

Chapter → 3

How do organisms reproduce.

Notes :-

Reproduction :- The production of new organism from the existing organism of the same species is known as reproduction.

→ Reproduction is essential for the survival of a species on this earth.

Advantages of reproduction

- Reproduction ensures continuity of a particular species on earth.
- It creates variation in DNA which leads to stability of a species.
- It help in evolution of a species

Information of the structure and function of organisms is present in the DNA.

DNA :- DNA is a thread like structure which contains codes all the information about our characters and it is passed on from one generation to the next generation

Length of human DNA = 2.2m

Date.....
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Ritika

Difference B/w chromatin and chromosome.

chromatin
Scattered form of DNA -
dispersed throughout nucleus

chromosome.
Highly coiled and condensed
form of DNA.

Chromosomes are visible
only during cell division.

Gene - A gene is a specific segment or part of DNA containing information for a particular character.

Genome - All the genetic material of an organism. The genome includes both nuclear DNA as well as mitochondrial DNA & chloroplast DNA.

DNA Replication :- The process DNA replication will have some error which will lead variations. As a result the DNA copies generated will be similar but may not be identical to the original.

* When organism reproduce, the offsprings show minor variations due to inaccuracies in
• DNA copying.

↓
Error in sequence +
character change + information change

Importance of variation

- Variations help organism to adapt in the changing environment.
- Variation provides stability to a species and thereby helps in evolution.
- Variation in DNA result in varieties of a species and formation of new species.

Types of Reproduction

- | | |
|--------------------------------------|--------------------------------------|
| ① Asexual reproduction | ② Sexual reproduction |
| → Single parent is involve | Two parents involved |
| → No gamete formation | Gamete formations & |
| → No fertilisation | fertilisation occurs. |
| → Offsprings are genetically similar | Offsprings are genetically different |

Asexual reproduction.

Production of offsprings by a single parent without the formation and fusion of gametes is called as asexual reproduction.

Types of Asexual reproduction.

- ① Fission
- ② Fragmentation
- ③ Budding
- ④ Regeneration
- ⑤ vegetative propagation
- ⑥ Spore formation.

Fission

→ Fission is the division or splitting of a unicellular organism into two or more cells/individuals.

Types of Fission

① Binary Fission

Two daughter-cells are formed.

② Multiple fission.

More than two daughter cells are formed.

Types of Binary fission: on the basis of shapes.

① Irregular
Amoeba

② Longitudinal
Leishmania

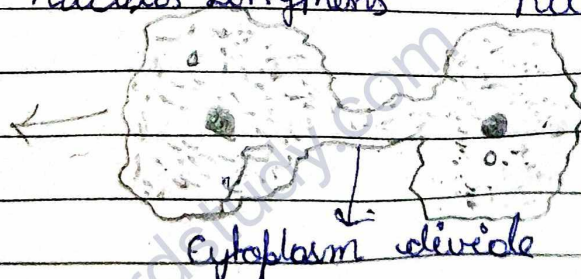
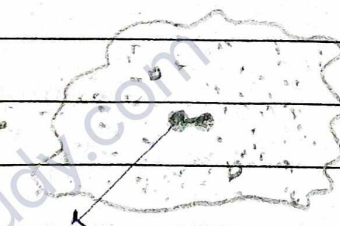
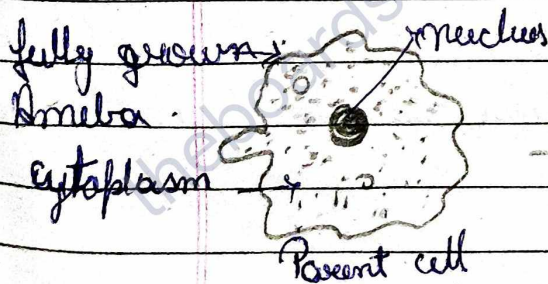
③ Transverse
Paramecium

Irregular binary fission in Amoeba.

It is a eukaryotic cell nucleus is present.

It is a unicellular organism.

It is a type of protozoa.



Two daughter cells

Amoeba reproduction by binary fission.

- * Karyokinesis : Division of nucleus (Karyon)
- * Cytokinesis : Division of cytoplasm

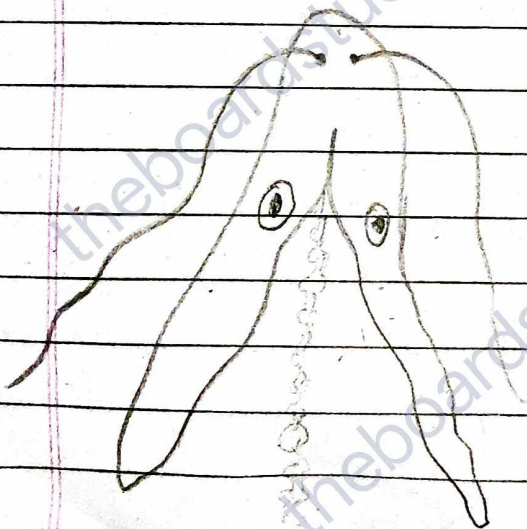
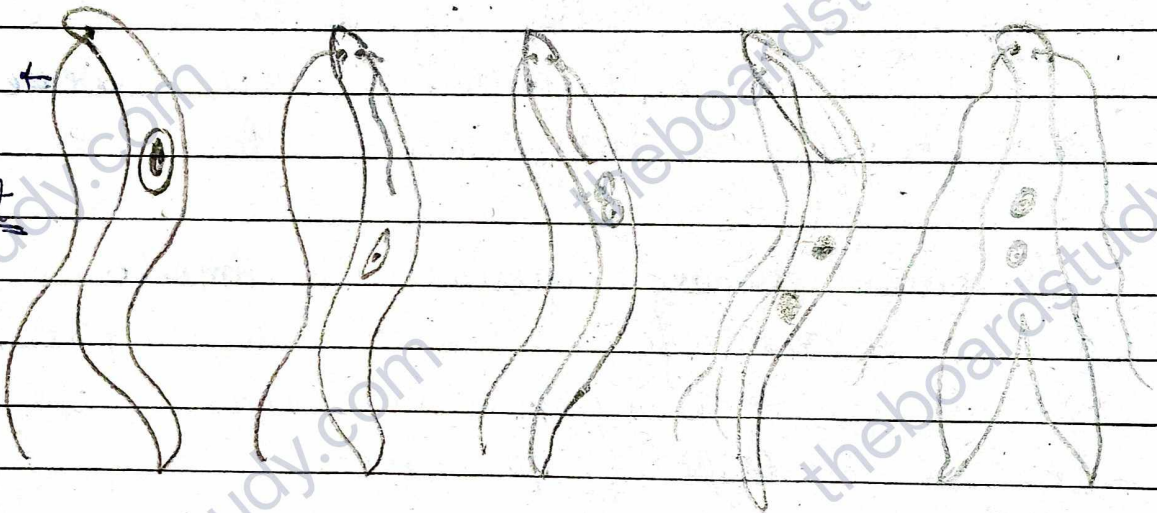
Longitudinal binary fission in Leishmania

It is a unicellular organism and Eukaryotic cell

It is flagellated protozoa.

It causes Disease called Kala agar [Black fever]
 or Dum Dum fever or Leishmaniasis.

