CLASS 10TH

HOW DO ORGANISMS REPRODUCE

GUN SHOT

Reproduction

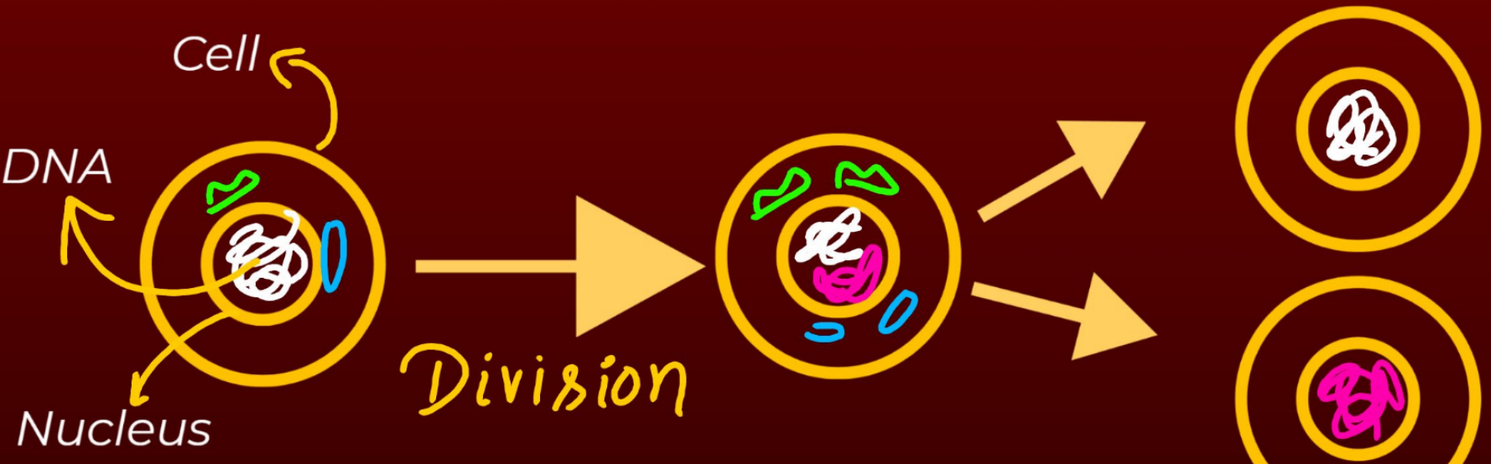
Reproduction is the process by which living organism produce new individuals of the same species.

It is not an Essential Life Process.

Why is it Important ?

1. It Ensures the continuity of a particular species on earth - Population stability
2. It creates Variation in DNA that provides stability to a species. ??

DO ORGANISMS CREATE EXACT COPIES OF THEMSELVES?



Variation

Variations are the differences present between the individuals of the same species.

Reproduction

↓

✓ Formation of new cells

↓

✓ Replica of Cell

↓

✓ Copy of DNA

Deoxyribo Nucleic Acid

✓ Genetic material present in Nucleus of cell

↓

✓ Errors during DNA Copying

↓

✓ Information changed

↓

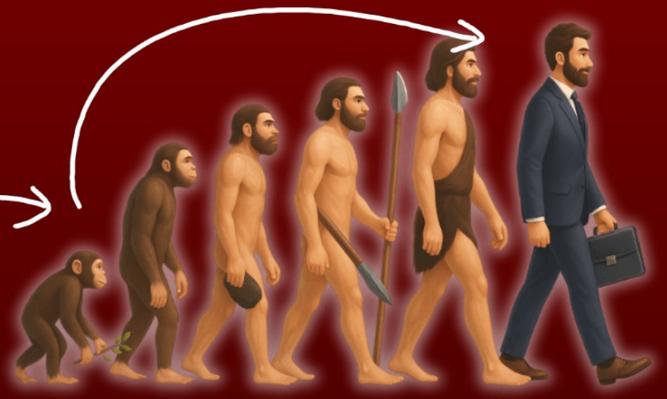
✓ New Characters

↓

✓ Variation

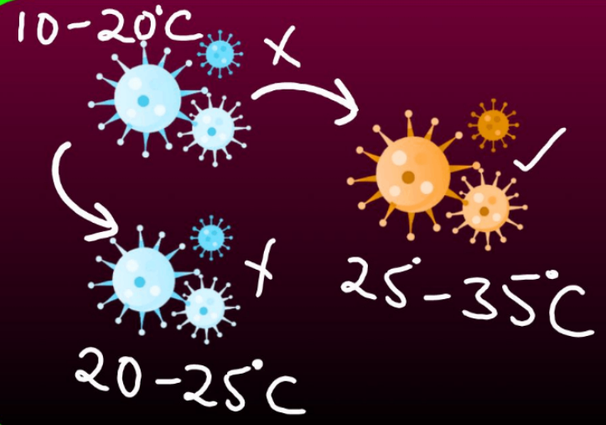
Importance of Variation

Reproduction



1. Survival during Environmental Changes
2. Prevents extinction of Species → Provides Stability
3. Helps in Evolution of species
4. Variation in DNA results in the varieties of a species and formation of new species

30°C



Population of bacteria in water → Global warming icreases water temperature → Most bacteria die - > Only few Variants which can live in high temperature survuve → They reproduceand species grow further

Asexual Reproduction

1. Single parent is involved
2. No Gamete formation
3. No fertilisation
4. Offsprings formed are usually genetically similar → Single Parent

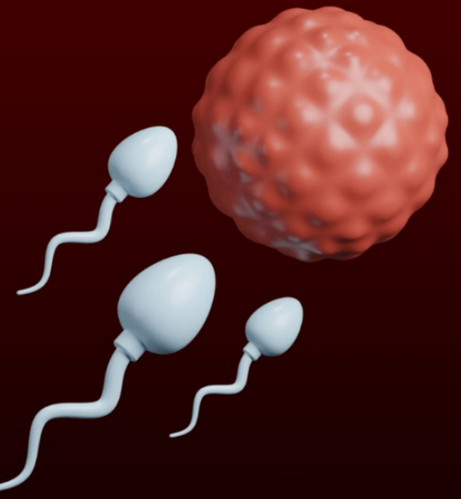
1. Fission
2. Fragmentation
3. Regeneration
4. Budding
5. Spore formation
6. Vegetative propagation

Sexual Reproduction

1. Two parents are involved
2. Gamete formation occurs
3. Fertilisation occurs
4. Offsprings formed are genetically dissimilar → Many Parents

M + F → O + O → O (zygote)

Reproduction in flowering plant



Reproduction in human beings

Assertion (A): Offsprings produced by asexual reproduction are genetically similar to the parents.
Reason (R): Asexual reproduction involves a single parent.

CBSE 2017, 2024

A Both (A) and (R) are true and (R) is the correct explanation of (A).

B Both (A) and (R) are true and (R) is not correct explanation of (A).

C (A) is true, but (R) is false.

D (A) is false, but (R) is true.

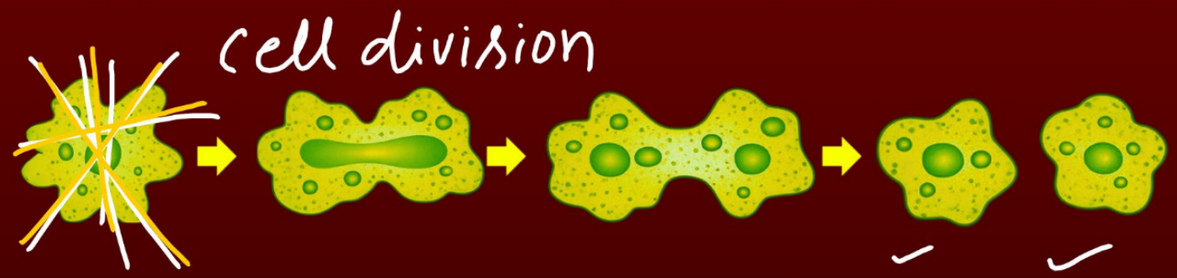
1.FISSION

In Unicellular organisms , cell division or fission is the way of reproduction.

