Orientation to LFSC

Scope

Skills required for every test or exam

Skill	Key point
Drawing a: **•Line graph** **•Bar graph** **•Histogram** **•Pie chart**	• The caption must have ***two variables*** as stated on the axes. • Scale: **Equal spaces** between units on axes which are in chronological order **Equal width** of the bars and between bars • Labelling of axes with **units** • Pie graph must show calculations and a *compass & protractor* must be used No marks will be given for a pie chart drawn in free hand.
Drawing a: **Table** **Diagram with labels**	• **Table must be drawn** with clear columns and related items must be compared • Drawings must be in **pencil** with a definite **heading/caption** and label lines must point to the exact part and the labels written in pen (Remember that a heading *cannot* be A DIAGRAM SHOWING THE RESULTS) Be specific as to what the drawing is.
Answering: **Scientific investigative questions**	• Use the Aim of the investigation to determine the dependent and independent variables which is not always the same as the labels on a graph or table • Reliability – repeat the investigation and increase the sample size must be linked to the investigation (eg. Sample- 20 people were used or use more than 20 people/ repeat- the investigation was conducted for three weeks or do the investigation for more than three weeks • Validity – keep the variables constant(e.g., same age, gender, environmental conditions etc.) the word same must be included • Control – to compare results and ensure that the results are due to the factor that is tested • Difference between the experiment and the control. With the control you eliminate the factor that you test. With the experiment you provide the factor you test
Do calculations	Simple calculations • Percentage • Average • Percentage increase or decrease Formula: $\frac{\text{Final value – Initial value}}{\text{Initial value}} \times 100$ (always multiply by 100 when calculating percentage) •Convert calculations to a description

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Graphs Notes

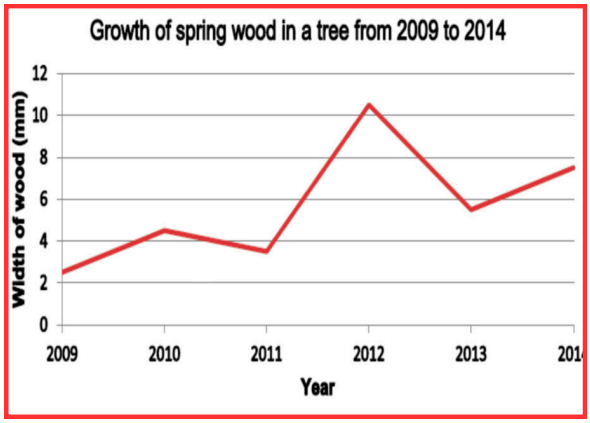
know the difference between a line graph, bar graph, histogram and a pie chart.

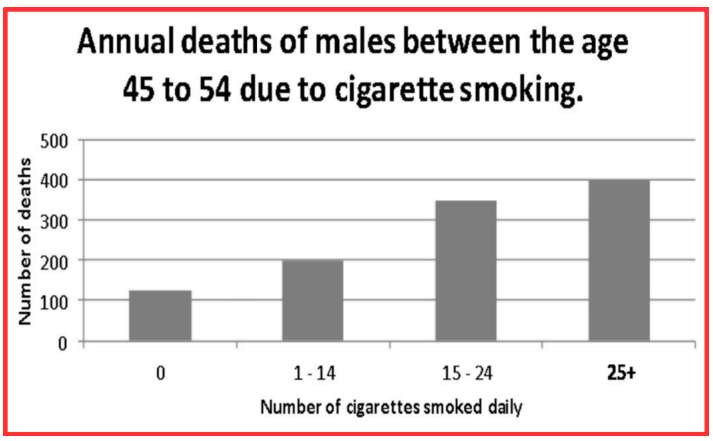
All graphs require a **caption(C)** - with both variables included in the axes.
Label(L) in full and include units like (cm/%)
Draw with a pencil and write with a pen

Line graph

Line graphs show the relationship between two types of information where the independent variable is continuous.

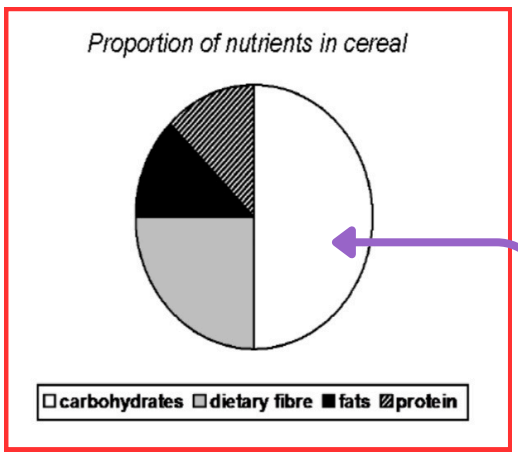
Scale (S) - correct scale for x&y axis - equal spaces between units. Units start from zero and are in chronological order ✅
Plotting (P) - All points plotted correctly ✅✅





