GRADE 11 LIFE SCIENCES

ANGIOSPERMS

Instructions:

1. There are a number of activities on angiosperms that need to be completed (pages 62-64). The answers will be given below. Copy them down.

2. Complete the worksheet and terminology on plant diversity. (pages 65-70) The answers for the worksheet will be given below.

3. Complete the **Proposal** for your assignment.
   This is due on 17th April.

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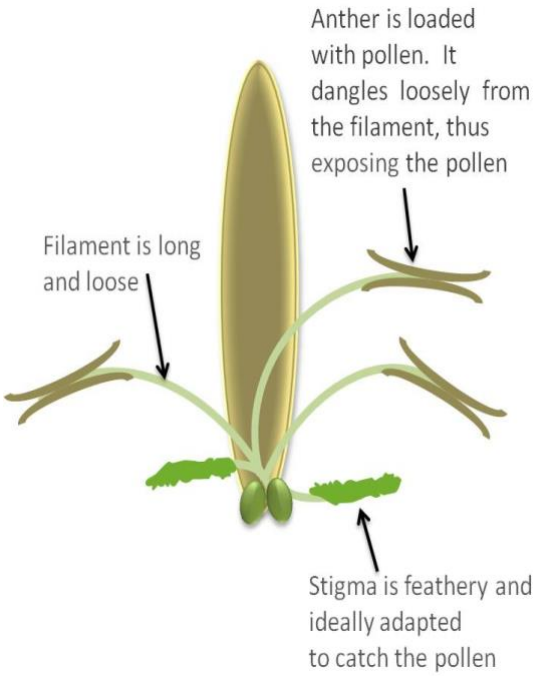
1. Angiosperm activities

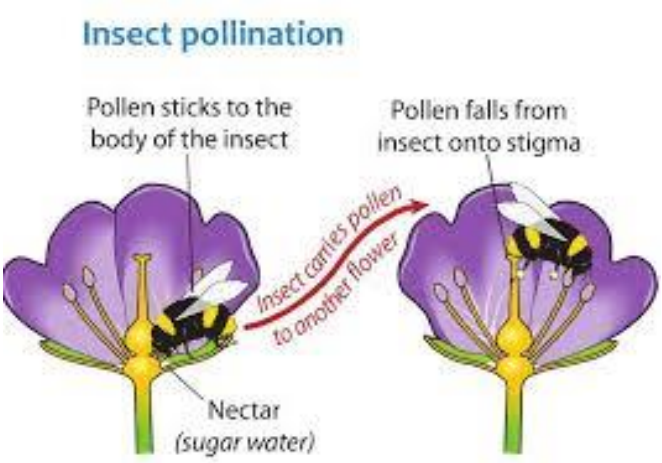
a) Wind, insect and bird pollinated flowers (page 62)

Wind pollinated flowers:



- Flowers generally small with no nectar, scent or large coloured petals.
- The pollen produced is smooth and light to float easily in air currents.
- The pollen is dry so that it does not clump together and can float freely.
- Large anthers producing large amounts of pollen.
- Large, feathery and sticky stigmas to catch pollen and they are usually situated below the stamens.

Insect pollinated flowers:



- Bright coloured petals.
- Nectar.
- Attractive Scent.
- Designed with a landing platform for its specific pollinator.
- Sticky pollen to cling to insects body.
- Sticky stigma to collect pollen from insect.

Bird pollinated flowers

- Flowers generally red, orange or yellow coloured.
- Tubular shaped.
- Large amounts of nectar.
- Well-protected ovules to prevent damage from bird's beak.

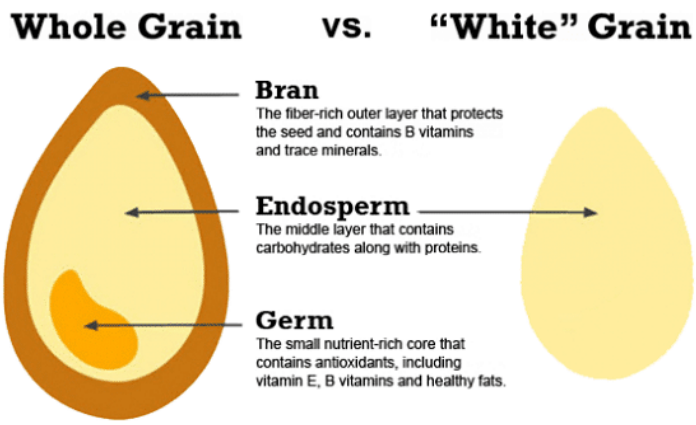
b) <u>Why have seeds made spermatophytes the most successful plants on earth? (page 62)</u>