Flagella +
 help in
 Movement

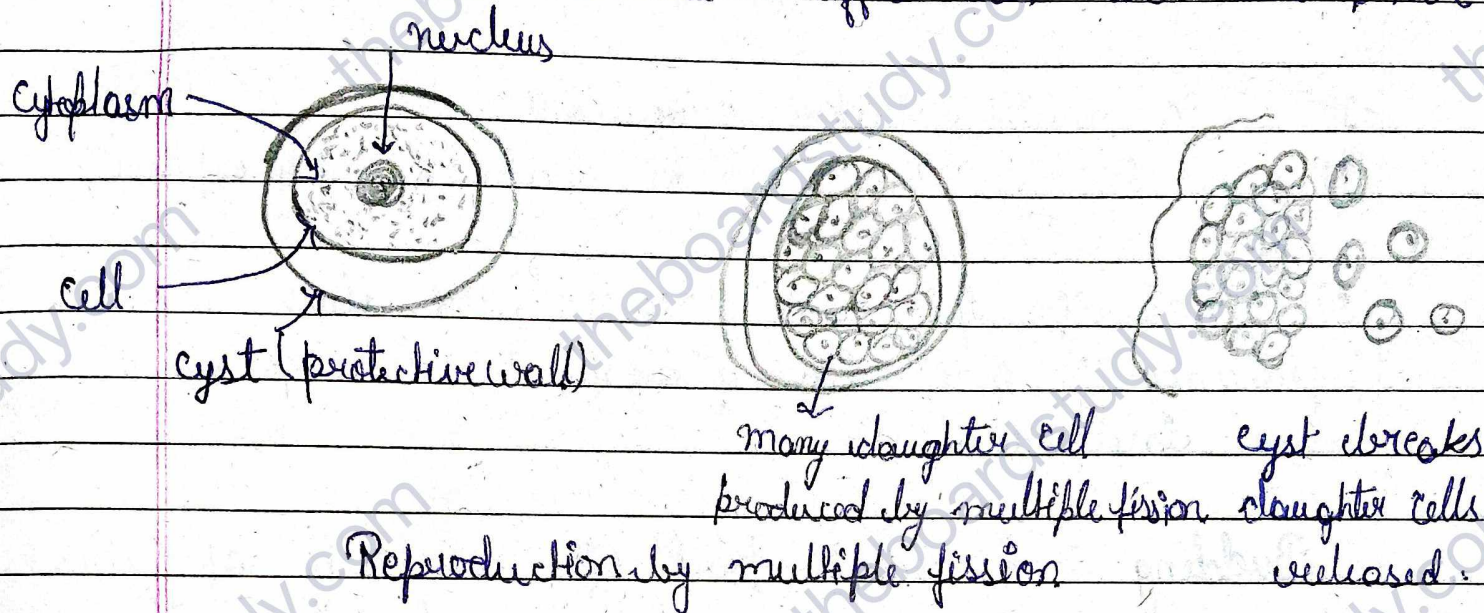


Binary fission in Leishmania

Multiple fission in Plasmodium

It is a unicellular protozoa

It cause malaria → affect our liver cells & RBC



Reproduction by multiple fission

Difference between Binary fission and multiple fission.

Binary fission

Two daughter cells are formed from the splitting of the parent's cell or nucleus.

Divides only once

Includes a definite pattern of division

Ex:- Amoeba, Bacteria etc

Multiple fission

Many daughter cells are formed from the splitting of the parent's cell or nucleus.

Divides repeatedly

Has no definite pattern of division.

Example:- Plasmodium.

Fragmentation:- The breaking up of the body of a simple multicellular organism into two (or more) pieces or maturing each of which grows to form a complete new organism is called

fragmentation.

Fragmentation in Spirogyra.

It is a multi cellular organism

It is Green algae spiral shaped chloroplast

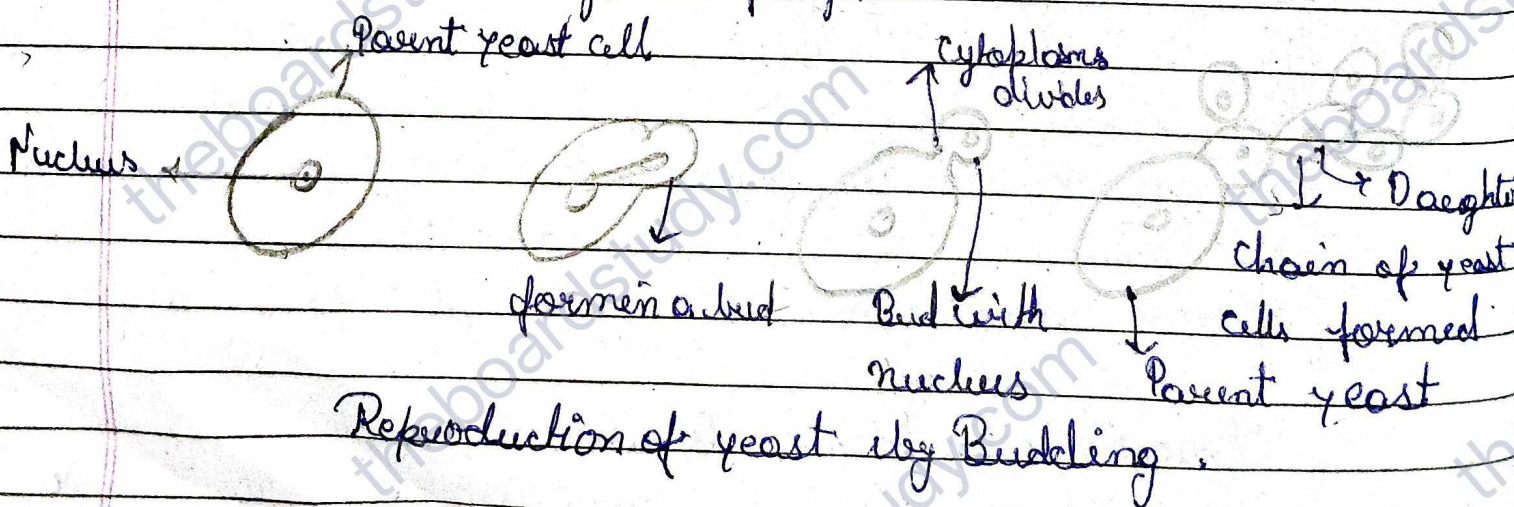
On maturity Spirogyra breaks itself into many fragments and each fragment develop into new individual.

Budding :- A small part of the body of the parent organism grows out as a bud which then detaches and become a new organism

