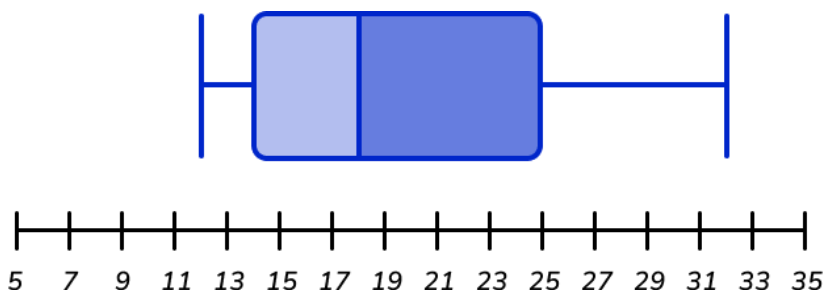
34	6	27
9	17	19
25	30	11
23	28	6
23	15	16
32	11	12

Box Plots - Worksheet

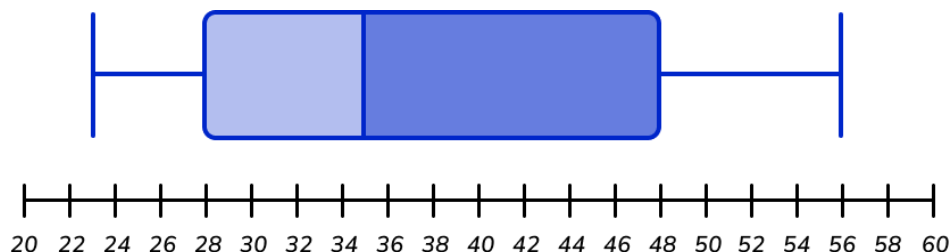
Group C - Reading information from a box plot

For each box plot, write down the median, lower and upper quartiles, and calculate the IQR:

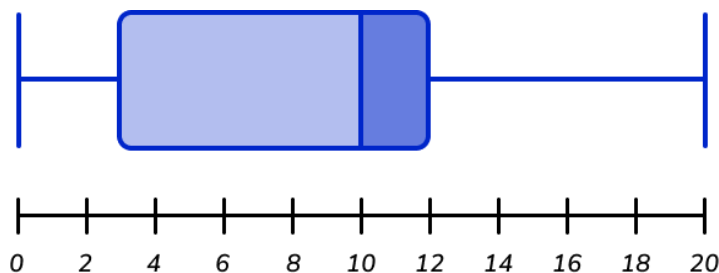
1)



2)



3)



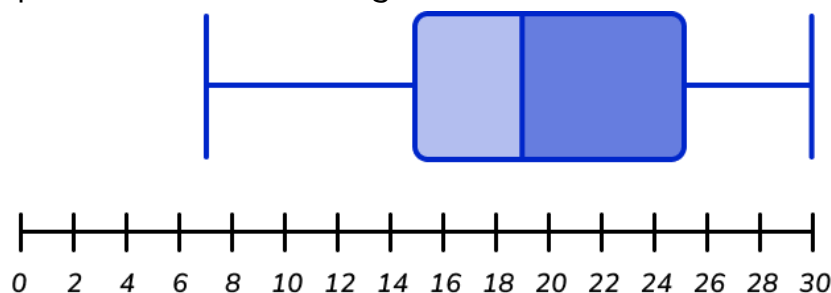
Box Plots - Worksheet

Applied

- 1) Here is a table showing the five-number summary for a set of data.

Lowest value	??
Lower quartile	15
Median	??
Upper quartile	??
Highest value	30

- (a) Use the box plot to fill in the missing information:



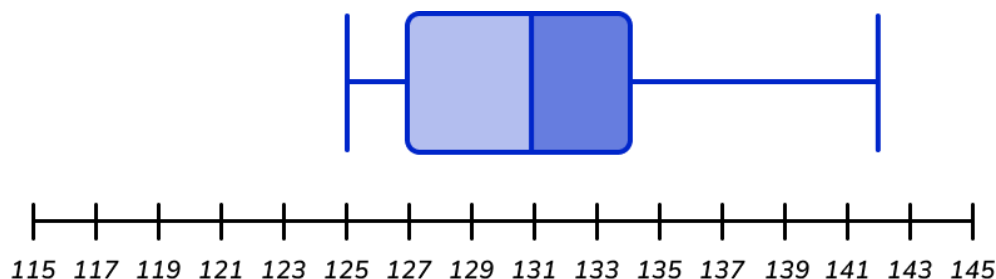
- (b) Calculate the interquartile range.

