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Peter Preethlall, Sagie Pillay and Karoline Hanks
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Study & Master

Study Guide 10

Life Sciences

Peter Preethlall ● Sagie Pillay ● Karoline Hanks

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Introducing the Grade 10 Life Sciences study guide

This study guide is designed to help you to understand the content of the Grade 10 Life Sciences curriculum and to be able to pass your exams successfully. Life Sciences is the study of life in the natural and human-made environment. Life Sciences focuses on an understanding of the basic life processes and how the living and physical world interact and are dependent on each other. To be successful in studying Life Sciences, you need to understand the processes of scientific enquiry, problem-solving, critical thinking and how to apply your knowledge. The subject of Life Sciences draws on disciplines such as botany, zoology, genetics and physiology.

Outcomes-based education

When you study Life Sciences, as with every other subject you study, you are working with learning outcomes and assessment standards that give you a framework for what you should know and how you should be able to apply that knowledge. The content within Life Sciences is constructed and applied within four knowledge areas: tissues, cells and molecular studies; structures and control of processes in basic life systems; environmental studies; and diversity, change and continuity. This study guide is arranged to cover these knowledge areas and to cover the learning outcomes and assessment standards that are necessary for you to succeed in Life Sciences in Grade 10.

During your study of Life Sciences, you are expected to develop the following abilities, called Learning Outcomes:

- scientific enquiry and problem-solving skills
- construction and application of Life Sciences knowledge
- develop an understanding of the interrelationship between Life Sciences, technology, the environment and society.

These abilities should not be seen as isolated items. Within each learning outcome there are standards called critical outcomes and developmental outcomes. For example, when you are developing your scientific enquiry and problem-solving skills, you are learning to:

- solve problems, make decisions and think rationally
- collect, analyse, organise and critically evaluate information
- communicate effectively, using visual aids and language.

Other critical outcomes that you will develop during the construction and application of Life Sciences knowledge and while understanding the interrelationship between Life Sciences and the rest of society, include:

- working as a team
- using science and technology responsibly towards the environment and other people.

Using this book

This book is written in a way that should be easy for you to understand and to help you to come to grips with the requirements of the curriculum.

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Introduction

You should use this book for independent self-study, along with your normal Life Sciences text book and any other reference material that you have used in class or at home.

Self-study is important because it will help you to develop a greater sense of responsibility, more self-discipline and greater self-motivation.

The best way to use this book is to:

- Carefully read each module and the units within it.
- Summarise the information that is contained in the modules in point form for each topic. You can do this with material that you dealt with in class as well.
- Practise drawing diagrams and adding labels in the correct way (see the section on drawings and diagrams for details).
- Check the accuracy of your diagrams and labels by comparing them with the diagrams in this book.
- Answer the questions at the end of each module or unit. Do not read the answers before you have attempted to answer the questions yourself without help.
- Compare your answers with those in the book. This will allow you to immediately see where there are gaps in your knowledge. You need to go back to the relevant sections in this book and in your text book and learn this material again if you cannot answer the questions.
- If you have specific problems that you cannot work out from this book or other reference material, speak to your teacher about these.

Portfolio tips

Your portfolio is a collection of your work that is used to calculate your continuous assessment (CASS) mark. This mark makes up 25% of your total mark in Life Sciences. Continuous Assessment is an integral part of the final assessment for Senior Certificate. This means that you are assessed on an ongoing basis at school by your teacher using various assessment techniques. If you are a full-time candidate, you must have CASS marks for Life Sciences, or your results will not be accepted by the South African Certification Council and you may have to re-write your exams.

A portfolio is a collection of evidence showing that you have done the work. You do not have to spend a lot of money presenting your work. Examples of inexpensive portfolios are:

- stapled sheets of cardboard
- sealed A4 envelopes with the top cut off
- flip files
- lever arch files.

Your work should be neat and well organised. Your teacher will have a record of all the marks you have been awarded against your portfolio, but you must keep this safe and be prepared to present this as evidence of your continuous assessment work.

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Study methods and exam tips

We all have to pass exams in order to progress through the education system and make our way in the world. With the correct preparation and approach, exams need not be a hurdle, but can become a way of showing what you know and also a way to help you organise your knowledge logically.

Study methods

We all have different ways of studying. Some people work hard and consistently all the way through the term and then spend very little time revising for exams. Other people find that they need lots of revision time close to the exam. No one way is right. As you progress through the education system you will work out what is right for you.