- The seeds can remain dormant (inactive but alive) and can survive harsh weather conditions for a very long time
- The seed becomes active when the conditions are favourable for germination
- The testa and cotyledons protect the embryo during the early stages of development
- The cotyledons contain stored food to nourish the embryo in the early stages of development until the seedling (young plant) can photosynthesis for itself
- Various adaptations of the seed allow for improved dispersal. Dispersal is significant because the seeds are spread away from the parent plant and from each other, which reduces competition
- The seed is a product of sexual reproduction and therefore every seed is genetically different, which increases its chances of survival in changing environ mental conditions

c) <u>The importance of seeds as a food source. (page 62)</u>

Over 80% of humans' energy requirements are provided for by the seeds of plants.

The majority of seeds eaten are from monocotyledonous cereal grasses and are called **grains**. These include plants such as wheat, oats, barley, rice, millet and rye.
Whole grains are unrefined and are much healthier than refined ("white") grains which have had the outer bran husk and germ removed.



Another important food source is from a group of dicotyledonous legumes (produce seeds in pods). These seeds are called **pulses**. These include beans of all sorts, lentils and chickpeas. Soya beans are the most widely grown seeds in the world and are used as a substitute for meat and dairy.

Many seeds are rich in oils. These are used in cooking. Examples include, sunflower oil, canola oil, palm oil etc.

Endemic seed food species in Africa include sorghum (also used in manufacture of beer), samp and pearl millet (also used in the manufacture of beer).

d) <u>What is a seed bank and what are the reasons for maintaining a seed bank? (page 62)</u>

A seed bank is a place in which seeds are preserved under specific conditions for later use. Seeds are stored under low temperatures that keep seeds dormant till they are needed for replanting.
It's easy for plants to be stored in their seed form since they are small and therefore, they occupy minimum space. This makes it possible to store a huge variety of seeds. The Slavbard Global Seed Vault is the biggest seed bank and it stores seeds for almost every country in the world! Seeds are stored in secured seed banks and can be retrieved when crops disappear.

The Importance of Seed Banks:
1. *Preservation of Crop Diversity*
This is the most important reason for the storage of seeds. Just as human beings and animals are adapted to different conditions for survival, so are crops. Different types of the same species exist due to this adaptive nature. Therefore, it is of critical necessity that such diversity is preserved.

2. *Protection from Climate Change*

For a couple of decades now, the world has witnessed radical climatic change that has been accelerated by increased industrial pollution. Crop extinction is inevitable with such extreme changes. If seeds are stored in seed banks, the danger of total elimination of certain species of crops is eliminated.

3. *Protection from Natural Disasters*

Natural disasters are unforeseen events that could lead to complete annihilation of crops from the face of the earth. The foresight of keeping seeds in a seed bank could save such a situation. Malaysian rice paddies, for example, were wiped out during the 2004 tsunami and international seed banks provided farmers with seeds that helped them start over.

4. *Disease Resistance*

Crop diseases are highly contagious and very deadly to plants. A serious breakout could completely eliminate crops. Where diseases have ravaged crops and left no traces that farmers could start on, seed banks can intervene and provide them with seeds that will enable them start on a clean slate.

5. *Provide seed material for research*

Seeds that are stored in seed banks can be made easily available to scientists and researchers who wish to study these seeds especially if such research could lead to improvement of crop production.

6. *Preservation from Man-made Disasters*

Man-made disasters such as war and oil spills could lead to the annihilation of crops. Counties that are engaged in war make it difficult for farmers to continue farming and it's easy for crops to disappear. Once peace is restored, seeds can be retrieved from seed banks and replanted.

Properly stored seeds can stay viable for even millennia, eliminating the risk of losing crops that are critical for the existence of human beings and animals.

e) <u>The decreasing dependence on water for reproduction in plants. (page 64)</u>

- **Bryophytes (moss)**
  The sporophyte and gametophyte generations are thallus and are not well adapted to live on land. No true roots stems and leaves, no vascular tissue, no supporting tissue, no cuticle.
  Sexual reproduction is also dependent on water. The male gamete is flagellate and requires water to swim to the female gamete.