- 2) (a) The data below shows the heights in metres of 27 girls in a primary school.

117	118	118	120	120	121	124	124	125
125	126	126	127	127	127	128	128	128
129	130	131	132	132	133	135	138	140

Draw a box plot to represent this data.

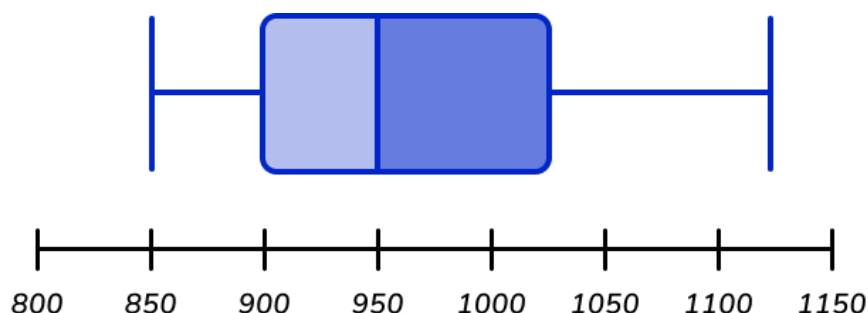
This box plot shows the distribution of heights for boys of the same age.



- (b) Make two comments to compare the distributions of girls' heights and boys' heights.

Box Plots - Worksheet

- 3) When would you use the median and interquartile range, rather than the mean and the range, to describe a set of data?
- 4) (a) A mathematician records the weight (g) of his weekly loaf of bread for 50 weeks. Here are his results:



Work out the interquartile range.

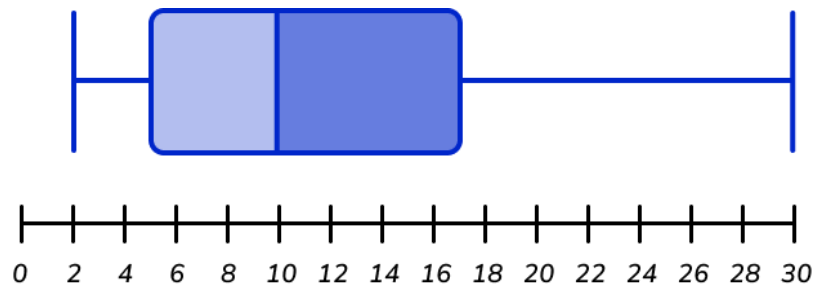
- (b) What percentage of loaves weigh between $850g$ and $900g$?
- (c) What is the probability that, in one fortnight, he will get two loaves weighing $950g$ or more? (Assume that the events are independent)

Box Plots - Exam Questions

- 1) Here is some information about the weights (to the nearest kg) of some dogs at a show:

Lightest dog	2
Heaviest dog	26
Median	10
Upper quartile	17
Interquartile range	10

Here is a box plot drawn to show this information.



Make two criticisms of the box plot.

1.

2.

(2 marks)

Box Plots - Exam Questions

- 2) Here is some information about the distance (in *km*) travelled to school by a group of 120 students:

Shortest distance	0.1
Lower quartile	0.5
Median	1.4
Range	3.9
Interquartile range	1.5

- (a) Draw a box plot to represent this information.

(3)

- (b) Explain why a box plot is useful for representing this information.

.....
(1)

- (c) Work out an estimate for the number of students that travel 2km or less to get to school.