But there are some basic tips that are helpful to everyone:
- Find a quiet place to study. If this isn't possible at home, try to use areas of your school during the day or your local library when you cannot use the school premises. Make sure that your study area is well lit and comfortable.
- Sit at a desk! Very few people can study effectively in an arm chair or in bed.
- Let others in the household understand that you need dedicated time to study and that they must not interrupt you unless it is absolutely necessary.
- Work hard, but not so hard that you become over-tired.
- If you play a sport or do regular exercise, don't stop. Just make sure that you fit this in around your studying and not the other way around.
- Do neglect your social life for a while. Relax quietly with music or family rather than going out with friends, which could lead to late nights and poor concentration the next day.
- Get enough sleep. Most people need seven to eight hours a night and you remember better if you are getting enough sleep.

Specific study tips:
- Before you start to revise make sure that you know exactly what material you have to cover for a particular exam. Look at the contents page of this study guide and your other text books. This is the material that you need to cover.
- Gather all your reference material together, including summarised notes, if you have prepared them.
- If you have not prepared summarised notes, now is the time to do so.
- Decide on specific times during the day or evening when you are going to study. Stick to this schedule as far as you can.
- Make a revision time-table.
- Study actively. Don't just sit and try to memorise information. Use notes, concept maps, key words and draw labelled diagrams.

- Test yourself regularly by answering practice questions. Explain concepts to other members of the family. You need to know something well before you can explain it to someone else.
- Take regular breaks. Get up and walk around, preferably outside. Eat frequent snacks to keep your energy levels up. Do not drink too much coffee!

Exam technique

The night before an exam:

- Don't try to cram in final bits of knowledge.
- Gather together everything you will need for the exam the next day such as pens and pencils.
- Make sure that you know the time that the exam starts and where the exam is being held.
- Set your alarm so that you get up in good time, can eat a good breakfast and have plenty of time to get to the exam.
- Get a good night's sleep.

The exam:

- Read the instructions on the paper carefully and take notes of any comments made by the invigilator.
- Read through the whole paper carefully before you start answering questions.
- If there is a choice of questions, put a mark next to the questions that you know you can answer well.
- Note the time allowed for the examination and the number of questions that you have to answer. Divide your time carefully so that you answer the full number of questions that are required. If you leave out questions, you will lose a lot of marks.
- In multiple choice questions, read each question and think carefully before you answer. Do not guess.
- Read short answer and structured questions carefully. Arrange your answers clearly and logically, using notes if you prefer. Do not make vague and unclear statements. Make sure that you answer the question that is asked.
- In questions that allow you a free response or a short essay, take the time to note down the main points that you need to cover. This helps you to remember the material and allows you to organise your thoughts so that you can put the answer down clearly.
- Draw diagrams and graphs clearly and label them correctly. Make them a size that the examiner is going to be able to mark easily.
- Arrange your time so that you have a few minutes at the end of the exam to go through your questions and answers to check them.

Good luck!

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Notes on specific study areas

Questions that involve comprehension and extracting data from other material

These types of questions involve understanding or comprehending the information that is provided in extracts from other textbooks, scientific journals and newspaper and magazine articles. The extracts that you are given in the question are relevant to Life Sciences and its application to everyday life situations. The questions that are set on these extracts assess how well you can understand the information in the extract and how you interpret any data that the extract contains.

These are the important points to note when you are answering a comprehension question:

- Read the extract thoroughly before you look at the questions. Ask yourself if you understand the information that is in the extract.
- If there are words that you do not understand look at how they are used in the extract and see if you can work them out from the context.
- Now look at the questions. All the information that you need to answer the questions will be in the extract that you have been given. Remember this!
- Take each question in turn and go back through the extract to find the answer. You can use the wording in the extract to help you to put your answer together. Remember that the answers to the questions must be based on the information that is in the extract that you have been given.
- Practice answering comprehension questions using the questions in this book.
- If you have trouble constructing sentences in English, use notes for each answer. As long as all the correct information is in your answer, you will get the points that you need.

Drawings and diagrams

Drawings and diagrams are essential in any science and are particularly important in Life Sciences because you use them to interpret what you see. For example, when you look at a specimen under the microscope or when you understand how the human body works. But there are rules about scientific drawings and diagrams. Remember that your drawing or diagram is not a sketch. It is an easy-to-understand representation of what you see.

Rules for drawings and diagrams

There are general rules that you need to follow when doing drawings and constructing diagrams.

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Drawings and diagrams must:

- be drawn in pencil (using a sharp HB pencil to draw clear smooth lines)
- be labelled in ink
- be large enough (at least half of an A4 page) to see all the structures that are in the diagram
- be positioned in the centre of the page
- usually be two-dimensional (i.e. show length and width only)
- not be shaded
- have a heading/caption below them.

