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Flower : Parts(whorls) and their respective functions

Period 1

SUBJECT : (Science)
CHAPTER NUMBER: 1
CHAPTER NAME : The Flower

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THE FLOWER

Flowers are the reproductive part of a plant. They are not only involved in reproduction, but are also a source of food for other living organisms. They are a rich source of nectar.

Flowers can either be

- Complete
- Incomplete.

A complete flower is the one that consists of sepals, petals, stamens and pistil. On the contrary, an incomplete flower is the one that lacks one or more of these structures.

A complete flower consists of two different parts:

- Vegetative Part
- Reproductive Part

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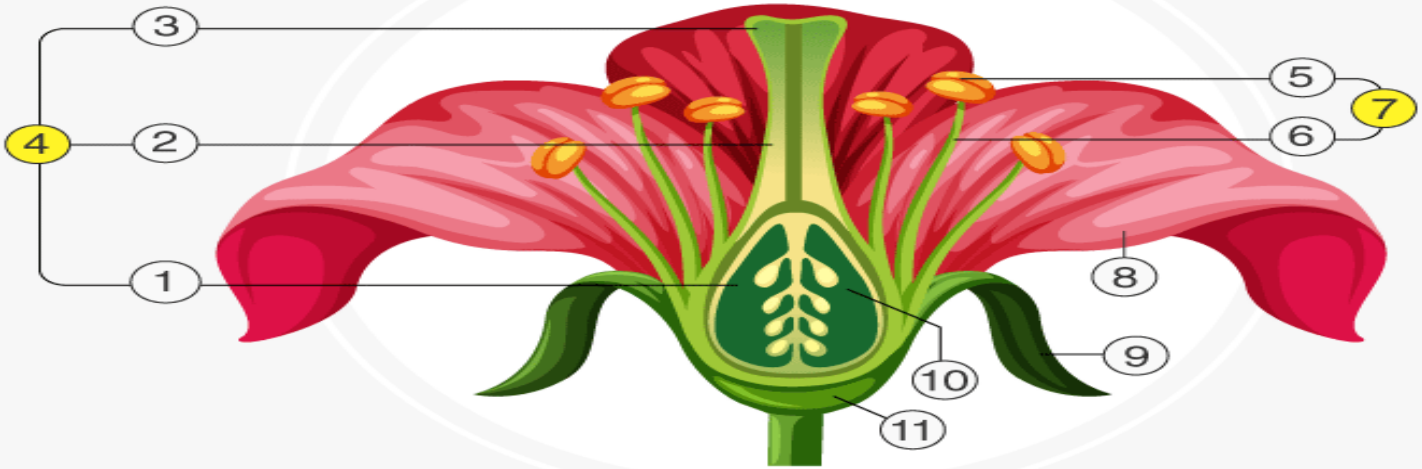

1 Ovary	2 Style	3 Stigma	4 Pistil
5 Anther	6 Filament	7 Stamen	8 Petal
9 Sepal	10 Ovule	11 Receptacle	

Parts of a Flower

Vegetative Parts of a Flower

The vegetative part of a flower consists of the following:

Petals: This is a bright-coloured part that attracts bees, insects, and birds. Colour of petals varies from plant to plant; some are bright while some are pale coloured. Thus, petals help us to differentiate one flower from another.

Sepals: Sepal is the green-coloured part beneath the petals to protect rising buds**.** Some flowers have fused petals-sepals while a few have separated petals-sepals.

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Reproductive Parts of a Flower

Flowers contain the plant's reproductive structures

In different plants, the number of petals, sepals, stamens and pistils can vary. The presence of these parts differentiates the flower into complete or incomplete. Apart from these parts, a flower includes reproductive parts – stamen and pistil. A flower may have only female parts, only male parts, or both.

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The reproductive parts of a flower consist of the following:

Stamen: This is the male reproductive organ and is also known as Androecium. It consists of two parts namely: anther and filaments.
The anther is a yellowish, sac-like structure, involved in producing and storing the pollens.
The filament is a slender, threadlike object, which functions by supporting the anther.
Pistil: This is the innermost part and the female reproductive organ of a flower which comprises three parts -stigma, style and ovary. This is collectively known as the pistil.
Stigma: It is the topmost part or receptive tip of carpels in the gynoecium of a flower.
Style: It is the long tube-like slender stalk that connects stigma and the ovary.
Ovary: It is the ductless reproductive gland that holds a lot of ovules. It is the part of the plant where the seed formation takes place.

Whorls

Along with the vegetative and reproductive parts, a flower is also composed of four whorls, which are largely responsible for the radial arrangement of a flower. A typical flower has a circular section with a common centre, which can be clearly observed and distinguished from the top of the flower. There are four whorls:

Calyx

The calyx is the outermost whorl of a flower. It comprises sepals, tiny leaves present at the base of a flower. These protect the flower whorls against mechanical injuries and desiccation. Some plants have coloured sepals the calyx and are called petaloid.

If the sepals are free the calyx is called polysepalous, and if they are united it is called gamosepalous.

In many flowers, the sepals fall off before the flower even opens fully. Such sepals are known as caducous.

In some, the sepals fall off after fertilization. Such sepals are known as deciduous.

The persistent sepals remain up to the fruiting stage.

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Corolla

This is the second whorl of a flower. It contains petals which serve two main functions:

- To attract pollinators.
- To protect the reproductive parts of a flower

Petals are brightly coloured and scented to attract animals and insects for pollination. The calyx and corolla are collectively called the perianth.

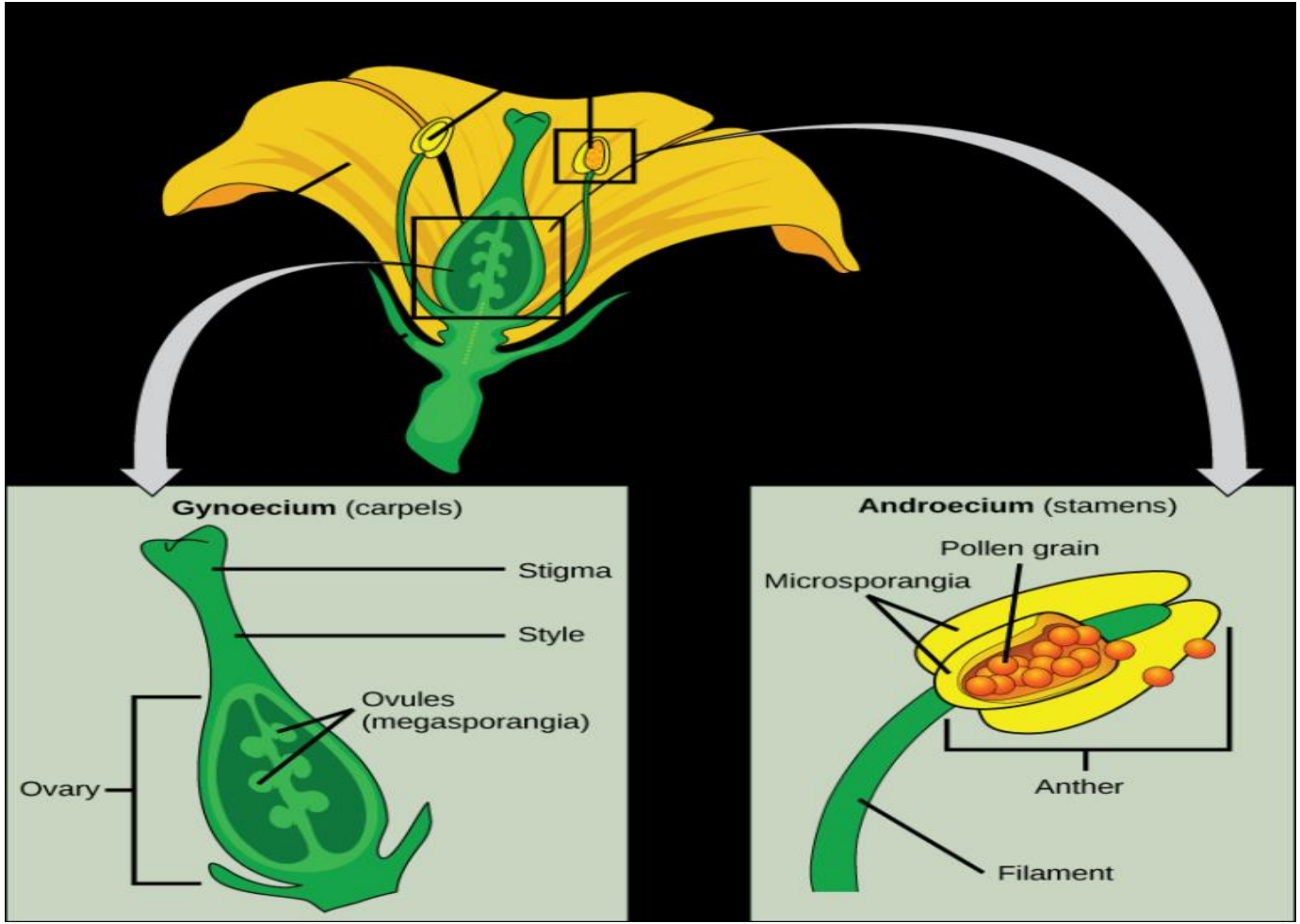
ANDROCIUM

Stamens

Stamen is also known as the third whorl of the flower and is the male reproductive part. It consists of a filament which is a thread-like structure with a circular structure anther on the top. Pollen is produced by the anther which contributes to the male reproductive process of the plant. All the stamens do not bear fertile anthers.

GYNOECIUM

- **Carpels** The carpel is the fourth whorl of the flower present in the centre. The carpels contain the pistil, the female reproductive part of the flower. It comprises the ovary, style, and stigma. The egg or the ovule is present in the ovary. After fertilization, sometimes the ovary turns into the fruit to keep the seed. At the top of the ovary is a vertical structure called style that supports the stigma. The dispersed pollens stick to the stigma and travel down to the ovary through the style.



