GRADE 7 NATURAL SCIENCES
TERM ONE: LIFE AND LIVING

CONTENTS
TOPIC 1 – THE BIOSPHERE
## Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where are living things found?</td>
<td>5</td>
</tr>
<tr>
<td>Identifying areas where life is found</td>
<td>6</td>
</tr>
<tr>
<td>Activity 1</td>
<td>6</td>
</tr>
<tr>
<td>The Biosphere</td>
<td>6</td>
</tr>
<tr>
<td>Life in the Biosphere</td>
<td>7</td>
</tr>
<tr>
<td>Lithosphere</td>
<td>7</td>
</tr>
<tr>
<td>Hydrosphere</td>
<td>8</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>8</td>
</tr>
<tr>
<td>Activity 2</td>
<td>8</td>
</tr>
<tr>
<td>The Seven Life Processes</td>
<td>9</td>
</tr>
<tr>
<td>Activity 3: Experiment</td>
<td>9</td>
</tr>
<tr>
<td>Requirements for life</td>
<td>11</td>
</tr>
<tr>
<td>Topic 2: Biodiversity</td>
<td>12</td>
</tr>
<tr>
<td>Activity 4</td>
<td>14</td>
</tr>
<tr>
<td>MNEMONIC - TO REMEMBER THE CLASSIFICATION LEVELS</td>
<td>15</td>
</tr>
<tr>
<td>Differences between plants and animals</td>
<td>16</td>
</tr>
<tr>
<td>Activity 5(a)</td>
<td>16</td>
</tr>
<tr>
<td>Classification</td>
<td>16</td>
</tr>
<tr>
<td>Classification of vertebrates and invertebrates</td>
<td>17</td>
</tr>
<tr>
<td>Vertebrates</td>
<td>17</td>
</tr>
<tr>
<td>Invertebrates</td>
<td>17</td>
</tr>
<tr>
<td>Vertebrates - Classification</td>
<td>17</td>
</tr>
<tr>
<td>Refresher: Activity 5(b)</td>
<td>17</td>
</tr>
<tr>
<td>Fish (Osteichthyes - pronounced as os-tay-yek-thies)</td>
<td>18</td>
</tr>
<tr>
<td>Amphibians</td>
<td>18</td>
</tr>
<tr>
<td>Reptiles</td>
<td>18</td>
</tr>
<tr>
<td>Birds</td>
<td>18</td>
</tr>
<tr>
<td>Mammals</td>
<td>19</td>
</tr>
<tr>
<td>Activity 6</td>
<td>19</td>
</tr>
</tbody>
</table>
Invertebrates....................................................................................................... 20
Arthropods.......................................................................................................... 20
Insects............................................................................................................... 20
Arachnids ......................................................................................................... 21
Crustaceans ....................................................................................................... 21
Molluscs ........................................................................................................... 22
Activity 7 ........................................................................................................... 23
Diversity of Plants................................................................................................. 24
Gymnosperms ...................................................................................................... 25
Angiosperms (angi - enclosed, sperma - seed) ............................................................... 25
Monocotyledons .................................................................................................... 26
Dicotyledons ....................................................................................................... 27
Activity 8: Test yourself.......................................................................................... 28
Topic 3: Plant and human reproduction................................................................. 29
Sexual reproduction in Angiosperms ........................................................................... 29
Seeds and flowers .............................................................................................. 29
Components of a flower ....................................................................................... 29
Activity 9: Identify the parts and functions of a flower .................................................... 30
Pollination ....................................................................................................... 30
Activity 10 .......................................................................................................... 31
Fertilisation and fruit/seed dispersal ....................................................................... 32
Fruit and seed dispersal ....................................................................................... 33
Activity 11 .......................................................................................................... 34
Sexual reproduction in humans ................................................................................. 35
Activity 12 .......................................................................................................... 36
Reproductive Organs .............................................................................................. 37
The male reproductive organ ............................................................................... 37
The female reproductive organ ........................................................................... 37
Activity 13 .......................................................................................................... 38
Fertilisation, pregnancy and menstruation................................................................. 38
Fertilisation and pregnancy ................................................................................... 38
Activity 14 .................................................................................................................. 39
Sexual health and Responsibility ............................................................................... 40
Sexually transmitted diseases (STDs) ........................................................................ 40
HIV and AIDS ........................................................................................................... 40
  Myths about menstruation and sex ....................................................................... 41
Activity 15 ............................................................................................................... 41
Variation within a species ....................................................................................... 42
Activity 16 ............................................................................................................... 43
Where are living things found?

Organisms, or living things, are found in almost every place on Earth’s surface. They are found in the air, in water and on land. In order to survive, organisms need access to water, air, food, space, favourable temperatures and protection from enemies. Organisms can only survive in environments that meet their needs. Organisms are adapted to survive in their specific environment.