The following rules apply to the caption/heading:

- Remember that a biological specimen can be sliced in different ways. This is the section of the part, i.e. whether it is the transverse section (T/S), cross section (C/S), or longitudinal section (L/S).
- The caption should show the source of the diagram, i.e. whether it is from a specimen, a micrograph or a slide.
- The magnification/scale of the drawing should be placed either in the caption or in one corner of the drawing itself.

Label lines must:

- be drawn in with a ruler (not hand-drawn)
- not cross each other
- not have arrows at the end
- touch the part/structure that is labelled
- be on one side of the diagram if there are few labels, otherwise both sides can be used
- be aligned neatly, preferably one label below the other.

The following assessment criteria will be used by teachers and examiners when they are assessing your diagrams:

- shape
- size
- proportion (if the different parts of the diagram are the correct size in relation to the size of the object being shown)
- position of parts
- caption
- magnification/scale
- labels
- neatness.

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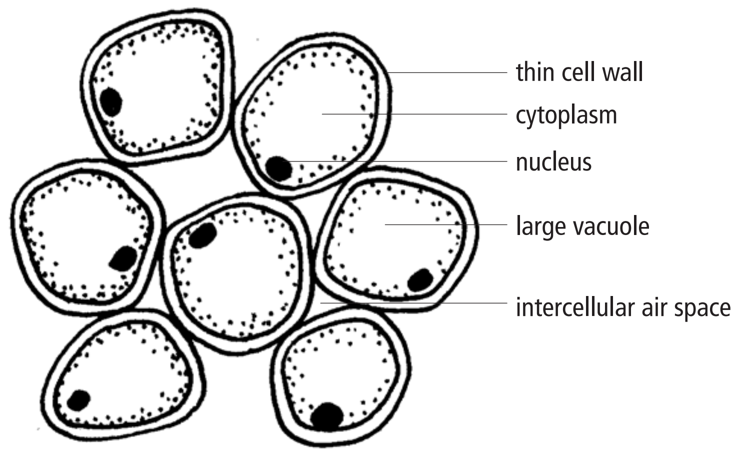

Figure 1 A drawing of a typical parenchyma

Tables

A table is used to organise and present the data that you have collected using as few words as possible. A table is used as a summary of data. A table is a rectangular grid that is divided up into rows and columns. Rows run from left to right across the table.

The shaded area in the table below illustrates a row (made up of three cells).

Columns are the vertical blocks of a table. The shaded area in the table below illustrates a column (made up of four cells).

Tables can be simple (made up of two columns and a few rows) or complex (made up of many columns and many rows).

Tables can be used:

- To record the results of an investigation.
- To illustrate certain patterns/trends, e.g. the growth of a population.
- To compare different organisms/organs and so on.
- To summarise information.
- To provide the data that you will use to construct a line graph, a bar graph or a pie chart.

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A table should have a caption above it to state what type of information it contains. Each column and each row may have its own heading, with units where applicable.

As an example, look at the features of the table shown below (Table 1):

- It has a caption on top of it.
- It has two columns and eight rows.
- Each column has a heading.
- The first column should indicate the independent variable (*x*-axis – position of the lamp).
- The next column (and other columns, if applicable) should indicate the dependent/responding variable (*y*-axis - diameter of the pupil).
- Each piece of information is in a different cell.
- The table has 2 × 8 = 16 cells.

Table 1: The changes in the diameter of the pupil of the eye in response to light of different intensities

Position of the lamp	Diameter of the pupil (mm)
1	1,2
2	1,8
3	2,4
4	3,0
5	3,6
6	4,2
7	4,8

The following checklist or rubric may be used by your teachers and examiners to mark a table that you have put together:

Assessment criteria	1 mark	0 mark
caption		
informative column headings		
informative row headings		
first column: independent variable		
inclusion of units in headings		
no units in body of table		
neatness		
full set of results recorded		

Bar graphs

Bar graphs are used to represent data where the independent variables, that is, the variables on the *x*-axis, are each associated with something different. In other words, the bars on the graph compare different facts or information. The example that you have been given shows the different types of transport that different learners use to reach school. There is no relationship between the different types of transport, so a bar graph is the best way to represent these data.

When you construct a bar graph remember that:

- The bars must be of the same width and must be the same distance apart from each other.
- The bar graph can be presented vertically or horizontally.
- A bar graph must have a heading/caption.
- The independent variable (x-axis) and the dependent variable (y-axis) should each be labelled. Remember to use units if this is necessary.

The following table and the bar graph drawn from the data in the table shows how a bar graph should be drawn.