Budding in yeast

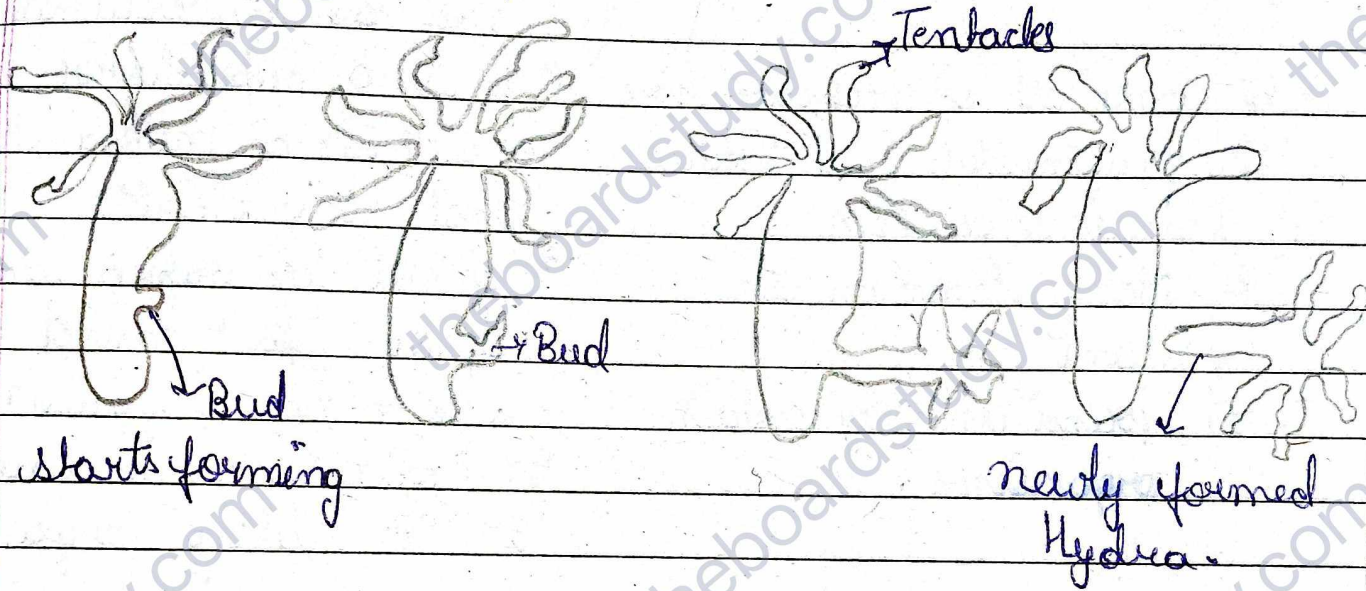
It is a unicellular fungi

It is a Eukaryotic fungi



Budding in Hydra

It is a Aquatic animal 2 to 5 cm
 Multicellular organism



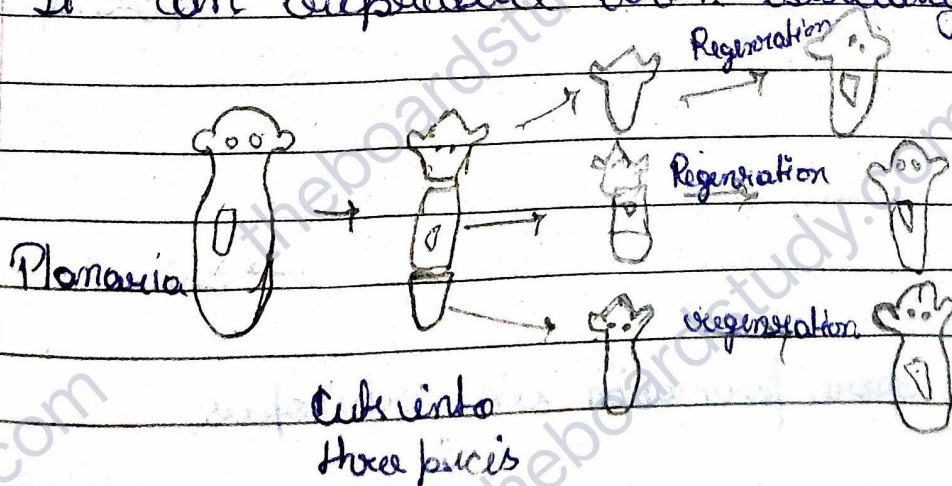
Regeneration:- The process of getting back a full organism from its body parts is called regeneration.

Regeneration in planaria

It is a multi cellular organism

It is a aquatic animal (very thin flat worm called platyhelminthes)

It can reproduce both sexually & asexually



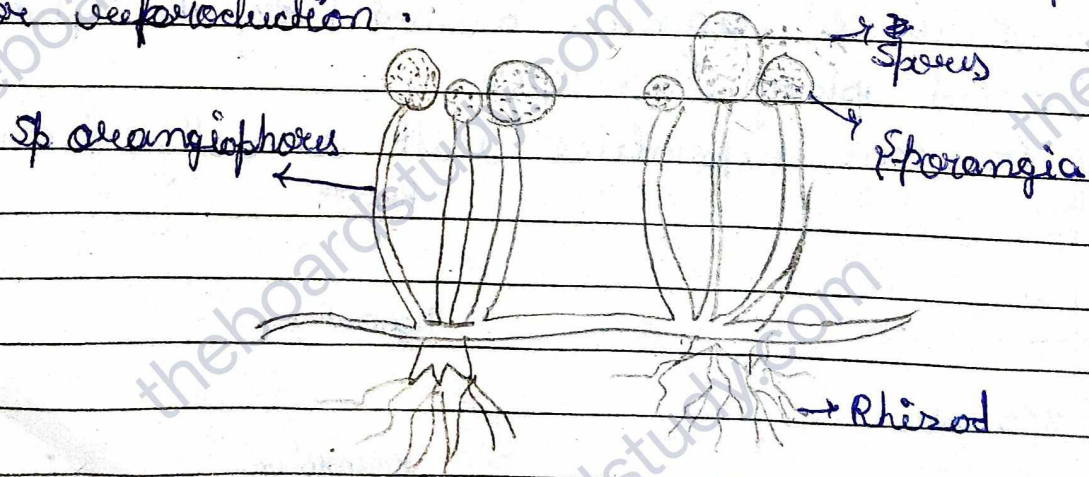
Difference between fragmentation and regeneration

- | Fragmentation | Regeneration |
|--|---|
| ① Limited to invertebrates | ① present in both vertebrates as well as invertebrate |
| ② A method of reproduction | ② It is a reproductive method as well as a method to regenerate lost body parts |
| ③ fragmented part produce new organism | ③ If not for reproduction, separated part cannot grow into a new organism |
| ④ More common in plant | ④ More common in animals |
| ⑤ found in only certain organisms. | ⑤ All living organism. |

Spore formation :- The parent plant produces hundreds of microscopic reproductive units called 'spores'.

Spore formation in Rhizopus (Bread mould)
 Multicellular fungi

Reproduce by spores (specialized cells responsible for reproduction).



spore formation in rhizopus

How will an organism be benefitted if it reproduce through spores?

- Large numbers of spores are produced in one sporangium
- They are rounded and very light in weight and hence can be so easily transferred
- Spores are distributed easily by air to far off places to avoid competition at one place.
- Spores are covered with thick walls to prevent dehydration under unfavourable conditions.

Vegetative propagation

In vegetative propagation new plants are obtained from the parts of old plants without the help of any reproductive organ.

Parts of plant

① Reproductive part
 part of the plant which are involved in the process of sexual reproduction called ~~flower~~ reproductive part. ex - flower

② vegetative part
 Parts of the plant not involved in sexual reproduction called vegetative part.
 ex: stem, leaf, root.

Vegetative propagation

It is a type of asexual reproduction in which new plants are formed with help of its vegetative part.

Types of vegetative propagation.

- ① Natural ② Artificial

Natural vegetative propagation in Bryophyllum, potato and sweet potatoes etc.

- ① Bryophyllum plants can be reproduced by vegetative propagation by using a piece of stem or leaf.
- ② ~~potato~~ tuber is the thickened underground stem of a plant which usually stores food.
- ③ A potato tuber can be used for the vegetative reproduction of potato plants.

Artificial propagation of plants.

The process of growing many plants from one plant by man methods is called artificial propagation of plants. Methods are on field cutting, layering and grafting. In the laboratory tissue culture.

Cutting - A part of stem is cut and the cut end grows into new plant when placed in moist soil.

eg mango, guava, litchi, lemon, rose etc.

Layering - The stem of a plant is bent down until it touches the soil. The stem is then cut once it develops roots and grow into a new plant. eg. lemon, rose, jasmine.

Grafting - The stem of a plant is cut and then fitted on another strong plant and covered with grafting wax. eg - apples, oranges, water melon, ornamental plants.

Advantages of vegetative propagation.

- Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds.
- Plants can be produced in large numbers in less time.
- Vegetative propagation is a more rapid, easier and economical method of multiplication of plants.
- All plants produced are genetically similar enough to the parent plant.
- Desirable character of fruit can be maintained.

Sexual reproduction.

- Two parents of different sexes are involved.
- Gamete formation and fertilisation take place.
- Specialized cells responsible for the sexual reproduction are called gametes / germ cells / sex cells.
- Since gametes are derived from two different organisms, it results in a new combination of genes which increases the chance of genetic variation and better survival in changing environment.