KEY WORDS:
- Biosphere – all of the areas on Earth where life exists.
- Decomposers – organisms, such as fungi and bacteria that break down dead plants and animal matter.
- Ecosystem – all of the living things that live in a specific area and the non-living things that make up their environment.
- Species – a group of similar organisms that can mate and produce offspring.
Identifying areas where life is found

Activity 1

Discuss the following questions in groups and write the answers in your workbooks.
1. List at least 5 places where life is found.
2. Name 5 living things that you might expect to find in the different places.
3. Suggest some relationships between the living things shown in the above image.
4. Find the meaning of “adapted” and write down a definition.

The Biosphere

The biosphere\(^1\) is a group of different areas where life exists on earth. The biosphere can be divided into smaller units called ecosystems. An ecosystem can be large or small.

The Biosphere is made up of the atmosphere, hydrosphere and the lithosphere.

\(^1\) Biosphere (say: bye -oh- sfeer) - bio = life and sphere = the shape of the earth
The atmosphere
This is the layer of gases around the earth. These gases are necessary for life on earth.

The hydrosphere
This is made up of all the water on earth. It includes all the rivers, dams, oceans and underground water.

The lithosphere
This is made up of all the rocks and soils on the earth’s crust including the seabed.

Life in the Biosphere
Life is found in all three parts of the biosphere. This includes micro-organisms, plants and animals.

Lithosphere
Many different plants and animals live in the Lithosphere. Some live above the ground and others live underground. Bacteria and micro-organisms, like protozoa, help to break down dead organic material (consisting of plants and animals).
Hydrosphere

Plants such as algae and seaweed live in the hydrosphere. Many animals also live here. Micro-organisms such as plankton and amoeba live here. Bacteria are also present.

Atmosphere

Birds, insects, some other animals and bacteria are found here.

Activity 2

1) Draw the table below in your workbooks.
2) Write the different headings of the spheres.
3) Write down at least two/three living things for plants and animals, you can think of that live in the different spheres:

<table>
<thead>
<tr>
<th></th>
<th>Lithosphere</th>
<th>Hydrosphere</th>
<th>Atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td></td>
<td><strong>Blue</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All living things carry out the following life processes.

1) **Nutrition (Feeding)**
   Most plants make their own food and animals eat plants or other animals.

2) **Growth**
   All living things increase in size as they mature.

3) **Reproduction**
   Living things produce new individuals with the same characteristics as their parents.

4) **Respiration (Breathing)**
   Living things break down food to produce energy.

5) **Excretion**
   Waste substances are removed from the body.

6) **Sensitivity to the environment**
   Living things detect changes or stimuli in the environment and react to them. For example, you may sneeze, to remove dust and germs from your nasal passages.

7) **Movement**
   Animals move from place to place to find food and shelter, or to avoid danger. Plants do not move although they can grow towards the light and the petals of a flower can open and close in response to light.

**Activity 3: Experiment**

AIM: To investigate the requirements of seedlings for growth.

If we had to take 4 similar seedlings and add the following requirements for growth, we would look at the four images, to see what seedlings need to grow and what they are deprived of and then write a hypothesis.

A **hypothesis** is a **statement** explaining what you think will happen in an experiment.
Variables are the things that are different, e.g. no sunlight, too much water, not enough nutrients, etc., that can have an effect on the growth of plants.

INSTRUCTIONS:
1. Write your own hypothesis for this experiment. (2)
2. List the variables that you think will affect this experiment. (3)
3. Predict what you think will happen in the experiment. (1)
4. Write a conclusion for this experiment. Do seedlings need water and light to grow? (2)
5. Suggest ways of improving this experiment. What could we do differently? (2)

Total: 10
Requirements for life

1. **Energy**
Producers make their own food by photosynthesis. Consumers eat plants or animals.

2. **Gases**
78% of the air is made up of Nitrogen. 21% of the air is made up of Oxygen. Less than 1% of the air is made up of Carbon dioxide. Nitrogen is used in the body to make protein (hair, skin, cells, etc). Oxygen is used in the body for respiration. Carbon dioxide is used by plants to photosynthesize.

3. **Water**
Water helps the body to absorb the nutrients in food. It is also needed for photosynthesis.

4. **Soil**
Soil is abiotic (non-living) and is essential for plant growth.

5. **Favourable Temperature**
Not many living organisms can survive in very high or low temperatures.
Biodiversity refers to the large variety of plants, animals and micro-organisms in their habitats. The most widely accepted system of classification divides living organisms into five main groups, called kingdoms.