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Flower : Types of flower, pollination and its types, agents of pollination

Period 2

SUBJECT : (Science)
CHAPTER NUMBER: 2
CHAPTER NAME : The Flower

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FLOWER

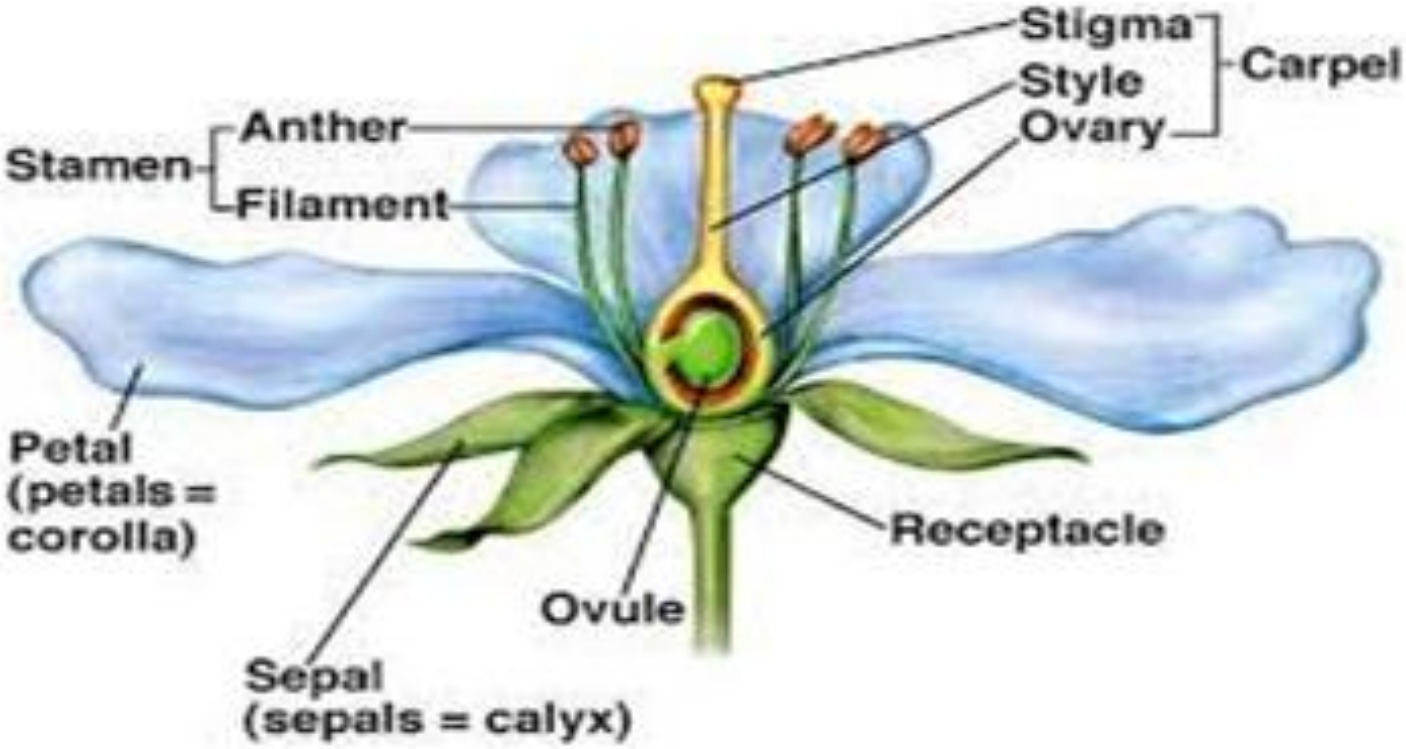
ACCESSORY WHORLS

- CALYX
- COROLLA

ESSENTIAL WHORLS

- ANDROCIUM
- GYNOECIUM

PARTS OF A TYPICAL FLOWER



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TYPES OF FLOWER

Unisexual flowers

The flowers which contain only the male or female reproductive organs are called unisexual flowers. They are called incomplete flowers. To reproduce they undergo cross-pollination.

They do not have both stamen and carpels.

Examples: Papaya, White mulberry and Watermelon.

Bisexual flowers

The flowers which contain both male and female reproductive organs are known as full or bisexual flowers.

They will self-pollinate themselves.

Examples: Tulip, Sunflower and Lily.

- **Complete flowers** have sepals, petals, pistils and stamens on each flower, as in the drawing above:
    - Both male and female reproductive parts
    - Sepals protect the flower buds during development
    - Petals lure pollinators to the flower to promote pollination
- **Incomplete flowers** are missing one or more of those features
- **Perfect/imperfect** flowers refer only to the **sexual** flower parts:
- **Perfect flowe**rs have both male (staminate) and female (pistillate) parts on the same flower.
- **Imperfect flowers** are missing one set of reproductive parts

FUNCTIONS OF FLOWER

1. Gametophytes develop in the flowers.
2. The flowers can produce diaspores without fertilization.
3. After fertilization, the ovary of the flower develops into a fruit containing a seed.
4. The most important function of flowers is reproduction. They help in the union of male and female gametes.
5. Flowers provide nectar to certain birds and insects, which in turn help in the transfer of pollen from one flower to the other.
6. Flowers may promote selfing, i.e., the union of sperms and eggs from the same flower, or cross-fertilization, i.e., the union of sperms and eggs from different flowers.

Pollination in Plants

Reproduction is the life process which helps an organism to procreate its own offspring. There are a lot of events involved in this. In plants, pollination is one among them. Pollination can be defined as the pre-fertilization event or process where pollen grains from anther are transferred to the stigma of a flower.

Plants are immobile. Unlike animals, both male gamete and female gamete are immobile. They can't copulate with each other by themselves. They need a vector for this. Pollination is the process that helps to unite the male and female gametes and thus helps in fertilization. It can be broadly classified into two, cross-pollination and self-pollination and this is achieved with the help of a variety of vectors/agents. For successful pollinations, it must occur between the same species.

Pollination

What Is Pollination?

Pollination is a biological process in which the pollen grains are transferred from an anther (male part of a flower) to the stigma (female part of a flower). There are two types of pollination:

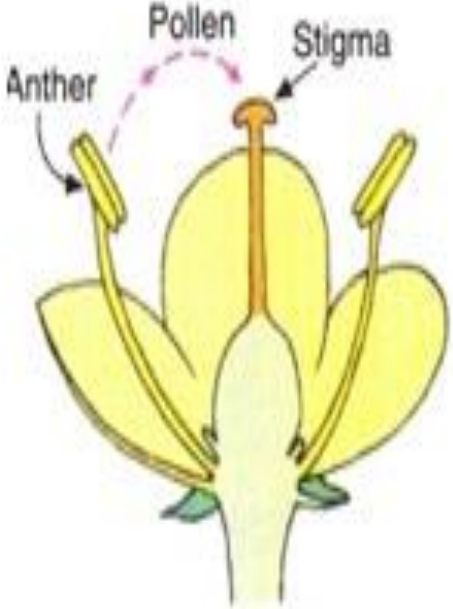
- Self-Pollination
- Cross-Pollination

What Is Self-Pollination?

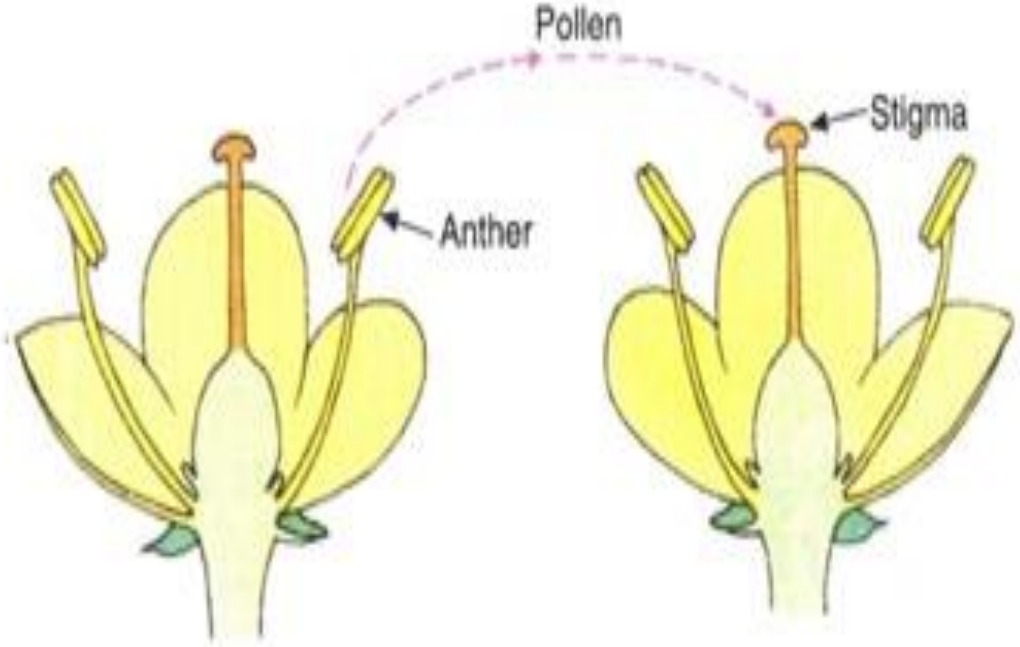
Self-pollination is referred to as the primary type of pollination, which occurs by transferring the pollen grains directly from anther into the stigma of the same flower.

What is Cross-Pollination?

Cross Pollination is referred to as the complex type of pollination during which the pollen grains are transferred from the anther of one flower into the stigma of another flower.