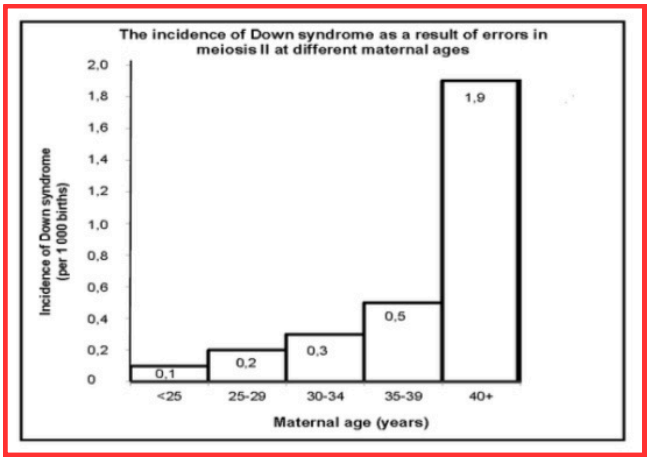
Histogram

Histograms have connected bars displaying continuous data.
Scale (S) - correct scale for x&y axis - Units on y-axis start from zero and are in chronological order - bars of equal width ✅
Plotting (P) - All bars plotted correctly ✅✅



Bar graph

Bar graphs show different categories of data and are used when the independent variable is not a set of continuous numbers or continuous groups (discontinuous data).
Scale (S) - correct scale for x&y axis - equal spaces between Bars. Units on y-axis start from zero and are in chronological order - bars of equal width ✅
Plotting (P) - All bars plotted correctly ✅✅



Pie chart

Pie charts are circular charts used to compare parts of the whole.

Use a compass to draw your circle & A protractor to plot your points.

Show calculations even when not asked to!

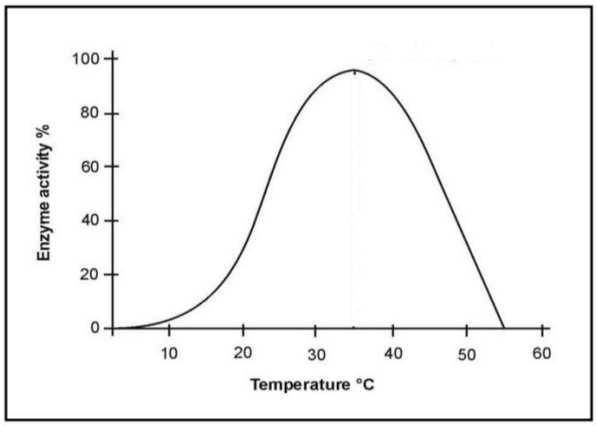
Multiply by 360° each time for each value
E.g. 25/50 x 360° = 180°

Scientific investigative skills Notes

Aim

Starts with 'to Investigate'...
e.g To investigate the **effect** of **temperature** on **enzyme activity**.

2.2 Study the following graph showing the results of an experiment conducted by Lerato to determine the effect of temperature on enzyme activity in an alkaline medium



Formulating a hypothesis

<u>*Use the aim to identify variables*</u> and state the <u>*relationship between the variables*</u>.
Always start with the independent. A hypothesis answers an investigative question.
e.g An increase in Temperature results to an increase in enzyme activity

Varibles

Independent variable: Manipulated by the investigator. Found on x-axis. e.g Temperature
Dependent variable: Measured. Changes when the independent is manipulated. Found on y-axis. E.g Enzyme activity
Controlled variable: Any other factor that can affect the dependent variable. Kept the same so that only the independent variable is tested. E.g Same pH, Same amount of enzyme used, Same amount of chicken liver

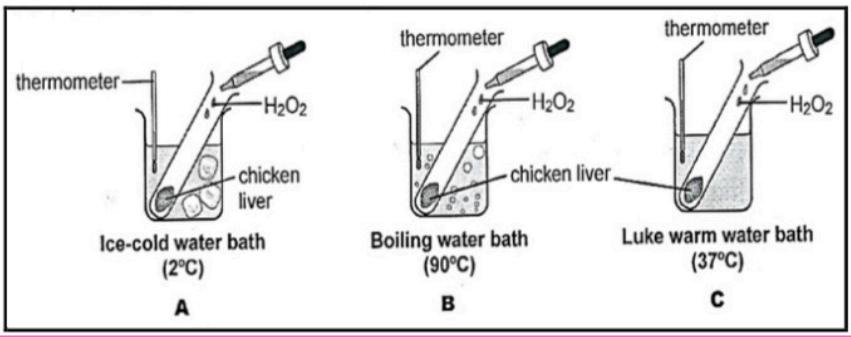
The control

A second set up in the investigation that allows a <u>comparison</u> with the results of the experiment. The control is identical to the experiment except that it excludes the variable that is being tested.