**Monera:** Organisms in this kingdom are usually single-celled organisms with no nucleus. A nucleus is a cell structure that contains hereditary information or DNA. Plant cells are surrounded by a thick, rigid cell wall and animal cells have a thin layer of cell membrane, called cytoplasm—the jellylike material outside the cell. An example of an organism in this kingdom is bacteria.

**Protista:** Organisms in this kingdom are called protists. They are single-celled and usually move by cilia, flagella, or by amoeboid mechanisms.

**Fungi:** Fungi are multicellular organisms. They have no mechanisms for locomotion. Fungi range in size from microscopic to very large (such as mushrooms). Organisms in this kingdom cannot photosynthesize. They must get their food from the surrounding environment—usually decaying plants and animals.
**Plantae:** Plants are multicellular and most don't move. Nutrients are acquired by photosynthesis. This means that plants require sunlight.

**Animalia:** Animals are multicellular organisms that are usually able to move. They acquire nutrients by eating plants or other animals.

Each of the kingdoms is very large and contains many different types of organisms. The pie chart on the next page shows the approximate number of different organisms in each of the kingdoms.
KEY WORDS:
- Classify – arrange objects in groups based on similar characteristics.
- Taxonomy – branch of science that is concerned with classification.
- Kingdoms – highest category in taxonomic classification.

Activity 4

1) Create a document on your tablet and save it as NS Grade 7 ____ Activity 4.
2) Create a table, in landscape format, with headings for the five kingdoms.
3) Provide a brief definition of each kingdom, under the relevant heading.
4) Look at the pictures below. Classify the organisms according to their kingdoms.

A: lion
B: mushroom
C: amoeba
D: frangipani
E: jellyfish
F: bread mould
G: spirillum
H: lilac breasted roller
I: mouse spider
Within each kingdom, the organisms that belong to it can be classified even further. In total, there are seven levels of classification: Kingdom, Phylum, Class, Order, Family, Genus and Species. To make it easier to remember the Seven (7) level classification system used to group all living organisms, we can use a mnemonic - which is a technique to help you learn a list of words or objects. A mnemonic can use the first letter of each item on the list, in the correct order, to make up a sentence. An example of a mnemonic used to remember the seven classification levels could be:

**EXAMPLE:**

```
Keep Clean
kingdom phylum class
Or Family Gets Sick
order family genus species
```

Work in groups to make up your own mnemonic to remember the seven levels of classification. Think of a number of different mnemonics and then choose the best one. The group will then present the best one to the rest of the class. Do actions with it.
Differences between plants and animals

Differences help distinguish between plants and animals. Differences include:

**Movement** - Plants are only capable of basic movement because they need to be anchored to the soil. Animals can easily change their position and have a much wider range of movement.

**Nutrition** - Plants can make their own food via photosynthesis. Animals need to eat plants and other animals to survive.

**Reproduction** - Plants rely on environmental factors such as wind water and animals to assist in reproduction. Animals reproduce through interaction between male and females.

---

**Activity 5(a)**

1) Draw up a table in your workbook. Add in columns.
2) Identify the basic differences between plants and animals.
3) Concentrate on movement, nutrition and reproduction.
4) Indicate the differences between plants and animals.
5) Design and draw your own image of a plant and animal combined and name the new creature. Use colouring pencils to decorate.

---

**Classification**

A system for classification contains:

Kingdom
Phylum

**KEY WORDS:**

- Cold-blooded – describing organisms that cannot control their body temperature and so take on the temperature of their surroundings.
- External fertilisation – fusion of the egg and the sperm outside the mother’s body.
- Metamorphosis – process of change in some organisms from an immature form to an adult.
Classification of vertebrates and invertebrates

Vertebrates

These animals all have an internal backbone made up of vertebra. They may be warm blooded or cold blooded.

Invertebrates

These animals do not have a backbone and they are all cold blooded.

Vertebrates - Classification

Kingdom: Animals
Phylum: Vertebrates
Class: Mammals, Reptiles, Amphibians, Aves (birds), Fish (osteichthyes /bony fish).

Refresher: Activity 5(b)

Each of the pictures below represents a different class of the Phylum Vertebrates.

A  B  C

D  E
1. Read through the notes, below, and then sort the animals, in the pictures, into their different classes according to their characteristics.

2. List the characteristics that you have thought of for each class. This activity must be done in your workbooks.

**Fish (Osteichthyes – pronounced as os-tay-yek-thies)**

Fish are cold-blooded and live in aquatic ecosystems. They breathe with gills. Fish move through the water with the use of fins and are covered in scales. Fish reproduce by laying many eggs. They live in fresh and salt water. They usually have scales, fins and a tail.

**Amphibians**

Amphibians are cold-blooded and live on land and in water but mainly in damp environments. They breathe through gills when they are tadpoles and when they grow up they breathe through lungs. Frogs use their limbs to jump across land and have webbed feet to move easily through water. Their skin is moist and slimy. Frogs reproduce by laying eggs.