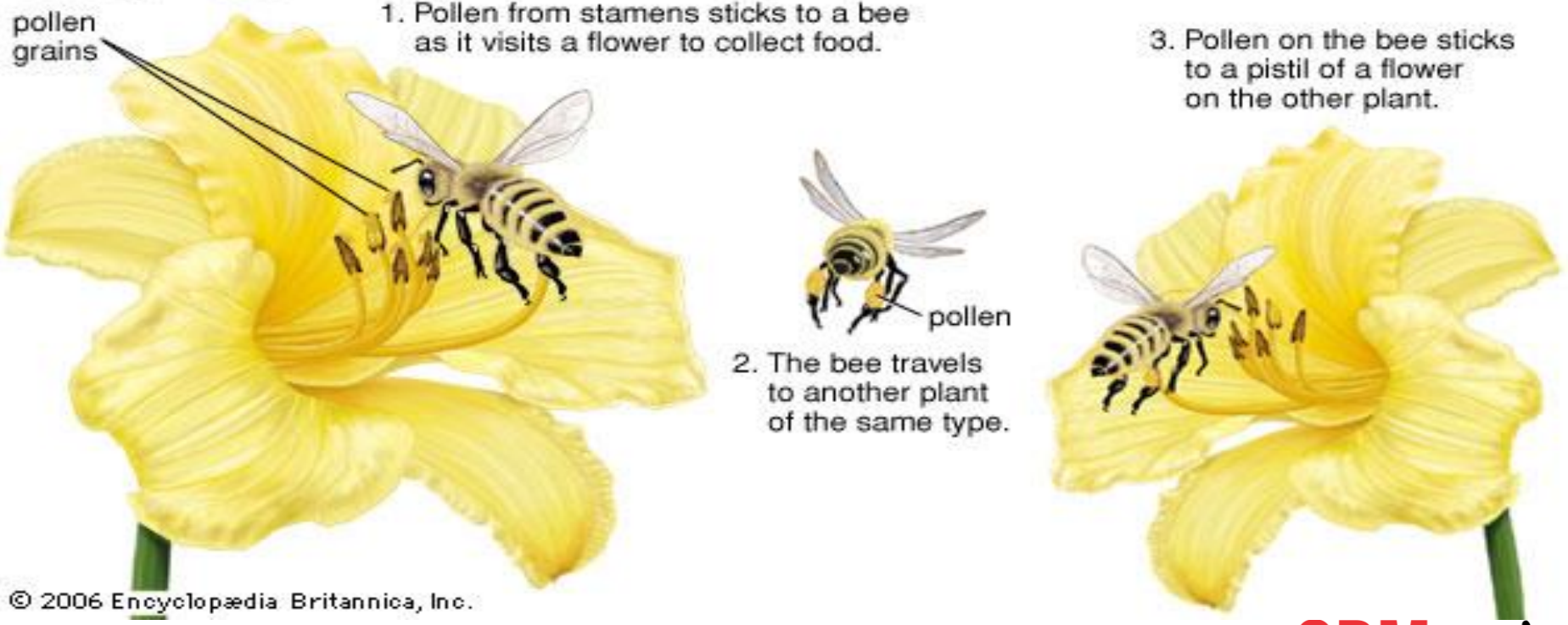


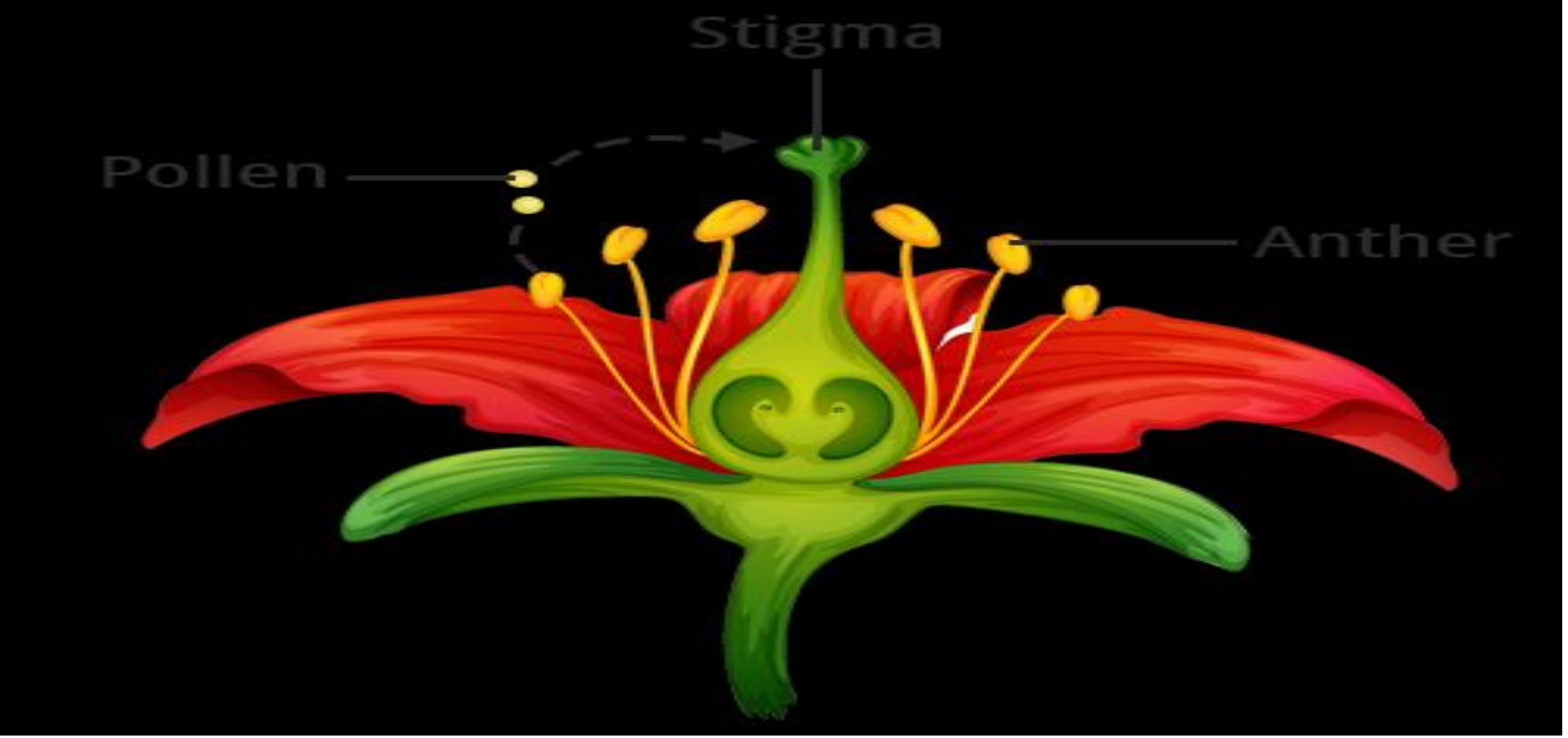
(a) Self-pollination



(b) Cross-pollination

Cross-pollination





What are the Pollinating Agents?

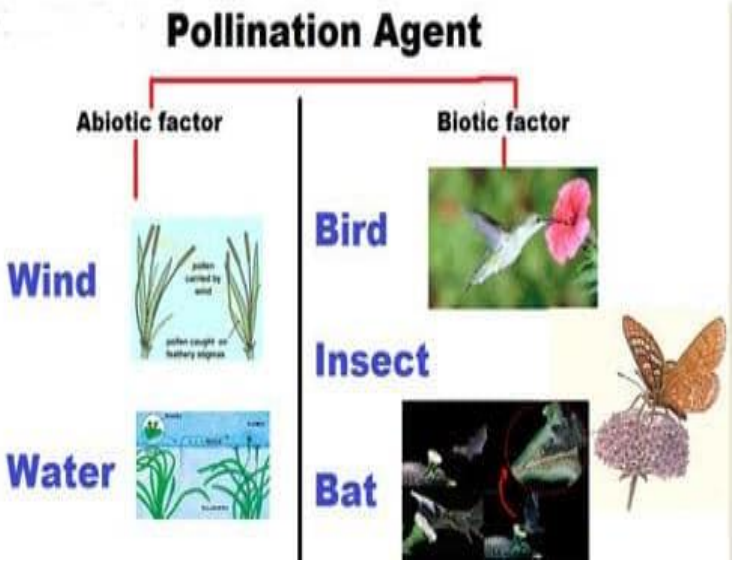
The agents which are involved in transferring the pollen grains from one flower to another flower are called as the Pollinating Agents. Animals, birds, insects, wind and other biotic and abiotic agents are all examples of Pollinating Agents.

How does Pollination occur in Plants?

There are two different types of pollinations in which the pollen grains are transferred from one flower to another. In both the process, pollen grains are transferred from a stamen to the stigma of the same plant or to a flower of different plants.

AGENTS OF POLLINATION

- **1.WIND 2.WATER 3.INSECTS 4.ANIMALS**
- POLLINATION BY WIND
- EX WHEAT,MAIZE
- POLLINATION BYWATER
- EX VALLISNERIA,HYDRILLA
- POLLINATIONBY INSECTS
- EX ROSE,MARIGOLD
- POLLINATION BY ANIMALS
- EX BIGONIA,RED SILK COTTON, KADAM ETC.



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Flower :Fertilisation and after fertilisation changes in a flower, Parts of a fruit , types and functions of fruit

SUBJECT : (Science) Period 3
CHAPTER NUMBER: 2
CHAPTER NAME : The Flower

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What is Fertilization?

- In plants, fertilization is a process of sexual reproduction, which occurs after pollination and germination.
- Fertilization can be defined as the fusion of the male gametes (pollen) with the female gametes (ovum) to form a diploid zygote. It is a physicochemical process which occurs after the pollination of the carpel. The complete series of this process takes place in the zygote to develop into a seed.
- In the fertilization process, flowers play a significant role as they are the reproductive structures of angiosperms (flowering plants). The method of fertilization in plants occurs when gametes in haploid conditions fuse to produce a diploid zygote.
- In the course of fertilization, male gametes get transferred into the female reproductive organs through pollinators (honey bees, birds, bats, butterflies, flower beetles) and the final product will be the formation of the embryo in a seed.

Video link- https://www.youtube.com/watch?v=vMyKhxCEy1Q

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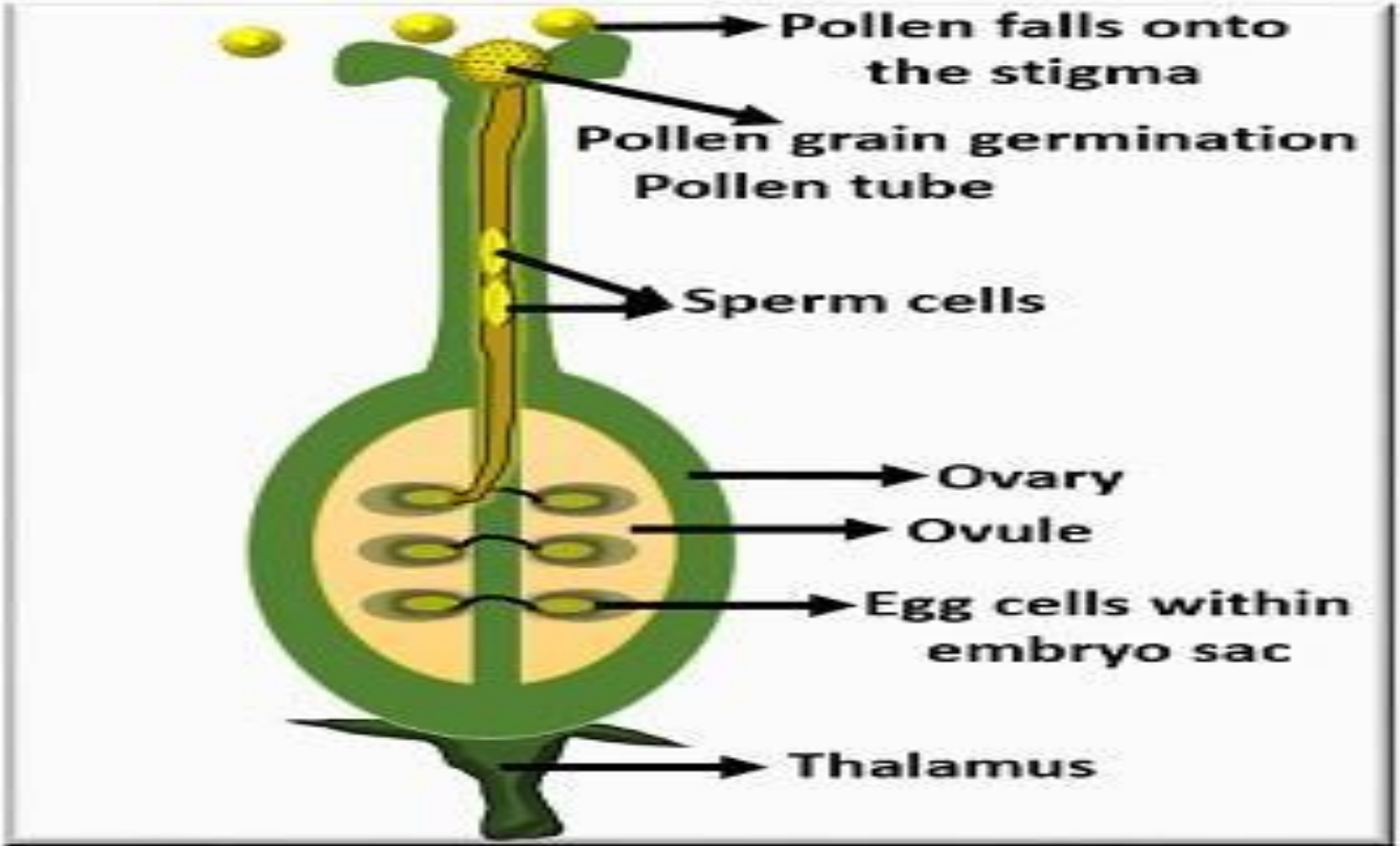

DIAGRAM OF FERTILIZATION IN FLOWERING PLANT

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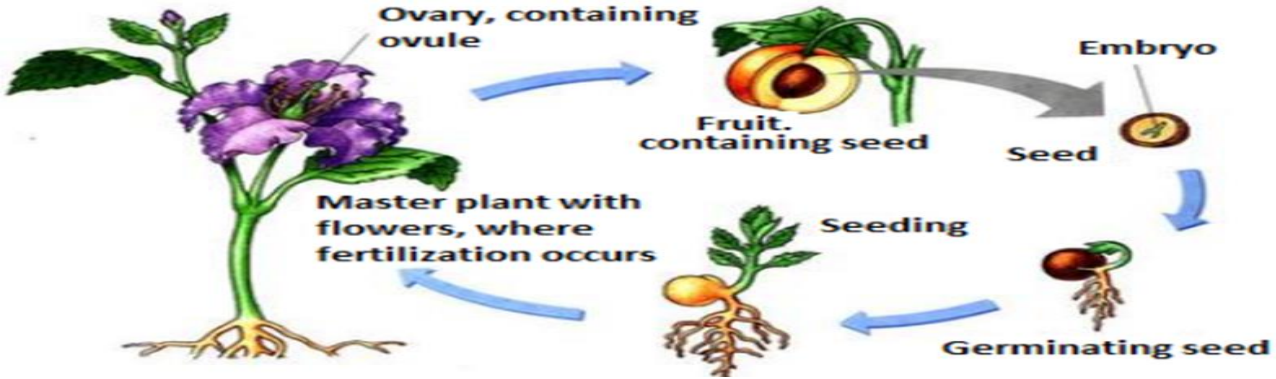
BIOLOGY READER