Occurs in many bacteria and protozoa

Amoeba - unicellular organism

1. **Binary fission** in amoeba (2)
2. Splitting of cells can take place in any plane
3. Parent cell divides into two daughter cells



Leishmania - unicellular organism

1. Has a whip-like structure at one end of cell
2. **Binary fission** occurs in fixed plane (in relation to whip-like structure - Longitudinal fission)
3. Causes kala-azar → Black fever

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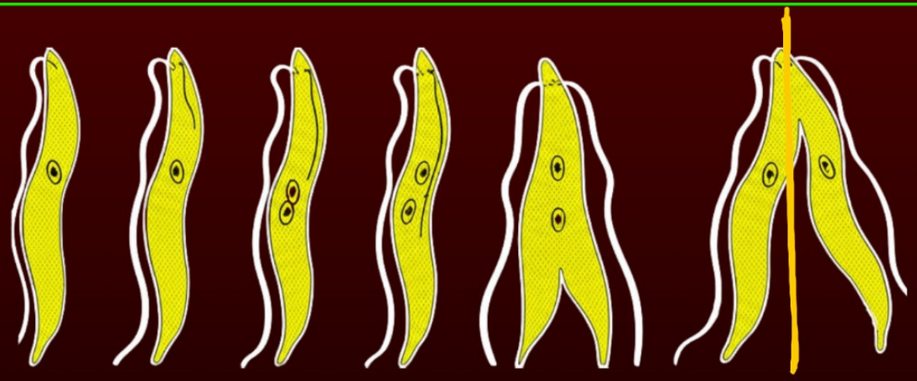
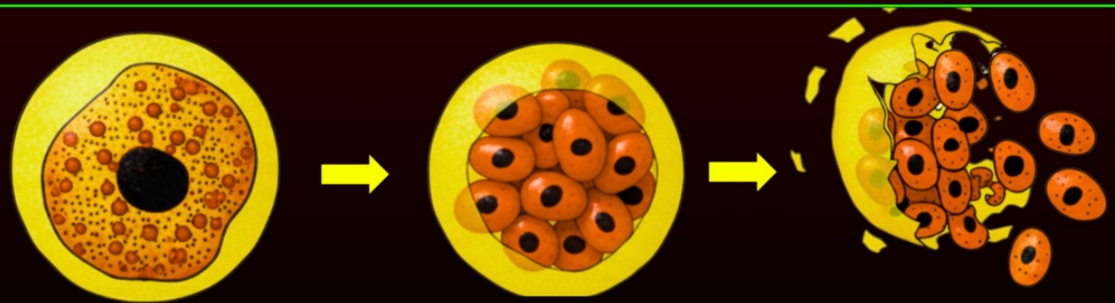


Plasmodium - unicellular organism

1. Divides by **multiple fission**
2. Malarial parasite

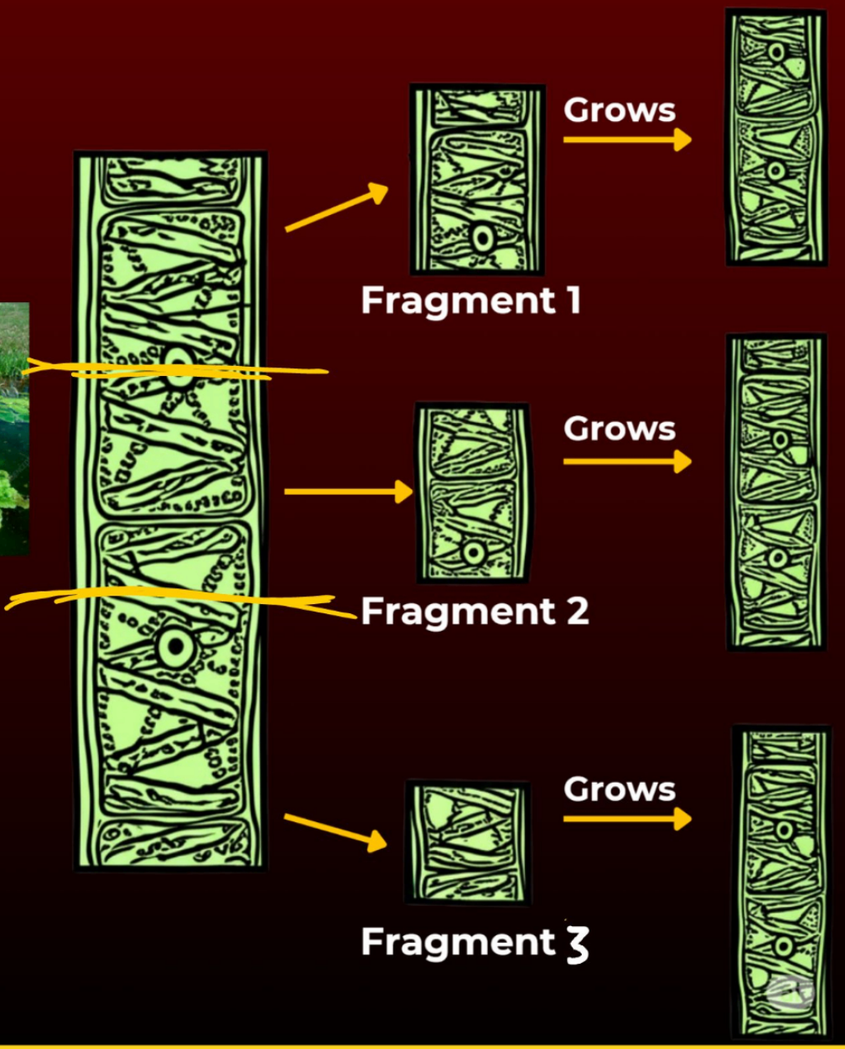
Many

imp



2.Fragmentation in Spirogyra

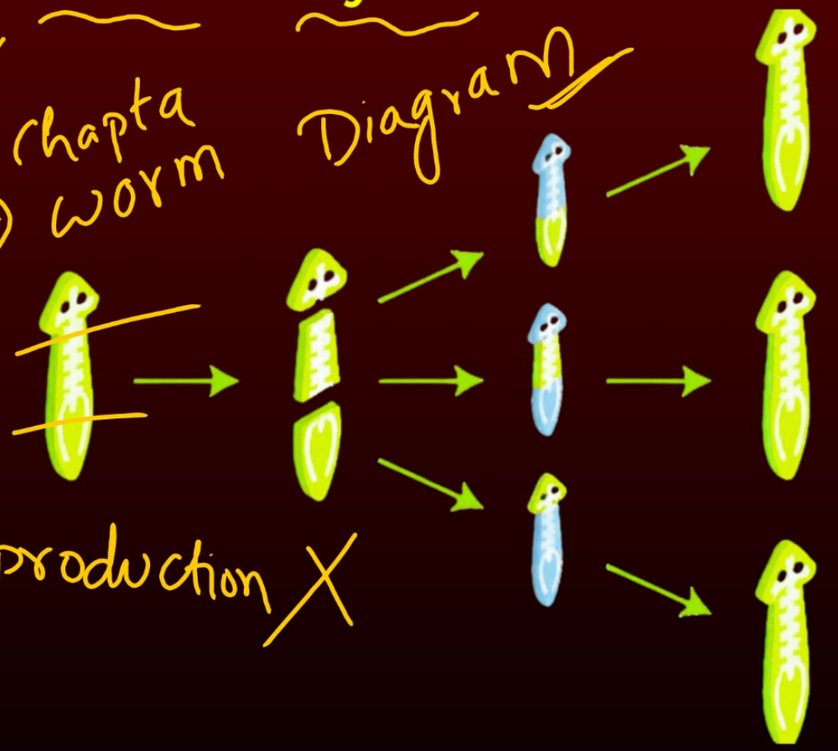
Breaks into smaller pieces upon maturation



3.Regeneration in Planaria

If the individual is cut into many pieces, these pieces grow into separate individuals.
Regeneration is carried out by specialised cells

E.g. Planaria & Hydra



REGENERATION ≠ REPRODUCTION

The modes of reproduction in Spirogyra and Planaria respectively are :

CBSE 2020, 2023, 2025

A Regeneration and budding

B Regeneration and fragmentation

C Fragmentation and regeneration

D Budding and regeneration

Name the method by which Spirogyra reproduces under favourable conditions. Is this sexual or asexual?

Ans - Fragmentation. This is asexual method.

CBSE 2025, 2021, 2020, 2017, 2016, 2016

4.Budding in Hydra

Hydra - Aquatic animal

Use Regenerative cells for Reproduction

⬇

Repeated cell division at one specific site
->Forms an outgrowth --> bud develops

