

## INTRODUCTION TO A-LEVEL STATISTICS

Statistics deals with;

- (a) Collection of data
- (b) Representation of the data
- (c) Analysis of the data
- (d) Interpretation of the data.

### Common terms used.

1. **Population:** This is the totality of all observable units of interest. E.g All Senior five students at Gayaza High School.
2. **Sample:** This is the subset of the population on which the study is done. Thus several samples of equal members can be drawn from a population. E.g Samples of five students can be drawn from the class of Senior five students at Gayaza High School.
3. **Parameter:** This is the numerical value, usually unknown used to describe the characteristics of the population, e.g the Population mean, Population median, Population variance e.t.c. However this value is a single fixed value.
4. **Statistic:** This is a numerical value used to describe the characteristics of a sample. It varies from sample to sample even when the samples may be from the same population. E.g Sample mean, Sample median, Sample variance. It is usually used to estimate the unknown parameters of a population.

### Categories of statistics.

1. **Descriptive statistics.** This involves data collection, data organisation and representation, description of data to give meaningful information.
2. **Inferential statistics.** This is the analysis of the data from the samples to predict information about the population.

**Reference:** [http://www.stats.gla.ac.uk/steps/glossary/basic\\_definitions.html](http://www.stats.gla.ac.uk/steps/glossary/basic_definitions.html)

### LESSON ONE:

**ACTIVITY:** Gayaza High School has set up a community garden where the pupils are taught good farming methods after their primary leaving examinations. <http://feedthechild.wordpress.com>

The garden has 30 small gardens in form of plots with a variety of vegetables growing.

A group of Senior five girls 2014 from Gayaza High School visited this community garden with the following instructions;

- (a) Working in teams of five take a sample of 5 plots of land and describe the type of vegetables growing in each plot. Count the number of plants in each plot
- (b) If the plants in your selected plot have fruits growing count the number of fruits you can see having a reasonable size within the plot.



Findings from one of the students;

Plot number	Description of Vegetable	Number of plants	Total number of fruits
1	Garden eggs	21	240
2	Cabbages	21	21
3	Egg plant	27	210
4	Beetroot	20	20
5	Carrots	12	12

**Exercise:**

1. Calculate the average number of fruits per plant in each plot.
2. Calculate the average number of fruits per plot in this community garden.
3. If the selling price per fruit is given as follows; An Egg plant fruit -Sh.100, Cabbage- Sh 1,500, Garden egg fruit-Sh.50, Carrot-Sh.150 and Beetroot-Sh.500. Calculate the expected revenue from each of the plots and the total revenue for the community garden.

**LESSON TWO:**

**Activity:** Senior Five students from Gayaza High School visited one of the farmers in a nearby village (Kiteezi) and they were trained in proper management of a Banana Plantation. They were also able to see the other farming activities that relate directly to the Banana growing industry.



They later on visited a proper banana plantation and carried out practical data collection as per the questions below.

- (a) Working in your groups select a sample of five banana plants and measure their diameter at the height position of the shortest member of the group.
- (b) Repeat the procedure in (1) above for 4 other samples.
- (c) How many plants are you going to work with?

Sample results from one of the groups:

Sample	Results(cm)
1	45,15,13,25,20
2	28,19,23,12,17
3	35,26,18,16,29

Sample	Results(cm)
4	38,16,24,15,32
5	25,24,26,37,28



Exercise: Using the data collected above;

- (1) Calculate the sample mean diameter for each set of values.
- (2) Calculate the sample median values and sample variances of the diameter in each set of values.
- (3) Construct a frequency table to represent the data above using classes; 10- <15, 15- <20, 20- <25, 25- <30, 30- <40, 40- 45. Draw a pie chart to represent this information.
- (4) Calculate the mean diameter of all the plants sampled in the garden.
- (5) Calculate the median, mode and the standard deviation of the data collected.
- (6) State the range within which the average diameter of a banana plantation lies within this garden.
- (7) Construct a Histogram showing the diameter of the banana plants sampled and use it to estimate the modal diameter. Superimpose a frequency polygon onto the Histogram.
- (8) Construct a Cumulative distribution curve (Ogive ) and use it to estimate the median diameter.
- (9) Use the Ogive to estimate;
  - (a) the percentage number of plants within the middle 75% of the distribution.
  - (b) the semi-interquartile range of the distribution.

**Sampling distribution:**

- (10) Using the sample mean values obtained in (1) above construct a frequency table (with no classes) of the distribution obtained. Use this distribution to calculate the mean of sample means and variance of the sample means.

Look out for lesson three from <http://etutoring.gayazahs.sc.ug>

Details of the visit to the farmer will be found at <http://www.gayazahs.sc.ug> .