FORMATION OF FRUIT

- Video link- https://www.youtube.com/watch?v=3OVd2_bPoBY
- After fertilization a number of events take place in the flower.
- 1.The ovary remains attached to the stalk of the flower and grows in to fruit.
- 2.The ovules develop in to seeds.
- 3.The wall of ovary develops in to fruit wall.
- 4.The other parts of flower sepal, petals falls off.
- 5 Style stigma and stamen also fall off



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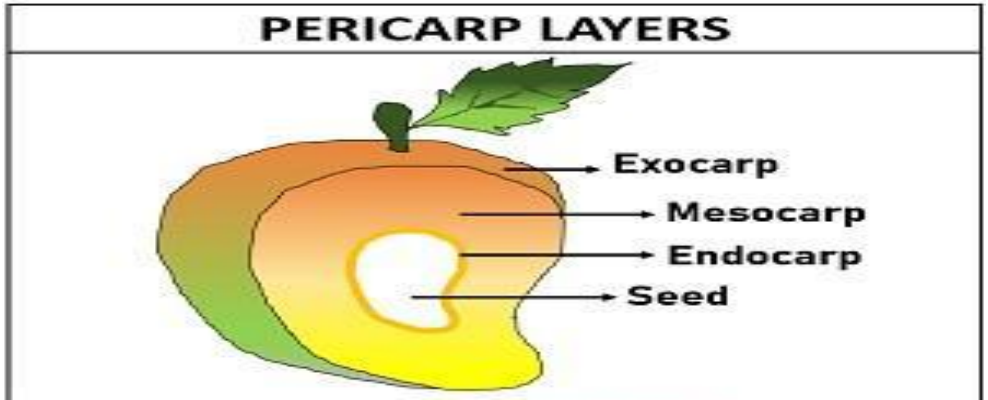
PARTS OF FRUIT

- A fruit is ripened ovary. It consists of pericarp(fruit wall) and seeds.
- Pericarp develops from ovary wall. It may be thick (in fleshy fruits) or thin 9 in dry fruits. It has three parts :
- Epicarp : It is outer thin covering of the fruit.
- Mesocarp : In fleshy fruits, It is the sweet, fleshy middle layer of the pericarp.
- Endocarp: It is the inner layer hard part of the pericarp.



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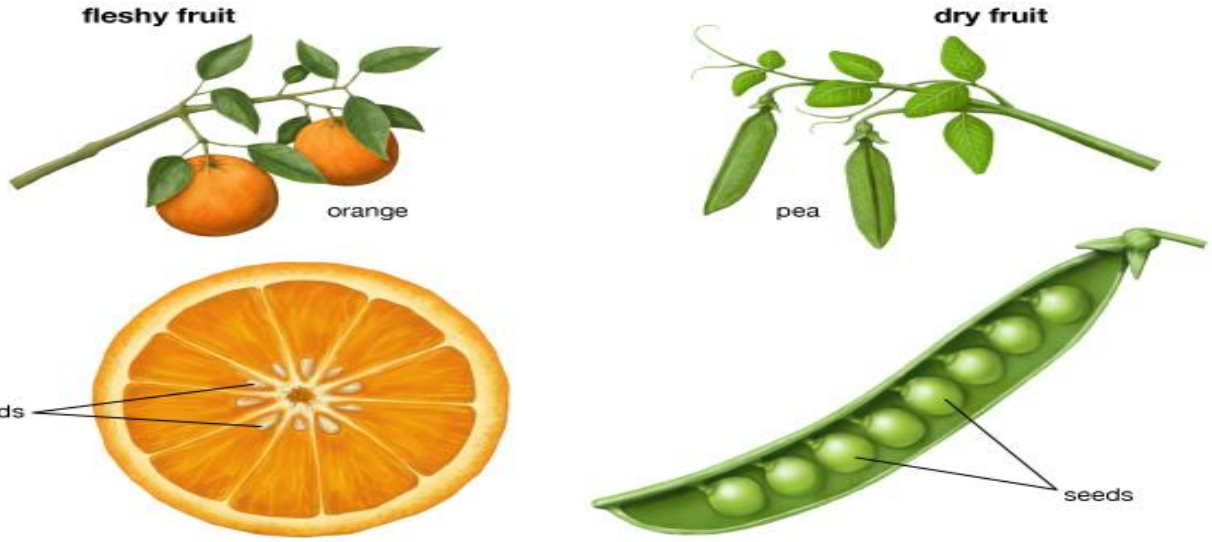
DRY AND FLESHY FRUITS

- In dry fruits, the pericarp is dry and non edible. The edible part of the fruit is seeds. Ex maize, gram , pea
- In fleshy fruits, the pericarp or some of its part are soft and pulpy.Grapes, apple etc.



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Fruit : Parts of a fruit , types and functions of fruit

SUBJECT : (Science)
CHAPTER NUMBER: 2
CHAPTER NAME : The Flower

Period 4

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FORMATION OF FRUIT

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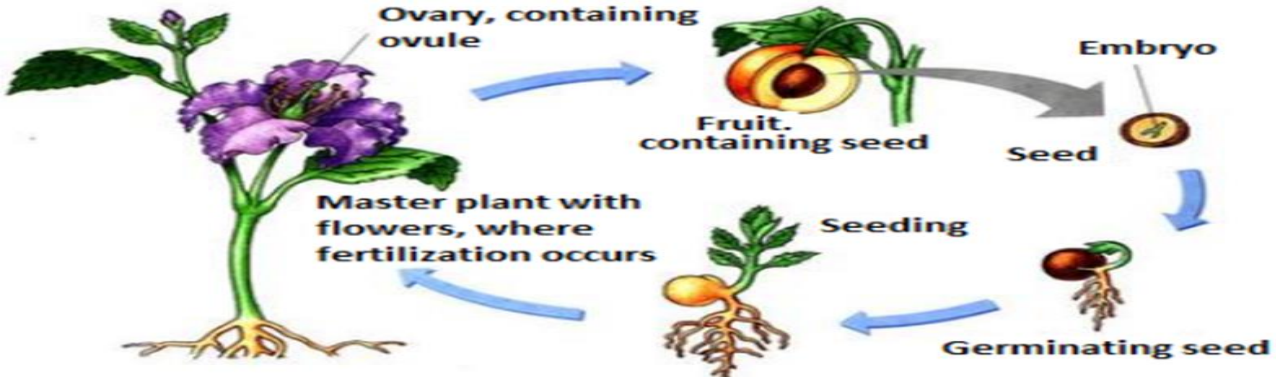

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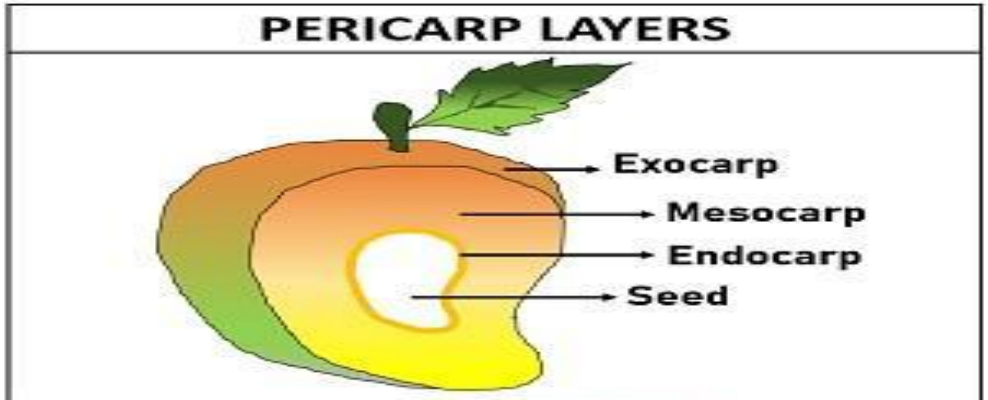

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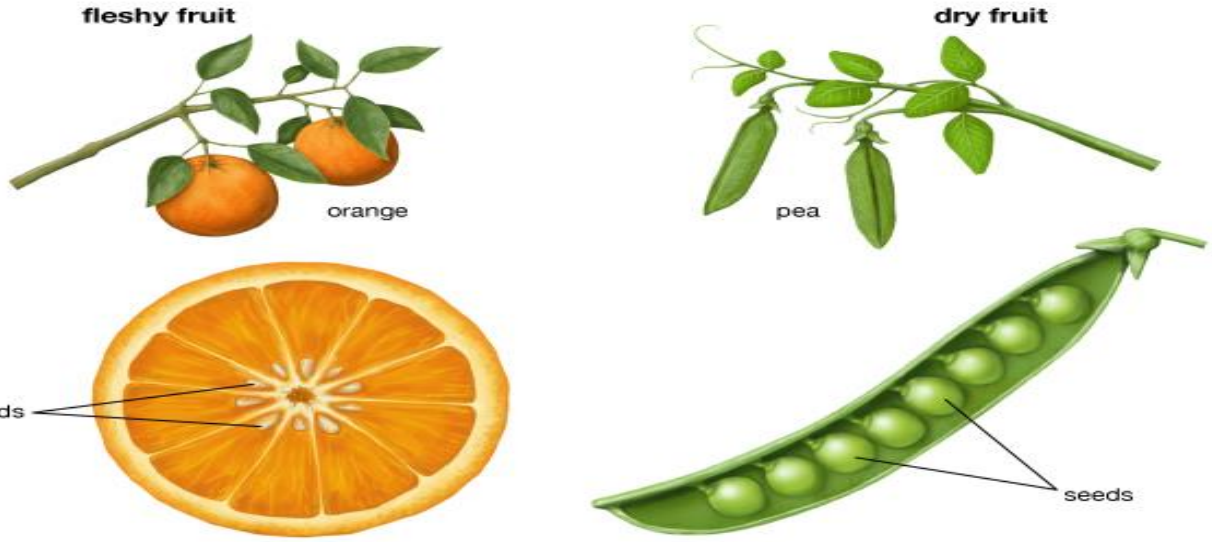

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FUNCTIONS OF FRUIT

1. It protects seeds from the unfavorable environment conditions.
2. Fruits store food inside them
3. Fruits help in dispersing the seeds present inside them and facilitate their germination.

Multiple Choice questions:

1. Tick () the appropriate answer.

(i) In a germinating seed the roots develop from.

(a) Radicle (b) Plumule

(c) Tegmen (d) Hilum

(ii) In a germinating seed the shoot develops from

(a) Radicle (b) Plumule

(c) Tegmen (d) Hilum

(iii) Which one of the following is a monocotyledonous seed?

(a) Bean (b) Pea

(c) Maize (d) Gram

(iv) If the cotyledons are pushed above the soil, then such type of germination is called

(a) Epigeal (b) Hypogeal

(c) Perigeal (d) Progeal

(v) If the cotyledons remain under the soil, then such type of germination is called

(a) Epigeal (b) Hypogeal

(c) Perigeal (d) Progeal

(vi) Pollen is produced in the

(a) Filament (b) Style

(c) Pistil (d) Anther

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(vii) Reproductive whorl of a flower are

(a) Stamen and carpels (b) Sepals and petals

(c) Sepal and stamens (d) Petals and carpels

(viii) Which one of the following is a false fruit?