**Reptiles**

Reptiles are cold-blooded and nearly all reptiles are terrestrial. However, turtles and crocodiles are examples of reptiles that spend a lot of time in water. Reptiles breathe with lungs and some even absorb oxygen in water through membranes. Many have limbs that allow them to move quickly and close to the ground while others, like snakes, have no limbs and slither in an S-shape. Reptiles are covered in scales and reproduce by laying eggs.

**Birds**

Birds are warm-blooded and are found in a wide range of habitats. They breathe with their lungs. They have wings, feathers (that cover their bodies) and beaks. Most birds move comfortably through the air by using their wings. Birds reproduce by laying eggs. Most birds are able to fly, although there are some that cannot, even though they have wings.
Mammals

Mammals are warm-blooded and live in a wide range of habitats. Human beings are the only mammals that walk, permanently, upright, on 2 legs. Mammals breathe with their lungs and usually have four limbs. A mammal’s body is covered in fur or hair. The limbs of mammals are adapted to their lifestyle. Some limbs are adapted for walking and running. Dolphins and whales have limbs that have become adapted to work as fins and smooth skins to travel effortlessly through the water. Mammals give birth to live young.

Activity 6

Write the answers on the printed worksheet and then use your tablet to create a page for NS Activity 6 and draw up a table listing the major characteristics that distinguish the five classes of vertebrates. Complete the table by typing in the missing information, in red font.

The first row has been done for you. Don’t forget to save your work. Save it as NS Grade 7 ___ Activity 6.

<table>
<thead>
<tr>
<th>Distinguishing characteristics of the classes of vertebrates</th>
<th>FISH</th>
<th>AMPHIBIANS</th>
<th>REPTILES</th>
<th>BIRDS</th>
<th>MAMMALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of fertilisation</td>
<td>External</td>
<td>External</td>
<td>Internal</td>
<td>Internal</td>
<td>Internal</td>
</tr>
<tr>
<td>Type of body covering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold-blooded or warm-blooded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of reproduction (lays eggs or gives birth to live young)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organs used for breathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number and types of limbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Invertebrates

Kingdom: Animals
Phylum: Invertebrates
Class: Arthropods and Molluscs.

Arthropods

All Arthropods have exoskeletons made from chitin (pronounced as Ki-tin). Their bodies are segmented to allow movement. All arthropods need to moult (shed skin) when they grow. The word arthropod means "jointed legs". Arthropods are classified according to the number of legs they have.

Some general characteristics of all arthropods:

- Their eyes may be simple or compound.
  - Simple eyes - Made up of only 1 lens, see mostly light and dark.
  - Compound eyes - Made up of many lenses, see many small pictures.
- The body may be made up of 2 or 3 parts - Head, thorax and abdomen or Cephalothorax and abdomen (cepha = head) where the head and thorax are joined.
- All have an exoskeleton.
- All have sensory organs- antennae, bristles.

There are 4 classes of arthropods:

Insects - have a hard exoskeleton and body that consists of 3 parts (head, thorax and abdomen). They breathe through a series of tubes and have compound eyes with many lenses. They have 6 legs and the thorax may also, in some species, have wings for flying. Insects also have antennae.
**Arachnids**  – have a hard exoskeleton and four pairs of jointed legs. The body consists of 2 parts (cephalothorax and abdomen). They have book lungs (air taken in through the abdomen) and 8 legs and they also produce silk webs. They do not have antennae.

![Scorpions](image1)

![Solifuges](image2)

![Ticks](image3)

![Spiders](image4)

![Mites](image5)

**Crustaceans**  - have a hard exoskeleton and the body is made up of 2 parts (cephalothorax and abdomen). They have gills for breathing and 5 pairs of jointed legs. They stay in aquatic systems and have two pairs of antennae.

![Crustaceans](image6)
Molluscs – are soft-bodied animals, such as snails. They usually have a head and a foot region and the body is often covered by a hard shell. Although snails live on land, the majority of molluscs live in the sea. Molluscs range from species that are microscopic to giant squid that can weigh up to 270kg.

All molluscs have:
Soft bodies
An internal or external shell
A mantle which is a fold of the body wall that secretes the shell
A muscular foot and/or tentacles
A radula which is a toothed structure in the mouth that is used to grate food.
Two pairs of gills (In some land snails the gills have become small because they are not used for breathing)
Activity 7

Study the pictures below. Answer the questions in your workbook. Choose one peer to mark the activity. Do corrections.