⬇

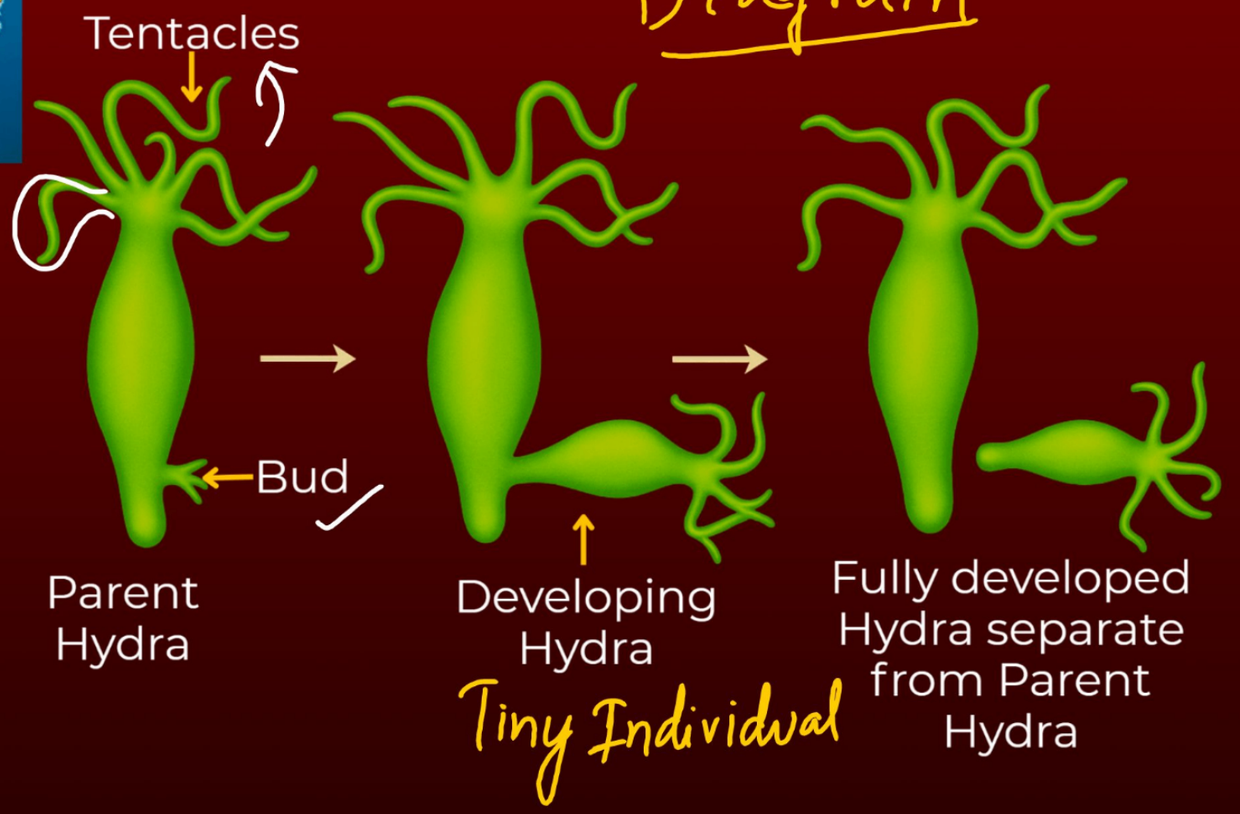
Buds develop into tiny individuals

⬇

On maturity ,it detach from the parent body to become new independent individuals

E.g. Hydra & Yeast

Diagram



Describe budding in Hydra with the help of a labelled diagram.

CBSE 2015, 2016, 2017, 2019, 2021, 2022, 2024

Identify the mode of asexual reproduction in the following organism:

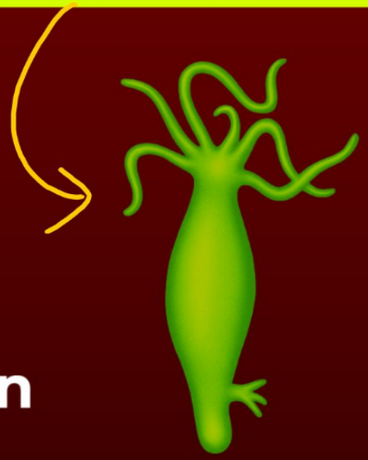
CBSE 2025, 2024, 2020

A Fragmentation

B Multiple fission

C Budding

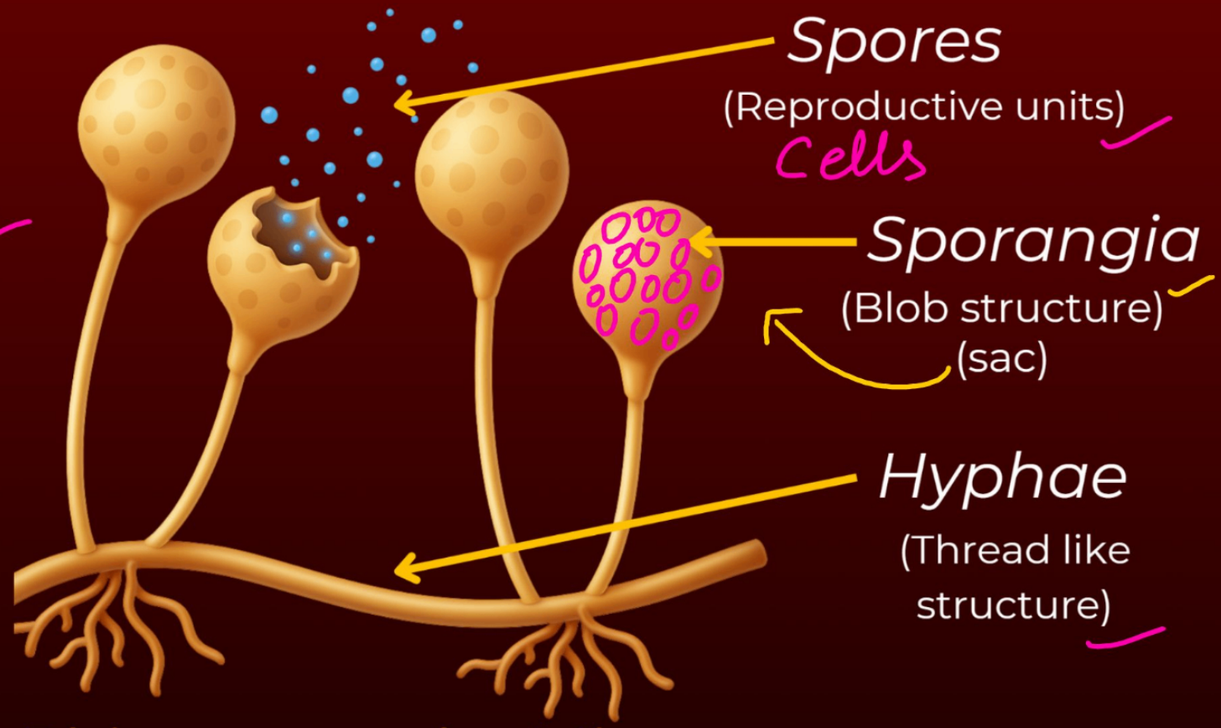
D Binary fission



Hydra → Regen + Budding

5. Spore Formation in Rhizopus (Bread mould)

1. Rhizopus (bread mould) → fungus
2. Spores are Covered by thick walls that protect them in unfavourable conditions.
3. Favourable conditions (moisture & warm temperature & nutrition) → Spores germinates and develop into new individuals Or Rhizopus



Rhizopus under Microscope

Advantages of Spore formation ① Spores are very light weight and easily transport from on place to another and ② Large no. of spores are produced in a single time

Why does Rhizopus not multiply on a dry slice of bread ? List two conditions required for its growth.

CBSE 2015, 2016, 2017, 2021, 2024

Rhizopus does not multiply on a dry slice of bread because moisture is essential for its spores to germinate. In dry conditions, the spores remain inactive and cannot grow.

Two conditions required for its growth:

1. Moisture
2. Warm temperature

Nutrition

6.Vegetative Propagation : Asexual reproduction in plants

Parts like roots, stems & leaves develop into new plants

1. Stem (Potato , Ginger, Onion)
2. Root (Sweet potato)
3. Leaves (Bryophyllum)

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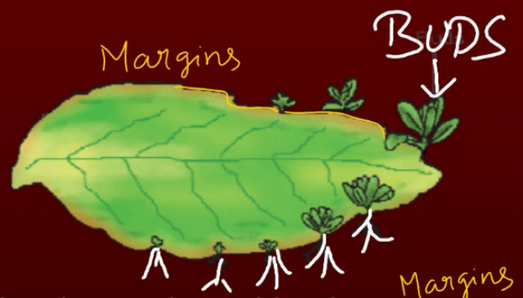
Potato - Underground stem

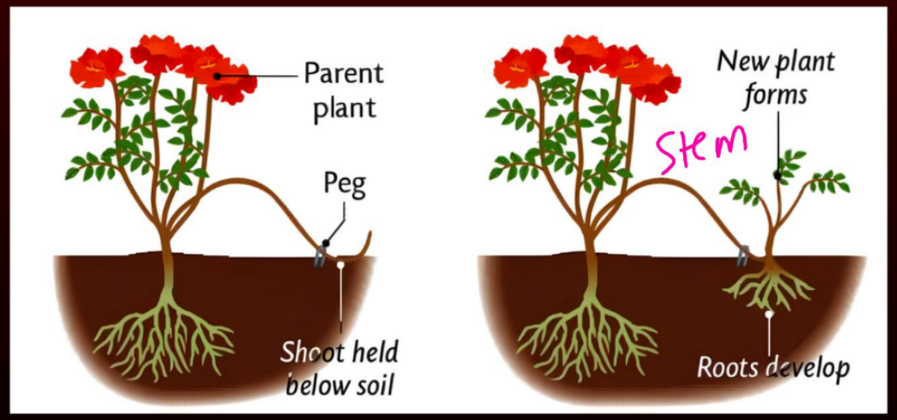


buds produced in the notches along the leaf margin of Bryophyllum fall on the soil and develop into new plants