→ Sexual reproduction is divided into three phases or events:

- ① Pre-Fertilisation ② Fertilisation ③ Post Fertilisation

- ① Gametogenesis ② Gamete transfer

① Pre fertilisation

→ Gametogenesis is a process of formation of gametes.
 → Spermatogenesis is process of formation of male gamete i.e. sperm cell in the male body.

→ Oogenesis is the process of formation of female gamete i.e. ovum/egg cell in the female.

* chromosome number becomes half during gamete formation. (meiosis)

a) Gamete transfer: The transfer of sperm cell near ovum cell.

Fertilisation :- The fusion of a male gamete with a female gamete to form a zygote during the sexual reproduction is called fertilization.

Zygote :- A single cell formed as a result of fertilisation.

Post fertilisation.

Zygote divide by the mitosis and form a embryo, by this embryo a new organism is produce.

Embryo : Group of cells formed due to regular division (mitosis) in zygote.

General comparison between male and female gamete.

Male Gamet (sperm cell)	Female Gamete (ovum / egg cell)
* They are motile - can move	They are non-motile - can't move.
* Smallest cell	Largest cell.
* No food reserve	Food reserve

Sexual reproduction

Gamete formation (Gametogenesis)

↓
Gamete transfer

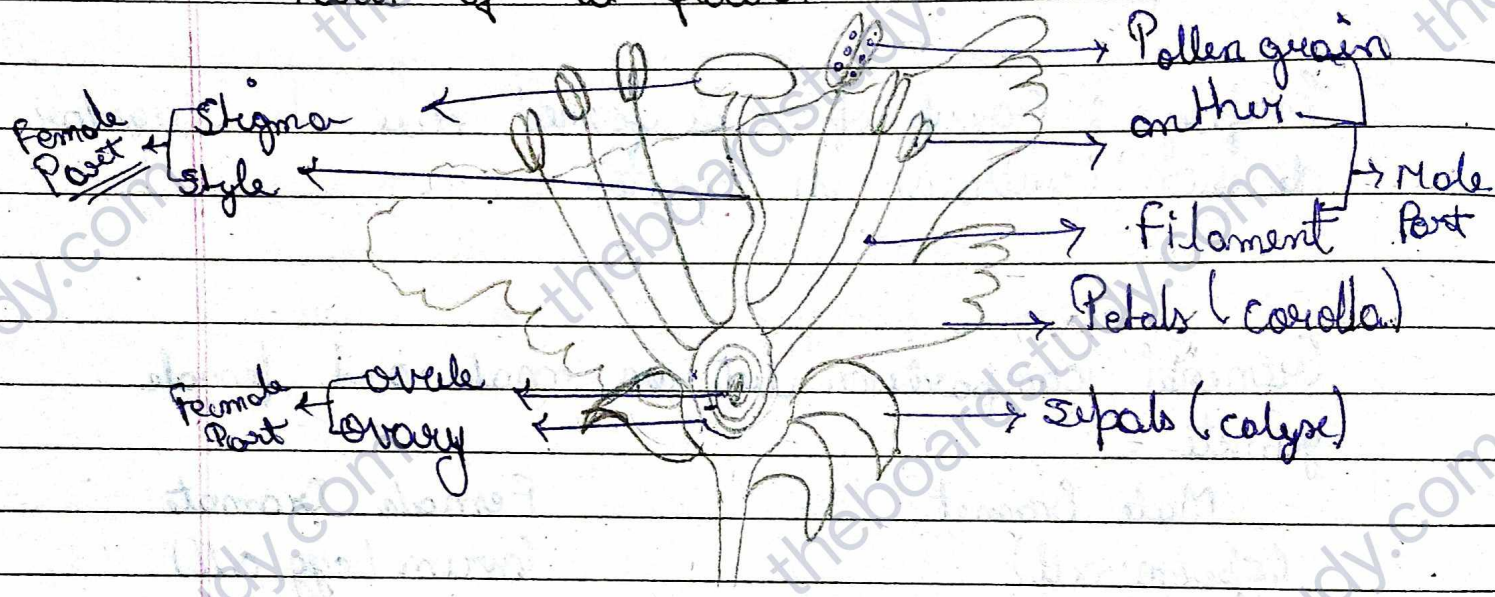
↓
fertilisation.

↓
formation of zygote

Development of zygote into embryo
 Growth and development of embryo in the whole new organism.

Sexual reproduction in flowering plants / Angiosperms

Parts of a flower



Parts of the flower

Functions

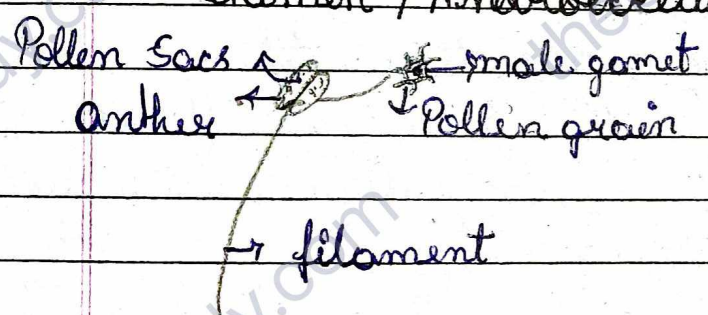
Sepals (calyx)	usually green and provide protection to flowers during the bud stage.
Petals (corolla)	Brightly coloured and have a strong fragrance to attract pollinators.
Anther	Produces pollen grains which consist of male gametes.
Filament	It forms the stalk that bears anther.
Stigma	Receives pollen grains during pollination due to their sticky nature.
Style	Elongated structure connects stigma and ovary, pollen tube travels through

The style to reach the ovule.

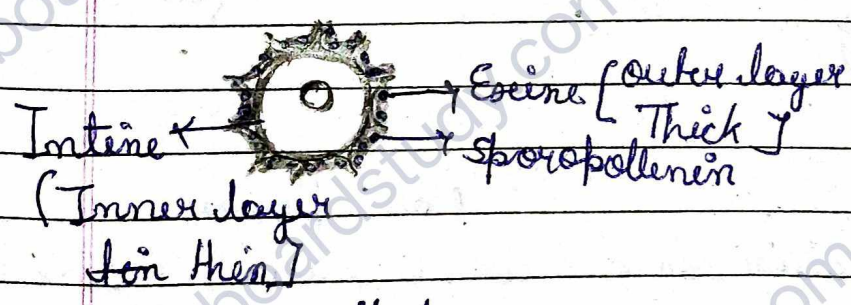
Ovary Basal swollen part of pistil converts into fruit after fertilisation

Ovule Present inside ovary consist of female gametes. site of fertilisation.

Stamen / Androecium / male reproductive organ

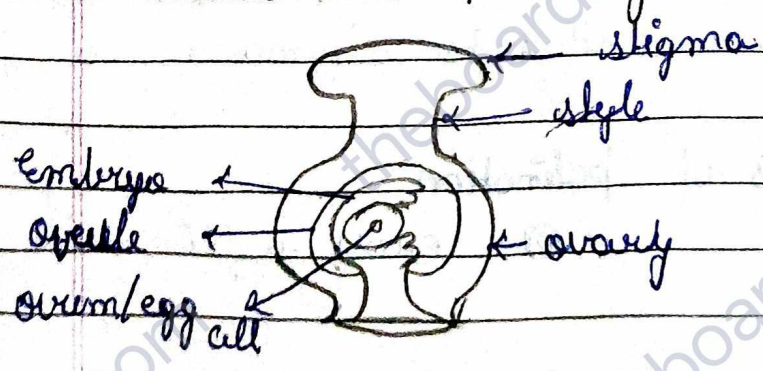


Pollen grain : contain male gamete.



