**PERCENTILE and QUARTILE**

**KEY WORDS**

Mean

Median

Mode

Mean

Median

Mode

Range

***Recall Measures of Central Tendency*** (*\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_*)

\_\_\_\_\_\_\_\_: the average (add up all the values and divide by the # of values in the data set)

\_\_\_\_\_\_\_\_\_\_\_: the value that lies in the **middle** of **sorted** data

\_\_\_\_\_\_\_\_: the value that occurs most frequently within the data

\_\_\_\_\_\_\_\_\_\_: the highest data value **MINUS** the lowest data value (a measure of spread)

***EXAMPLE 1*** The 14 students in Jesse’s math class measured their heights to the nearest centimetre.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 160 | 178 | 167 | 180 | 168 | 157 | 164 | 179 | 153 | 182 | 176 | 165 | 175 | 167 |

1. Determine the measures of central tendency and the range for this set of data.

|  |  |
| --- | --- |
| **MEAN** | *\* (add all numbers) / how many*  |
| **MEDIAN** | \* *Rearrange* *the numbers in ascending order. If the set has even number of data, average the two numbers in the middle to find the median. If the set has odd number of data, then the median is the number in the middle.*  |
| **MODE** | \* *If one number repeated, mode 1; if two numbers repeated bimodal; if more than 3 numbersrepeated multimodal.* |
| **RANGE** | \* max - min =  |

1. What percent of the class is shorter than each measure of central tendency?

|  |  |  |
| --- | --- | --- |
| **SHORTER THAN MEAN** | **SHORTER THAN MEDIAN** | **SHORTER THAN MODE** |
|  |  |  |

1. Ryan is taller than 65% of the class. How many students are shorter than he is? What is Ryan’s height?

**TRY:**

**KEY WORDS**

Closely

Mean

Less than

20%, 20th

***MEASURES OF SPREAD***

**STANDARD DEVIATION**: measures how \_\_\_\_\_\_\_\_\_\_ the data are centered around the \_\_\_\_\_\_

**PERCENTILES**: tells what percent of the data are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a particular data value

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the data are less than or equal to the \_\_\_\_\_\_\_ percentile

**Example:** Bob is in the 23rd percentile for intelligence. This means:

* 23% of the population is less intelligent than Bob.
* 77% of the population is more intelligent than Bob.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 28 | 33 | 37 | 40 | 45 | 46 | 48 | 49 | 49 | 53 | 59 | 63 |

a) What percentile is 59?

b) Anyone in the 25th percentile is considered “young”. What age is that?

**QUARTILES**: divide a set of *sorted* data into **four** equal parts

* The ***2nd*** quartile,  is the median of the entire data. It cuts the data set in half so it is the same as the 50th percentile.
* The ***1st*** quartile, is the median of the lower half below. It divides the lower half of the data set in half so it is the same as the 25th percentile
* The ***3rd*** quartile,  is the median of above . It divides the upper half of the data set in half so it is the same as the 75th percentile



***EXAMPLE*** *1*: Find the quartiles of the data: 3, 7, 8, 5, 12, 14, 21, 13, 18

**Step 1:** Sort the numbers in ascending – lowest to greatest – order. (*Ensure you fit all of them in one line).*

**Step 2:** Circle the median (middle number). This is your 2nd quartile.

**Step 3:** Find the median of the lower half (set to the left of the median). This is the 1st quartile

**Step 4:** Find the median of the upper half (set to the right of the median). This is the 3rd quartile.

***EXAMPLE 2***: Find the quartiles of the data: 3, 7, 8, 5, 12, 14, 21, 15, 18, 14

***EXAMPLE 3:*** The following dollar amounts were the hourly collections from a Salvation Army kettle at a local store one day in December: $19, $26, $25, $37, $32, $28, $22, $23, $29, $34, $39, and $31. Determine the first quartile and third quartile for the amount collected.

***EXAMPLE 4:*** Here are the hourly pay rates, in dollars, for 17 high-school students with part-time jobs.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11.50 | 10.50 | 8.00 | 8.25 | 9.00 | 9.15 | 9.75 | 7.50 | 8.00 |
| 12.50 | 13.00 | 11.25 | 10.75 | 9.50 | 9.25 | 9.45 | 7.75 |  |

1. What are the quartiles for this data set?
2. Damien’s pay is in the 85th percentile for this group. What does the percentile mean? What is Damien’s hourly pay rate?