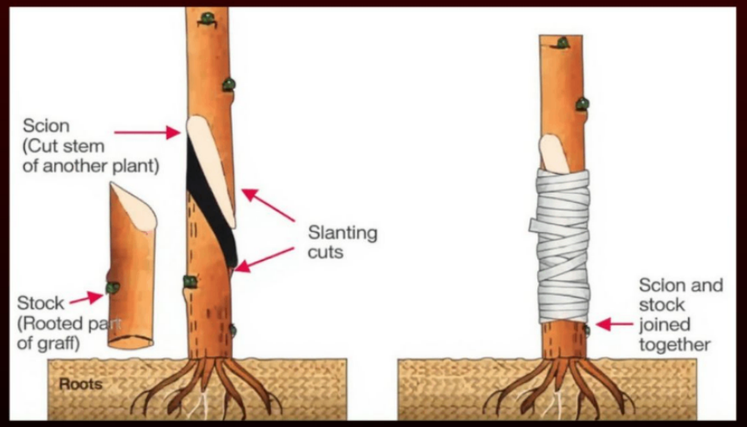
Sweet Potato

Root

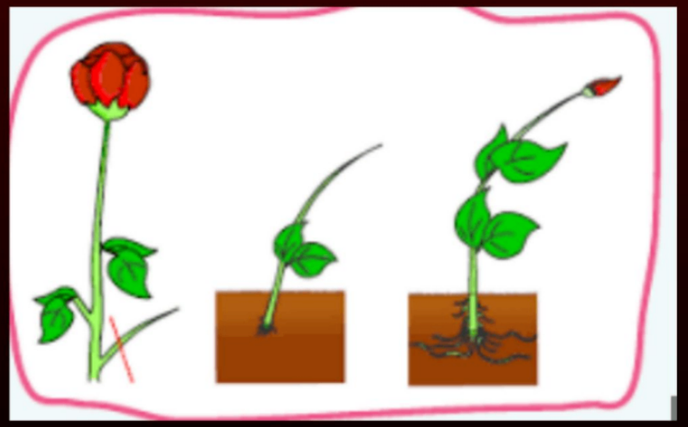
Artificial Methods



Layering



Grafting



Cutting

Advantages of Vegetative Propogation

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1. Bear fruits & flowers earlier than those produced from seeds
2. Vegetative propagation is a more rapid, easier and cheaper method of multiplication of plants.
3. Used in layering / grafting to grow plants like sugarcane, roses, grapes
4. Makes possible the Propagation of plants that have lost the capacity to produce seeds (banana, orange, rose, jasmine)

Fruits Flowers

5. Plants produced are genetically similar to the parent plant & its characteristics.

Asexual → Single Parent

6. Desirable character of fruit can be maintained.

Examples -Sugarcane,Potato,Ginger,Onion,Jasmine,Rose,Grapes, Banana,Sweet Potatao, Byrophyllum

Learn

Vegetative propagation refers to the production of new plants of the same species from the following parts of a plant

A stem, flower and fruit

B roots, stem and flower

C stem, leaves and flower

D roots, stem and leaves

CBSE 2025, 2024, 2023, 2016

The plants that can be raised by the method of vegetative propagation are:

A Sugarcane, roses, grapes

B Sugarcane, mustard, potato

C Banana, orange, mustard

D Papaya, mustard, potato

CBSE 2024, 2023, 2021

What happens when:
(1) Leaves of Bryophyllum fall on the soil?
(2) Planaria is cut into many pieces.
(3) Sporangia of Rhizopus on maturation liberate spores?
Mention the modes of reproduction in each of the above three cases.

CBSE 2023, 2020, 2017, 2016

1) When leaves of Bryophyllum fall on the soil, new plants grow from the buds on the leaf margins.
Mode of reproduction: Vegetative propagation

(2) When Planaria is cut into many pieces, each piece grows into a new Planaria.
Mode of reproduction: Regeneration

(3) When sporangia of Rhizopus mature, they burst and release spores that germinates in moisture and warm temperature to grow into new individuals.
Mode of reproduction: Spore formation

Organism	Cellularity	Mode of Reproduction	Disease
Amoeba	Unicellular	Binary fission (any plane)	
Leishmania	Unicellular	Binary fission (fixed plane)	Kala azar
Plasmodium	Unicellular	Multiple fission	Malaria
Spirogyra	Multicellular	Fragmentation	
Planaria	Multicellular	Regeneration	
Hydra	Multicellular	Budding, Regeneration	
Yeast		Budding	
Rhizopus	Multicellular	Spore formation	