Example

The following table and bar graph represent the type of transport that various learners in a class use to get to school:

Table 2: Methods used by learners to get to school

Type of transport	No. of learners using this method
Walking	26
Bicycle	2
Taxi	1
Bus	3

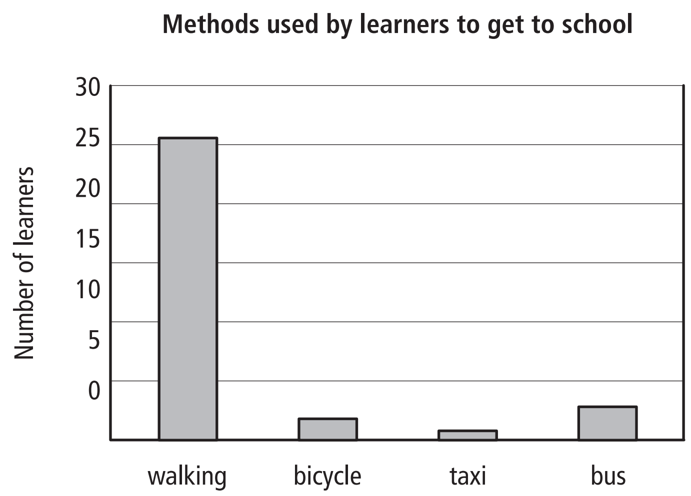

Figure 2 A bar graph showing the methods used by learners to get to school.

Histograms

Histograms are a type of bar graph. A histogram is used to represent data when the independent variable (x-axis) represents groups of information along a continuous scale. Histograms are similar to bar graphs, except that in histograms, there are no spaces between the bars because each bar is showing data that are related to each other in some way, so the bars are continuous (next to each other).

The bars can be drawn horizontally or vertically. When drawing the bars, make sure that they are all of the same width.

A histogram must have a heading. The independent variable (x-axis) and the dependent variable (y-axis) should each be labelled.

The following table and the histogram drawn from the data in the table shows how a histogram should be drawn.

Example
The following table and histogram shows the range of learners' marks in an assignment:

Table 3: Number of learners with a particular %

Range (%)	Number of learners with a particular %
0 – 9	0
10 – 19	0
20 – 29	2
30 – 39	3
40 – 49	4
50 – 59	7
60 – 69	10
70 – 79	6
80 – 89	3
90 – 100	0

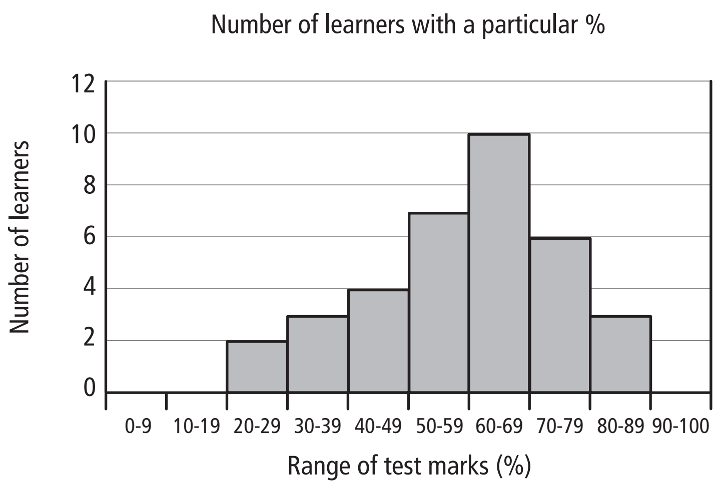

Figure 3 A histogram showing the number of learners with a particular percentage test score.

The following rubric shows the criteria that your teachers and examiners could use to mark bar graphs and histograms.

Assessment criteria used for assessing bar graphs and histograms

Assessment criteria	1 mark	0 marks
correct type of graph		
title/caption of graph		
correct choice and label for *x*-axis		
correct choice and label for *y*-axis		
appropriate units for *x*-axis		
appropriate units for *y*-axis		
appropriate scale for *x*-axis		
appropriate scale for *y*-axis		
bars drawn correctly		

You will lose marks if:

- You draw the wrong type of graph or you draw the bars incorrectly. Remember that a bar graph is used when the data are not related to each other and a histogram is used when the data are related.
- You draw the axes incorrectly. Remember that the *y*-axis is always the vertical axis and the *x*-axis is always the horizontal axis.

Using line graphs

A line graph is used when the relationship between two variables can be represented in a continuous way. An example of a continuous relationship between variables is the effect of temperature on the rate of photosynthesis.

