Interquartile Range - Worksheet

Skill

Group A - Finding quartiles

Find the lower and upper quartiles

1) $4,\ 6,\ 8,\ 10,\ 12,\ 14,\ 16$

2) $2,\ 2,\ 3,\ 4,\ 5,\ 5,\ 5,\ 6,\ 6,\ 7,\ 7,\ 8,\ 8,\ 9,\ 10$

3) $5,\ 1,\ 3,\ 2,\ 2,\ 4,\ 1,\ 3,\ 6,\ 1,\ 0$

4) $4,\ 6,\ 8,\ 10,\ 12,\ 14$

5) $2,\ 3,\ 4,\ 5,\ 5,\ 5,\ 6,\ 6,\ 7,\ 7,\ 8,\ 8,\ 9,\ 10$

6) $5,\ 1,\ 3,\ 2,\ 2,\ 4,\ 1,\ 6,\ 1,\ 0$

7) $4,\ 6,\ 8,\ 10,\ 12$

8) $2,\ 3,\ 4,\ 5,\ 5,\ 5,\ 6,\ 6,\ 7,\ 7,\ 8,\ 9,\ 10$

9) $1,\ 3,\ 2,\ 2,\ 4,\ 1,\ 6,\ 1,\ 0$

10) $-2, 3, 4, -1, 0, -3, 2, 1, -5, 4$

11) $0.3,\ 0.8,\ 0.11,\ 1.2,\ 0.31$

12) $\frac{1}{2},\ 2,\ 0.75,\ 1\frac{1}{4}$

Group B - Finding the interquartile range

Find the interquartile range

These are the same data sets as in part A, so you can use those answers to help

1) $4,\ 6,\ 8,\ 10,\ 12,\ 14,\ 16$

2) $2,\ 2,\ 3,\ 4,\ 5,\ 5,\ 5,\ 6,\ 6,\ 7,\ 7,\ 8,\ 8,\ 9,\ 10$

3) $5,\ 1,\ 3,\ 2,\ 2,\ 4,\ 1,\ 3,\ 6,\ 1,\ 0$

4) $4,\ 6,\ 8,\ 10,\ 12,\ 14$

5) $2,\ 3,\ 4,\ 5,\ 5,\ 5,\ 6,\ 6,\ 7,\ 7,\ 8,\ 8,\ 9,\ 10$

6) $5,\ 1,\ 3,\ 2,\ 2,\ 4,\ 1,\ 6,\ 1,\ 0$

7) $4,\ 6,\ 8,\ 10,\ 12$

8) $2,\ 3,\ 4,\ 5,\ 5,\ 5,\ 6,\ 6,\ 7,\ 7,\ 8,\ 9,\ 10$

9) $1,\ 3,\ 2,\ 2,\ 4,\ 1,\ 6,\ 1,\ 0$

10) $-2, 3, 4, -1, 0, -3, 2, 1, -5, 4$

11) $0.3,\ 0.8,\ 0.11,\ 1.2,\ 0.31$

12) $\frac{1}{2},\ 2,\ 0.75,\ 1\frac{1}{4}$

Interquartile Range - Worksheet

Group C - Quartiles for frequency tables and grouped data

Find the LQ, UQ and IQR of the following sets of data:

1) The number of people waiting at a bus stop at half-hour intervals.

Number of people	Frequency
0	4
1	5
2	10
3	15
4	7
5	4
6	2

2) The shoe sizes of a group of Year 9 students.

Shoe size	Frequency
4	3
5	6
6	10
7	12
8	16
9	9
10	4
11	1

State the class interval in which the lower and upper quartiles lie:

3) The heights of a group of Year 10 students.

Height (h cm)	Frequency
$1.3 < h \leq 1.4$	5
$1.4 < h \leq 1.5$	12
$1.5 < h \leq 1.6$	20
$1.6 < h \leq 1.7$	14
$1.7 < h \leq 1.8$	4

4) The times of bus journeys recorded over a month.

Time (mins)	Frequency
$5 < t \leq 7$	1
$7 < t \leq 10$	9
$10 < t \leq 12$	9
$12 < t \leq 15$	7
$15 < t \leq 25$	2

Interquartile Range - Worksheet

Applied

1) This table shows the five-number summary for a set of data:

Lowest value	**14**
Lower quartile	**18**
Median	**25**
Upper quartile	**34**
Highest value	**50**

(a) Find the interquartile range.