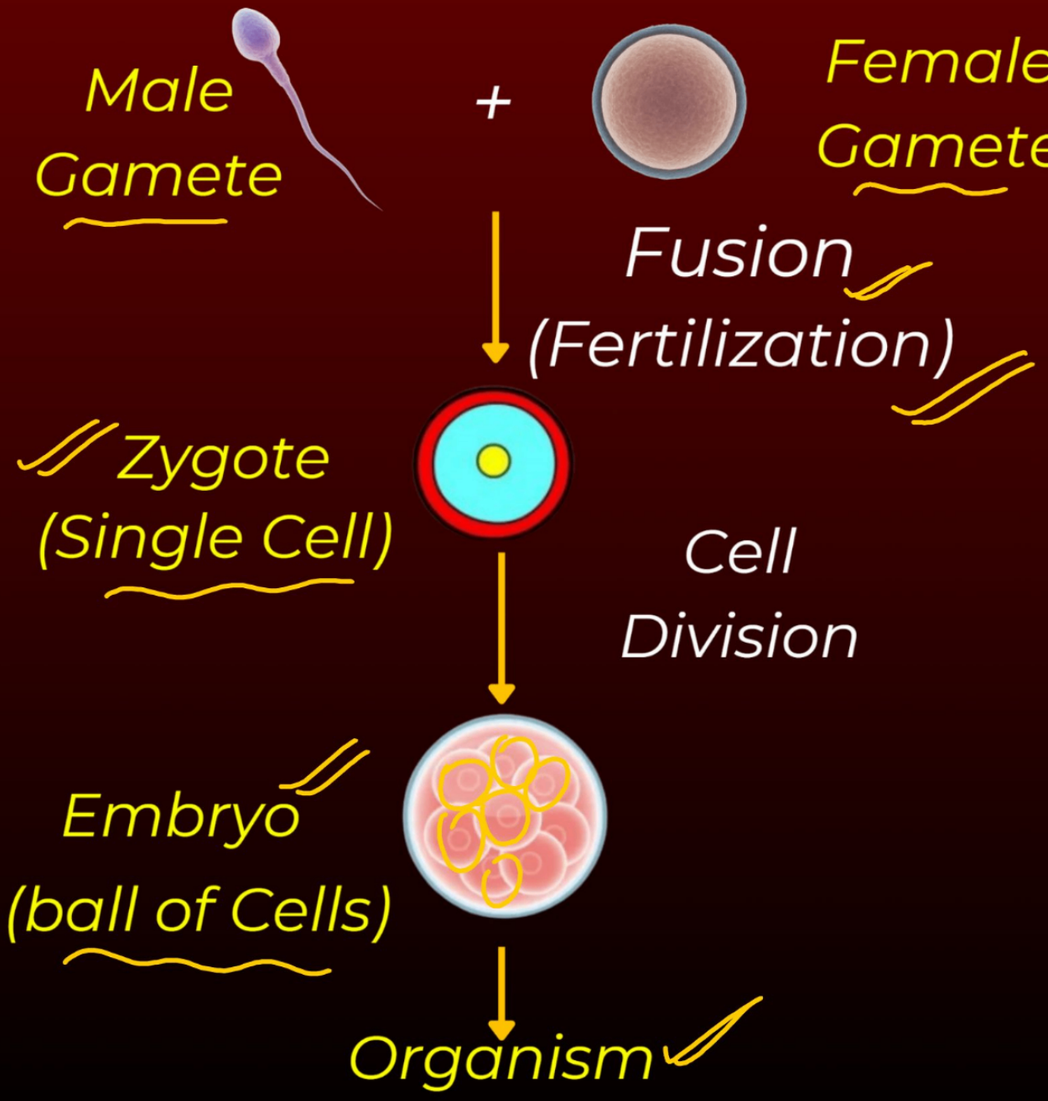
Sexual Reproduction

MO OF

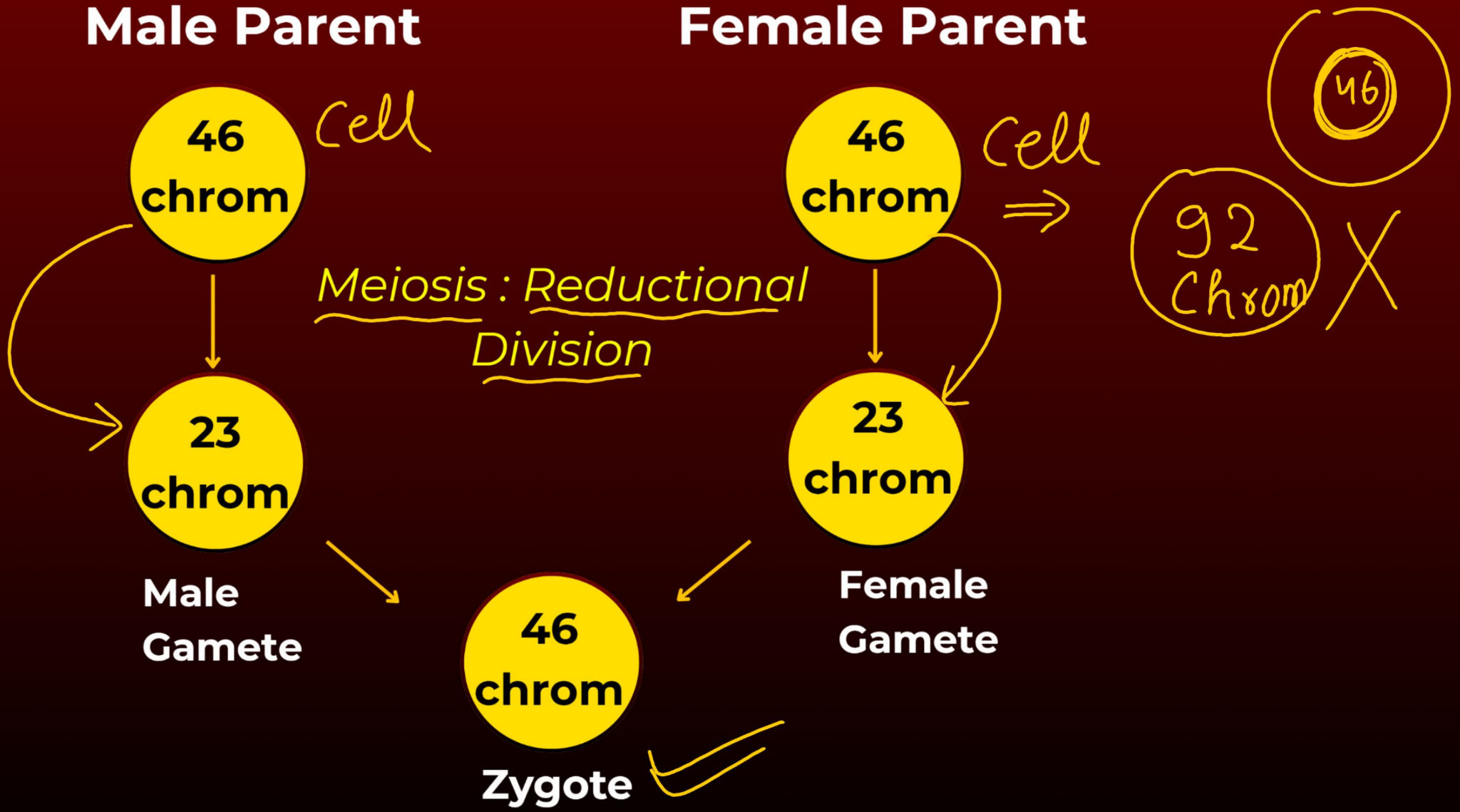
Why the Sexual Mode of Reproduction?

1. Combine variations from two parentsof same species.
2. Increase chances of survival by creating more variety in a population

Gamete is a reproductive cell or sex cell.
Also called germ -Cells (*)



Human cells have 23 pairs of Chromosomes = 46 Chromosomes



Offsprings formed as a result of sexual reproduction produce more variations because:

CBSE 2016, 2017, 2024

A genetic material is contributed by many parents.

B sexual reproduction is a lengthy process.

C genetic material is contributed by two individuals of same species to produce a new generation.

D DNA copying is not accompanied by the creation of cellular apparatus.

A zygote is formed by the fusion of a male gamete and a female gamete. The number of chromosomes in the zygote of a human is:

A 23

B 44

C 46

D 92

CBSE 2016, 2018, 2020, 2024

PARTS OF A FLOWER

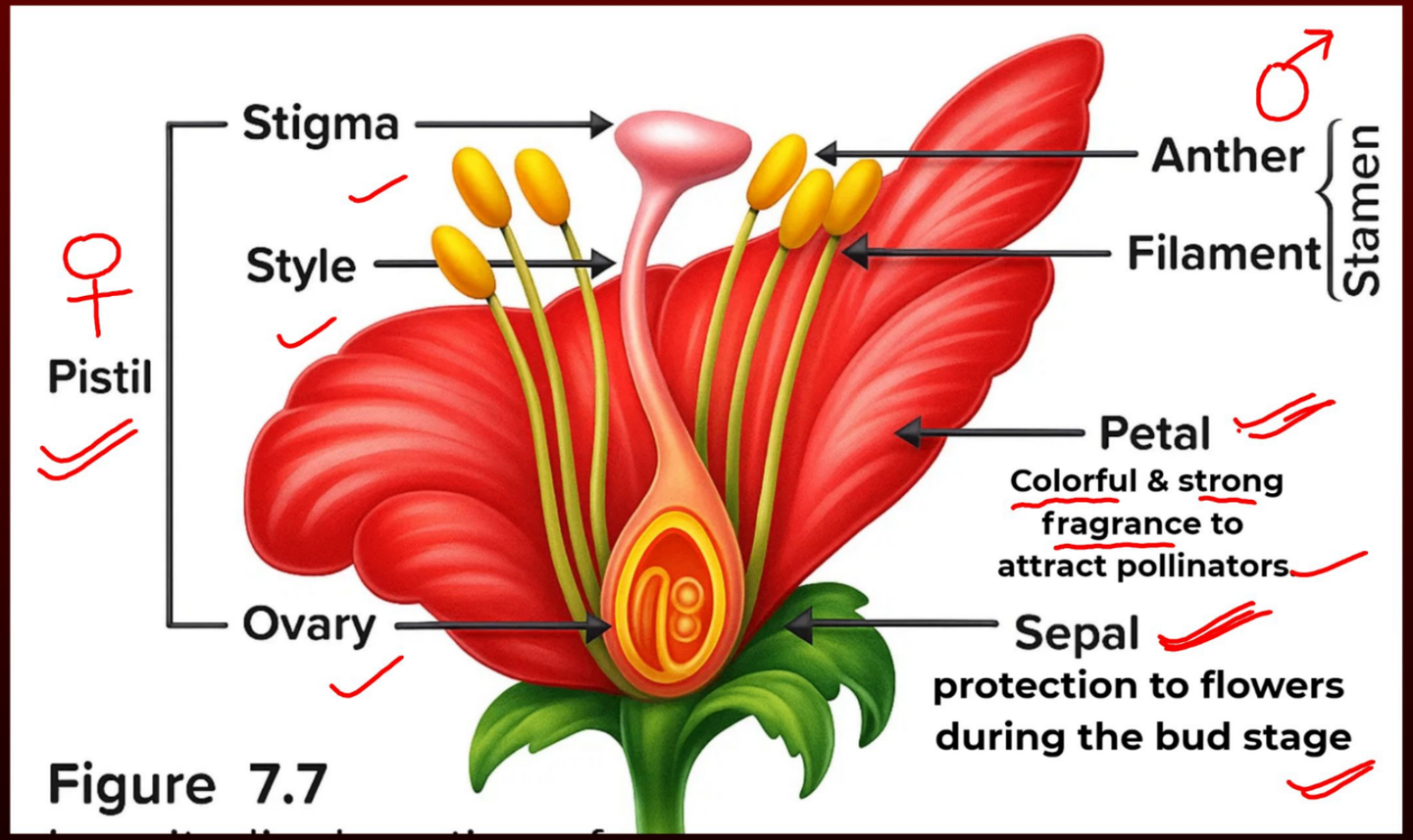


Figure 7.7

Reproductive Organ Of Plant = FLOWER

SEED

Hibiscus

Male Reproductive Part → Stamen
Female Reproductive Part→ Pistil /Carpel

MH

Bisexual flowers → Contains both stamens & pistil -> hibiscus (china rose), mustard
Unisexual flowers → Contains either stamen or pistil -> papaya , watermelon

PW

Select a pair of bisexual flowers from the following :

CBSE 2022, 2025

MH

A Papaya and mustard

B Hibiscus and mustard

C Hibiscus and papaya

D Hibiscus and watermelon

Part(s) of a flower which attracts insects for pollination is (are) :

