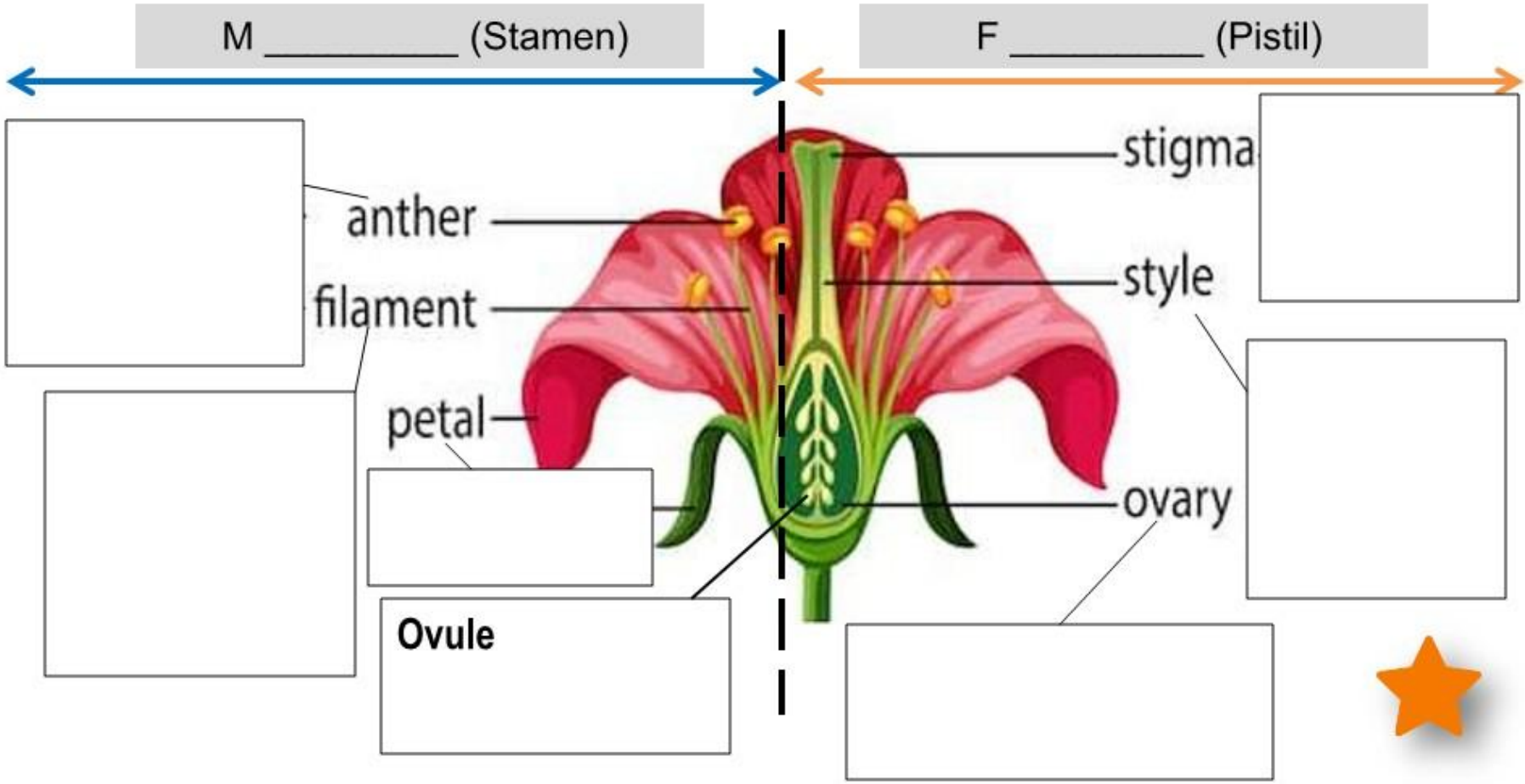
Chapter 2 – Reproduction In Plants



Bisexual _____

_____ (eg; _____, _____)

Unisexual _____

_____ (eg; _____, _____)

Reproduction By Seeds

4 Stages

Pollination

(a) _____

(b) _____
. Self – pollination
. Cross – pollination

Fertilisation

Seed Dispersal

By _____
Eg:

By _____
Eg:

By _____
Eg:

Germination

By _____
Eg:

Reproduction By Plant Parts

Roots	 Carrot
Underground Stem	 Ginger
Suckers	 Banana
Leaves	 Bryophyllum
Spores	 Fern

EXPERIMENTS

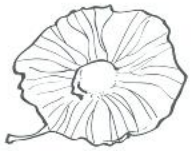
Experiment 1

Materials needed:

- 3 Angsana
- Scissor
- Stop watch

Steps:

1. Label the 3 fruit A, B and C.
2. Trip the wing-like structure of Fruit B and C to different sizes.
3. Drop each fruit from the same height and measure how long it takes for each to land on the ground.
4. Repeat Step 3 three times and calculate the average timetaken.



