



Algebra 2 – Year 2

Lesson 11.5 – Analyzing Data
Notes & Examples (Day 2)

Name: _____

Date: _____ Hour: _____

The **range of a set of data** is the difference between the greatest(largest) and least(smallest) values.

The values that separate the data into four parts are called **quartiles**.

- The **interquartile range (IQR)** is the difference(or distance) between the third and first quartiles.
 - The length of the box in a box-and-whisker-plot is also known as the **interquartile range (IQR)**.

Example 1 - Find the five-number summary for the data set, and find the IQR.

~~5~~ ~~6~~ ~~8~~ ~~12~~ ~~11~~ ~~9~~ ~~4~~ ~~3~~ ~~7~~ ~~10~~ ~~19~~

3 4 5 6 7 8 9 10 11 12 19

Min = 3

Q1 = 5 (left median) 3 4 5 6 7

Max = 19

Q2 = 8 (median of entire set)

Q3 = 11 (right median) 9 10 11 12 19

Find the value of the IQR, which is found by calculating $Q3 - Q1$. IQR = 6
 $11 - 5 = 6$

An **outlier** is a value that is extremely larger or smaller than the other data values. It can cause the measures of central tendency to be misleading. To determine if an outlier exists, the **lower-fence** and **upper-fence**(cut-off values) must be calculated.

- When a data value is less than the **lower-fence** or greater than the **upper-fence**, then the value is considered to be an **outlier**.

Example 2 - For the data set above calculate the lower-fence and the upper-fence and identify any outliers.

lower-fence: $Q1 - 1.5(IQR) = \underline{5 - 1.5(6)} = -4$

upper-fence: $Q3 + 1.5(IQR) = \underline{11 + 1.5(6)} = 20$

Outlier(s): None

Example 3 – Find the five-number summary for the following data set, find the IQR, and create the corresponding boxplot.

11, 12, 12, 12, 13, 13, 14, 14, 14, 15, 17, 17, 18, 19, 22, 30

Min = 11 $\frac{12+13}{2} = 12.5$ Max = 30

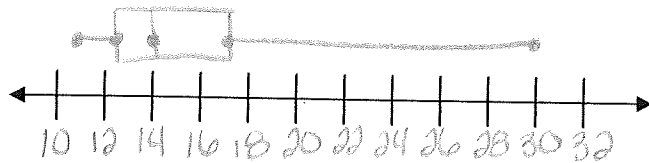
Q1 = 12.5 left 11 12 12 12 13 13 14 14 IQR = 17.5 - 12.5 = 5

Q2 = 14 entire $\frac{14+14}{2} = 14$ Range = 30 - 11 = 19

Q3 = 17.5 right 14 15 17 17 18 19 22 Outlier = 30
 $\frac{17+18}{2} = 17.5$

lower-fence: Q1 - 1.5(IQR) = 12.5 - 1.5(5) = 5

upper-fence: Q3 + 1.5(IQR) = 17.5 + 1.5(5) = 25



A **percentile** is a number from 0 to 100 that you can associate with a value x from a data set. It shows the percent of the data that are less than or equal to x .

Example 4 - Find the 55th, 65th, and 95th percentiles for the given data set.

41 54 61 65 67 73 74 77 77 77 77 79 80 82 88 89 93 97 98 98 100

55th percentile: 79

$20 \cdot 55\% = 20 \cdot .55 = 11$ values

65th percentile: 82

$20 \cdot 65\% = 20 \cdot .65 = 13$ values

95th percentile: 98

$20 \cdot 95\% = 20 \cdot .95 = 19$ values



Algebra 2 – Year 2

Assignment: Lesson 11.5 worksheet #2

Name: _____

Date: _____ Hour: _____

For 1-2, find the five-number summary for each data set and identify any outliers (SHOW WORK).

1. 3.4 4.5 2.3 5.9 9.8 3.3 2.1 3.0 2.9
 2.1 2.3 2.9 3.0 3.3 3.4 4.5 5.9 9.8

a. Find the "five-number summary".

Min = 2.1

Max = 9.8

Q1 = 2.6 left 2.1 2.3 2.9 3.0

Q2 = 3.3 entire $\frac{2.3 + 2.9}{2} = 2.6$

Q3 = 5.2 right 3.4 4.5 5.9 9.8
 $\frac{4.5 + 5.9}{2} = 5.2$

b. Find IQR.

IQR = 5.2 - 2.6 = 2.6

c. Identify any outliers.

lower-fence: $Q1 - 1.5(IQR) = 2.6 - 1.5(2.6)$

upper-fence: $Q3 + 1.5(IQR) = 5.2 + 1.5(2.6)$

Outlier(s): 9.8

2. 947 757 103 619 582 626 900 869 728 1001 596 515
 103 515 582 596 619 626 728 757 869 900 947 1001

a. Find the "five-number summary".

Min = 103

Max = 1001

Q1 = 589 left 103 515 582 596 619 626

Q2 = 677 entire $\frac{582 + 596}{2} = 589$

Q3 = 884.5 right 728 757 869 900 947 1001

$\frac{869 + 900}{2} = 884.5$

b. Find IQR.

IQR = 884.5 - 589 = 295.5

c. Identify any outliers.

lower-fence: $Q1 - 1.5(IQR) = 145.75$

upper-fence: $Q3 + 1.5(IQR) = 1327.75$

Outlier(s): 103

$589 - 1.5(295.5) = 145.75$

$884.5 + 1.5(295.5) = 1327.75$

3. Refer to the temperature data at the right.

Honolulu (1961-1990)
Monthly Mean Temperature (°F)

Jan.	71.8
Feb.	71.8
Mar.	72.5
Apr.	73.9
May	75.7
June	77.5
July	78.6
Aug.	79.3
Sept.	79.2
Oct.	77.9
Nov.	75.6
Dec.	73.2

a. Find the "five-number summary".