This table shows some descriptive statistics for a set of data:

Lowest quartile	**4**
Median	**11**
IQR	**21**
Upper quartile	**??**

(b) Find the upper quartile.

2) Year 10 and Year 11 both sat the same Maths test paper. Here is a summary of their results:

	Median	IQR	Range
Year 10	28	9	34
Year 11	30	15	40

Which statement **must** be true?

☐ Year 11 had more consistent scores than Year 10
☐ A Year 10 student had the lowest score
☐ Year 10 scored higher on average than Year 11
☐ Year 10 had more consistent scores than Year 11

3) **(a)** Write down a set of data with an IQR of 15.

(b) Here is a set of data with an IQR of 10. Find the missing value:
$34,\ 35,\ 38,\ 40,\ 45,\ ??,\ 58$

Interquartile Range - Exam Questions

1) The following data shows the English test results of 11 students:

15, 16, 19, 25, 26, 27, 28, 28, 30, 35, 36

Work out the interquartile range.

....

(2 marks)

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2) **(a)** This table shows the ages of 25 members of a club in years.
Find the lower and upper quartiles.

20	21	25	26	30
34	35	36	36	37
39	40	40	41	42
45	46	46	50	53
62	64	65	65	82

....

(2)

(b) Hence, find the interquartile range.

....

(1)

(c) Why should the interquartile range be used to describe the spread of this data rather than the range?

....

(1)

(4 marks)

Interquartile Range - Exam Questions

3) **(a)** Tom records the number of cars passing his school at five-minute intervals:

Number of cars	Frequency
0	2
1	3
2	12
3	17
4	5
5+	0

Find the median number of cars.

....

(1)

(b) Find the interquartile range.

....

(2)

(c) Work out the total number of cars that passed Tom's school.

....

(2)

(5 marks)

Interquartile Range - Answers

	Question	Answer
	Skill Questions	
Group A	Find the lower and upper quartiles	
	1) $4, 6, 8, 10, 12, 14, 16$	**1)** LQ $= 6$, UQ $= 14$
	2) $2, 2, 3, 4, 5, 5, 5, 6, 6, 7, 7, 8, 8, 9, 10$	**2)** LQ $= 4$, UQ $= 8$
	3) $5, 1, 3, 2, 2, 4, 1, 3, 6, 1, 0$	**3)** LQ $= 1$, UQ $= 4$
	4) $4, 6, 8, 10, 12, 14$	**4)** LQ $= 6$, UQ $= 12$
	5) $2, 3, 4, 5, 5, 5, 6, 6, 7, 7, 8, 8, 9, 10$	**5)** LQ $= 5$, UQ $= 8$
	6) $5, 1, 3, 2, 2, 4, 1, 6, 1, 0$	**6)** LQ $= 1$, UQ $= 4$
	7) $4, 6, 8, 10, 12$	**7)** LQ $= 5$, UQ $= 11$
	8) $2, 3, 4, 5, 5, 5, 6, 6, 7, 7, 8, 9, 10$	**8)** LQ $= 4.5$, UQ $= 7.5$
	9) $1, 3, 2, 2, 4, 1, 6, 1, 0$	**9)** LQ $= 1$, UQ $= 3.5$
	10) $-2, 3, 4, -1, 0, -3, 2, 1, -5, 4$	**10)** LQ $=-2$, UQ $= 3$
	11) $0.3, 0.8, 0.11, 1.2, 0.31$	**11)** LQ $= 0.205$, UQ $= 1$
	12) $-2, 3, 4, -1, 0, -3, 2, 1, -5, 4$	**12)** LQ $= 0.625$, UQ $= 1.625$
Group B	Find the interquartile range	
	1) $4, 6, 8, 10, 12, 14, 16$	**1)** IQR $= 8$
	2) $2, 2, 3, 4, 5, 5, 5, 6, 6, 7, 7, 8, 8, 9, 10$	**2)** IQR $= 4$
	3) $5, 1, 3, 2, 2, 4, 1, 3, 6, 1, 0$	**3)** IQR $= 3$
	4) $4, 6, 8, 10, 12, 14$	**4)** IQR $= 6$
	5) $2, 3, 4, 5, 5, 5, 6, 6, 7, 7, 8, 8, 9, 10$	**5)** IQR $= 3$
	6) $5, 1, 3, 2, 2, 4, 1, 6, 1, 0$	**6)** IQR $= 3$
	7) $4, 6, 8, 10, 12$	**7)** IQR $= 6$
	8) $2, 3, 4, 5, 5, 5, 6, 6, 7, 7, 8, 9, 10$	**8)** IQR $= 3$
	9) $1, 3, 2, 2, 4, 1, 6, 1, 0$	**9)** IQR $= 2.5$
	10) $-2, 3, 4, -1, 0, -3, 2, 1, -5, 4$	**10)** IQR $= 5$
	11) $0.3, 0.8, 0.11, 1.2, 0.31$	**11)** IQR $= 0.795$
	12) $\frac{1}{2}, 2, 0.75, 1\frac{1}{4}$	**12)** IQR $= 1$