.....
(2)
(6 marks)

Box Plots - Exam Questions

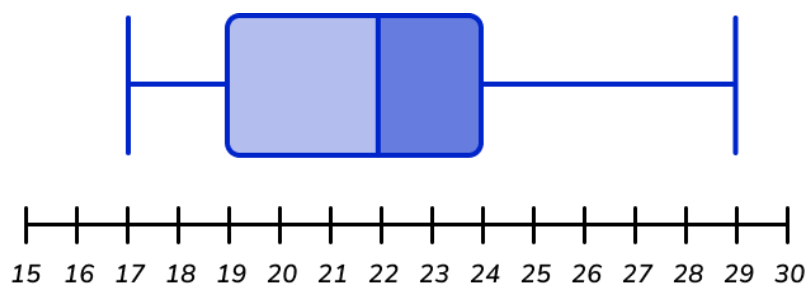
- 3) Here is some information about the daily maximum temperature (in °C) in January:

Lowest temperature	1
Lower quartile	4
Median	6
Interquartile range	5
Highest temperature	12

- (a) Draw a box plot to show this information.

(3)

- (b) The box plot below shows some information about the daily maximum temperature (in °C) in June:



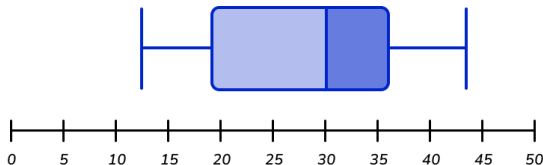
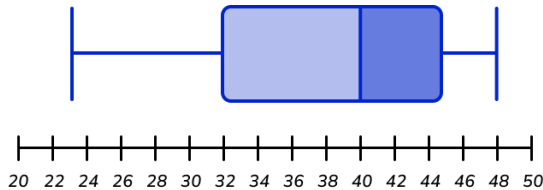
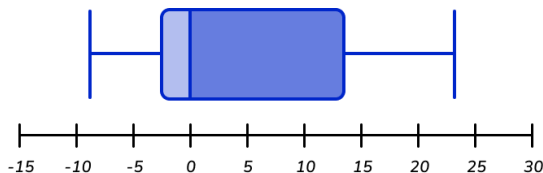
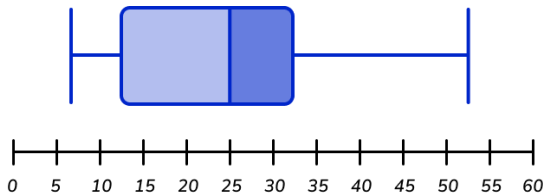
Make two comments to compare the distributions.

1.

2.

(2)
(5 marks)

Box Plots - Answers

	Question	Answer										
	Skill Questions											
Group A	Draw box plots for the following:											
	1) <table border="1"><tr><td>Lowest value</td><td>12</td></tr><tr><td>Lower quartile</td><td>19</td></tr><tr><td>Median</td><td>30</td></tr><tr><td>Upper quartile</td><td>36</td></tr><tr><td>Highest value</td><td>43</td></tr></table>	Lowest value	12	Lower quartile	19	Median	30	Upper quartile	36	Highest value	43	1) 
	Lowest value	12										
	Lower quartile	19										
	Median	30										
Upper quartile	36											
Highest value	43											
2) <table border="1"><tr><td>Lowest value</td><td>23</td></tr><tr><td>Lower quartile</td><td>32</td></tr><tr><td>Median</td><td>40</td></tr><tr><td>Upper quartile</td><td>45</td></tr><tr><td>Highest value</td><td>48</td></tr></table>	Lowest value	23	Lower quartile	32	Median	40	Upper quartile	45	Highest value	48	2) 	
Lowest value	23											
Lower quartile	32											
Median	40											
Upper quartile	45											
Highest value	48											
3) <table border="1"><tr><td>Lowest value</td><td>-9</td></tr><tr><td>Lower quartile</td><td>-2</td></tr><tr><td>Median</td><td>0</td></tr><tr><td>Upper quartile</td><td>13</td></tr><tr><td>Highest value</td><td>24</td></tr></table>	Lowest value	-9	Lower quartile	-2	Median	0	Upper quartile	13	Highest value	24	3) 	
Lowest value	-9											
Lower quartile	-2											
Median	0											
Upper quartile	13											
Highest value	24											
4) <table border="1"><tr><td>Lowest value</td><td>6</td></tr><tr><td>Lower quartile</td><td>13</td></tr><tr><td>Median</td><td>25</td></tr><tr><td>IQR</td><td>18</td></tr><tr><td>Highest value</td><td>52</td></tr></table>	Lowest value	6	Lower quartile	13	Median	25	IQR	18	Highest value	52	4) 	
Lowest value	6											
Lower quartile	13											
Median	25											
IQR	18											
Highest value	52											