(a) Tomato (b) Apple

(c) Potato (d) Pea

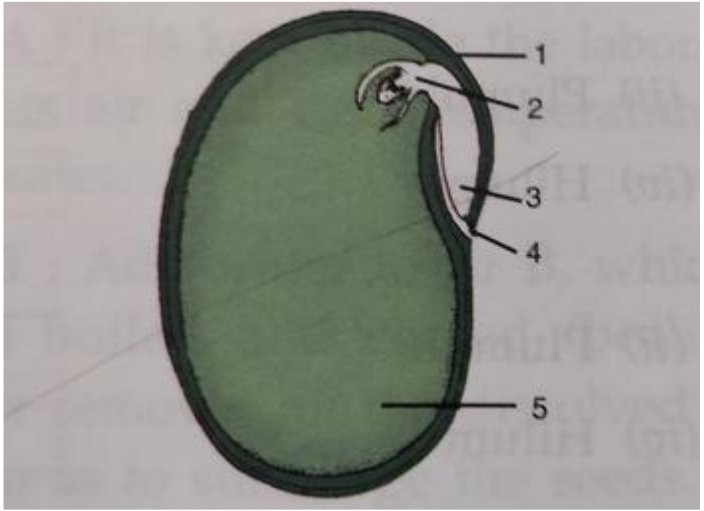
(ix) In a seed food is generally stored in

(a) Radicle (b) Plumule

(c) Fruit (d) Cotyledons or endosperms

Short Answer questions

1. Giving below is a longitudinal section of a bean seed. Level the parts Marked 1 to 5 and right their functions.



1. Testa: It is the outer exposed part of of the seed.
2. Plumule: It is located between the two cotyledons and develops in to a shoot.
3. Radicle: It is located between the two cotyledons and develops in to a root.
4. Micropyle: It absorbs and allows the entry of as much as water as is required for germination.
5. Cotyledon: It stores the food material which is used by the seedling for growth.

2. Name the following:

a) A seed which shows hypogeal germination. ------ Pea

b) A monocot seed. -------- Maize grain

c) A dicot seed. ---------- Bean seed

d) A seed which shows epigeal germination ------- Bean seed

3. Differentiate between the following pairs of terms:

a) Radicle and plumule

The radicle develops in to a root, while the plumule develops in to a shoot.

b) Hilum and micropyle.

Hilum is the inner concave side of the seed, where the seed was attached to the fruit wall. Micropyle is a small pore which absorbs and allows water required for germination.

c) Testa and tegmen.

Testa is the outer exposed part of the seed coat, whereas tegmen is a thin membrane and lies under the testa. It is the inner part of the seed coat

4. Give two functions of fruit.

The two functions of fruit are

i) It protects the seed from the unfavorable environmental conditions.

ii) Fruits store food inside them.

5. Match the columns:

Ans. a- iii, b- i, c- ii, d- v, e- iv

Column A		Column B	
a)	Radicle	i)	Shoot
b)	Plumule	ii)	Store food material
c)	Cotyledon	iii)	Root
d)	Testa	iv)	Absorb water needed for germination
e)	Micropyle	v)	Protection of seed

Long answer questions:

1. What is meant by pollination? Name two types of pollination.

Pollination is the transfer of pollen grains from the anthers to the stigma of a flower.

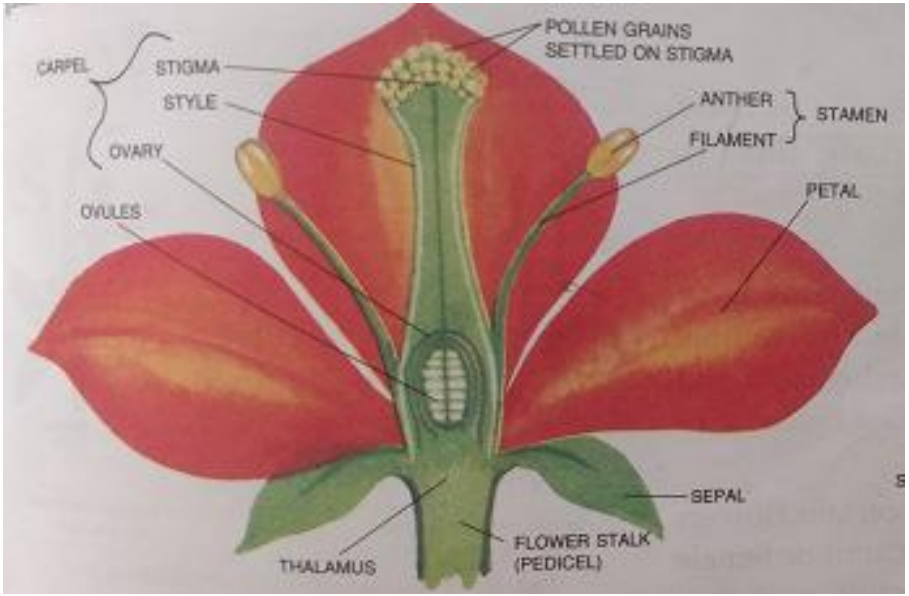
The two types of pollination are

a) Self pollination: It occurs within a single flower or between the flowers of same plant.

b) Cross Pollination: It occurs in flowers of different plants of same kind.

3. What is a flower? Draw a typical flower and level its different parts

A flower is the most beautiful and colourful part of a plant which serves as a reproductive organ.



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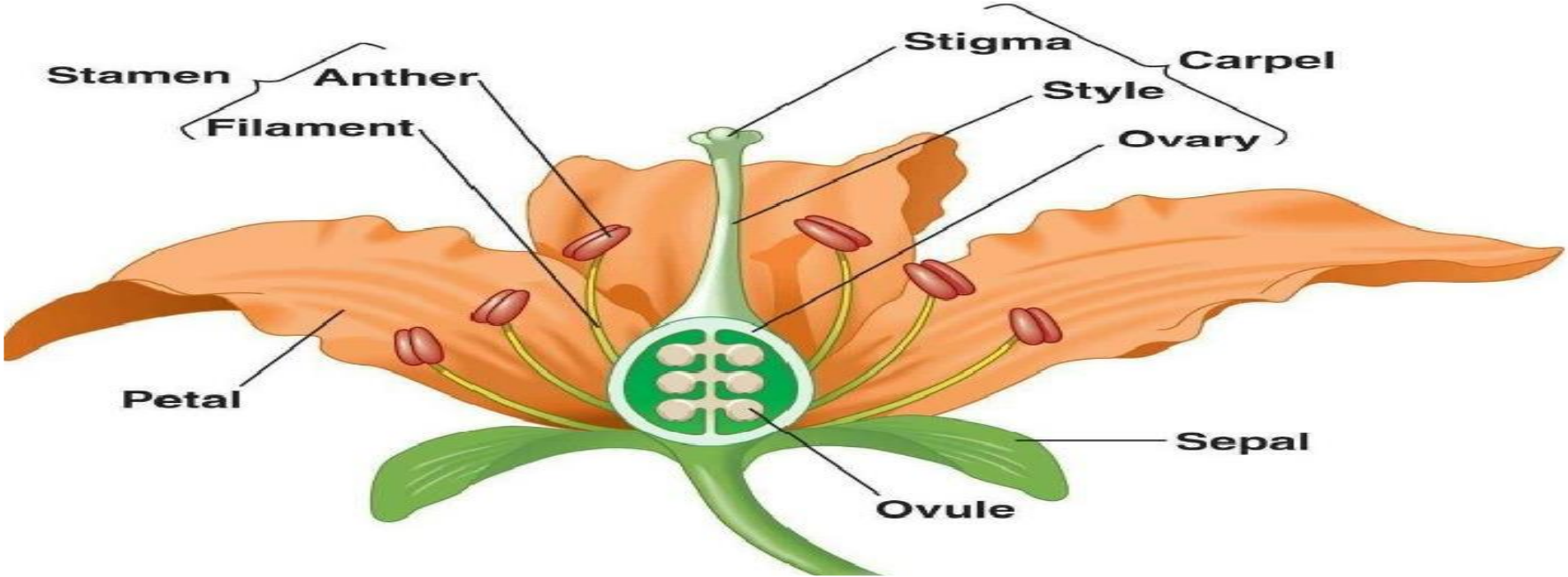
8. State the location of the following in a flower.

(a) Sepals: Sepals are the green outermost part of a flower.
(b) Petals: This forms the second inner whorl. Petals are the large, fragrant and brightly coloured parts of the flower.
(c) Anthers: It is located in the third whorl of the flower. The filament of the stamen bears the anther at its tip.
(d) Stigma: It is located in the fourth and the innermost whorl of the flower. The style bears the stigma at its tip.

9. Given below the diagram of a typical flower. Label the parts marked by Guidelines.



10. Give the difference in the function between the following parts.
(a) Ovary and ovule (b) Petal and sepal
(c) Filament and style (d) Pollen grains and ovule

(a) Ovary and ovule

Ovary	Ovule
It is the female reproductive part of a flower.	Ovule is located inside the ovary.
After fertilization the ovary turns in to a fruit.	Ovule turn in to seed after fertilization.

PETAL AND SEPAL

Petal	Sepal
Petal is present in the second inner whorl of the flower.	It is the outermost whorl of a flower.
Petals are usually coloured or white but never green. It makes the flower attractive and attracts the insects for pollination.	Sepals are green leaf like structures. They enclose the inner part of the flower to provide necessary protection to growing bud.

(c) Filament and style

Filament	Style
Filament is a thin thread like structure which bears the anther on its tip.	Style bears an expanded stigma at its tip and transfers the male gametes of the pollen grain in to the ovary.

(d) Pollen grains and ovule

Pollen grains	Ovule
Pollen grains contain the male gametes.	Ovule contains the female gametes.
Pollen grains germinate to produce pollen tubes, which carry the male gametes to the ovary.	After fertilization the ovule develops in to a seed.

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Flower :Seed: types of seeds, structure of a seed- bean, coconut

SUBJECT : (Science) Period 5
CHAPTER NUMBER: 2
CHAPTER NAME : The Flower

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Parts Of A Seed

A seed is an important part of a flowering plant. They give rise to a new plant. They may be of different shapes, colours and sizes. They may be round, wrinkled, winged or hairy. They are in a dormant condition until they receive adequate sunlight, water, and soil. The growth of the plant from a seed is known as germination. A seed has three parts:

- **Seed Coat**
- **Endosperm**
- **Embryo**

Seed Coat

- A seed coat protects the internal parts of a seed. The seed coat has two layers. The outer layer is thick and known as the testa. The inner layer is thin and known as tegmen.
- A thick seed coat protects the seed from sunlight and water. It prevents the loss of water and entry of parasites within the seeds. The hard seed coats prevent germination during unfavourable environmental conditions.
- An opening in the integument of the ovule is known as the micropyle and is visible on some seed coats. The hilum is also visible which is equivalent to the naval in humans where the umbilical cord is attached.

Endosperm

- The endosperm contains the nutrients stored in it. It provides nutrients to the seed in the form of starch, carbohydrates and proteins to support the embryo during germination. It is located below the seed coat. The seeds remain viable with the intake of nutrients until germination.
- In corns and other cereals, endosperm constitutes a major portion of the seed. In seeds like beans, the endosperm is utilized in the embryo development and is absent in the seed. Coconut is the liquid endosperm.

Embryo

The embryo is the most important part of a seed. It is diploid, developed from the fertilized egg. All the cells that need to develop into a mature embryo are present within the embryo. An embryo comprises the following parts:

Epicotyl

Hypocotyl

Radicle

Cotyledons

Epicotyl is a small shoot which gives rise to the entire plant shoot system.

The primary root emerges first during germination. It is also known as **hypocotyl**. It anchors the plant firmly in the soil.

Radicle is a small embryonic root.

The **cotyledons** provide nourishment to different parts of the embryo. It emerges as a tiny or fleshy leaf from the soil with the seedling during growth. It stores food in the form of starch and protein.