Interquartile Range - Answers

Group C

Find the LQ, UQ and IQR of the following sets of data:

1) The number of people waiting at a bus stop at half-hour intervals.

Number of people	Frequency
0	4
1	5
2	10
3	15
4	7
5	4
6	2

1) $n = 47$

$LQ = \frac{47+1}{4}^{th} = 12^{th} = 2$

$UQ = 3 \times \frac{47+1}{4}^{th} = 36^{th} = 4$

$IQR = 4 - 2 = 2$

2) The shoe sizes of a group of Year 9 students.

Shoe size	Frequency
4	3
5	6
6	10
7	12
8	16
9	9
10	4
11	1

2) $n = 61$

$LQ = \frac{62}{4}^{th} = 15.5^{th}$

$15^{th} = 6,\ 16^{th} = 6 \Rightarrow LQ = 6$

$UQ = 3 \times \frac{62}{4}^{th} = 46.5^{th}$

$46^{th} = 8,\ 47^{th} = 8 \Rightarrow UQ = 8$

$IQR = 8 - 6 = 2$

State the class interval in which the lower and upper quartiles lie:

3) The heights of a group of Year 10 students.

Height (h cm)	Frequency
$1.3 < h \leq 1.4$	5
$1.4 < h \leq 1.5$	12
$1.5 < h \leq 1.6$	20
$1.6 < h \leq 1.7$	14
$1.7 < h \leq 1.8$	4

3) $n = 55$

$LQ = \frac{55+1}{4}^{th} = 14^{th}$

LQ lies in $1.4 < h \leq 1.5$

$UQ = 3 \times \frac{55+1}{4}^{th} = 42^{nd}$

UQ lies in $1.6 < h \leq 1.7$

Interquartile Range - Answers

	4) The times of bus journeys recorded over a month. Time (mins) | Frequency $5 < t \leq 7$ | 1 $7 < t \leq 10$ | 9 $10 < t \leq 12$ | 9 $12 < t \leq 15$ | 7 $15 < t \leq 25$ | 2	**4)** $n = 28$ $LQ = \frac{29}{4}^{th} = 7.25^{th}$ 7^{th} and 8^{th} lie in $7 < t \leq 10$ $UQ = 3 \times \frac{29}{4}^{th} = 21.75^{th}$ 21^{st} and 22^{nd} lie in $12 < t \leq 15$

Time (mins)	Frequency
$5 < t \leq 7$	1
$7 < t \leq 10$	9
$10 < t \leq 12$	9
$12 < t \leq 15$	7
$15 < t \leq 25$	2

Interquartile Range - Answers

<table>
<tr><th></th><th>Question</th><th>Answer</th></tr>
<tr><td></td><td>Applied Questions</td><td></td></tr>
<tr><td>1)</td><td>a) This table shows the five-number summary for a set of data:

<table>
<tr><td>Lowest value</td><td>14</td></tr>
<tr><td>Lower quartile</td><td>18</td></tr>
<tr><td>Median</td><td>25</td></tr>
<tr><td>Upper quartile</td><td>34</td></tr>
<tr><td>Highest value</td><td>50</td></tr>
</table>

Find the interquartile range.

b) This table shows some descriptive statistics for a set of data:

<table>
<tr><td>Lowest quartile</td><td>4</td></tr>
<tr><td>Median</td><td>11</td></tr>
<tr><td>IQR</td><td>21</td></tr>
<tr><td>Upper quartile</td><td>??</td></tr>
</table>

Find the upper quartile.</td>
<td>a) $IQR = 34 - 18 = 16$

b) $UQ = LQ + IQR$
$= 4 + 21 = 25$</td></tr>
<tr><td>2)</td><td>a) Year 10 and Year 11 both sat the same Maths test paper. Here is a summary of their results:

<table>
<tr><th></th><th>Median</th><th>IQR</th><th>Range</th></tr>
<tr><td>Year 10</td><td>28</td><td>9</td><td>34</td></tr>
<tr><td>Year 11</td><td>30</td><td>15</td><td>40</td></tr>
</table>

Which statement must be true?
Year 10 scored higher on average than Year 11
Year 10 had more consistent scores than Year 11
A Year 11 student had the highest score
A Year 10 student had the lowest score</td>
<td>a) Year 10 had more consistent scores than Year 11</td></tr>
<tr><td>3)</td><td>a) Write down a set of data with an IQR of 15.

b) Here is a set of data with an IQR of 10. Find the missing value:

$34, 35, 38, 40, 45, ??, 58$</td>
<td>a) Various answers.

b) Missing value $= 45$</td></tr>
</table>

Interquartile Range - Mark Scheme

<table>
<tr><th></th><th>Question</th><th>Answer</th><th></th></tr>
<tr><td></td><td>Exam Questions</td><td></td><td></td></tr>
<tr><td>1)</td><td>The following data shows the English test results of 11 students:

15, 16, 19, 25, 26, 27,
28, 28, 30, 35, 36

Work out the interquartile range.</td><td>$LQ = 19$ or $UQ = 30$

$IQR = 30 - 19 = 11$</td><td>(1)

(1)</td></tr>
<tr><td>2) (a)</td><td>This table shows the ages of 25 members of a club in years.

Find the lower and upper quartiles.
<table>
<tr><td>20</td><td>21</td><td>25</td><td>26</td><td>30</td></tr>
<tr><td>34</td><td>35</td><td>36</td><td>36</td><td>37</td></tr>
<tr><td>39</td><td>40</td><td>40</td><td>41</td><td>42</td></tr>
<tr><td>45</td><td>46</td><td>46</td><td>50</td><td>53</td></tr>
<tr><td>62</td><td>64</td><td>65</td><td>65</td><td>82</td></tr>
</table></td><td>(a) $LQ = 6.5^{th}$
$6^{th} = 34, 7^{th} = 35$
so $LQ = 34.5$

$UQ = 19.5^{th}$
$19^{th} = 50, 20^{th} = 53$
so $UQ = 51.5$</td><td>(1)

(1)</td></tr>
<tr><td>(b)</td><td>Hence, find the interquartile range.</td><td>(b) $IQR = 51.5 - 34.5 = 17$</td><td>(1)</td></tr>
<tr><td>(c)</td><td>Why should the interquartile range be used to describe the spread of this data rather than the range?</td><td>(c) IQR should be used because the data set contains an extreme value/outlier</td><td>(1)</td></tr>
<tr><td>3)</td><td>Tom records the number of cars passing his school at five-minute intervals:
<table>
<tr><th>Number of cars</th><th>Frequency</th></tr>
<tr><td>0</td><td>2</td></tr>
<tr><td>1</td><td>3</td></tr>
<tr><td>2</td><td>12</td></tr>
<tr><td>3</td><td>17</td></tr>
<tr><td>4</td><td>5</td></tr>
<tr><td>5+</td><td>0</td></tr>
</table>
(a) Find the median number of cars.</td><td>(a) $n = 39$
Median $= \frac{40}{2}^{th} = 20^{th} = 3$</td><td>(1)</td></tr>
</table>

Interquartile Range - Mark Scheme

(b)	Find the interquartile range.	$LQ = \frac{40}{4}^{th} = 10^{th} = 2$ or $UQ = 30^{th} = 3$ $IQR = 3 - 2 = 1$	 **(1)** **(1)**
(c)	Work out the total number of cars that passed Tom's school.	$(0 \times 2) + (1 \times 3) + (2 \times 12) + ...$ $= 98$	**(1)** **(1)**