Box Plots - Answers

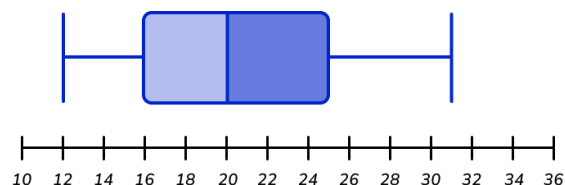
Group B

Calculate the median and quartiles, then draw box plots:

1)

12	14	15
16	17	17
19	20	23
24	25	25
28	30	31

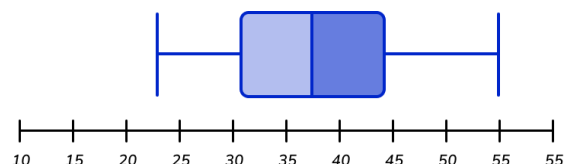
1) $Q_1 = 16, Q_2 = 20, Q_3 = 25$



2)

23	26	29
31	32	34
34	37	38
39	42	44
45	47	55

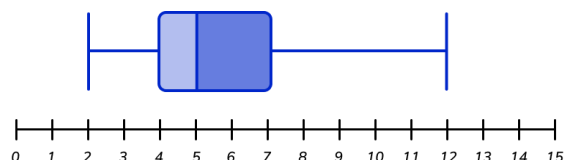
2) $Q_1 = 31, Q_2 = 37, Q_3 = 44$



3)

2	2	3
3	4	4
4	4	5
5	6	6
7	7	7
8	10	12

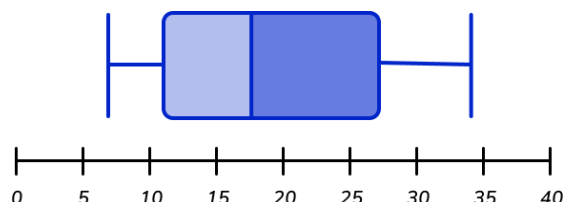
3) $Q_1 = 4, Q_2 = 5, Q_3 = 7$



4)

34	6	27
9	17	19
25	30	11
23	28	6
23	15	16
32	11	12

4) $Q_1 = 11, Q_2 = 18, Q_3 = 27$

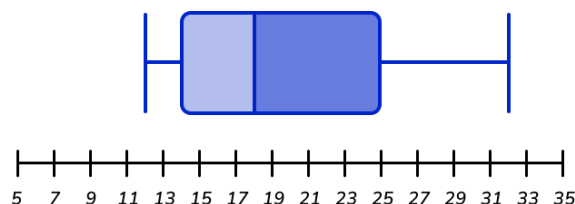


Box Plots - Answers

Group C

For each box plot, write down the median, lower and upper quartiles, and calculate the IQR:

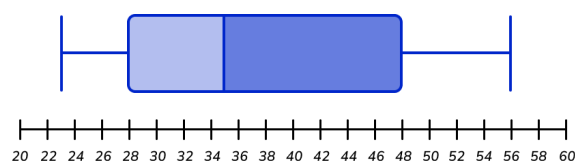
1)



$$1) Q_1 = 14, Q_2 = 18, Q_3 = 25$$

$$IQR = 25 - 14 = 11$$

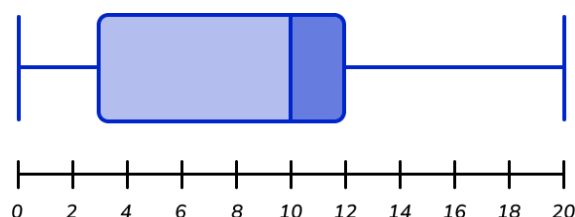
2)



$$2) Q_1 = 28, Q_2 = 35, Q_3 = 48$$

$$IQR = 48 - 28 = 20$$

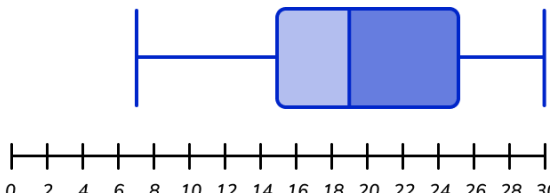
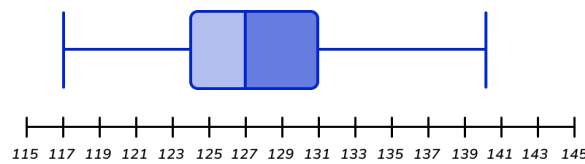
3)