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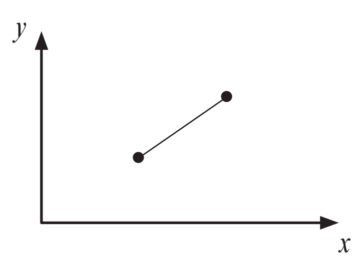
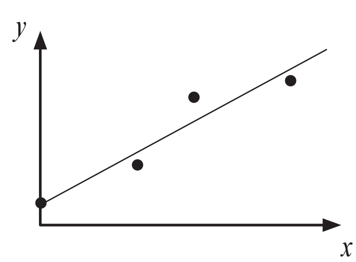
A line graph has the following features:

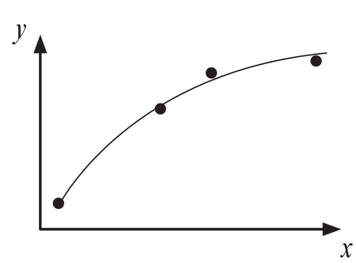
- A horizontal axis called the *x*-axis for the **independent variable** or **manipulated variable**. This represents the variable that is controlled or changed during the investigation to determine what effect it has. This axis must be appropriately labelled with the units, e.g. Temperature (in degrees Centigrade).
- A vertical axis called the *y*-axis for the **dependent variable** or **responding variable**. This is the response that is measured or monitored during the investigation. In other words, it is the variable that reacts or which is measured or calculated. The axis must be appropriately labelled with units, e.g. Number of bubbles of gas produced per minute.
- An appropriate scale to represent data.
  The points plotted should use most of the axis, i.e. the available space. In order to do this you must study the range of readings and then work out the lowest and the highest values for each scale. The scale you choose should always be in a regular sequence, that is, all scale divisions must be equal, e.g. 4 in 4, 8, 12, etc. Each axis must be labelled with the appropriate units and what is shown on each axis. Using the example of the effect of temperature on the rate of photosynthesis: the temperature would be on the *x*-axis – labelled Temperature (°C) and the number of bubbles of gas produced per minute would be on the *y*-axis – labelled Rate of photosynthesis (number of bubbles of gas produced per minute).
- Plotting the points.
  The data that is given in a table is then plotted on the graph. You use the X and Y co-ordinates to plot the points.
- The points are joined.
  A ruler may be used to join points that lie on a straight line.





The points are not usually in an absolutely straight line because of experimental errors and variation. In such cases a line of best fit is drawn. Those points that do not fit should be distributed fairly evenly on either side of the line.

If the points appear to be following a curved pattern, then carefully draw a curve by joining all the points. Do not draw short interrupted lines.



Only begin the graph at 0 when there are values for 0. If there are no values for 0 then start the graph at the first plotted point.

- Title of graph.
  Each graph must have a clear, descriptive title showing the relationship between the variables. For example, “The effect of temperature on the rate of photosynthesis”.
- Key.
  If more than one graph is drawn on the same set of axes, a key should be included or a dotted and solid line should be used and labelled.

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Reading values off a line graph

When reading information from a graph, use a dotted line that extends from a point on the *x*-axis to the line that you have drawn on the graph. Where this dotted line intersects with the line on the graph, draw a broken line down to the *y*-axis and read the value at this point where the dotted line touches the *y*-axis.

Example
Using the graph below, determine how long it took for the plant to release 30 bubbles.

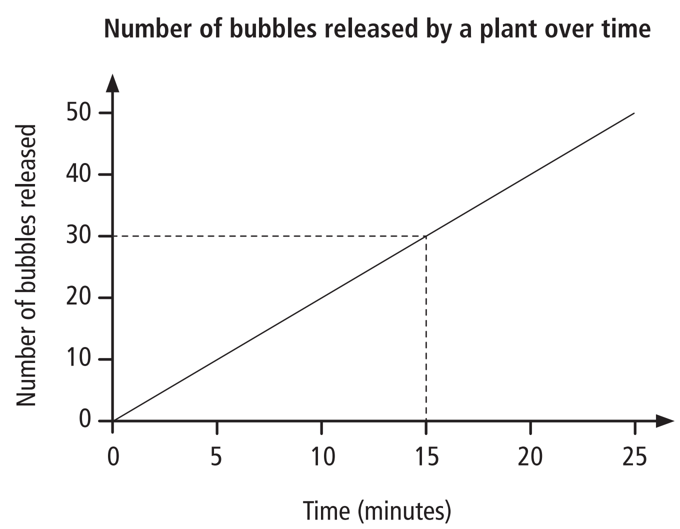

Figure 4 Line graph showing the relationship between number of bubbles released by a plant and time.