- **Pderidophyta (ferns)**
  They are less dependent on water. The sporophyte generation has true roots stems and leaves, there is vascular tissue, supporting tissue, cuticle and stomata.
  The gametophyte generation however is dependent on water. No true roots stems and leaves, no vascular tissue, no supporting tissue, no cuticle.
  Sexual reproduction is also dependent on water. The male gamete is flagellate and requires water to swim to the female gamete.

- **Spermatophytes (gymnosperms and angiosperms)**
  They are fully adapted to live on land and do not require water to complete the sexual generation of their life cycle. The sporophyte generation has true roots stems and leaves, there is vascular tissue, supporting tissue, cuticle and stomata. The gametophyte generation is reduced and completely retained within the sporophyte plant. Sperm no longer needs to swim to the egg. Pollen with pollen tubes delivers the male gamete to the female gamete without the need for water. Wind or other pollinating agents are used to transfer the pollen from one plant to another.

f) Sexual and asexual reproduction, and the advantages and disadvantages of each method. (page 64)

1. **Sexual reproduction** is a mode of reproduction involving the fusion of a haploid female gamete (egg cell) and haploid male gamete (sperm cell). The fusion of these gametes occurs at fertilization resulting in the formation of a diploid zygote. The zygote develops into a new individual organism.

The **advantages** of sexual reproduction:

- produces genetic variation in the offspring
- the species can adapt to new environments due to variation, which gives them a survival advantage
- a disease is less likely to affect all the individuals in a population

The **disadvantages** of sexual reproduction:

- time and energy are needed to find a mate
- it is not possible for an isolated individual to reproduce

2. **Asexual reproduction** is a mode of reproduction in which the offspring comes from a single parent, and not from the union of gametes as it is in sexual reproduction. The offspring are clones of the parent and each other.
In plants this is also called vegetative reproduction. Examples of this are runners (strawberries), lateral buds from tubers (potatoes) or bulbs (onions) and cuttings.

The **advantages** of asexual reproduction include:

- the population can increase rapidly when the conditions are favourable
- only one parent is needed
- it is more time and energy efficient as you don't need a mate
- it is faster than sexual reproduction

The **disadvantages** of asexual reproduction include:

- it does not lead to genetic variation in a population
- the species may only be suited to one habitat
- disease may affect all the individuals in a population

2) PLANT DIVERSITY: Worksheet and Terminology. (page 65-70)

1) 1.1 B
   1.2 D
   1.3 A
   1.4 C

2) 2.1 pollination
   2.2 asexual
   2.3 fruit
   2.4 diploid
   2.5 sexual reproduction

3) a) A- petal (corolla)
   B- anther (stamen)
   D- stigma (pistil)
   b) The pollen grows a pollen tube down the style and enters the ovule. The male gametes (sperm cells) travel down the tube and enter the ovule. One of the male gametes fuses with the ovum (female gamete) inside the ovule.
   c) i) seed
   ii) fruit

4) a) Insects are attracted to the flowers with large petals. More insects will visit the flowers with petals and deposit more pollen on the stigmas.
   b) Some of the pollen is from self pollination. These produce a pollen tube that grows into the style but does not fertilise the ovules.
   c) More reliable – more flowers, repeat the experiment with different types of insect pollinated flowers, leave for a longer time period
   Increase validity – flowers must not be damaged when removing petals, flowers must be in same area, experiment carried out at the same time so all environmental conditions are the same for both types of flowers

5) a) meiosis
   b) E (the capsule/sporangium)
   c) They are poorly adapted to life on land. The male gamete needs to swim in water to get to the female gamete.

6) a) It has flowers
   b) insects
   c) The transfer of pollen from the male structure (anther) to the female structure (stigma)
   d) Produces pollen
   e) The ovary

7) a) A- bryophyte
B- pteridophyte
C- gymnosperms
D- angiosperms

b) i) A and B
ii) C and D

c) Thallus – no true roots, stems or leaves
No cuticle
Rhizoids
No stomata
No strengthening tissue
No transport tissue

Complete the plant diversity terminology using your notes

3) Complete your proposal for the research project.
This is due on the Friday that you return to school.
You have been given the proposal sheet along with the project instructions.