A Petals and Sepals

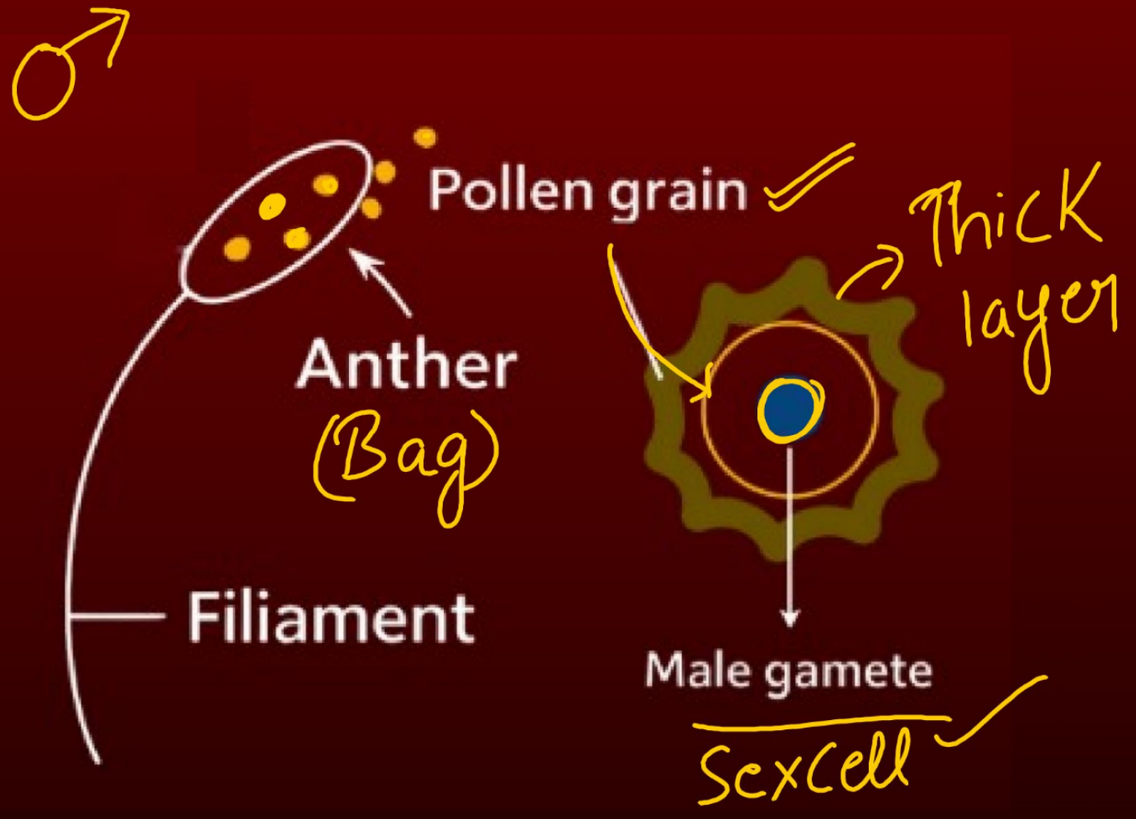
B Anther and Stigma

C Petals only

D Sepals only

CBSE 2021,2024, 2025

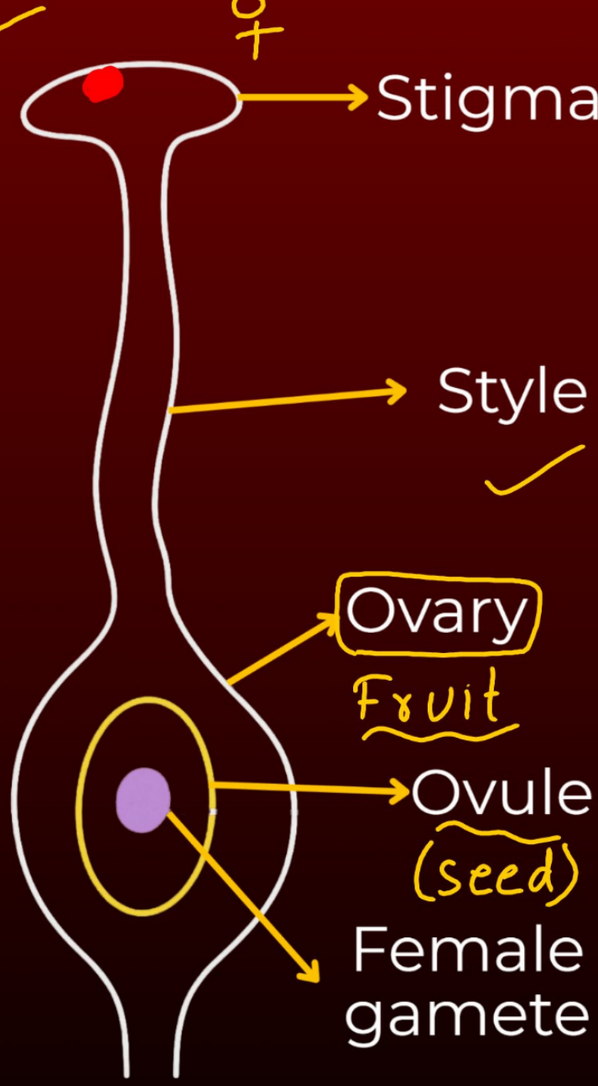
STAMEN → Male reproductive part



Anther → Produces pollen grains which consists of male gametes

Filament → It forms the stalk that bears anther

PISTIL → Female reproductive part



Receives pollen grains during pollination due to their sticky nature.

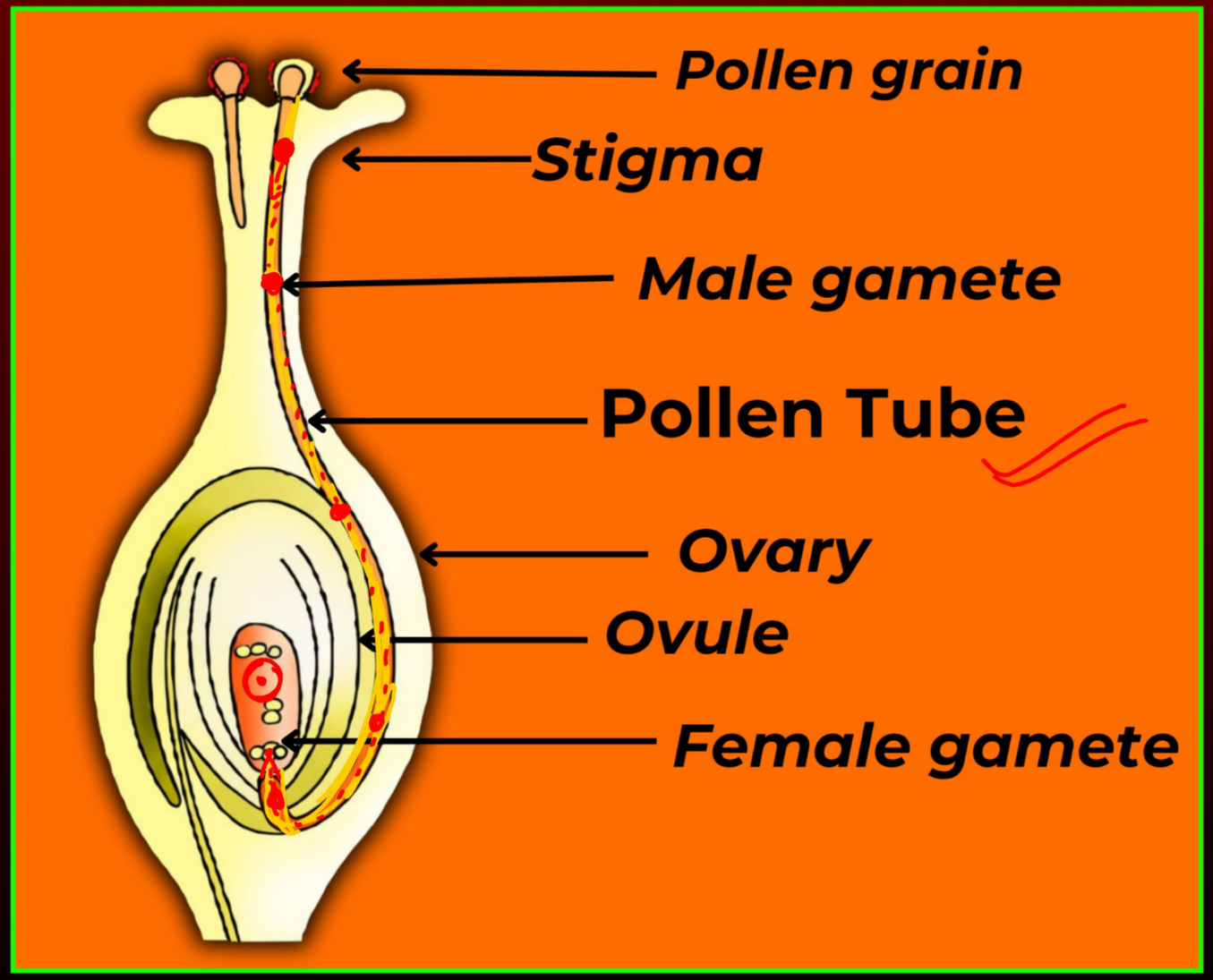
ElongatedTube like structure, connects stigma and ovary,

Swollen part of pistil

Present inside ovary, Consist of female gametes, site of fertilisation.