The embryonic leaves are the first to appear above the ground. An embryo develops from a fertilized egg.

Types of Seeds

There are two types of seeds:

- Monocotyledonous seeds
- Dicotyledonous seeds

1. Monocotyledonous Seeds

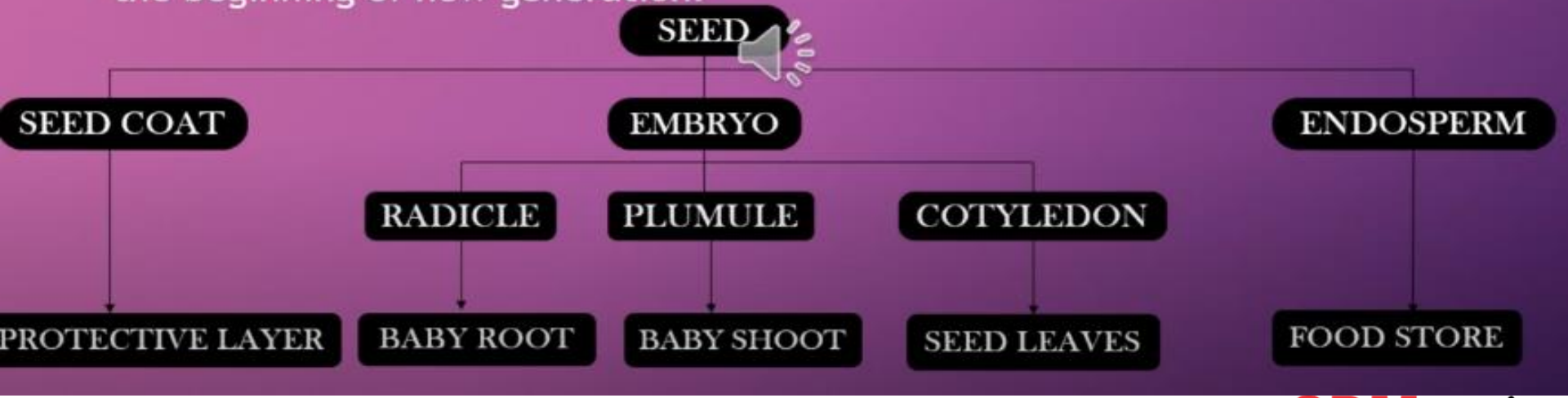
These comprise a single cotyledon emerging from the seeds on germination. For eg., rice

2. Dicotyledonous Seeds

These comprise two cotyledons emerging from the seeds on germination. For eg., tomato

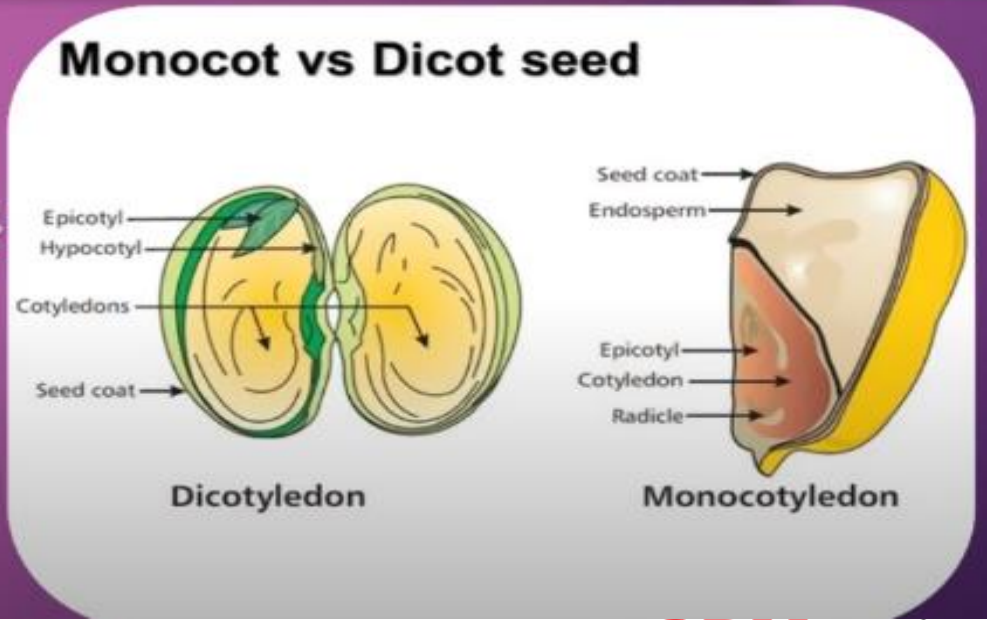
Seeds

- Seeds is fertilized ovule. It develops after fertilization and marks the beginning of new generation.

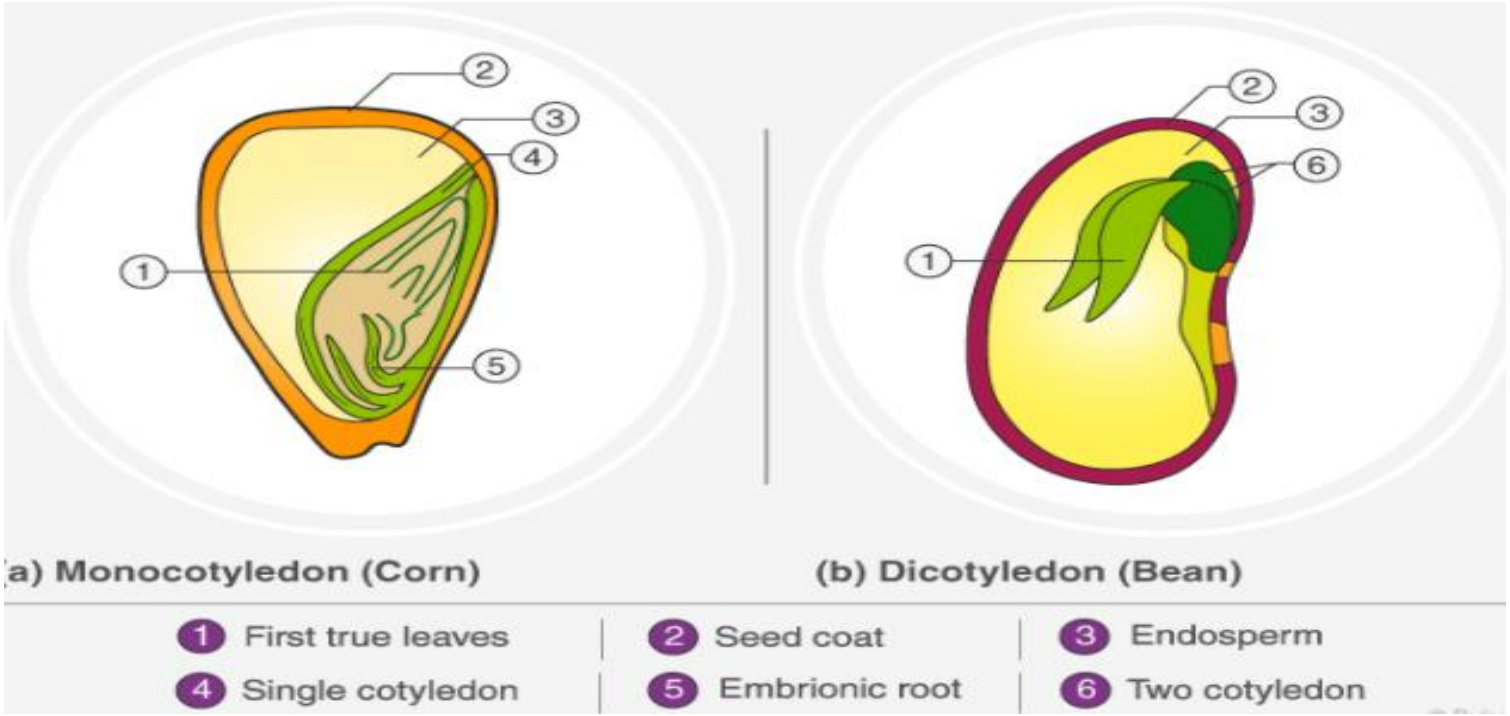


Types of seeds

- 1. Dicotyledonous seed
- 2. Monocotyledonous seeds



MONOCOTYLEDON & DICOTYLEDON-



Monocotyledon vs Dicotyledon

Monocotyledon	Dicotyledon
The monocot embryos have a single cotyledon	The dicot embryos have a pair of cotyledons
They have a fibrous root system	They have a tap root system
Leaves in monocots have parallel venation	Leaves in dicots have reticulate or net venation
In monocot flowers, the count of parts of the flower is a multiple of three or equal to three	The count of parts in a dicot flower is a multiple of four or five or equal to four or five
The roots and stems of Monocotyledons do not possess a cambium and cannot increase in diameter	The roots and stems of Dicotyledons possess a cambium and have the ability to increase in diameter
A few examples of monocotyledons are garlic, onions, wheat, corn and grass	A few examples of dicots are beans, cauliflower, apples and pear

VIDEO LINK- https://www.youtube.com/watch?v=xDeei76ii5E

VIDEO LINK- https://www.youtube.com/watch?v=Ilz9nkxUvhQ

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Flower : Germination: Necessary Conditions for germination (Activity 7 and Activity 8)

SUBJECT : (Science)
CHAPTER NUMBER: 2
CHAPTER NAME : The Flower

Period 6

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What is Seed Germination?

Seed germination may be defined as the fundamental process by which different plant species grow from a single seed into a plant. This process influences both crop yield and quality.

A common example of seed germination is the sprouting of a seedling from a seed of an angiosperm or gymnosperm.

The Process of Seed Germination

- During the beginning stage of germination, the seeds take up water rapidly and this results in swelling and softening of the seed coat at an optimum temperature. This stage is referred to as Imbibition. It starts the growth process by activation of enzymes. The seed activates its internal physiology and starts to respire and produce proteins and metabolizes the stored food. This is a lag phase of seed germination.
- By rupturing of the seed coat, radicle emerges to form a primary root. The seed starts absorbing underground water. After the emerging of the radicle and the plumule, shoot starts growing upwards.
- In the final stage of seed germination, the cell of the seeds become metabolically active, elongates and divides to give rise to the seedling.

Conditions Necessary for Seed Germination

- Here are some important requirements which are essential for a seed to germinate into a seedling and to a plant.
- Water: It is extremely necessary for the germination of seeds. Some seeds are extremely dry and need to take a considerable amount of water, relative to the dry weight of the seed. Water plays an important role in seed germination. It helps by providing necessary hydration for the vital activities of protoplasm, provides dissolved oxygen for the growing embryo, softens the seed coats and increases the seed permeability. It also helps in the rupturing of seed and also converts the insoluble food into soluble form for its translocation to the embryo.

Oxygen: It is an important and essential source of energy required for seed growth. It is required by the germinating seed for metabolism and is used as a part of **aerobic respiration** until it manages to grow green leaves of its own. Oxygen can be found in the pores of soil particles, but if the seed is buried too deep it will be deprived of this oxygen.

Temperature: For a seed to germinate, it requires a moderate temperature of around 25-30°C. Quite obviously different seeds require different optimum temperatures. There are some seeds which require special requirements either lower or higher temperature between 5 to 40°C.

Light or darkness: This can act as an environmental trigger. Many seeds do not germinate until sunlight falls on them.