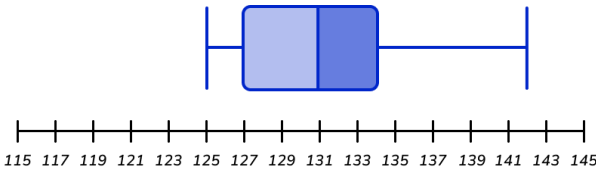
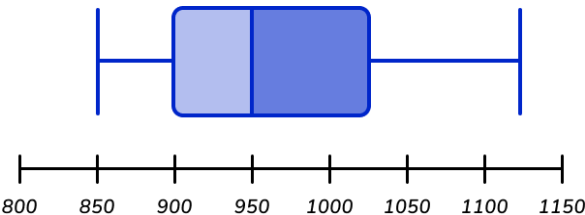
$$3) Q_1 = 3, Q_2 = 10, Q_3 = 12$$

$$IQR = 12 - 3 = 9$$

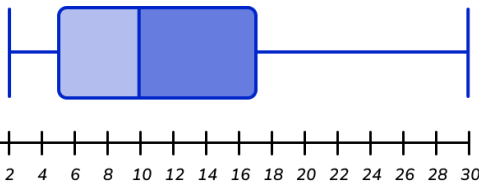
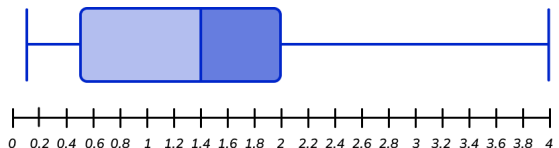
Box Plots - Answers

	Question	Answer										
	Applied Questions											
1)	<p>Here is a table showing the five-number summary for a set of data.</p> <table border="1"><tr><td>Lowest value</td><td>??</td></tr><tr><td>Lower quartile</td><td>15</td></tr><tr><td>Median</td><td>??</td></tr><tr><td>Upper quartile</td><td>??</td></tr><tr><td>Highest value</td><td>30</td></tr></table> <p>a) Use the box plot to fill in the missing information:</p>  <p>b) Calculate the interquartile range.</p>	Lowest value	??	Lower quartile	15	Median	??	Upper quartile	??	Highest value	30	<p>a) Lowest Value = 7 Median = 19 Upper Quartile = 25</p> <p>b) $IQR = 25 - 15 = 10$</p>
Lowest value	??											
Lower quartile	15											
Median	??											
Upper quartile	??											
Highest value	30											
2)	<p>The data below shows the heights in metres of 27 girls in a primary school class.</p> <p>117, 118, 118, 120, 120, 121, 124, 124, 125, 125, 126, 126, 127, 127, 127, 128, 128, 128, 129, 130, 131, 132, 132, 133, 135, 138, 140</p> <p>a) Draw a box plot to represent this data.</p>	<p>a)</p>  <p>$Q_1 = 124, Q_2 = 127, Q_3 = 131$</p>										

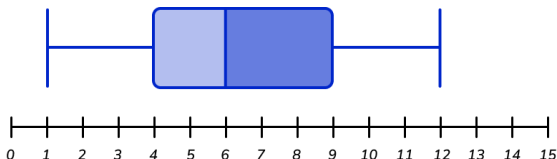
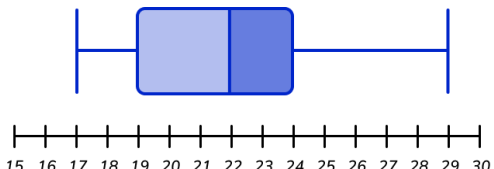
Box Plots - Answers