Single or More

Sexual Reproduction in Flowering Plants (Angiosperms)



Anther contains pollen grain

↓

Pollen lands on stigma

↓

A tube grows out of the pollen grain

↓ (Pollen Tube)

male gamete travels to ovule

↓

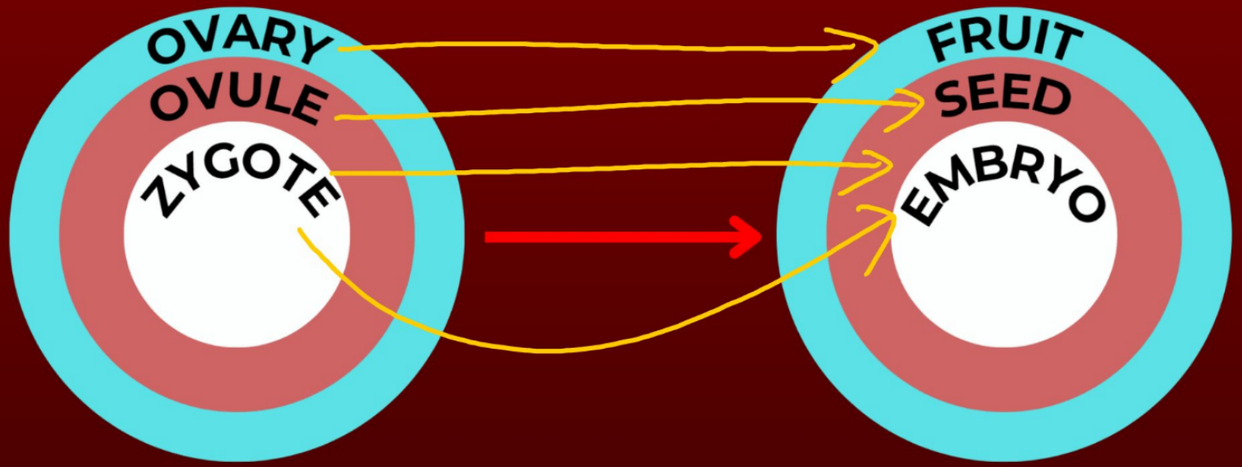
male gamete + female gamete

↓ Fertilization

Zygote (Single cell)

↓ Multiple division in zygote

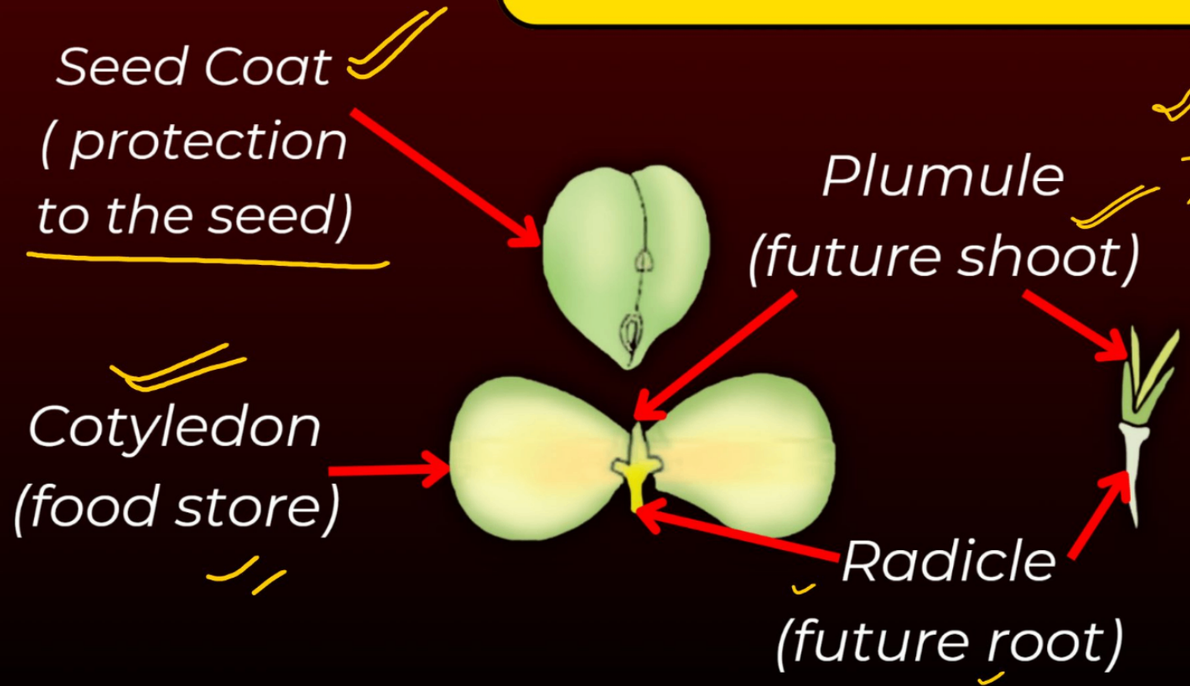
Embryo (within ovule) ✓



Zygote → divides several times →Embryo
Ovule →develops a tough coat →Seed
Ovary → grows rapidly and ripens→ Fruit

petals, sepals, stamen, style --> fall off

PARTS OF A SEED



Germination →
Process by which a seed starts to grow into a new plant

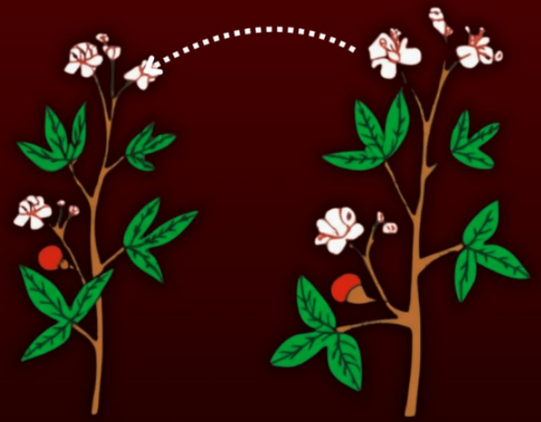
POLLINATION

Transfer of pollen from anther to stigma of a flower

Agent of pollination → wind, water, animals

Self pollination → Transfer of pollen grains from anther to stigma of either in the same flower or another flower in the same plant

Cross pollination → Transfer of the pollen grains from the anther of one flower to the stigma of another flower on a different plant of the same species.



CBSE 2023, 2023, 2024

Cross-pollination is better for the survival of species.
It mixes genes from two different plants, creating more variations, which help plants adapt and survive better in changing environments.

The correct/true statement(s) for a bisexual flower is/are :
(i) They possess both stamen and pistil.
(ii) They possess either stamen or pistil.
(iii) They exhibit either self-pollination or cross-pollination.

CBSE 2014, 2022, 2023, 2024

A (i) only

B (iv) only

C (i) and (iii)

D (i) and (iv)

Sexual Maturation Of The Body : Puberty

Puberty - The time in life , when a boy or girl becomes sexually mature. It is a process that usually happens between ages 10 and 14 for girls and ages 12 and 16 for boys. It causes physical changes, and affects boys and girls differently .

Changes during Puberty

MALES

1. Facial hair growth
2. Underarm and pubic hair growth
3. Deepening of voice
4. Enlargement of genitals (Penis size)
5. Sperm production
6. Oily Skin & Pimple form

FEMALES

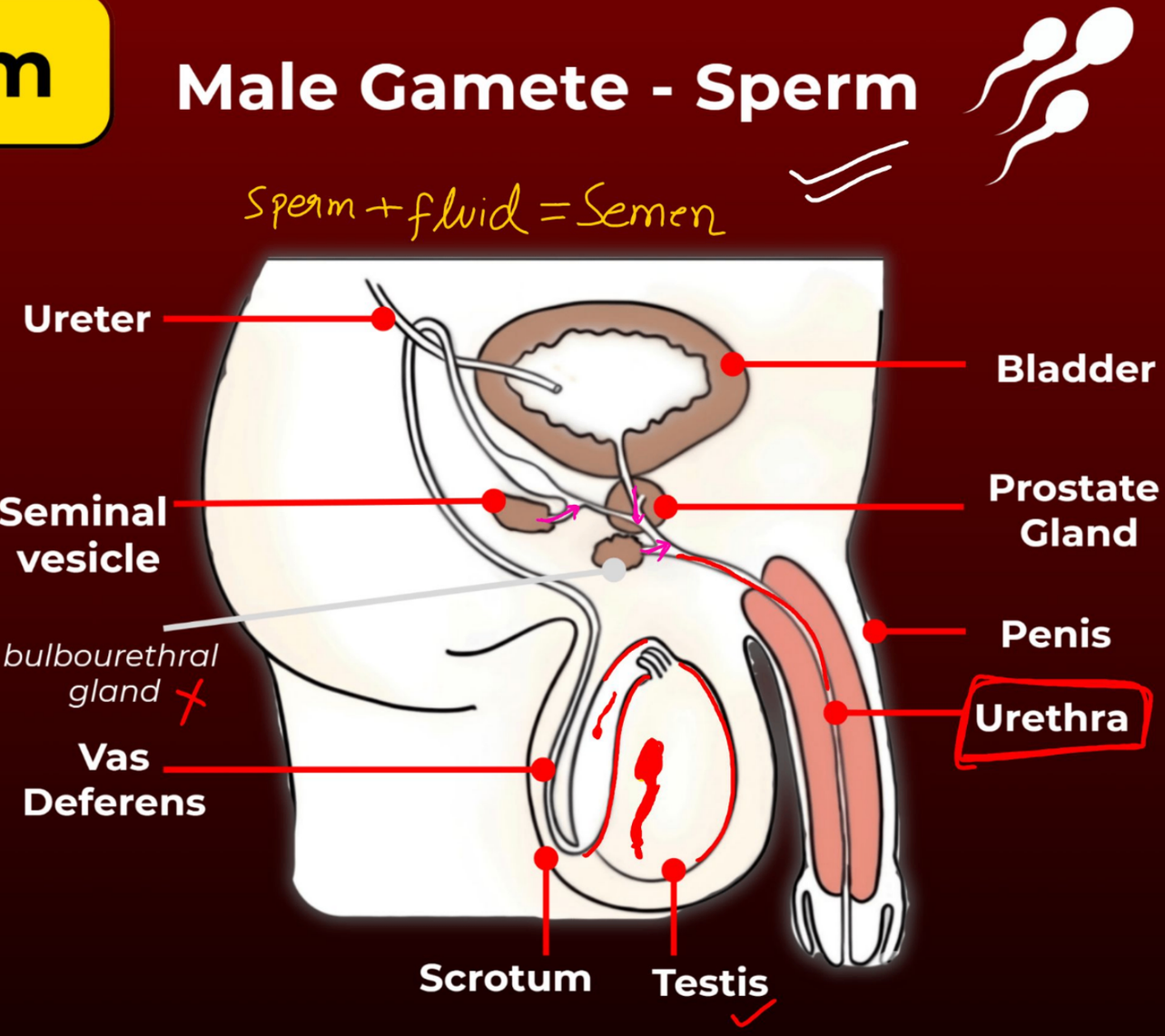
1. Breast development
2. Underarm and pubic hair growth
3. Increase in fat mass of hips and thighs
4. Menstruation cycles start