A

B

C

D

1. Explain why the animals shown in pictures A and B are classified as vertebrates. (1)
2. Name the class to which the organism in Picture A belongs and give three characteristics of this group. (4)
3. Name the phylum to which the organism shown in photograph C belongs and name two other groups of organisms that belong to this phylum. (3)
4. List two reasons why humans and the organism shown in picture B are both classified as mammals. (2)
5. Name the phylum to which the organism in picture D belongs, and give three characteristics that are shared by all the organisms that belong to this phylum. (4)

Total marks: 20
The plant kingdom is divided into two groups. One group contains all the plants that use seeds to reproduce. The other group contains all the plants that use spores to reproduce.
Gymnosperms

Gymnosperms are similar to angiosperms in that they also produce seed. However, gymnosperm seeds are not surrounded by a fruit. The seeds of gymnosperms form in cones instead of flowers. They contain male and female cones and gymnosperms plants usually have needle shaped leaves. Ovules form on the scales of the female cone. The smaller male cone produces pollen. Wind transports the pollen to the female cones in order for pollination to occur so that seeds can be formed. Examples of gymnosperms include cycads and pine trees.

Male and female cones

Angiosperms (angi – enclosed, sperma – seed)

Angiosperms produce flowers with petals. The ovules are enclosed in the ovary where, after fertilisation, the ovules become seeds which are enclosed in fruit. Examples include roses and proteas.
There are 2 major groups of Angiosperms: Monocotyledons (pronounced as mono-cot-lee-de-nous) and Dicotyledons (pronounced as di-cot-lee-de-nous). The plants are grouped according to the number of cotyledons (number of seeds).

**Monocotyledons**

Plants from this group have one cotyledon. Monocotyledons are characterised by a fibrous root system, parallel veined leaves with no stalks. The flowers are made up of parts in multiples of 3 (3, 6, 9, etc.).
Dicotyledons

Plants from this group have two cotyledons. They are characterised by a taproot system and net veined leaves with stalks. The flowers are made up of parts in multiples of 4 or 5.
Activity 8: Test yourself

Do the activity in your workbooks. Give it to a peer member to mark. Then, do corrections and let peer check corrections.

1. Write down a definition for each of the following terms.
   a) Vertebrate
   b) Invertebrate
   c) Mollusc
   d) Dicotyledons
   e) Monocotyledon (5)

2. Name the five kingdoms. (5)

3. To which kingdoms do each of the following organisms belong:
   Ferns, humans, mushrooms, beetles, oysters. (5)

4. You are a biologist and you have discovered a new living organism. You think that it is a mammal. Give a name to the mammal. Write a paragraph in which you describe 5 characteristics that you would expect it to have if it were a mammal. (5)

5. Study the diagram below.

   a) Which plant is a dicotyledonous plant? (1)
   b) List four characteristics, visible in the image which could be used to identify a dicotyledonous plant? (4)
   c) Which plant, A or B, represents a monocotyledonous plant? (1)
   d) List four characteristics, visible in this diagram which could be used to identify a monocotyledonous plant? (4)

Total marks: 30
Sexual reproduction in Angiosperms

Seeds and flowers

Seeds are produced in the flowers of angiosperms. The sexual organs of angiosperms are situated in the flowers.

KEY WORDS:
- Sepals – protect and enclose the other whorls while the flower is developing.
- Stamens – male parts of a flower.
- Pistil – female parts of a flower.
- Stigma - nodule at the tip of the style that receives pollen.

Components of a flower

The components of a flower

A flower contains both male and female structures.
The stamen is the male structure. It is made up of the anther and the filament. The anther contains pollen sacs which produce pollen. The pollen contains the male sex cells. The filament is a long stalk that helps to lift the anther to the top of the flower so that the pollen can be released.

The pistil is the female structure. It is made up of the stigma, style and ovary. The stigma is sticky and hairy so that pollen can stick to it. The style is a long tube down which pollen travels from the stigma in order to reach the ovary. The ovary is a cavity that contains the ovules. Ovules are the female sex cells that become the seeds when fertilised by the male sex cells on the pollen.

Flower petals are usually brightly coloured to attract pollinators such as butterflies and bees. The flower bud is protected by a green structure at the flower’s base. This protective structure is called a sepal. The receptacle is also at the bottom of the flower.