Types Of Germination-

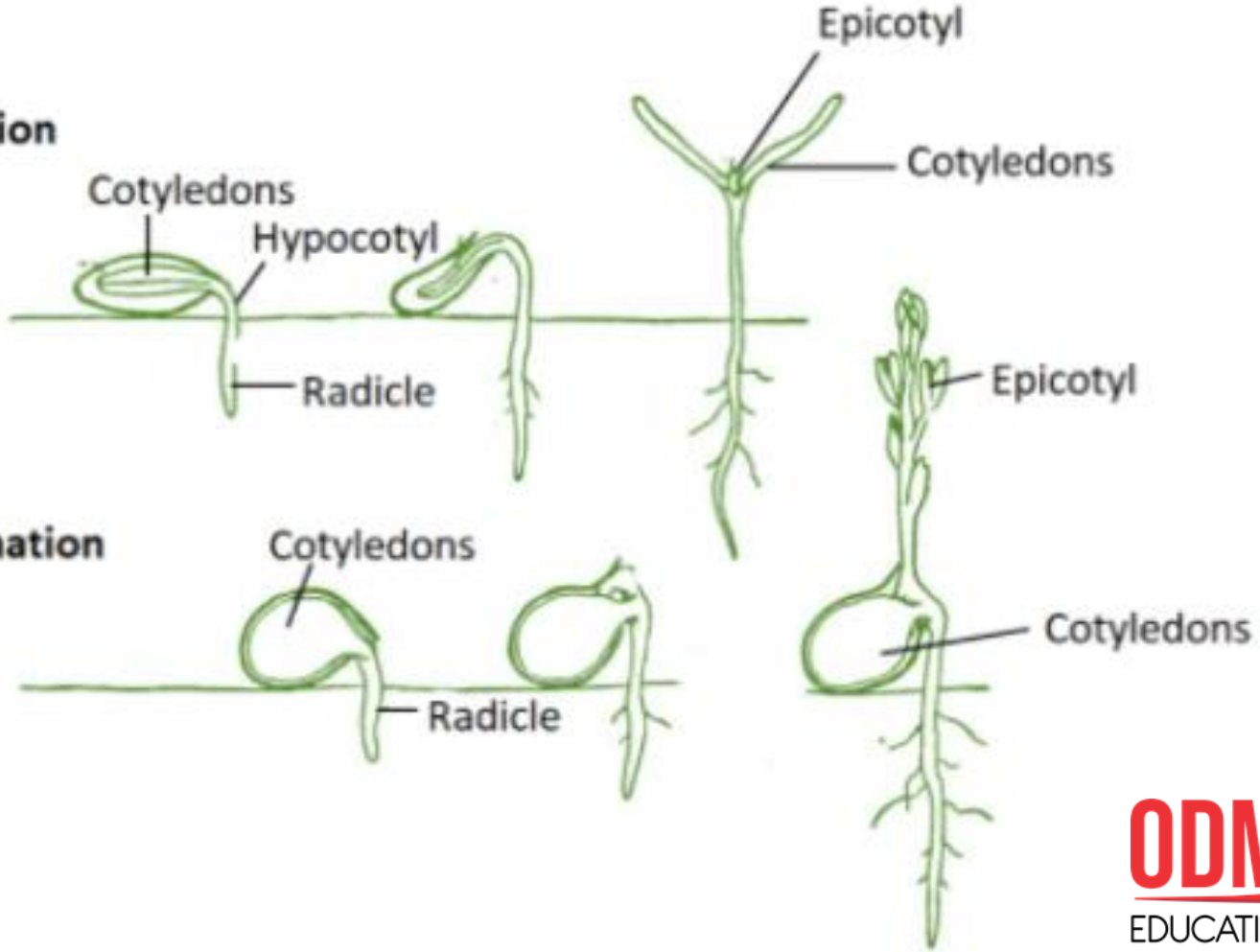
- Germination is the fundamental process in which the sown plant seeds are grown into young plants or seedlings. Based on their growing conditions and the fate of the cotyledons, the process of germination is classified into two main types:

1. Epigeal Germination
2. Hypogeal Germination

Epigeal germination indicates the germination of plants that pushes the cotyledons above the ground. However, Hypogeal germination implies that the cotyledons stay below the ground. The difference between the epigeal and hypogeal germination –

Epigeal germination	Hypogeal germination
In this type of germination, the cotyledons originate from the soil surface.	In this type of germination, cotyledons remain inside the soil surface.
The cotyledons come out of the ground by the excessive growth of hypocrisy.	In this process, the epicotyl grows and takes the plumule above the soil.
To protect the plumule from the friction of soil, the terminal part of hypocotyl gets curved.	Here, the terminal part of epicotyl gets curved to protect the plumule from friction.
For the growth, Energy is derived from the cotyledons.	Energy is primarily derived from the endosperm for growth.
The cotyledons turn into green and act as the first leaf of the plant that performs photosynthesis.	In this method, cotyledons do not play any role in photosynthesis.
The example includes bean and castor.	The examples include pea, maize, and coconut.

Epigeal germination



Hypogeal germination

- https://www.youtube.com/watch?v=TE6xptjgNR0
- https://www.youtube.com/watch?v=_2tgcvvHOHI
- https://www.youtube.com/watch?v=ZdOmVDRNXys

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Flower : Recapitulation of the topic

SUBJECT : (Science)
CHAPTER NUMBER: 2
CHAPTER NAME : The Flower

Period 7

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EXERCISE

Multiple Choice questions:

1. Tick (✓) the appropriate answer.

(i) In a germinating seed the roots develop from.

(a)	Radicle	✓	(b)	Plumule	
(c)	Tegmen		(d)	Hilum	

(ii) In a germinating seed the shoot develops from

(a)	Radicle		(b)	Plumule	✓
(c)	Tegmen		(d)	Hilum	

(iii) Which one of the following is a monocotyledonous seed?

(a)	Bean		(b)	Pea	
(c)	Maize	✓	(d)	Gram	

(iv) If the cotyledons are pushed above the soil, then such type of germination is called

(a)	Epigeal	✓	(b)	Hypogeal	
(c)	Perigeal		(d)	Progeal	

(v) If the cotyledons remain under the soil, then such type of germination is called

(a)	Epigeal		(b)	Hypogeal	✓
(c)	Perigeal		(d)	Progeal	

(vi) Pollen is produced in the

(a)	Filament		(b)	Style	
(c)	Pistil		(d)	Anther	✓

(vii) Reproductive whorl of a flower are

(a)	Stamen and carpels	√	(b)	Sepals and petals	
(c)	Sepal and stamens		(d)	Petals and carpels	

(viii) Which one of the following is a false fruit?

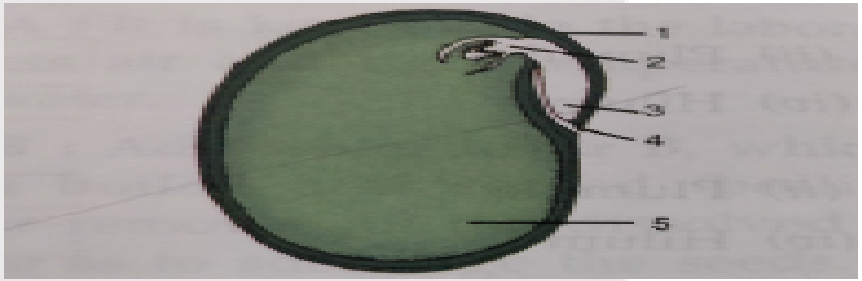
(a)	Tomato		(b)	Apple	√
(c)	Potato		(d)	Pea	

(ix) In a seed food is generally stored in

(a)	Radicle		(b)	Plumule	
(c)	Fruit		(d)	Cotyledons or endosperms	√

Short Answer questions

1. Giving below is a longitudinal section of a bean seed. Level the parts Marked 1 to 5 and right their functions.



1. Testa: It is the outer exposed part of of the seed.

2. Plumule: It is located between The two cotyledons and develops in to a shoot.

3. Radicle: It is located between The two cotyledons and develops in to a root.

4. Micropyle: It absorbs and allows the entry of as much as water as is required for germination.

5. Cotyledon: It stores the food material which is used by the seedling for growth.

2. Name the following:

a) A seed which shows hypogeal germination. ------ Pea

b) A monocot seed. ------- Maize grain

c) A dicot seed. --------- Bean seed

d) A seed which shows epigeal germination ------ Bean seed

3. Differentiate between the following pairs of terms:

a) Radicle and plumule

The radicle develops in to a root, while the plumule develops in to a shoot.

b) Hilum and micropyle.

Hilum is the inner concave side of the seed, where the seed was attached to the fruit wall. Micropyle is a small pore which absorbs and allows water required for germination.

c) Testa and tegmen.

Testa is the outer exposed part of the seed coat, whereas tegmen is a thin membrane and lies under the testa. It is the inner part of the seed coat

4. Give two functions of fruit.

The two functions of fruit are

i) It protects the seed from the unfavorable environmental conditions.

ii) Fruits store food inside them.

5. Match the columns:

Column A		Column B	
a)	Radicle	i)	Shoot
b)	Plumule	ii)	Store food material
c)	Cotyledon	iii)	Root
d)	Testa	iv)	Absorb water needed for germination
e)	Micropyle	v)	Protection of seed

Ans. a- iii, b- i, c- ii, d- v, e- iv

6. Radicle emerges out of the seed earlier than plumule. State one advantage served by this.

As the radicle emerges out of the seed earlier and develop in to a root it helps in providing water and mineral for further growth of the plumule.

7. State whether the following statements are TRUE or FALSE

a) Some seeds have no cotyledons. FALSE

b) Warmth is necessary for germination of seeds. TRUE

c) All seeds have two cotyledons. FALSE

d) Oxygen is necessary for germination of seeds. TRUE

8. State one function of the following:

a) Radicle: It develops in to a root.

b) Cotyledons: It stores the food material which is used by the seedling for growth.

c) Endosperm: It stores food in the form of starch.

d) Micropyle: It absorbs and allows the entry of as much as water as is required for germination.

9. The three conditions necessary for germination of seeds are (Tick the correct answer):

a) Oxygen, suitable temperature and water. ✓

b) Good soil, water and air.

c) Good soil, suitable temperature and light.

d) Light, oxygen and temperature.

e) Oxygen, carbon dioxide and light

10. Name the part of the seed from which the following are given out:

(a) Roots: Radicles

(b) Leaves: Plumule

11. In the spaces provided below, draw labelled diagram to show the three stages in the germination of any seed you have observed.

Complete seed

Radicle emerged

Plumule emerged

Long answer questions:

1. What is meant by pollination? Name two types of pollination.

Pollination is the transfer of pollen grains from the anthers to the stigma of a flower.
The two types of pollination are

a) Self pollination: It occurs within a single flower or between the flowers of same plant.

b) Cross Pollination: It occurs in flowers of different plants of same kind.

2. Imagine all the seeds produced by a plant happen to fall under the same plant and sprout in to new plants. Mention any two problems that will be faced by the new plants.

If all the seeds produced by a plant happen to fall under the same plant and sprout in to new plants, then the following problem will happen.

a) As a large number of plants will grow in a very small area, the water and minerals available for the plants will be very limited.

b) The air and sunshine for them will be not enough. As a result most of the sprouts will die.

3. What is a flower? Draw a typical flower and level its different parts.

A flower is the most beautiful and colourful part of a plant which serves as a reproductive organ.

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4. With the help of a suitable diagram, describe the structure of a dicot seed.

The bean seed is an example of a dicot seed, whose diagram is shown below.

The green outermost covering of the seed is called the seed coat. It protects the seed from insects and bacteria as well as from mechanical injury.
The seed coat is again Made up of two parts. The outer exposed part is called the testa and the inner part is called tegmen.
A scar called hilum is present in the inner concave side of the seed. This is the place where the seed is attached to the fruit wall.
Above the hilum there is a small pore called micropyle. It absorbs and allows the entry of water required for germination.
The seed is made up of two fleshy seed leaves called the cotyledons. They contain stored food material which is used by the seedling for growth.
In between the two cotyledons a delicate embryo is located, which is consist of radicle and plumule. The radicle develops in to a root and the plumule develops in to a shoot.