Reliability

- Repeating the investigation
- Increasing size of sample
- Calculating the average
- Randomly selecting the sample

2.1.2 An experiment was conducted to determine the effects of different temperatures on the action of the enzyme catalase, found in raw chicken livers. The apparatus was set-up as shown below.



Validity

- keeping all other factors constant
- identifying the controlled variables

Conclusion

Link to hypothesis, accept or reject it. Then state the correct one.

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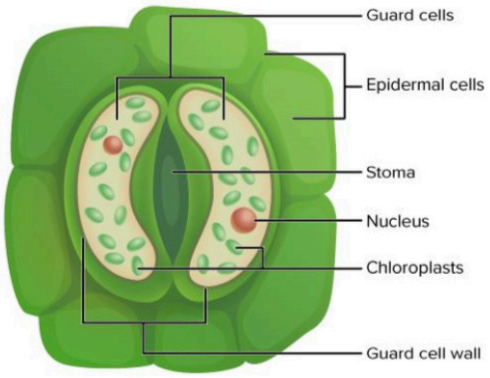
Drawing skills

Diagrams

You should know the relationship between structures & their functions



Different structures (cells, tissues, organs and systems) perform specific functions e.g. the epidermal cells of a leaf allow gaseous exchange to occur in a leaf.

Biological drawing

<u>Use the following basic guidelines when you make drawings:</u>

- drawings must be in pencil and label them in blue ink.
- Draw sharp, clear and solid lines.(no sketching or shading)
- appropriate sized drawing & clearly label structures(lower case)
- Label lines must be drawn with a ruler and they must not cross
- Label lines must point to the exact labelled part
- A drawing must have an appropriate heading (underlined)
- Annotated diagrams have labels and functions or labels and descriptions of the structures.

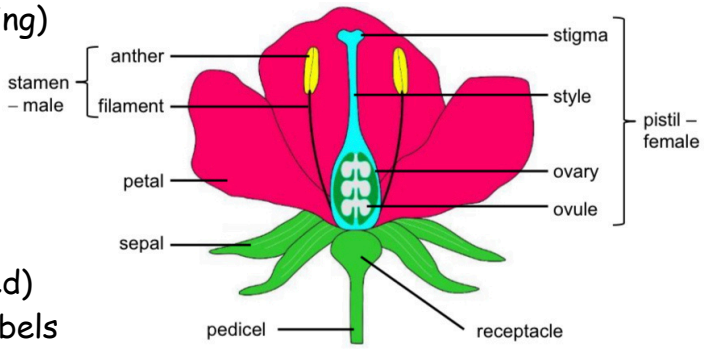


Figure 9: A longitudinal section through a typical dicotyledonous flower

Tables

<u>Scientific data can be presented in the form of a table.</u>

- Tables are used to record the results of an investigation
- A table must have an appropriate heading which includes the variables that are in the table
- The heading must be underlined.
- A table is divided into rows and columns
- Each column and row may have its own heading with units if applicable.
- The independent variable is normally in the left-hand column
- The dependent variable is normally in the right-hand column
- Table must have a frame or border (drawn in pencil and with a ruler)

Number of children born with sickle cell disease in some regions in a particular year

REGION	NUMBER OF CHILDREN BORN WITH SICKLE CELL DISEASE
Democratic Republic of Congo	39 746
USA	90 128
Nigeria	91 011

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Calculations

Average

To calculate the **average**: Add together the set of quantities and then divide by the number of quantities that were added.

The average of 2, 4, 6 and 8

$$2 + 4 + 6 + 8 = 20 = \frac{20}{4} = 5 \; is \; the \; average$$

Percentage

Percents are all calculated with the same basic formula using the amount of the "part" and the amount of the "whole". Note that the percent will always be less than or equal to 100% because the "part" must be less than or equal to the "whole".

$$\text{Percentage} = \frac{part}{whole} \; x \; 100$$

Percentage increase/decrease

Shows the percentage in which a value increases or decreases from the initial starting value.

$$\%\; increase \; or \; decrease = \frac{difference}{first} \; x \; 100$$

Ratio

Understand ration allows us to easily compare separate quantities.

A colon separates one Quantity from another.

X : Y ← X and y stand for the quantities of each thing

Magnification

1. **Total magnification** = eyepiece magnification x objective lens magnification

2. Magnification of an image is calculated using the following equation:

$$\text{Magnification} = \frac{Drawing \; size}{Actual \; size}$$

3. Size of a specimen:

$$\text{Actual length of specimen} = \frac{\text{measured length of specimen x length on scale}}{\text{measured length on scale}}$$

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