Activity 9: Identify the parts and functions of a flower

1) Draw any kind of flower in your book adding all the parts of the flower.
2) Now label the different parts of a flower and colour it in. (10)
3) Read through the notes above and describe one function of each of the following parts of a flower:
   a) sepal (1)
   b) anther (1)
   c) filament (1)
   d) ovary (1)
   e) style (1)

Total marks: 15

Pollination

Pollination and fertilisation are essential processes for flowers to produce seeds. Pollination is the transfer of pollen between plants of the same species, for fertilisation purposes.
Factors that influence pollination:

Plant species' survival depends on pollination and so plants have adapted to aid this process. Because plants can’t move around to find a mate, they must rely on pollinators such as wind, water and animals, to disperse pollen. Some flowers have unique adaptations to help the pollination process. For example, Carrion flowers (also known as stinking flowers or corpse flowers), rely on flies to move pollen from one plant to another. These flowers smell like rotting meat (carrion) and this smell attracts the flies. For more information on this and other unusual plants go to

- Wind and water pollinated plants produce a lot of pollen because so much of the pollen is simply washed or blown away.
- Some plants have stigmas that are situated outside of the flower to allow the wind to easily catch the pollen.
- Flowers pollinated by insects are usually large and brightly coloured to attract insects. These flowers also produce pollen that is sticky enough to attach to insects.
- Some flowers also give off a scent to attract certain insects and may even contain nectar to provide birds and mammals with a food source and promoting pollination.

**Activity 10**

1) Suggest and explain how you think each flower is pollinated. (e.g. Wind, insect, bird etc.).

2) Describe how each flower is adapted for its specific method of pollination?
Fertilisation and fruit/seed dispersal

Fertilisation is the fusion of male and female sex cells to produce seeds. This process happens during pollination.

Fertilisation occurs as follows:

- Each mature pollen grain contains 2 male sex cells.
- When the pollen grain attaches to the stigma of a flower, of the same species, a long pollen tube is produced down the style which transports the male sex cells to the ovule (female sex cells).
- Within the embryo sac of the ovule 1 male sex cell fertilises the egg and develops into a seed. The other male sex cell joins with 2 female sex cells to produce an endosperm which is the food that feeds the developing seed.
- The ovary enlarges and becomes fruit.

Pollen grains land on the sticky stigma.
A pollen tube grows down the style, followed by male sperm nuclei.
The sperm nuclei fuse with the female ovules.
The ovules develop into seed, and the ovary develops into fruit.
View the following for more information about fertilization and pollination

https://www.youtube.com/watch?v=X7zW5W6XGeg Fertilization
https://www.youtube.com/watch?v=AbpEhe6eXGI Fertilization
http://www.neok12.com/video/Pollination/zX604d6f4771457c436c5902.htm Pollination

**Fruit and seed dispersal**

The seeds of angiosperms are contained in fruit (avocado, apple, peach, etc.). The process of scattering seeds is called seed dispersal and this can occur in one, or more, of 5 ways:

1) Fruit is eaten by animals where it passes through the digestive system and is then excreted at another place. This fruit is soft fleshy and bright in colour (plum).

2) Seeds may contain tiny hooks that stick to animals where they may drop off in a new place (blackjacks).

3) Seeds may contain hairs or wings allowing wind to carry them more easily (dandelion).

4) Seeds may be dispersed by water to a new place (coconut seed).
5) When fruit splits open with a lot of force and the seeds are shot out, by the force of the explosion, to new places (beans). View the following video clip to watch the process of seed dispersal by explosion https://www.youtube.com/watch?v=nHqHSpZhjeY

**Activity 11**

1) What method of seed dispersal does each of the seeds in the images use? Give a reason in each case.
The main purpose of sexual reproduction is for the male sex cell (sperm) and female sex cell (egg) to combine, develop and produce a baby.

**Puberty**

Puberty is the stage in human development when the human body becomes sexually mature. Puberty normally starts between 7 - 13 years of age, in girls, and 9 - 15 years of age, in boys.

**Physical and emotional changes**

Hormones are secreted by various glands in the human body. These hormones may cause the following:

- The skin produces more oil and pimples develop.
- Sweat glands begin to produce an unpleasant body odour.
- Hair develops in pubic areas.
- Emotional feelings of attraction and sexual feelings begin to develop.
Girls experience a growth spurt at around 11 years of age. At this time, girls grow larger breasts, wider hips and a smaller waist. Girls also begin to menstruate, indicating a release of eggs for reproduction.

Boys experience a growth spurt at around 13 years of age. Their muscles begin to grow larger, their shoulders become broader, their voices become deeper and facial hair begins to grow. A boy’s penis will also grow larger and widen and the testicles will also feel sensitive. Boys will also experience erections (penis hardens) and ejaculation occurs when semen comes out of the penis.

Boys and girls experience emotional changes. These include embarrassment and awkwardness around bodily development and changing hormone levels that may cause mood swings.