Min = 71.8

Max = 79.3

Q1 = 72.85 left

Q2 = 75.65 entire

Q3 = 78.25 right

$$\frac{72.5 + 73.2}{2} = 72.85$$

$$\frac{75.6 + 75.7}{2} = 75.65$$

$$\frac{77.9 + 78.6}{2} = 78.25$$

b. Find IQR.

IQR = $\frac{78.25 - 72.85}{= 5.4}$

71.8 71.8 72.5 73.2 73.9 75.6 75.7 77.5 77.9 78.6 79.2 79.3

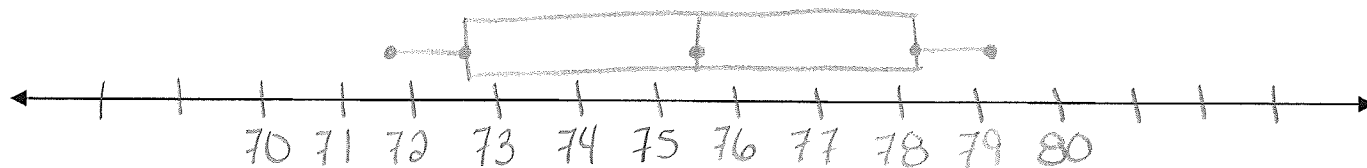
c. Identify any outliers.

lower-fence: $Q1 - 1.5(IQR) = 72.85 - 1.5(5.4) = 64.75$

upper-fence: $Q3 + 1.5(IQR) = 78.25 + 1.5(5.4) = 86.35$

Outlier(s): None

d. Make a box-and-whisker plot of the data.



4. Find the following percentiles of the data set below.

27 28 29 29 30 31 32 33 34 35 36 36 37 38 39 40 40 41 42 43

a. 45th percentile

$20 \cdot 45\% = 20 \cdot .45 = 9$
34

b. 70th percentile

$20 \cdot 70 = 14$
38

c. 25th percentile

$20 \cdot 25 = 5$
30

d. 95th percentile

$20 \cdot .95 = 19$
42

e. 80th percentile

$20 \cdot .80 = 16$
40

f. 15th percentile

$20 \cdot .15 = 3$
29



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Example 1 - Find the five-number summary for the data set, and find the IQR.

5 6 8 12 11 9 4 3 7 10 19

Min = _____ Q1 = _____

Max = _____ Q2 = _____

Q3 = _____

Find the value of the IQR, which is found by calculating $Q3 - Q1$. IQR = _____

An **outlier** is a value that is extremely larger or smaller than the other data values. It can cause the measures of central tendency to be misleading. To determine if an outlier exists, the **lower-fence** and **upper-fence**(cut-off values) must be calculated.

- When a data value is less than the **lower-fence** or greater than the **upper-fence**, then the value is considered to be an **outlier**.

Example 2 - For the data set above calculate the lower-fence and the upper-fence and identify any outliers.

lower-fence: $Q1 - 1.5(IQR) =$ _____

upper-fence: $Q3 + 1.5(IQR) =$ _____

Outlier(s): _____

Example 3 – Find the five-number summary for the following data set, find the IQR, and create the corresponding boxplot.

11, 12, 12, 12, 13, 13, 14, 14, 14, 15, 17, 17, 18, 19, 22, 30

Min = _____

Max = _____

Q1 = _____

IQR = _____

Q2 = _____

Range = _____

Q3 = _____

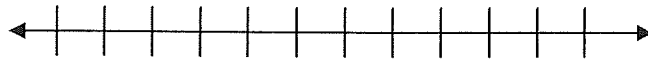
Outlier = _____

lower-fence:

$Q1 - 1.5(IQR) =$ _____

upper-fence:

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A **percentile** is a number from 0 to 100 that you can associate with a value x from a data set. It shows the percent of the data that are less than or equal to x .

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55th percentile: _____

65th percentile: _____

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a. Find the “five-number summary”.

Min = _____

Max = _____

Q1 = _____

Q2 = _____

Q3 = _____

b. Find IQR.

IQR = _____

c. Identify any outliers.

lower-fence: $Q1 - 1.5(IQR) =$ _____

upper-fence: $Q3 + 1.5(IQR) =$ _____

Outlier(s): _____

2. 947 757 103 619 582 626 900 869 728 1001 596 515

a. Find the “five-number summary”.

Min = _____

Max = _____

Q1 = _____

Q2 = _____

Q3 = _____

b. Find IQR.

IQR = _____

c. Identify any outliers.

lower-fence: $Q1 - 1.5(IQR) =$ _____

upper-fence: $Q3 + 1.5(IQR) =$ _____

Outlier(s): _____

3. Refer to the temperature data at the right.

a. Find the "five-number summary".

Min = _____

Max = _____

Q1 = _____

Q2 = _____

Q3 = _____

b. Find IQR.

IQR = _____

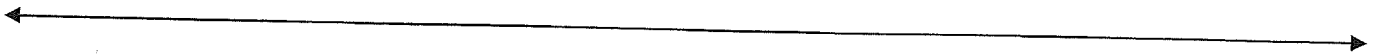
c. Identify any outliers.

lower-fence: $Q1 - 1.5(IQR) =$ _____

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4. Find the following percentiles of the data set below.

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a. 45th percentile

d. 95th percentile

b. 70th percentile

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c. 25th percentile

f. 15th percentile

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