Your reading shows that it took 15 minutes for the plant to release 30 bubbles of gas.

Your teachers and examiners will use the following criteria to assess how you have drawn a line graph:

Assessment criteria	1 mark	0 marks
correct type of graph		
title of graph		
correct choice and label for *x*-axis		
correct choice and label for *y*-axis		
correct units for *x*-axis		
correct units for *y*-axis		
appropriate scale for *x*-axis (constant intervals)		
appropriate scale for *y*-axis (constant intervals)		
points plotted correctly		
all plotted points joined correctly		

Pie charts

A pie chart shows data as a percentage or as a relative proportion of the total of a circle. You draw a pie chart by dividing a circle into sectors/slices (think of a pizza) to represent each item as a percentage of the whole. A complete circle represents the whole or 100%, a half circle represents 50%, and so on.

First calculate the percentages that you will use for each slice. You can then calculate the angle of each of the slices using the following formula (remember that there are 360° in a circle):

$$a = \frac{v \times 360}{t}$$

where:
a is the angle of the slice/vector
v is the amount of the variable
t is the total (100 in the case of percentage).

Example
In an ecosystem, 41 insects (ants, butterflies, and so on), two lizards, three spiders and four birds were counted. This gives a total of 50 animals. Use a pie chart to represent the percentage of each type of animal present in the ecosystem.

Using the above formula the percentage and degrees have been worked out and recorded in the table below:

Animals	%	Sector/slice
Insects	$\frac{41 \times 100}{50} = 82\%$	$\frac{82 \times 60}{100} = 295{,}2°$
Reptiles	$\frac{2 \times 100}{50} = 4\%$	$\frac{4 \times 360}{100} = 14{,}4°$
Arachnids	$\frac{3 \times 100}{50} = 6\%$	$\frac{6 \times 360}{100} = 21{,}6°$
Birds	$\frac{4 \times 100}{50} = 8\%$	$\frac{8 \times 360}{100} = 28{,}8°$

Constructing the pie chart:
1. A compass may be used to draw the circle and a protractor may be used to construct accurate angles for each sector or slice.
2. Begin with the largest angle/percentage starting at 12 o'clock. In the example above: insects 295,2° or 82%, then the next largest and so on.
3. Shade and label each slice and/or provide a suitable key. For example:

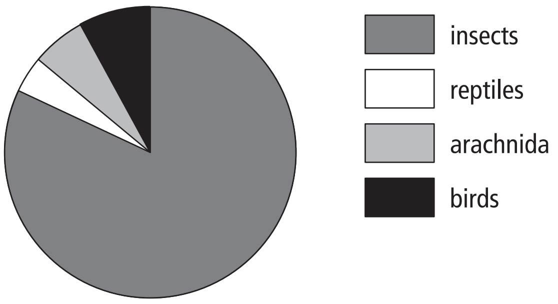

Figure 5 Pie chart showing the percentage of each animal type present in the ecosystem.

Your teachers and examiners may use the following criteria to assess your pie chart.

Assessment criteria	1 mark	0 marks
correct type of graph		
suitable heading		
appropriate labels/key		
calculating % of each sector/slice		
calculating degrees of each sector/slice		
sectors/slices drawn correctly		

Mathematical skills in Life Sciences

Mathematical skills are an important part of Life Sciences.

Scales

Scales are used to determine the actual size of an object that is reduced in size in a diagram, for example, calculating the width of the stomach in Figure 6. You are expected to measure the width of the stomach and then multiply this by the scale given in the diagram. For example, if the width of A in Figure 6 is
13 mm, then the actual width is 13 × 5 which is equal to 65 mm (because the scale is $\frac{1}{5}$).

Scales are also used to determine the actual size of a drawing/diagram of some organism/organelle that is microscopic, for example calculating the actual length of a microscopic bacterial cell. You need to measure the length using a ruler and then divide this figure by the magnification indicated below or in the drawing.

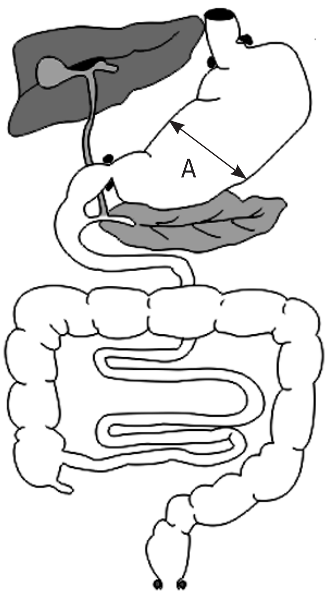

Figure 6 Part of the human digestive system. Scale of drawing: $\times \frac{1}{5}$

Averages

To find the average you find the sum of all the items and divide this total by the number of items.