### Activity 12

1) Look carefully at the timeline from 0-16 years. Look at the developmental steps of the female and then the male in the timeline.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Female development step</th>
<th>Age (years)</th>
<th>Male development step</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Birth</td>
<td>0</td>
<td>Birth</td>
</tr>
<tr>
<td>1</td>
<td>Started walking</td>
<td>1</td>
<td>Started walking</td>
</tr>
<tr>
<td>3</td>
<td>Started preschool</td>
<td>3</td>
<td>Started preschool</td>
</tr>
<tr>
<td>7</td>
<td>Started Primary school</td>
<td>7</td>
<td>Started Primary school</td>
</tr>
<tr>
<td>9</td>
<td>Breasts started to develop</td>
<td>11</td>
<td>Growth of genital organs. Growth of pubic hair began</td>
</tr>
<tr>
<td>9,5</td>
<td>Pubic hair started to grow</td>
<td>12</td>
<td>Rapid growth in height</td>
</tr>
<tr>
<td>11</td>
<td>Rapid growth in height</td>
<td>13</td>
<td>Voice starts to break</td>
</tr>
<tr>
<td>12</td>
<td>Pubic and underarm hair start to appear</td>
<td>14</td>
<td>Facial and underarm hair appear</td>
</tr>
<tr>
<td>12,5</td>
<td>First period</td>
<td>14,5</td>
<td>Started to get pimples</td>
</tr>
<tr>
<td>13</td>
<td>Growth in height and loss of puppy fat</td>
<td>16</td>
<td>Rapid growth in height and greater muscle development</td>
</tr>
</tbody>
</table>
Reproductive Organs

The male reproductive organ

The male reproductive organ is situated externally and includes the penis (shaft and glans) and testis (produces sperm cells and contained in the scrotum). The penis is responsible for producing, transporting and discharging semen into the female reproductive organs. When a man becomes sexually aroused the penis is filled with blood causing an erection so that the penis then enters the vagina during sexual intercourse.

The female reproductive organ

The female reproductive organs, most of which are situated internally, include the vagina (canal that joins the uterus to the outside of the body also known as the birth canal), uterus (a cavity, also known as the womb, that develops a thick layer of blood each month and divided into the cervix that opens into the vagina and the main body which expands to hold a baby) and ovaries (oval shaped glands that produce the ova, or egg cells, connected to the uterus by the fallopian tubes). The part of the female reproductive organs that is located externally is the vulva. It protects the internal organs and assists with sperm entering the body.
Activity 13

The figures above show the male and female reproductive organs. Give the name of each of the following by looking carefully at the labels on the diagrams. Read carefully as the statements can belong to female or male parts.

a. The organ that releases the egg cells
b. Where semen is placed during sexual intercourse
c. The tube that carries the egg to the uterus
d. The organ that produces sperm cells
e. The tube that carries sperm cells and urine out of the body.
f. A gland that secretes fluid to provide the sperm with energy
g. The part that contains and protects the testes
h. The opening to the uterus, commonly called “the neck of the womb”
i. The part that fills with blood and becomes swollen and erect during sexual intercourse
j. The part that makes millions of sperm cells

Total: 10

Fertilisation, pregnancy and menstruation

Fertilisation happens when the sperm cell joins with an egg cell. When this happens, a woman becomes pregnant.

KEY WORDS:
- Gestation – period during which an embryo develops in the female’s body, from implantation until birth.
- Foetus – unborn baby that is still developing inside the uterus.
- Labour – process by which a baby is pushed out of the uterus by the mother’s body.

Fertilisation and pregnancy

Every month, an ovary will release an egg cell for fertilisation. This process is known as ovulation. After the penis enters the vagina, semen is ejaculated and the sperm cells then moves through the cervix and uterus into the fallopian tube where the 1st sperm cell to
arrive, fertilises the egg. The fertilised egg then travels back through the fallopian tubes to attach to the uterus where there is a thick layer of blood known as the uterine lining. The woman will then become pregnant and a baby will develop within the uterus. If fertilisation does not occur then the layer of blood breaks down and is released, during menstruation, through the vagina. Menstruation occurs once every 28 days and lasts for approximately 4 – 7 days. It is commonly called a period. From the time a woman has her 1st menstrual cycle it is possible to become pregnant. Sanitary products such as tampons absorb this menstrual fluid.

Once pregnant, a woman will not experience her period. Pregnancy is the time between implantation of the fertilised egg and the birth of a baby and lasts for approximately 9 months in humans. The fertilised egg becomes an embryo and after 8 weeks it is referred to as a foetus. During a natural birth the baby will exit through the vagina, which widens significantly.

Diagrams 1 and 2 of sperm cells entering the ovary or female egg cell.

Activity 14

Read through the notes again and answer the questions.

1) Define the following terms using your own words:
   a) Puberty (1)
   b) Fertilisation (1)
   c) Menstruation (1)
   d) Pregnancy (1)

2) What are the fertilisation stages in humans from sexual intercourse to pregnancy? (4)

3) Explain why a pregnant woman should eat a healthy diet and not take drugs or drink alcohol. (2)

Total: 10
Sexual health and Responsibility

Sexual activity is a big risk, especially at an early age, as girls face the prospect of becoming pregnant at an age when they are not equipped to care for a baby emotionally and financially. It is also not fair on the baby. Men and woman are also in danger of becoming infected with serious diseases that are transmitted sexually (STD’s).