Made up of cellulose

Pistil / carpel / Gynoecium / female reproductive organ.

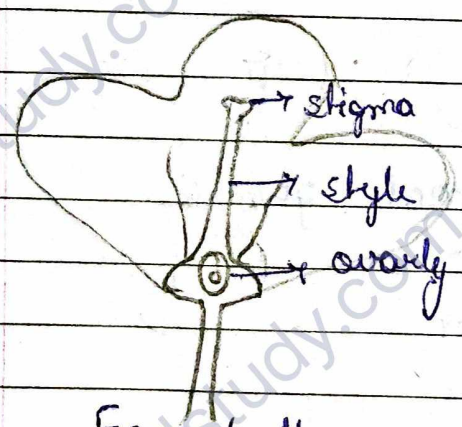


Types of flower

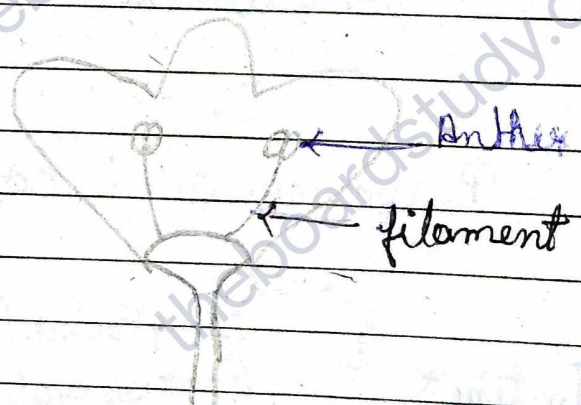
- | | |
|--|---|
| <p>① Bisexual flower</p> <p>→ Both stamen & pistil parts are present</p> <p>→ ex. Rose, Lily, Hibiscus, mustard, pea, Tomato, Mango, Brinjal, Sunflower.</p> | <p>② Unisexual flower</p> <p>→ Single reproductive organ</p> <p>→ Either stamen or pistil parts are present</p> |
|--|---|

Unisexual flower are two types.

- | | |
|--|---|
| <p>① Pistillate flower</p> <p>Only Pistil is present</p> | <p>② Staminate flower</p> <p>Only stamen is present</p> |
|--|---|



Female flower



Male flower.

ex.:- papaya, watermelon, coconut flower, maize etc.

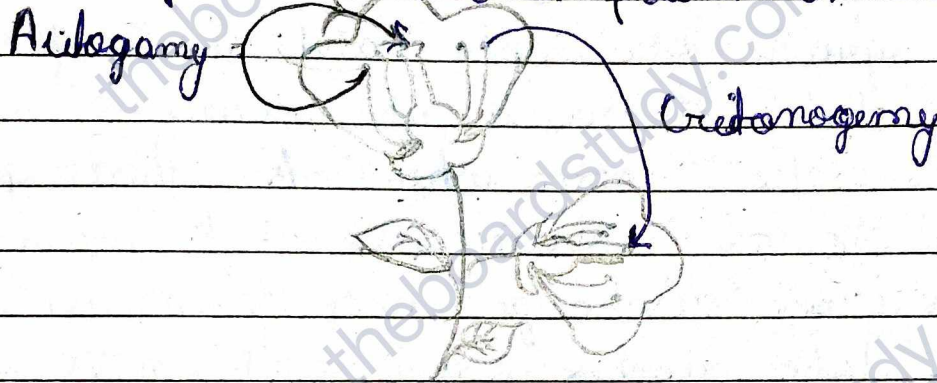
Pollination

Pollination can be defined as the transfer of pollen grains from anther to stigma of a flower.

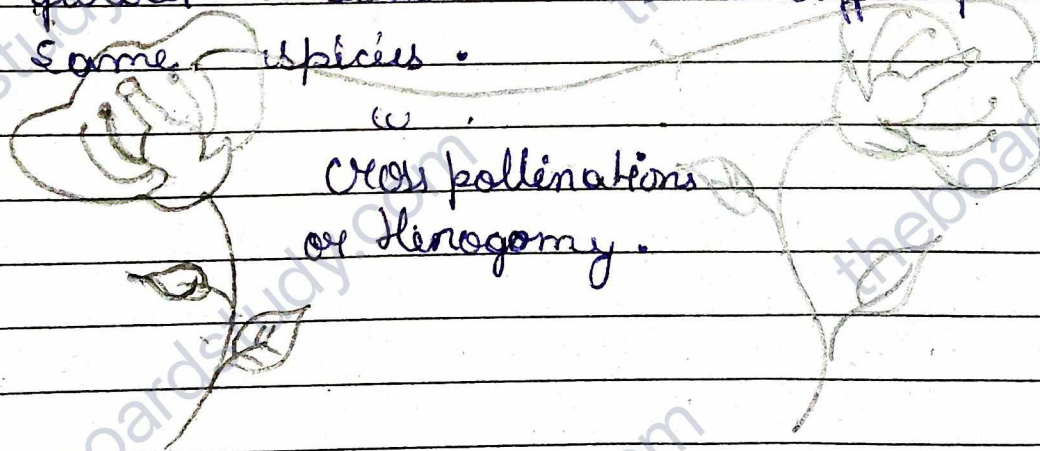
Types of pollination

- | | |
|---------------------------|----------------------------|
| <p>① self pollination</p> | <p>② cross pollination</p> |
|---------------------------|----------------------------|

Self pollination :- Transfer of the pollen grains from the anther to the stigma of either the same flower or another flower on the same plant.



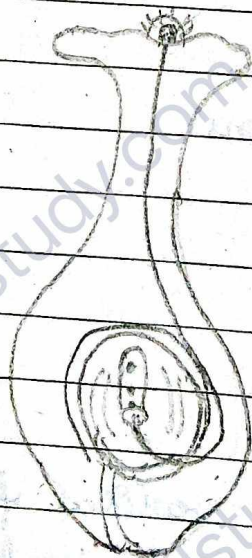
cross pollination :- Transfer of the pollen grains anther of one flower to the stigma of another flower reached on a different plant of the same species.



Pollination can occur by various factors:

① Abiotic factor technical term		② Biotic factor technical term	
wind	Anemophily	Insects	Entomophily
water	Hydrophily	Birds	Ornithophily
		Bats	Chiropterophily
		Snails	Malacophily

- Pollen grain containing male germ cell lands on the surface of stigma after pollination.
- Pollen-pistil interaction
- * Pollen grain germinates and starts forming pollen tube towards the ovule.
- Ovule release some chemicals then pollen tube grow towards ovule. This is known as chemotaxis.
- * Pollen grain discharge male gamete into pollen
- * Pollen tube reaches ovary and enters into ovule from micropyle where it finally release male gametes.
- Male gamet fuses with female gamete (fertilization) inside ovule and zygote is formed.



Post fertilization changes.

