

Chapter 7. Flowers

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Solution 1:

A flower is the reproductive unit in angiosperms. It is a modified shoot in which internodes are shortened and leaves are modified into floral structure. Flower is meant for sexual reproduction.

A typical flower has four different kinds of whorls arranged successively on the swollen parts of a flower stalk. Flower stalk consists of the stalk called pedicel and the swollen upper part called thalamus bearing the floral leaves.

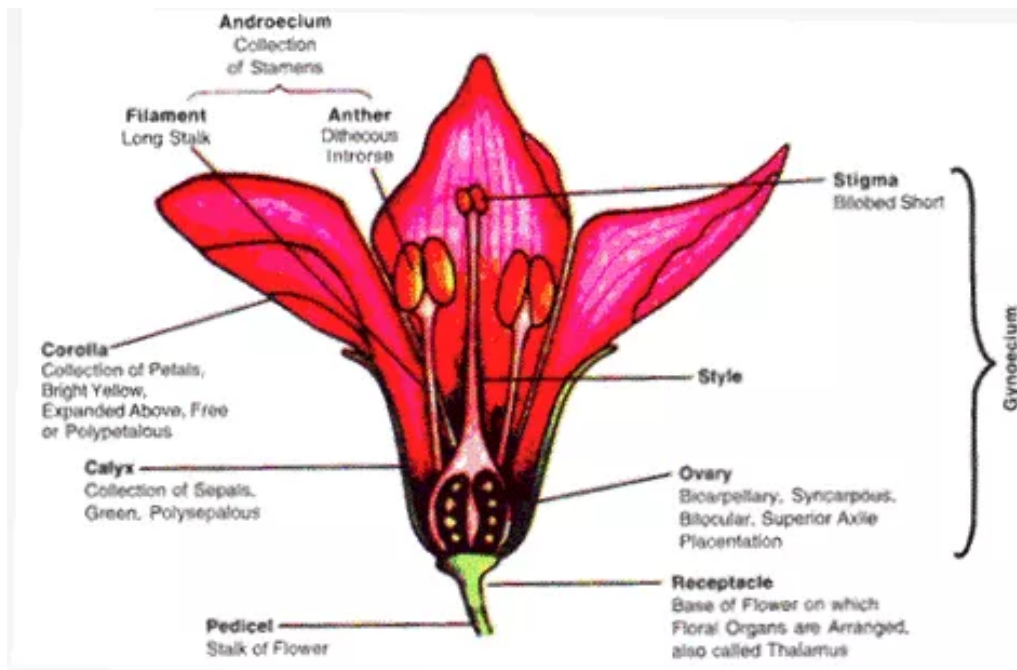
The different floral whorls are calyx, corolla, androecium and gynoecium. Calyx and corolla are accessory whorls, while androecium and gynoecium are reproductive whorls.

- **Calyx** – The calyx is the outermost whorl of the flower and its members are called sepals. Generally, sepals are green, leaf like and protect the inner whorls of the flower in bud stage. They are also involved in producing food by photosynthesis. The calyx may be gamosepalous (sepals united) or polysepalous (sepals free).
- **Corolla** – It is the second whorl composed of floral leaves called petals. Petals are usually brightly coloured to attract insects for pollination. Petals also protect the inner whorls. Like calyx, corolla may be also free (gamopetalous) or united (polypetalous). The shape and colour of corolla vary greatly in plants.
- **Androecium** – It is the third whorl and is the male reproductive whorl of a flower. Androecium is composed of one or more stamens. Each stamen consists of three parts:
 1. **Filament** – It is the lower stalk of the stamen.
 2. **Anther** – Filament bears a bilobed fertile structure called anther at its distal end. Each lobe contains two pollen sacs. The pollen grains are produced in pollen-sacs.
 3. **Connective** – Filament of the stamen is extended in between the two anther lobes called connective.
- **Gynoecium** – It is the innermost whorl and the female reproductive part of the flower. Gynoecium is made up of one or more carpels. A carpel consists of three parts namely stigma, style and ovary.

Ovary is the swollen basal part containing ovules. Each ovary bears one or more ovules attached to a flattened, cushion-like structure called placenta.

Style is the elongated thread like structure attached to the apex of the ovary. It connects the ovary to the stigma.

The stigma is situated at the tip of the style and is the receptive surface for pollen grains.



Solution 2:

(a) Inflorescence – The arrangement of flowers on the floral axis is called inflorescence. Function – Inflorescence facilitates the best arrangement and display of flowers on a branch without any sort of overcrowding. It also facilitates pollination via a prominent visual display and more efficient pollen uptake and deposition.

(b) Gynoecium – It is the innermost whorl of the flower bearing the female reproductive parts.