The safest and most responsible decision is to choose not to have sex at all until you are a lot older and ready for the physical and emotional consequences of having sex. This is called abstinence (choosing not to have sex).

Pregnancy can be prevented by using contraceptives. Barrier contraceptives include condoms, which stop the semen from entering the woman’s vagina, and they are available for men and women. Male condoms cover a man’s erect penis whereas a female condom is inserted into the vagina. Hormonal contraceptives change the balance of the hormones in the body. Examples of these include the contraceptive pill (it must be taken every day) and injections (are taken every month). It is very important to note that NO contraceptive is 100% reliable.

Sexually transmitted diseases (STDs)

There are a range of STD’s that affect the genitals as well as the rest of the body. They can have short term effects that include skin irritations, rashes, inflammation, etc. as well as long term effects which include cancer and death. The best protection is abstinence. Condoms are the only contraceptives that are able to provide some protection for people who choose to be sexually active. However, condoms are not 100% reliable.

HIV and AIDS

Acquired Immune Deficiency Syndrome (AIDS) is a serious illness transmitted through sexual intercourse by the infection of Human Immunodeficiency Virus (HIV). HIV attacks the immune system and when enough cells have been destroyed then a person is diagnosed with AIDS. It is not spread through the air but through bodily fluids such as
blood, semen and vaginal fluid. It can also be transferred from mother to the unborn child and through direct blood contact.

### Myths about menstruation and sex

A myth is a false idea or a story that is mainly or completely untrue. While completing the next activity, read carefully to determine whether the statements are factual or mythical. Complete this exercise in your workbook.

#### Activity 15

1) Define the words ‘contraceptive’ and ‘abstinence’?
2) How can the risk of infection by HIV be prevented?
3) Discuss the following myths and correct them by writing down the correct facts: (Refer to page 49 of Platinum textbook for reference).

**Myth 1:** A woman will not get pregnant the first time she has sex.

**Myth 2:** A woman cannot get pregnant during her period.

**Myth 3:** A woman cannot get pregnant if she has never had a period.

**Myth 4:** There is no birth control that is 100% reliable.

**Myth 5:** A woman cannot get pregnant when having sex while menstruating.

**Myth 6:** Condoms can be re-used.

**Myth 7:** Everyone is doing it, so there can’t be anything wrong with having sex!

**Myth 8:** The pill prevents pregnancy from the first day the woman takes it.

**Myth 9:** You are a prude if you do not want to have sex until you are older.

**Myth 10:** Drinking and drugs make sex more fun.
Variation within a species

A species is a category, within the classification system, consisting of living things of the same type that share certain similarities. One example is where humans are 1 species and dogs are another. Individuals within a species reproduce to make more of that species.

Humans belong to the species called Homo sapiens. Humans can also look different from one to another including skin colour, nose shape, etc. The differences within a species are called variation.

Many characteristics that you have are inherited. Inheritance refers to the passing on of characteristics from parents to children. In many cases, children inherit characteristics from their grandparents. For example, children may inherit their dad’s nose and mom’s dimples. Not all characteristics are good characteristics and children could inherit diseases as well.

KEY WORDS:

- Variations – differences between organisms of the same species.
- Inherited characteristic – feature that is passed down from parents to their young, for example height or eye colour.
- Correlation – relationship between two different factors such as the height of the parents and the height of their children.
- Inferences – conclusions based on evidence.
Activity 16

Write the answers to the questions in your workbook:

1) Define the following terms:
   a) Species
   b) Variation
   c) Inheritance

2) Describe three of your own characteristics.

3) Where do these characteristics come from?

4) What did you inherit from your parents or family members?

Record information about tongue rolling

Some people can roll their tongues, as shown in figure 1, and some people cannot. Can you roll your tongue? Is this characteristic correlated between family members? For example, are children whose parents can roll their tongue more likely to be able to roll their tongues too?

Method
a. Test if you can roll your tongue or not.
b. Count the number of learners in your class who can roll their tongues and the number of learners who cannot roll their tongues.

Results

<table>
<thead>
<tr>
<th></th>
<th>Tongue roller</th>
<th>Not a tongue roller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total in class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% in class</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Record your results in a table like the one above.
2. Calculate the percentage of learners in the class who can roll their tongue and the percentage of those who cannot roll their tongues.
3. Present your data as a bar graph.
4. Write a conclusion and draw inferences about whether or not tongue rolling is likely to be an inherited characteristic. An inference is a conclusion based on evidence.