	<p>This box plot shows the distribution of heights for boys of the same age.</p>  <p>b) Make two comments to compare the distributions of girls' heights and boys' heights.</p>	<p>b) Example comments: On average, boys are taller than girls. The median height of boys is greater than the median height of girls. The interquartile range of heights is the same for boys and girls. The girls have a larger range (23) of heights than the boys (17).</p>
3)	When would you use the median and interquartile range, rather than the mean and the range, to describe a set of data?	When the data contains extreme values or outliers
4)	<p>A mathematician records the weight (g) of his weekly loaf of bread for 50 weeks. Here are his results:</p>  <p>a) Work out the interquartile range. b) What percentage of loaves weigh between 850g and 900g? c) What is the probability that, in one fortnight, he will get two loaves weighing 950g or more? (Assume that the events are independent)</p>	<p>a) $IQR = 1025 - 900 = 125$ b) 25% c) $P(\text{Loaf} \geq 950g) = 0.5$ $P(\text{Loaf} \geq 950g \text{ and Loaf} \geq 950g)$ $= 0.5 \times 0.5$ $= 0.25$</p>

Box Plots - Mark Scheme

	Question	Answer										
	Exam Questions											
1)	<p>Here is some information about the weights (to the nearest kg) of some dogs at a show:</p> <table border="1"><tr><td>Lightest dog</td><td>2</td></tr><tr><td>Heaviest dog</td><td>26</td></tr><tr><td>Median</td><td>10</td></tr><tr><td>Upper quartile</td><td>17</td></tr><tr><td>Interquartile range</td><td>10</td></tr></table> <p>Here is a box plot drawn to show this information.</p>  <p>Make two criticisms of the box plot.</p>	Lightest dog	2	Heaviest dog	26	Median	10	Upper quartile	17	Interquartile range	10	<p>The highest value has been drawn at 30 instead of 26</p> <p>The lower quartile should be at 7 instead of 5</p> <p>(1)</p> <p>(1)</p>
Lightest dog	2											
Heaviest dog	26											
Median	10											
Upper quartile	17											
Interquartile range	10											
2)	<p>Here is some information about the distance (in <i>km</i>) travelled to school by a group of students:</p> <table border="1"><tr><td>Shortest distance</td><td>0.1</td></tr><tr><td>Lower quartile</td><td>0.5</td></tr><tr><td>Median</td><td>1.4</td></tr><tr><td>Range</td><td>3.9</td></tr><tr><td>Interquartile range</td><td>1.5</td></tr></table> <p>(a) Draw a box plot to represent this information.</p>	Shortest distance	0.1	Lower quartile	0.5	Median	1.4	Range	3.9	Interquartile range	1.5	<p>(a) $UQ = 2$ or <i>Highest Value = 4</i> seen</p> <p>Drawing a box with three correctly plotted values</p> <p>Fully correct box plot</p>  <p>(1)</p> <p>(1)</p> <p>(1)</p>
Shortest distance	0.1											
Lower quartile	0.5											
Median	1.4											
Range	3.9											
Interquartile range	1.5											

Box Plots - Mark Scheme

(b)	Explain why a box plot is useful to represent this information.	(b) The dataset contains extreme values	(1)										
(c)	Work out an estimate for the number of students that travel 2km or less to get to school.	(c) 120×0.75 oe 30	(1) (1)										
3)	<p>Here is some information about the daily maximum temperature (in °C) in January:</p> <table><tr><td>Lowest temperature</td><td>1</td></tr><tr><td>Lower quartile</td><td>4</td></tr><tr><td>Median</td><td>6</td></tr><tr><td>Interquartile range</td><td>5</td></tr><tr><td>Highest temperature</td><td>12</td></tr></table>	Lowest temperature	1	Lower quartile	4	Median	6	Interquartile range	5	Highest temperature	12		
Lowest temperature	1												
Lower quartile	4												
Median	6												
Interquartile range	5												
Highest temperature	12												
(a)	Draw a box plot to show this information.	(a) $UQ = 9$ Drawing a box with three correctly plotted values Fully correct box plot 	(1) (1) (1)										
(b)	<p>The box plot below shows some information about the daily maximum temperature (in °C) in June:</p>  <p>Make two comments to compare the distributions.</p>	(b) The median/average temperature was higher in June than January oe The interquartile range of temperatures were the same OR the ranges were similar OR both sets of data have the same variability oe	(1) (1)										

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