Function – The ovary of gynoecium produces ovules which bear the female gamete.

(c) Placentation – The manner in which placenta and ovules are arranged inside the ovary wall is known as placentation.

Function – Placentation helps in the best arrangement of ovules within the ovary.

Placentation also helps in plant classification.

(d) Incomplete flower – A flower lacking one whorl out of the four whorls is said to be incomplete flower.

Function – An incomplete flower contains either male or female reproductive organs.

(e) Perianth – When the calyx and corolla are not distinct in a flower (eg. – lily), the whorl is collectively called perianth.

Function – The members of perianth, called tepals are usually brightly coloured and bear scent. This attracts insects which aids in pollination. They also protect the flower in bud condition.

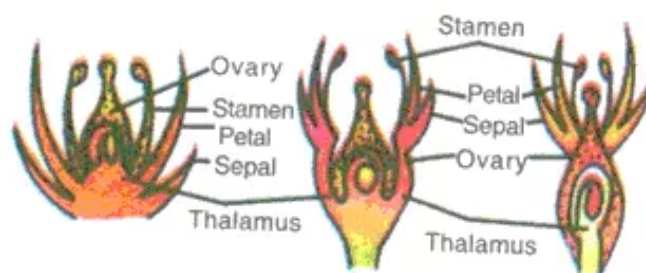
Solution 3:

Based on the position of calyx, corolla and androecium in respect to the ovary on thalamus, there are three floral whorl conditions. These are:

(i) Hypogyny – In this flower, the ovary occupies the highest position on the thalamus, while the petals, sepals and stamens are separately inserted below the ovary. The ovary in such flowers is said to be superior. E.g., mustard and china rose.

(ii) Perigyny – In this condition, the margin of the thalamus grows upwards to form a cup-shaped structure called calyx tube enclosing the ovary. The ovary here is said to be half inferior. E.g., plum and rose

(iii) Epigyny – In this flower, the margin of thalamus grows upwards enclosing the ovary completely and getting fused with it. The other parts of the flower are above the ovary. Hence, the ovary is said to be inferior. E.g. Sunflower, flowers of cucumber.



Solution 4:

The flower is the reproductive unit in the angiosperms and is meant for sexual reproduction. Flowers produce seeds from which new plants grow in future. So the main function of flower is to perpetuate the species.

There are six different types of flowers. These are complete, incomplete, bisexual, unisexual, actinomorphic and zygomorphic.

Solution 5:

(a)

Calyx	Corolla
It is the outermost whorl of flower.	It is the second whorl of flower.
Its members are called sepals.	Its members are called petals.
Sepals of calyx protect the inner whorls of the flower in bud stage.	Petals are usually brightly coloured to attract insects for pollination; they also protect the inner whorls.

(b)

Inflorescence	Flower
It refers to the arrangement of flowers on the floral axis.	Flower is a modified shoot in which internodes are shortened and leaves are modified into floral structure.
Inflorescence is of two types – Racemose and cymose.	Flowers are of six types - complete, incomplete, bisexual, unisexual, actinomorphic and zygomorphic.

(c)

Androecium	Gynoecium
It is the third whorl of a flower.	It is the innermost whorl of a flower and the female reproductive part of the flower.
It is the male reproductive part of a flower.	It is the female reproductive part of the flower.
Androecium is composed of one or more stamens	Gynoecium is made up of one or more carpels
Each stamen consists of filament, anther and a connective.	A carpel consists of three parts namely stigma, style and ovary.
Androecium produces the male gametes.	Gynoecium produces the female gametes.

(d)

Hypogyny	Perigyny
In this flower, the ovary occupies the highest position on the thalamus.	In this condition, the margin of the thalamus grows upwards to form a cup-shaped structure called calyx tube enclosing the ovary.
Here, the petals, sepals and stamens are separately inserted below the ovary.	Here, other parts of the flower are located on the rim of the thalamus almost at the same level as the ovary.
The ovary in such flowers is said to be superior.	The ovary here is said to be half inferior.
E.g. - mustard and china rose.	E.g., plum and rose.

(e)

Complete flower	Incomplete flower
A flower having all four whorls is said to be a complete flower	A flower lacking one whorl out of the four whorls is said to be an incomplete flower.
Eg. - Cotton	Eg. - Cucurbits

Solution 6:

In certain flowers like tomato and brinjal, the calyx remains attached even after the formation of the fruit and does not wither away. Such calyx is called persistent calyx.

Solution 7:

Calyx is the outermost whorl of a flower which is composed of sepals. Generally these sepals are green, leaf like and protect the inner whorls of the flower in bud condition. They are also involved in producing food by photosynthesis.

Solution 8:

There are 4 whorls present in a typical flower.