Example
In a class of 10 learners, the following marks were obtained in a test:
85, 54, 67, 90, 95, 80, 60, 50, 35, 40.
Total = 656 (Add all ten figures)

$$\text{Average} = \frac{656}{10} = 65{,}6$$

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Formulae

A formula is used in certain types of calculation. In Mathematics you learnt to substitute numbers into a formula. Exactly the same procedure is used when using formulae in other subjects.

Example 1

Simple sampling:

Estimated total number of individuals in a population

$$= \text{number of individuals in sampling area} \times \frac{\text{habitat size}}{\text{sample size}}$$

Example 2

Mark-recapture experiments:

$$N = \frac{C \times M}{R}$$

where:

N = estimated population size
C = total number of individuals captured
M = total number of marked individuals
R = total number of marked individuals recaptured

Hypothesis testing investigations

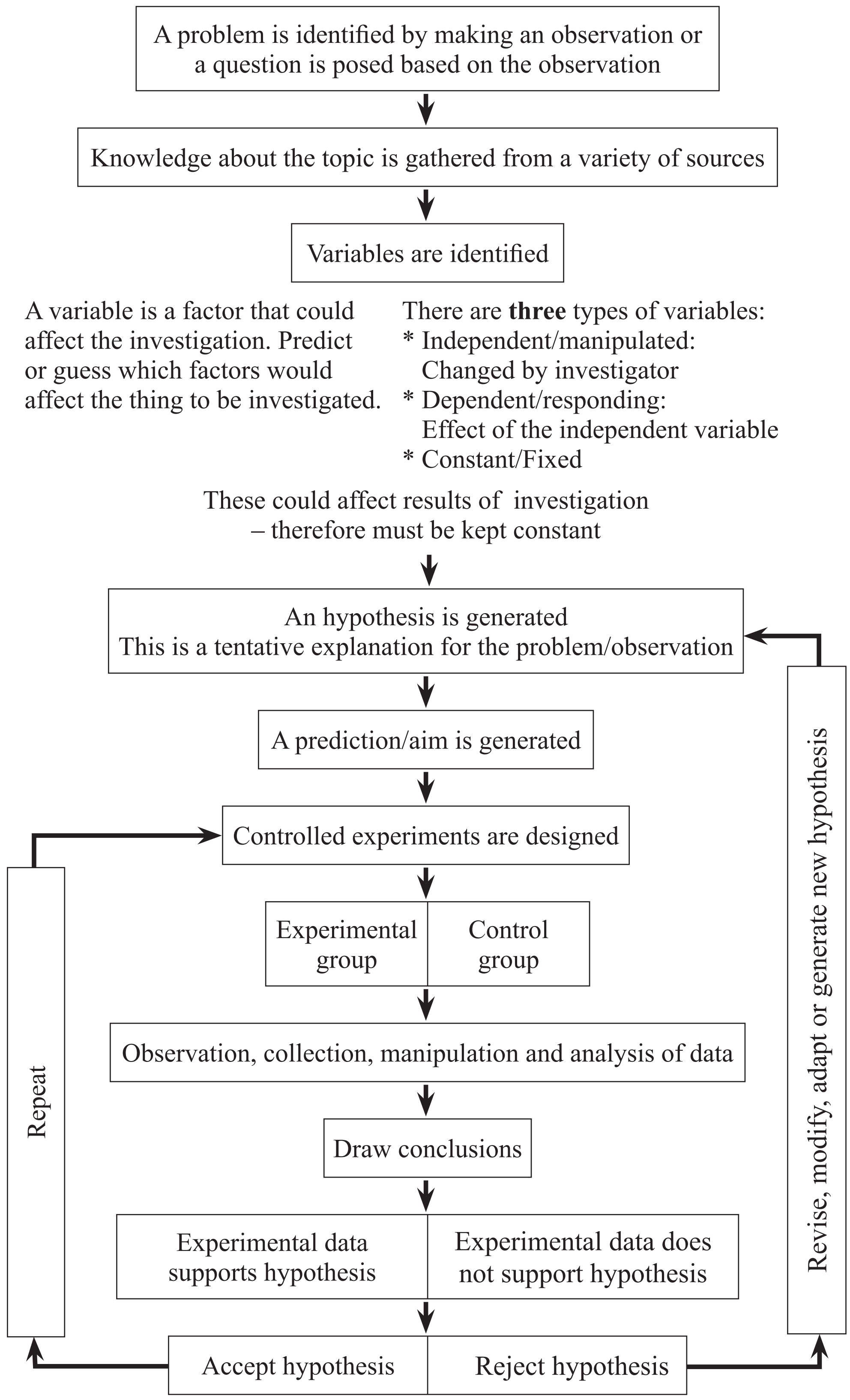
Introduction

Investigations in Life Sciences, and indeed in any science, do not claim to prove that a particular phenomenon occurs. The most an investigation can claim is that the results do not disprove the prediction or proposal. This prediction or proposal is usually called a hypothesis. This inability to "prove" that a particular hypothesis is "true" is a feature of many scientific investigations. One way that science progresses is by putting forward a hypothesis, making predictions from the hypothesis and then testing these predictions by experimentation. A hypothesis is an attempt to explain some event or observation using whatever information is currently available. The hypothesis is rejected or altered if the results of the experiment do not confirm the predictions.

To test hypotheses in Life Sciences, you follow the scientific method. This is a step-by-step approach that is summarised in the flow chart on the next page.

You can use the flow chart for a project, a hands-on practical, or a test or an examination question. Following the procedure as indicated below in different contexts will help you to understand the principles that underlie scientific investigations.

SUMMARY OF THE SCIENTIFIC METHOD



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Doing a survey to collect data for an investigation

Surveys are often used in the new Life Sciences curriculum. You collect data in a survey either through an interview or by administering a questionnaire. For these activities to be successful and to be of a high scientific standard, you need to know when and why such surveys are done and also the way that the questions in the questionnaires and interviews are put together.
Structured questionnaires are used for gathering data in the following types of situations:

- To gain **knowledge** about the understanding of some phenomenon within a community, e.g. the spread of tuberculosis (TB).
- To investigate the **opinions**, **beliefs** and **attitudes** of people, e.g. towards HIV/AIDS.
- To investigate the **behaviour** of, e.g. teenagers - how often they visit a library.

Part 1: Designing the questionnaire

Step 1

- Determine what information you want to gather. In order to do this you need to refer back to the steps of the scientific method.
- Formulate the question to be investigated so that it is clear and without any ambiguities. Again, refer to the steps in the scientific method.