- * Zygote convert into embryo and it convert into organism.
- Zygote → Embryo → organism

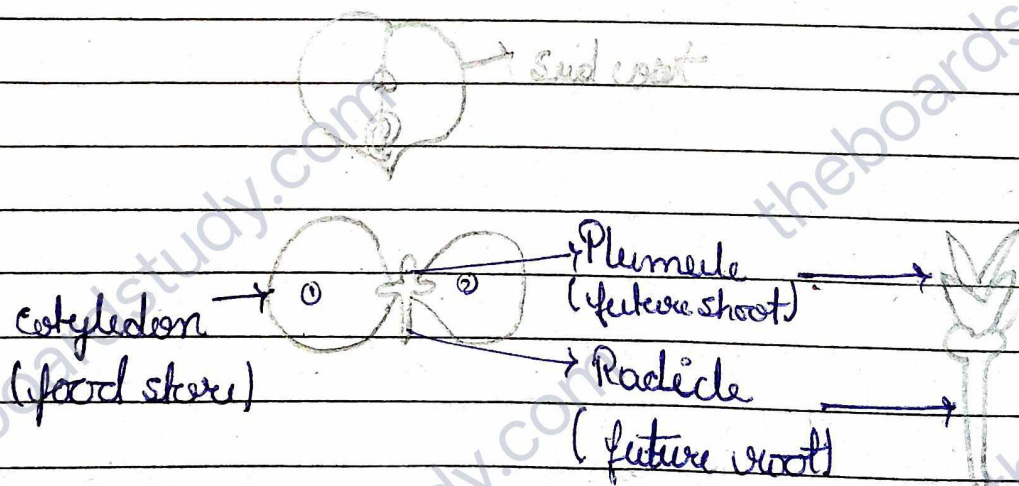
- * Ovule convert into seed.
- * Ovary - convert into fruit

After fertilization petals, sepals, stamen, style, stigma shrivel and fall off

Seeds.

A seed is the reproductive unit of a plant (which can be used to grow a new plant).
 Seed contain a baby plant or embryo and food for the baby plant.

Parts of seed.



① Seed coat	② Embryo	③ cotyledon
Protection		food storage
Protective layer	Plumule	for nourishment
	shoot system	to growing
	Radicle	embryo
	root system	

Types of seeds.

① Monocotyledonous seed

Seeds with one cotyledon

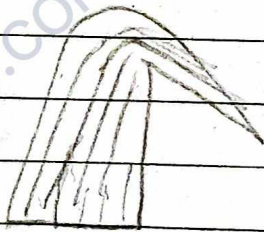
→ Plants with monocot seed

→ Leaves: long and narrow

→ Leaves with parallel venation

→ Fibrous root

→ ex: rice, wheat, maize, onion, sugarcane etc



② Dicotyledonous seed

Seeds with two coty.

Ledons

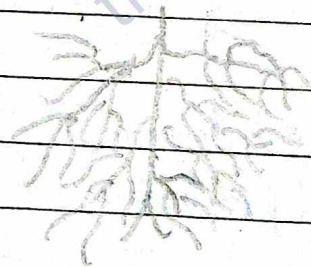
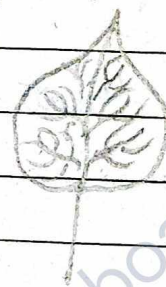
→ Plants with dicot seeds

→ Leaves: Broad

→ Leaves with reticulate venation

→ Tap root

→ ex: Gram, peanut, Apple, munga, pea, Beans etc



Sexual reproduction in human beings

Puberty :- Puberty is the time period or stage of human development during which an individual show growth and becomes sexually mature.

What happens during puberty?

Glands or Primary sex organs or gamete producing organs

Glands in male

A pair of testes

① sperm cell

② male sex hormone

↓
 Testosterone

Glands in female

A pair of ovaries

① Egg cell

② Female sex hormone

↓
 Oestrogen

↓
 Progesterone

Common in male and female

- Thick hair growth in armpits and pubic area.
- Increased activity of oil and sebaceous glands, develop pimples.

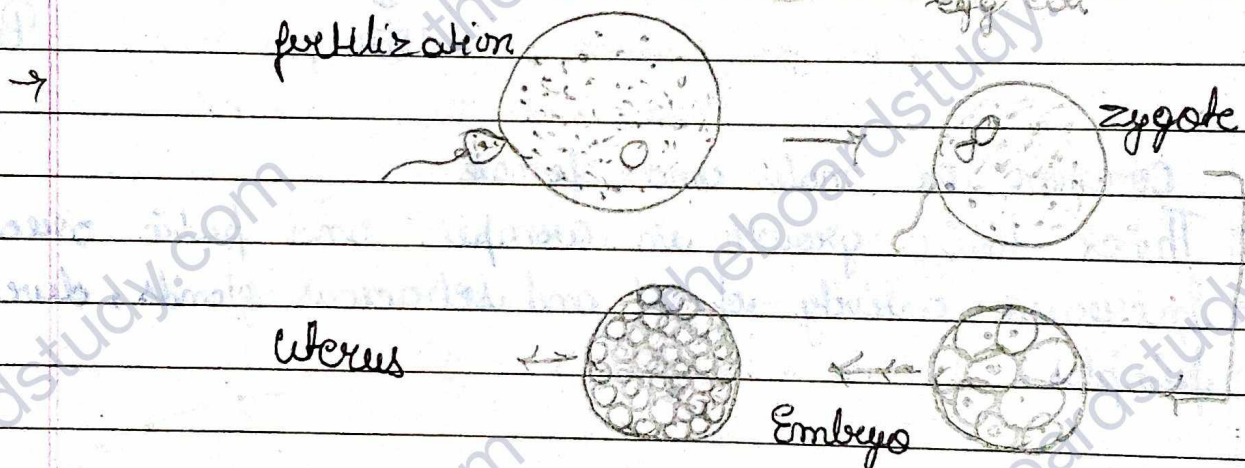
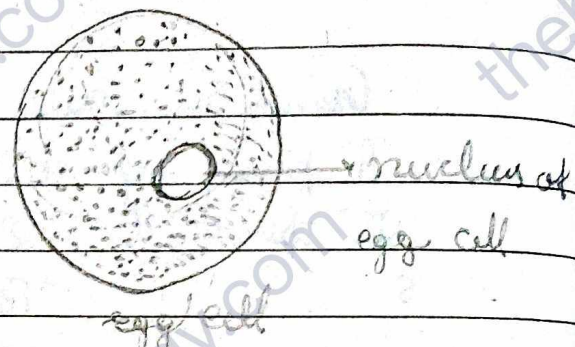
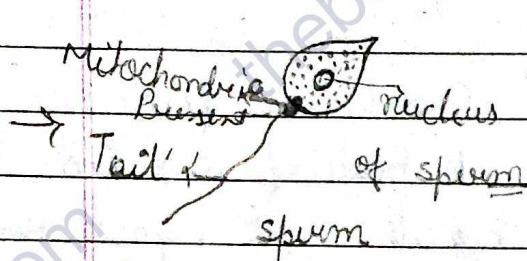
In girls

- Breast size begins to increase, darkening of skin of the nipples.
- Girls begin to menstruate
- Enlargement of reproductive organ

In Boys.

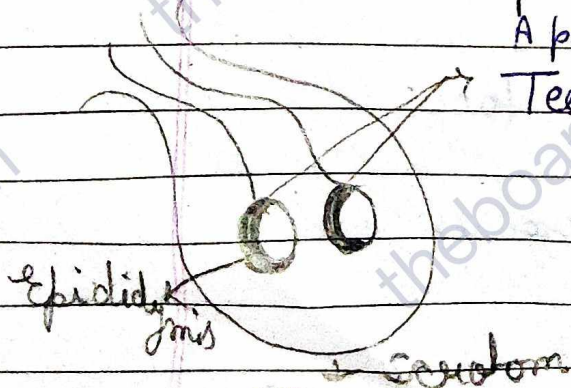
- Thick hair growth on the face
- Voice begins to crack
- Enlargement of reproductive organs.

sperm cell and egg cell



Attachment of growing embryo to the wall of uterus called implantation.