Whorls	Components
Calyx	Sepals
Corolla	Petals
Androecium	Stamens (anther, filament and connective)
Gynoecium	Carpels (stigma, style and ovary)

Solution 9:

Corolla is the second whorl composed of floral leaves called petals. Petals are usually brightly coloured to attract insects for pollination. Petals also protect the inner whorls. The shape and colour of corolla vary greatly in plants.

Solution 10:

The androecium and gynoecium are the essential parts of a flower because they are involved in sexual reproduction.

Androecium is the male reproductive organ of a flower and is involved in producing male

gametes.

Gynoecium is the female reproductive part of the flower and produces the female gametes.

The non-essential or accessory parts of flowers are the calyx and corolla since they do not directly participate in the process of sexual reproduction leading to the development of seed.

Sepals of calyx are green, leaf like and protect the inner whorls of the flower in bud stage. They are also involved in producing food by photosynthesis.

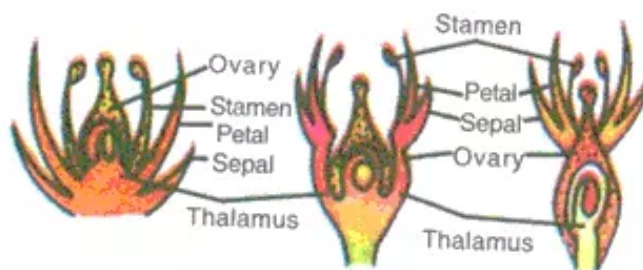
Petals of corolla are usually brightly coloured to attract insects for pollination; they also protect the inner whorls.

Solution 11:

In hypogynous flower, the ovary occupies the highest position on the thalamus, while the petals, sepals and stamens are separately inserted below the ovary. The ovary in such flowers is said to be superior. E.g., mustard and china rose.

In perigynous flower, the margin of the thalamus grows upwards to form a cup-shaped structure called calyx tube enclosing the ovary. The ovary here is said to be half inferior. E.g., plum and rose.

In epigynous flower, the margin of thalamus grows upward enclosing the ovary completely and getting fused with it. The other parts of the flower are above the ovary. Hence, the ovary is said to be inferior. E.g. Sunflower, flowers of cucumber.



Solution 12:

(a)

Inflorescence	Flower
It refers to the arrangement of flowers on the floral axis.	Flower is a modified shoot in which internodes are shortened and leaves modified into floral structure.
Inflorescence is of two types – Racemose and cymose.	Flowers are of six types - complete, incomplete, bisexual, unisexual, actinomorphic and zygomorphic.

(b)

Racemose inflorescence	Cymose inflorescence
Here oldest flower is at the base while the youngest flower is at the apex.	Here oldest flower is in the centre and youngest flower towards the periphery.
Here the main axis continues to grow.	Here, the main axis terminates in a flower, hence it is limited in growth.

(c)

Marginal placentation	Parietal placentation
There is a single placenta	Two or more placenta are present.
The single placenta develops along the junction of the two fused margins.	The ovary is unilocular and has two or more longitudinal placenta.
Eg. - Pea	E.g. <i>Argemone</i>

(d)

Ray florets	Disc florets
They are arranged on the rim of the receptacle.	They are grouped in the centre.
These florets may be sterile or fertile.	These florets are bisexual.
They are zygomorphic.	They are actinomorphic.

Solution 13:

(a) Androecium – It is the third whorl and is the male reproductive organ of a flower. Androecium is composed of one or more stamens. Each stamen consists of three parts: Filament, Anther and Connective. The pollen grains are produced in pollen-sacs on the anthers.

(b) Gynoecium – It is the innermost whorl and is the female reproductive part of the flower. Gynoecium is made up of one or more carpels. A carpel consists of three parts namely stigma, style and ovary. Ovary is the swollen basal part containing ovules.

(c) Calyx – The calyx is the outermost whorl of the flower and its members are called sepals. Generally, sepals are green, leaf like and protect the inner whorls of the flower in bud stage. They are also involved in producing food by photosynthesis. The calyx may be gamosepalous (sepals united) or polysepalous (sepals free).

(d) Corolla – It is the second whorl composed of floral leaves called petals. Petals are usually brightly coloured to attract insects for pollination. Petals also protect the inner whorls. Like calyx, corolla may be also free (gamopetalous) or united (polypetalous).

Solution 14:

- (a) Datura
- (b) Cotton
- (c) Cotton
- (d) Sunflower
- (e) Tomato
- (f) Mulberry

Solution 15:

- (i) (b) condensed stem
- (ii) (b) jointed calyx
- (iii) (c) thalamus
- (iv) (a) reniform
- (v) (c) capitulum