

# U4D1 filled\_Statistical Measures

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U4D1  
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## Unit 4 Lesson 1: Statistical Measures

### Recall:

One variable data has only one list of data.

It can be analysed using: mean, median, or mode.

### Statistical Language

**Net Income per capita** = Total Income of everyone  $\div$  Total number of people

**Per capita** means the average per person or the number of items divided by the number of people.

**Net worth** is the total assets (wealth) minus total liabilities(debt)

$$\text{NET WORTH} = \text{ASSETS} - \text{LIABILITIES}$$

Examples of **Assets**: home, car, land, furniture, appliances, clothing, investments (anything that could be sold and converted to cash)

Examples of **Liabilities**: mortgage, property taxes, bills, insurance, car loan, credit card debt

**Percent change** measures a change in value over time

$$\text{Percent Increase/Decrease} = \frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100\%$$

If answer is positive it is a percent increase,  
If answer is negative, it is a percent decrease.

**Percentile** is a number between 1 and 99 indicating the percent of the population with a score less than or equal to a specific value. Percentiles are a good way to rank data when you have a lot of data or you want to keep data private.

**Percentile Rank** is the percent of the population with a score less than a specific score.

Use formula  $p = \left( \frac{L + 0.5E}{n} \right) \times 100$  where  $p$  = percentile rank

$L$  = number of scores less than the value

$E$  = number of scores equal to the value

$n$  = total number of scores

### Example 1

The table shows the heights of 15 people in a class, ranked from tallest to shortest.

Height (cm)	Rank
182	1
180	2
179	3
178	4
176	5
175	6
172	7
170	8
168	9
167	10
165	11
164	12
163	13
160	14
157	15

a) Calculate the percentile rank for a person with a height of 176 cm.

$L = 10$     $E = 1$     $n = 15$

$$p = \left( \frac{10 + 0.5(1)}{15} \right) \times 100$$

$$p = \left( \frac{10.5}{15} \right) \times 100$$

$$p = 70$$

$\therefore$  the person who is 176 cm tall has a **percentile rank of 70**.

That means that he/she is in the **70<sup>th</sup> percentile**.

**Seventy percent of the people are shorter than that person.**

b) Which score/height is in the 25<sup>th</sup> percentile?

$p = 25$     $n = 15$

$$\frac{n \times p}{100} = \frac{15 \times 25}{100}$$

$$= \frac{375}{100} = 3.75$$

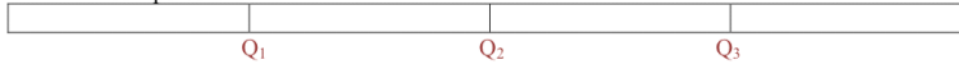
Round **up** to next whole number. Round up to 4. (Even 3.1 would be rounded up to 4)

**Find the fourth lowest score.**

$\therefore$  **164 cm is in the 25<sup>th</sup> percentile.**

**Quartile** is any of 3 numbers that separate a sorted data set into four equal parts.

- The second quartile  $Q_2$  is the median. It cuts the data in half. = 50<sup>th</sup> percentile
- The first quartile or lowest quartile  $Q_1$  is the middle of the lower half of the data. It separates the lowest 25%. = 25<sup>th</sup> percentile
- The third quartile is the middle of the upper half of the data. It separates the highest 25%. = 75<sup>th</sup> percentile.



### Example 2

Here are the hourly pay rates in dollars for 17 high school students.

11.5	10.2	8	8.25	9	9.15
9.75	7.5	8	12.5	13	11.25
10.75	9.5	9.25	9.45	7.75	

a) What are the quartiles for this data set?

13
12.5
11.5
11.25
10.75
10.2
9.75
9.5
9.45
9.25
9.15
9
8.25
8
8
7.75
7.5

→ For third quartile,  $(11.25 + 10.75) / 2 = 11$  \$11/hr

← Second Quartile = Median = \$9.45/hr

→ For First Quartile,  $(8 + 8.25) / 2 = 8.125$  or about \$8.13/hr

b) Dave's pay is in the 85<sup>th</sup> percentile for this group. What does the percentile mean?  
What is Dave's hourly pay rate?

85% of the students are paid a lower hourly rate than Dave.

$$n \times p \div 100$$

$$= 17 \times 85 \div 100$$

$$= 14.45$$

Select the 15th lowest piece of data.

Therefore, Dave is making \$11.50/hr if he is in the 85<sup>th</sup> percentile.

Practice: Pg 205-211 # 1ace, 2ace, 3, 5, 7, 10, 11 ac (✓ Answers Pg 549)