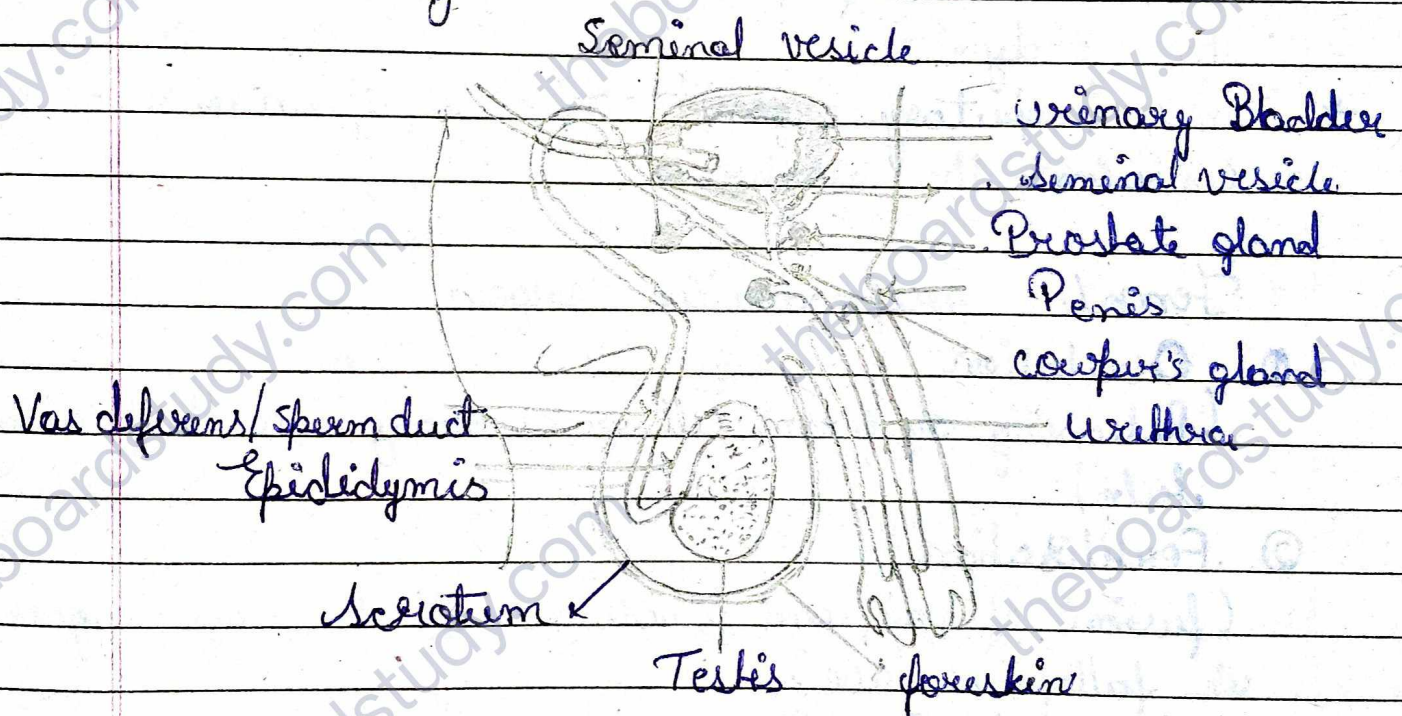
Male reproductive system



Temp. is lower than normal body temp.

→ Leydig cells
↓
Testosterone
↓
Seminiferous tubules
↓
Produces Immature cell
epididymis
(Maturation & storage of
sperm cells)

- vas deferens carries sperm cells with some fluids.
- The mixture of sperm cells and fluids called as semen.
- These fluids secreted by seminal vesicle, prostate gland, cowper's gland.
- Through the urethra semen and urine release outside body.



Functions of male reproductive system

- Testes :- Produce sperm cells & the hormone testosterone
- Seminiferous tubles :- Produce immature sperm cells
- Epididymis :- matures and stores sperm cells.
- Vas deferens :- carries sperm from the epididymis to urethra.
- Seminal gland vesicle :- secretes fructose into

the semen to protect the sperm from the acidic environment of the vagina.

- Cowper's gland (Bulbourethral gland) :- secretes mucus - rich fluids into the semen that may protect the sperm from acids in the urethra.
- Urethra :- carries semen during.
 carries urine from the bladder to the exterior of the body.
- Penis (copulatory organ) :- deposits sperm into the vagina.
 contains the urethra.

Female reproductive organ.

① Ovulation

(Releasing of ovum cell from ovary into the fallopian tube)

② Fertilisation

(fusion of male and female gamete to form zygote in fallopian tube)

③ Implantation

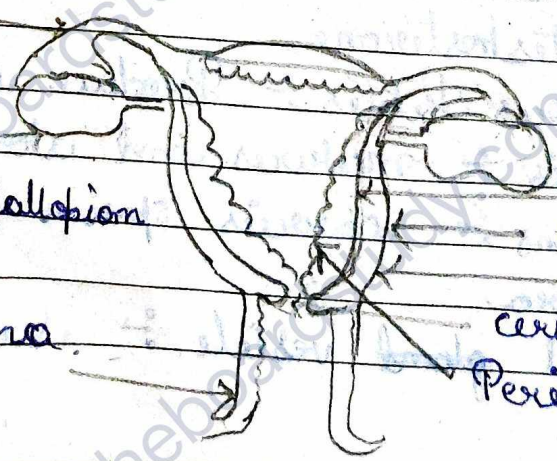
(Attachment of growing embryo to the inner wall of uterus i.e. endometrium)

~ 9 months [Gestation period]

Oviduct or fallopian tube
 ovary

(Release ovum into fallopian tube)