5. Define germination. Name two types of germination. Explain with example.

The process by which the embryo in the seed becomes active in the presence of water, air and suitable temperature and grows in to a young plant is called germination.

The two types of germination are epigeal germination and hypogeal germination.

Epigeal germination: The type of germination in which, the cotyledons are pushed above the soil is called epigeal germination. The leaves unfold and start preparing food for the growing plant.
Germination of a bean seed is an example of epigeal germination.

Hypogeal germination: The type of germination in which the cotyledons remain below the ground is called hypogeal germination. The plumule only comes out of the soil to form leaves.
Germination of pea seed and maize grain are examples of hypogeal germination

6. What are the three conditions necessary for the germination of seeds?

Water, air and favorable temperature are the three conditions required or the germination of seeds.

7. Give the main differences between hypogeal and epigeal germination.

Hypogeal germination	Epigeal germination
Cotyledons remain below the ground.	Cotyledons are pushed above the ground.
Epicotyl elongates faster than hypocotyl, hence cotyledons remain below.	Hypocotyl elongates faster than epicotyl. Hence cotyledons get pulled above.
Examples: maize, rice, ground nut	Examples: bean, tamarind, papaya, cucumber

8. State the location of the following in a flower.

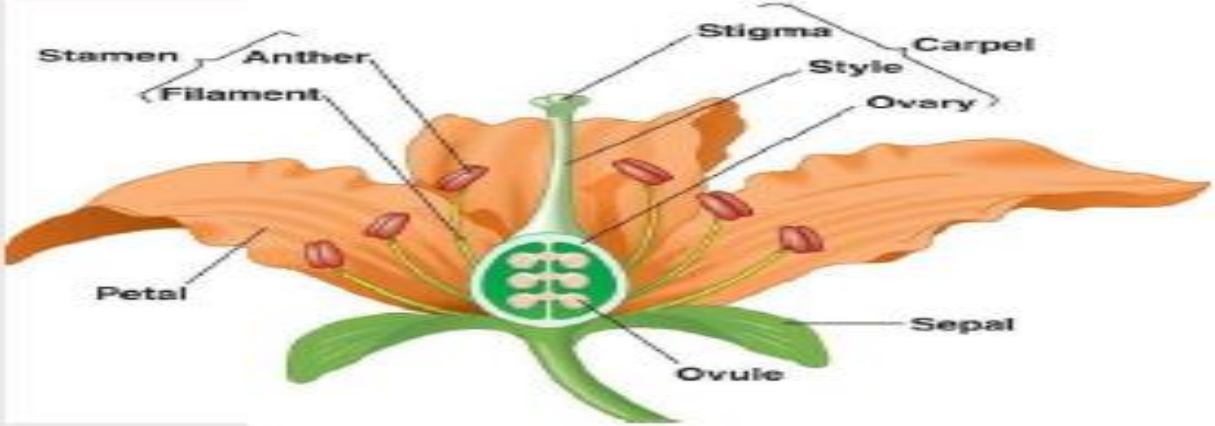
(a) Sepals: Sepals are the green outermost part of a flower.

(b) Petals: This forms the second inner whorl. Petals are the large, fragrant and brightly coloured parts of the flower.

(c) Anthers: It is located in the third whorl of the flower. The filament of the stamen bears the anther at its tip.

(d) Stigma: It is located in the fourth and the innermost whorl of the flower. The style bears the stigma at its tip.

9. Given below the diagram of a typical flower. Label the parts marked by Guidelines.



10. Give the difference in the function between the following parts.

(a) Ovary and ovule
(b) Petal and sepal
(c) Filament and style
(d) Pollen grains and ovule

(a) Ovary and ovule

Ovary	Ovule
It is the female reproductive part of a flower.	Ovule is located inside the ovary.
After fertilization the ovary turns in to a fruit.	Ovule turn in to seed after fertilization.

(b) Petal and sepal

Petal	Sepal
Petal is present in the second inner whorl of the flower.	It is the outermost whorl of a flower.
Petals are usually coloured or white but never green. It makes the flower attractive and attracts the insects for pollination.	Sepals are green leaf like structures. They enclose the inner part of the flower to provide necessary protection to growing bud.

(c) Filament and style

Filament	Style
Filament is a thin thread like structure which bears the anther on its tip.	Style bears an expanded stigma at its tip and transfers the male gametes of the pollen grain in to the ovary.

(d) Pollen grains and ovule

Pollen grains	Ovule
Pollen grains contain the male gametes.	Ovule contains the female gametes.
Pollen grains germinate to produce pollen tubes, which carry the male gametes to the ovary.	After fertilization the ovule develops in to a seed.

Extra Questions and Answers

A. Objective Questions

1. Fill in the blanks:

a) The flower is attached to the shoot by means of stalk or pedicel.
b) The androecium is called the male reproductive part of the flower.
c) The gynoecium is called the female reproductive part of the flower.
d) The gynoecium is made up of the carpel or the pistil.
e) The three parts of pistil are ovary, style and stigma.
f) The ovary contains small rounded bodies called ovules.
g) The fusion of male and female gametes is called fertilization.
h) A fruit is the ripened ovary.
i) Hilum is the place where the seed is attached to the fruit wall.
J) The upper large part of the maize grain is called the endosperm.
k) After the pollen grain reaches the stigma of the flower, it produces pollen tubes.

2. Give one word for the following.

a) The outermost whorl of flower – Sepals.
b) The second whorl of sepals in china rose – Petals.
c) A flower pollinated by bats – Guava.
d) The dry outer skin of fruit – Epicarp.
e) The thick tough outer seed coat – Testa.
f) Covering of plumule in monocotyledon – Coleoptile.
g) In monocot seeds, radicle is covered by a protective covering called – Coleorhiza
h) The protein rich layer surrounding the endosperm is called – Aleurone layer.

B. Short Questions And Answers.

1. Name the four whorls of a flower.

The four whorls of a flower are calyx, corolla, androecium and gynoecium.

2. What do you mean by a complete and incomplete flower?

When all the four whorls, calyx, corolla, androecium and gynoecium Are present in a flower, it is said as a complete or bisexual flower and If anyone whorl is missing in a flower it is said to be an incomplete flower.

3. What is the function of a flower?

The main function of flower is to produce seeds and fruits.

4. What are the agents of pollination?

Some agents of pollination are insects, wind, water and animals.

5. What happens to each part of the flower after fertilization?

After fertilization the ovary grows in to a fruit. The ovules inside the ovary develops in to seed. The sepals and petals fall off.

6. What is a false fruit? Define with example.

In some cases the thalamus of the flower develops in to a fruit and not the ovary. The ovary remains as a small central part containing the seeds. These types of fruits are called false fruits. Apple and pear are some example of false fruit.

7. What are the functions of a fruit?

i) It protects seeds from the unfavorable environmental condition.
ii) Fruits store food inside them.
iii) It helps in dispersing the seeds and facilitate their germination.

C. Long Questions And Answers.

Answer the following:

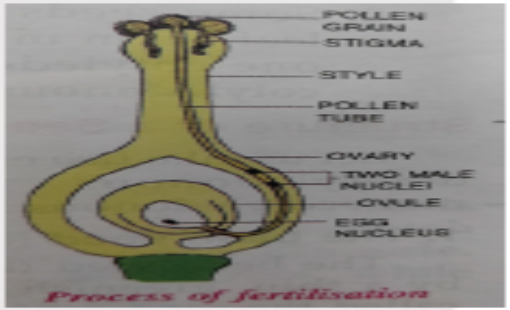
1. What are the different types of flowers?

Flowers can be divided in to two types. Bisexual flower and Unisexual flower.

Bisexual flower: The flower having both male and female reproductive parts(androecium and gynoecium) are called bisexual flowers.

Unisexual flower: The flowers having either the male reproductive part (Androecium) or female reproductive part (gynoecium) are called unisexual flowers.

2. Define fertilization. Describe the process of fertilization with neat diagram.



Process of fertilisation

The fusion of male and female gametes is known as fertilization.

After landing of the pollen grains on the surface of stigma they starts germinating and produce pollen tubes. One of the pollen tubes continues to develop downwards in to a style. This pollen tube carries the male gametes. This pollen tube finally reaches the ovary. When this reaches the ovule, the male gametes are released from the pollen tube and fuse with the female gametes located inside the ovule and produce a zygot. After fertilization the ovary becomes larger and develops in to a fruit and the ovule develops in to a seed.

3. Describe pericarp and its different parts.

The pericarp is the fruit wall, which develops from the wall of the ovary. It may be thick and thin depending on the kind of fruit. It is soft and fleshy in some fruits like tomato and papaya and it is dry in gram.

The pericarp has three part.
Epicarp: This is the thin outer protective covering of the fruit.

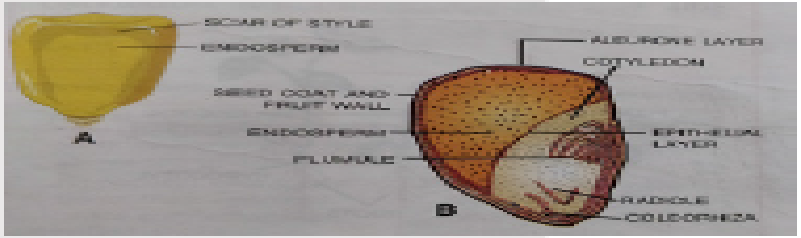
Mesocarp: This is the sweet, fleshy, edible middle layer of the fruit.

Endocarp: It is the inner hard part of the fruit, which contains seeds.

4. What is the difference between a fleshy fruit and a dry fruit?

In a fleshy fruit the entire pericarp is soft and fleshy. The endocarp is hard and contains the seeds. Example- grape, tomato, papaya etc.
In a dry fruit the pericarp is not pulpy and fleshy, it encloses the seeds. Example – in a pea pod the pod is the pericarp and the pea is the seed which is enclosed within the pod.

5. With the help of suitable diagram describe the structure of a monocot seed.



The maize grain has one cotyledon, hence it is said to be a monocot seed.
It is triangular in shape. The lower end of the seed is narrow and is yellowish white. The upper end of the seed is wide and is dark yellow in colour.
The seed coat of the maize grain is fused with the pericarp.
The upper larger part is called the endosperm. It stores the food and surrounded by a protein rich layer called Aleurone layer. The lower part of the seed is called cotyledon. It contains the embryo which is made up of the radicle and plumule.

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6. Write the difference between a bean seed and a Maize grain

Bean Seed	Maize Grain
Dicot seed	Monocot seed
Endosperm is absent	Endosperm is present
Cotyledons store food	Endosperm stores food.
Embryo is large	Embryo is small
Seed is contained separately in a fruit.	Seed coat and the fruit wall are fused to form a grain.

7. Write short notes on the following.
   i) Radicle ii) Plumule iii) Embryo iv) Cotyledon v) Endosperm

i) Radicle: The radicle is part of embryo inside the seed which first come out during the seed germination and develops in to the root of a plant.

ii) Plumule: The plumule is the portion of the plant embryo which gives rise to the first leaves and form the shoot system of the plant during germination.

iii) Embryo: Embryo is the baby plant inside the seed, which contains the radicle and plumule. It is the early stage of the plant and gradually develops after germination.

iv) Cotyledons: The cotyledons provide food for the embryo during the germination in dicot plants. They act as leaves and perform photosynthesis in the beginning.

v) Endosperm: It is present in the monocot seed and stores food in the form of starch, which helps the seedling for growth.

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