A

B

C

Fruit	Time taken to land on the ground (s)			
	1st try	2nd try	3rd try	Average
A	13.5	13.4	13.3	13.4
B	9.2	9.5	9.2	9.3
C	3.1	3.3	3.2	3.2

- What can be observed about the relationship between size of the wing-like structure and the time taken for the fruit to land on the ground?

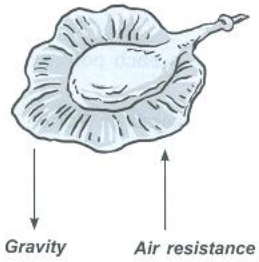
The bigger the size of the wing-like structure, the longer the time taken for the fruit to land on the ground. / The smaller the wing-like structure, the shorter the time taken for the fruit to land on the ground.

Notes

- Explain your observation.

There are two forces, the downward force of gravity and the upward force of air resistance, acting on the fruit as it falls.

The bigger wing-like structure of the fruit provides a larger surface area for air resistance to act on, which slows down the speed of it falling, causing it to take a longer time to land on the ground.



EXPERIMENTS

Experiment 2

Materials needed:

- 30 seeds
- 2 identical pots
- Some soil

Steps:

1. Put the same amount of soil in each pot.
2. Put 5 seeds in Pot A and 25 seeds in Pot B.
3. Place the pots at the same location, near a window.
4. Water the pots daily with the same amount of water.
5. Observe what happens after a few weeks.

Pot A Pot B

- What can be observed about the stem of the seedlings after a few weeks?

  The seedlings in Pot B have long and thin stems that cannot stand upright well, while the seedlings in Pot A have thicker and shorter stems that can stand up-right.

- Explain your observation for Pot B.

  There was overcrowding of seedlings in Pot B and they had to compete for water, space, mineral salts and sunlight. Thus, they grew taller to reach for more sunlight to make food, causing them to grow unhealthily.

Experiment 3

Materials needed:

- 10 seeds
- 2 cups
- Some cotton wool
- Some water

Steps:

1. Put the same amount of cotton wool in each cup.
2. Put 5 seeds into each cup.
3. Dampen the cotton wool in Cup A with some water.
4. Observe what happens after 1 week..

Cup A with damp cotton wool

Cup B with dry cotton wool

- What can be observed about the seeds after 1 week?

  The seeds in Cup A germinated while the seeds in Cup B did not germinate.

- Explain your observation.

  Air, water and warmth are needed for germination. The seeds in Cup B did not have water that is needed for germination.

- What can be concluded from this experiment?

  Water is needed for germination.

EXPERIMENTS

Experiment 4

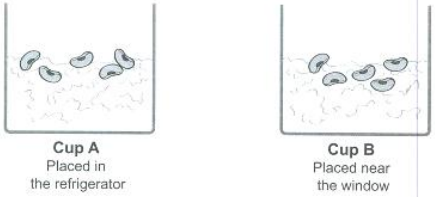
Notes

Materials needed:

- 10 seeds
- 2 cups
- Some cotton wool
- Some water
- Refrigerator

Steps:

1. Put the same amount of cotton wool in each cup.
2. Put 5 seeds into each cup.
3. Dampen the cotton wool in both cups with some water.
4. Place Cup A in the refrigerator.
5. Place Cup B near a window.



Cup A
Placed in the refrigerator

Cup B
Placed near the window

- What can be observed about the seeds after 1 week?

  The seeds in Cup B germinated while the seeds in Cup A did not germinate.

- Explain your observation.

  Air, water and warmth are needed for germination. The seeds in Cup A did not have warmth that is needed for germination.

- What can be concluded from this experiment?

  Warmth is needed for germination.

EXPERIMENTS

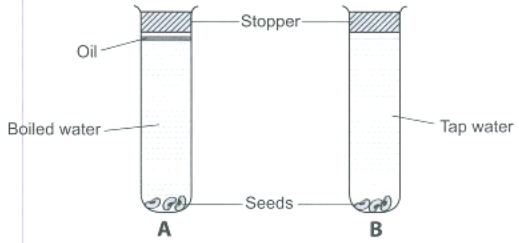
Experiment 5

Materials needed:

- 2 test tubes
- 2 rubber stoppers
- 6 seeds
- Tap water
- Boiled water
- Oil

Steps:

1. Put 3 seeds into the test-tube of cooled boiled water. (Test-tube A)
2. Put 3 seeds into the test-tube of tap water. (Test-tube B)
3. Pour a layer of oil onto the water in Test-tube A.
4. Seal the test-tubes with the rubber stoppers.
5. Put both test-tubes in a dark cupboard.
6. Observe what happens after a few days.