Vagina



Myometrium

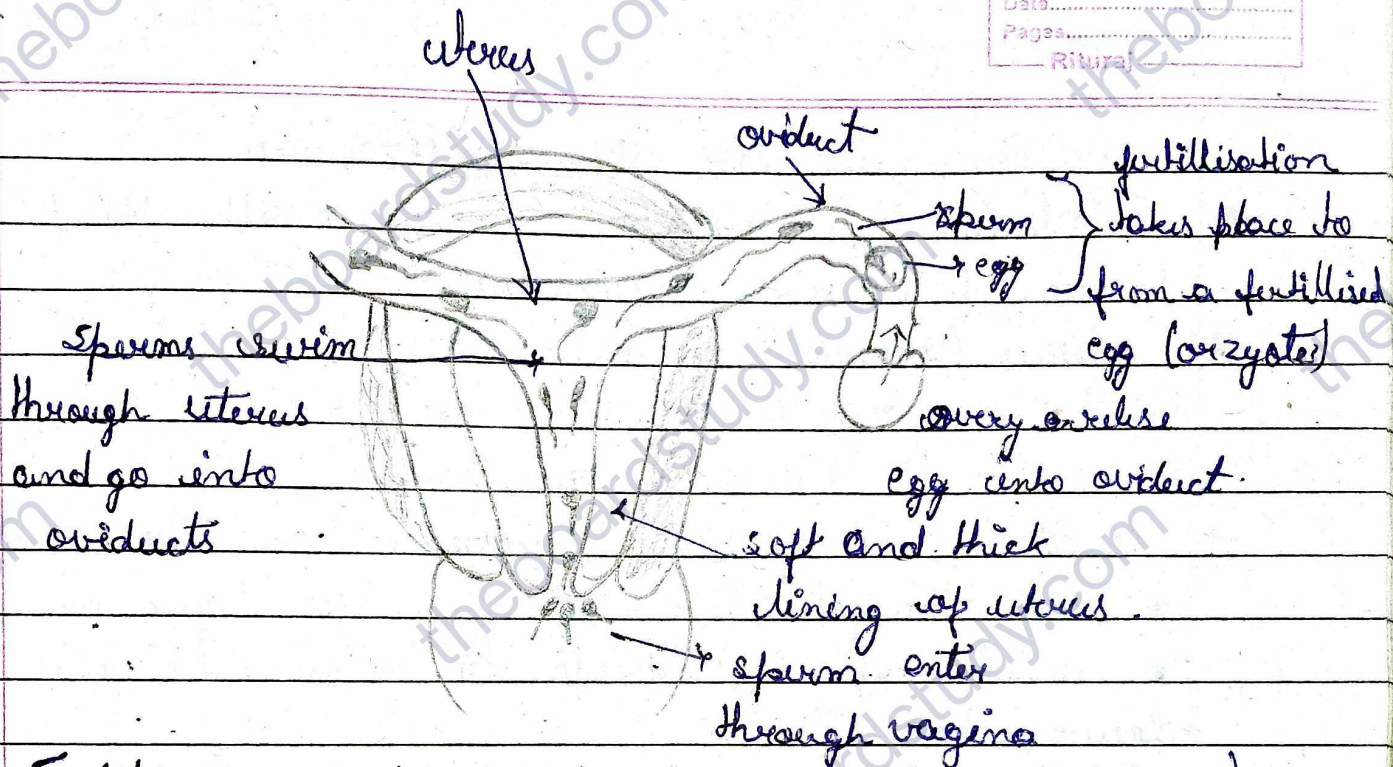
uterus

Perimetrium

cervix

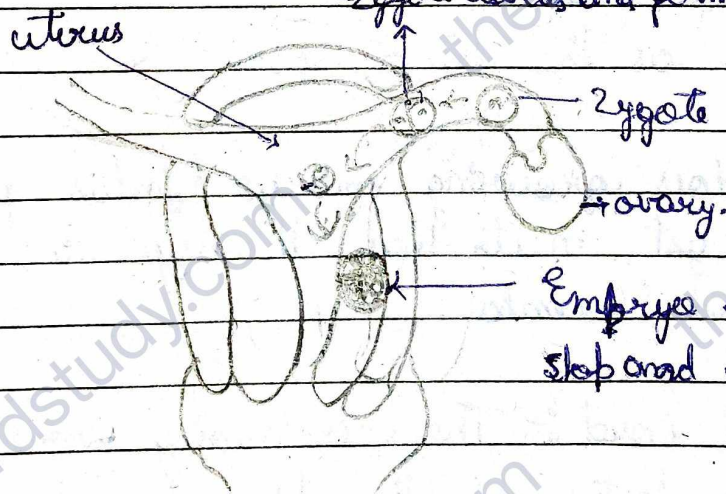
Perimetrium

Membranes of uterus



Fertilisation in human to form a zygote (fertilised egg).

zygote divides and form embryo



Ovary release
 once egg in
 each month

Implantation of embryo in the uterus.

Functions of female reproductive system

- Ovaries :- Produce the hormones estrogen and progesterone. • Safe site of ovum (egg cell) development and ovulation
- Fallopian tubes (oviducts) :- • Carry the ovum from the ovary to the uterus.

- Usually the site of fertilization
- Fimbriae :- sweep the ovum into the fallopian tube following ovulation.
- uterus (womb) :-
 - pear shaped organ in which the embryo and fetus develop.
 - involved in menstruation
- Cervix :-
 - separates the vagina from the uterus
 - holds the fetus in place during pregnancy.
 - dilates during birth to allow the fetus to leave the uterus.
- Vagina :-
 - provides a passageway for sperm and menstrual flow.
 - function as the birth canal.

* How does growing embryo / fetus get nutrition?
 fetus get nutrition through the umbilical cord and placenta.

Umbilical cord :- The connecting cord from the developing fetus to the placenta.

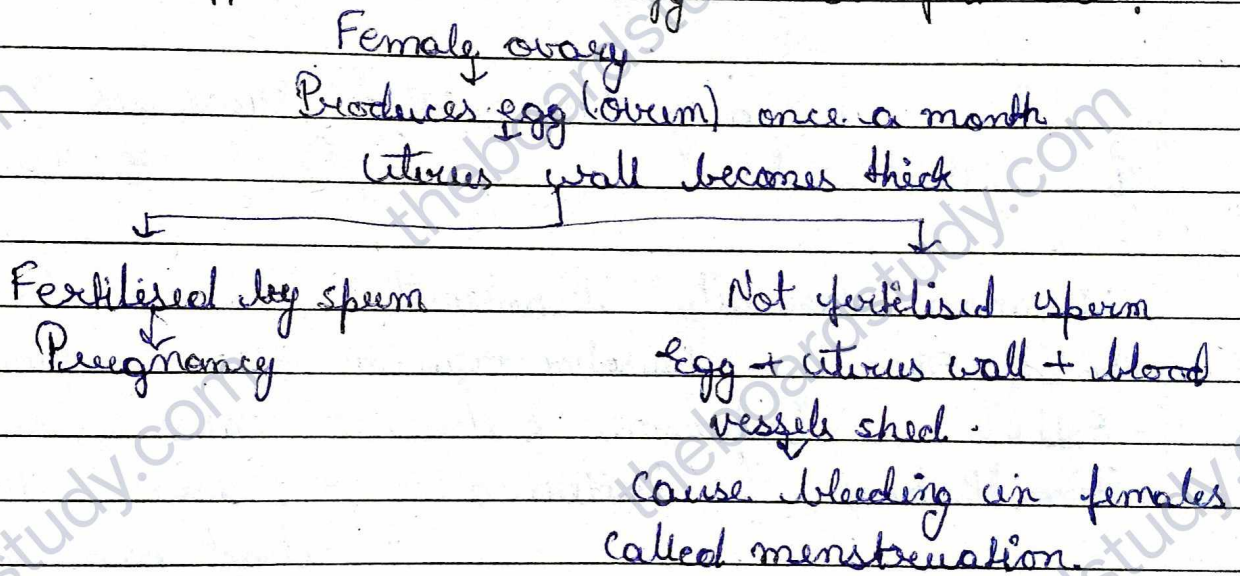
Placenta :- A disc like structure developed inside uterus to provide nourishment to the growing embryo.

- villi on placenta (embryo side) provides a large surface area for:
 - glucose and oxygen to pass from the mother

to the developing embryo.

- wastes to pass from the embryo to the mother through the placenta.

What happens when the egg is not fertilised?



Menstruation

the breakdown and removal of the inner, thick and soft lining of the uterus along with its blood vessels in the form of vaginal bleeding is called menstrual flow or menstruation.

Girl child → menarche → menopause → old age
 1st time menstruation Stoppage of menstruation
 Begins at puberty (11-14 yrs) At 45 to 50 years old

* Oxytocin :- Birth hormone or love hormone.

* Prolactin :- Help in milk production.

Reproductive Health

Diseases which can spread from one person to another person during sexual intercourse are known as sexually transmitted diseases.

Sexually transmitted Diseases (STD's)

- ① Bactarial ② ③ viral

Common sexually transmitted Diseases (STD's)

Name of STDs	Causative organism	Symptoms
Syphilis (virus Bacteria)	<i>Treponema pallidum</i> (a bacterium)	causes sores and lesions in the genital tract. Burning sensation at urination
AIDS (Acquired Immune Deficiency Syndrome) (virus)	HIV (human Immune deficiency virus)	Destroy the immune system of body.
Genital warts (virus)	human papilloma virus (a virus)	painful lumps on vagina, penis, anus or upper thighs, itching or bleeding.

HIV do not spread by handshake, hugging, playing together

Dispose
① Acute
short duration

② chronic
long duration /
life long

Contraception methods

Contraception methods or techniques adopted to prevent pregnancy as a consequence of sexual intercourse.

Why contraceptive methods should be adopted?

- To prevent unwanted children.
- To maintain the distance between two children and to plan the family size.
- To prevent sexually transmitted diseases.

Types of contraceptive methods

- Mechanical / Barrier method
- Chemical method
- Intra uterine contraceptive devices [IUCD]
- Surgical method.