- Next you must identify the variable/s and translate these into questions.
- As an introduction to the questionnaire, thank the subjects (people responding) for taking the time to answer the questions, briefly explain the purpose of the survey, give clear instructions on how to complete the questionnaire, and set a return date for collection or an address to which the questionnaire must be sent.
- The layout and sequence of the questions must be user-friendly. Begin with shorter, easier and more interesting questions so that the subject (person responding) is not put off completing the questionnaire.
- The subject (person responding) must always be kept in mind. The language level and vocabulary must be at a level that they will understand.
- Each question must be specific and simple to understand.
- Avoid too many open-ended questions because these are more difficult to analyse because they are subjective.

Step 2

The questionnaire must be tested on a few people to see if there are any problems, such as repetition and ambiguity in the questions. The people chosen to test the questionnaire must be similar to those to whom the questionnaire will be administered.

Part 2: Choosing your sample population
A questionnaire will never be given to a whole population. You will decide on a sample of the population and give the questionnaire to people within this sample.

The choice of sample should be:
- representative of the population you are targeting
- large enough for the results to be reliable
- often randomly selected, although structured sampling is also used, for example, if you want to look at people between certain ages or of a specific gender.

Part 3: Administering the questionnaire
The questionnaire:
- must be introduced to all participants in the same way without any additional information that may influence the responses of the subjects
- you should not be judgemental about the responses but rather accept people's answers to the questions.

Part 4: Collecting, recording and analysing the data
This is where you will notice how important it is to provide questions that do not have an open ended answer. For example, you could have questions that require a yes or a no, or that ask people to chose from a set list of responses. These responses can then be scored mathematically, for example, 0 for yes or 1 for no. If you have a range of choices, each choice can have a number. You can then record the number of people who responded in a specific way. This allows you to record your responses in a table and to analyse your results mathematically.
- Collect all the questionnaires that you have given out.
- Work out how many people in your sample have filled them in completely.
- Record the responses to each question using a table.
- It is appropriate to analyse the data mathematically because in this form it is objective, thus reducing biases and subjectivity.
- The mean (average), median (middle score of a group from highest to lowest) and the mode (most frequently occurring number in a sequence) is often used in analysing results of an investigations before conclusions are drawn.
- In addition, the results may be presented in the form of graphs and/or diagrams to identify trends.

Part 5: Presenting your findings
- A written report is compiled.
- A verbal presentation can be given.
- Posters and/or slide shows may be developed to enhance the presentations.