- What can be observed about the seeds after a few days?

  The seeds in Test-tube A did not germinate while the seeds in Test-tube B germinated.

Notes

- **Explain your observation.**

  There is dissolved air in the tap water in Test-tube B. Thus, with the presence of air, water and warmth, the seeds were able to germinate. There is no air in the cooled boiled water in Test-tube A as all the air escaped out of the water during the boiling process. The layer of oil on the water also prevented air from dissolving in the water. Thus, without air, the seeds in Test-tube A could not germinate.

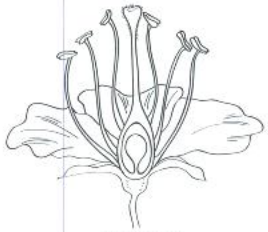
- What can be concluded from your observation?

  Air is needed for germination.

WORKED EXAMPLES

Experiment 1

The diagram below shows two flowers.



Flower X

Flower Y

(a) Identify the method of pollination for the flowers shown above. (1m)

(b) Explain your answer for each flower. (2m)

Thought Process:

Topic : Reproduction in plants

Key Concept(s) : Wind pollinated flowers have long or feathery stigmas that stick out of the petals to catch the pollen grains easily.

Key Words / Key Phrases : (a) Flower X – wind
Flower Y – animal

(b) Long anthers and stigma to catch pollen grains easily, large colourful petals to attract pollinators

Process Skills : Observing, Communicating, Inferring, Generating possibilities

Answers:

(a) **Flower X** is pollinated by **wind** while **Flower Y** is pollinated by **animals**. (1m)

(b) Flower X has **long anthers and stigma** that hang out of the petal to **catch the pollen grains easily**. (1m) Flower Y has **large colourful petal to attract pollinators**. (1m)

Experiment 2

Carina planted a seed in each of the five different pots, A, B, C, D and E. She placed the pots under different conditions for three days and recorded her observations as shown in the table below.

Pot	Air	Water	Light	Temperature	Result
A	✓	✓	✗	31°C	Root and shoot grew.
B	✓	✓	✓	5°C	No change.
C	✗	✓	✓	31°C	No change.
D	✓	✓	✓	31°C	Root and shoot grew.
E	✓	✗	✓	31°C	No change.

(a) What can be concluded about the conditions needed for germination? (1m)

(b) What would happen to the seedling in Pot A after 4 weeks if it was left under the same condition? Explain why. (2m)

Thought Process:

Topic : Reproduction in plants

Key Concept(s) : Water, Oxygen and Warmth (W.O.W) are needed for seeds to germinate.

Light is needed for plants to make their own food.

Key Words / Key Phrases : (a) Only air, water and warmth are needed, light is not needed

(b) Die, no light to make food, to survive

Process Skills : Observing, Communicating, Inferring, Predicting

Answers:

(a) **Only air, water and warmth are needed for germination**. **Light is not needed** for germination. (1m)

(b) The seedling will **die**. It **does not have light** to **make its own food to survive**. (2m)

WORKED EXAMPLES

Experiment 3

The diagram below shows 2 fruits, A and B that came from 2 flowers, X and Y.

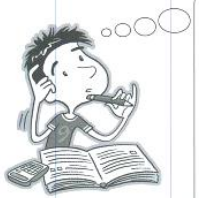
Fruit A *Fruit B* *Flower X* *Flower Y*

(a) Match the fruits to the flowers that they have developed from. (1m)

Fruit A: _____

Fruit B: _____

(b) Explain your answer in (a). (2m)



Thought Process:

Topic	:	Reproduction in plants
Key Concept(s)	:	After fertilisation, the ovary will develop into a fruit while the ovule(s) will develop into seed(s). One flower can only develop into one fruit. If a flower has many ovules, the fruit will have many seeds. If a flower has one ovule, the fruit will have one seed.
Key Words / Key Phrases	:	(a) Flower X, Flower Y (b) Ovules develop into seeds after fertilisation, many ovules, many seeds, one ovule, one seed
Process Skills	:	Observing, Comparing, Communicating, Inferring, Analysing

Answers:

(a) Fruit A: **Flower X** (½m)
Fruit B: **Flower Y** (½m)

(b) After fertilisation, the **ovules** in the flower will **develop into seeds**. Flower X has **many ovules** to develop into **many seeds** in Fruit A (1m) while Flower Y has **one ovule** which will develop into **one seed** in Fruit B. (1m)

Notes