1. All of these changes take place slowly, over a period of months and years.
2. They do not happen all at the same time in one person, nor do they happen at an exact age.
3. In some people, they happen early and quickly, while in others, they can happen slowly

Male Reproductive System

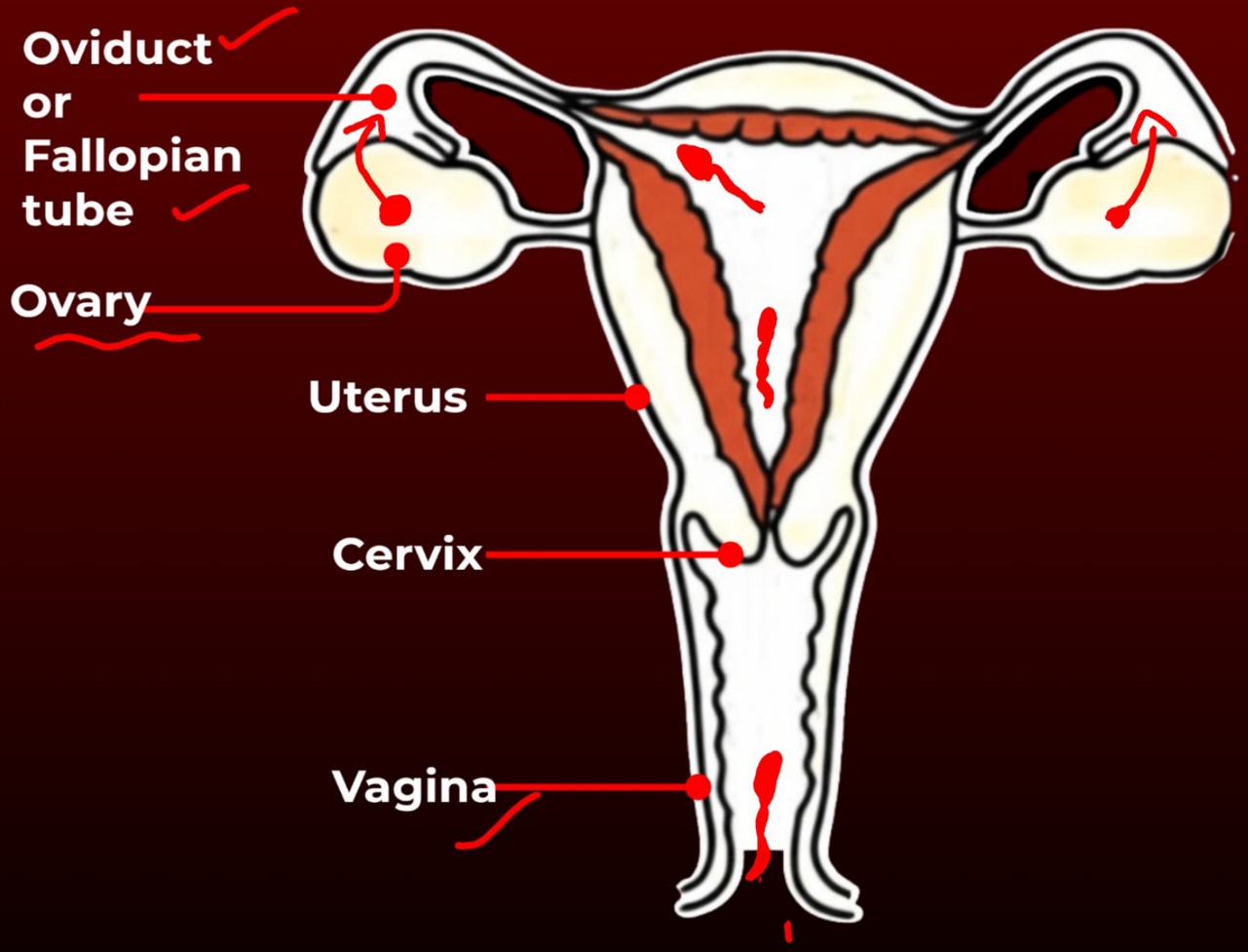
Scrotum (Skin Pouch)	Maintain the low temperature of the testes (2–2.5°C) lower than the normal internal body temperature
Testis	Produce sperm cells Produce the hormone testosterone • regulates formation of sperms • changes at the time of puberty
Vas deferens	Carries sperm towards urethra (SPERM DUCT)
Seminal vesicle and Prostate gland	• Add their secretions • Put sperms in a fluid which makes their transport easier • Provides nutrition
Urethra	Common passage for both semen (sperm) and urine
Penis	Deposits sperm into the vagina during insemination

Male Gamete - Sperm

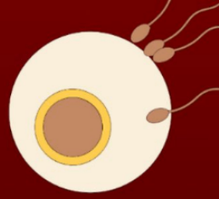


Semen is the whitish fluid that contains sperm cells and a nourishing, protective fluid produced by glands like the seminal vesicles and prostate gland

Female Reproductive System



Female Gamete - Egg Cell / Ovum



Ovary	• Site of ovum (egg cell) development • Contain thousands of immature eggs, some of these start maturing on reaching puberty • One egg is released every month by one of the ovaries
Fallopian Tubes (Oviducts)	• Carry the ovum from the ovary to the uterus • Site of fertilization imp
Uterus (womb)	• Elastic bag-like structure in which the embryo and foetus develop • Involved in menstruation
Cervix	• Separates the vagina from the uterus • Dilates during birth to allow the fetus to leave the uterus
Vagina	• Provides a passageway for sperm and menstrual flow • Functions as the birth canal

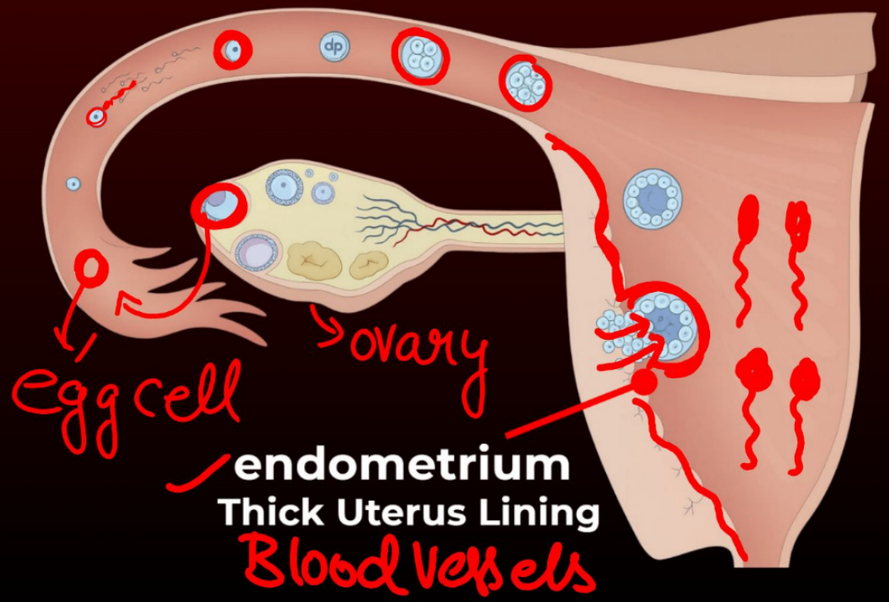
1. Fertilization:
When a sperm reaches the oviduct (fallopian tube), it fuses with ovum (egg cell) to form a zygote.

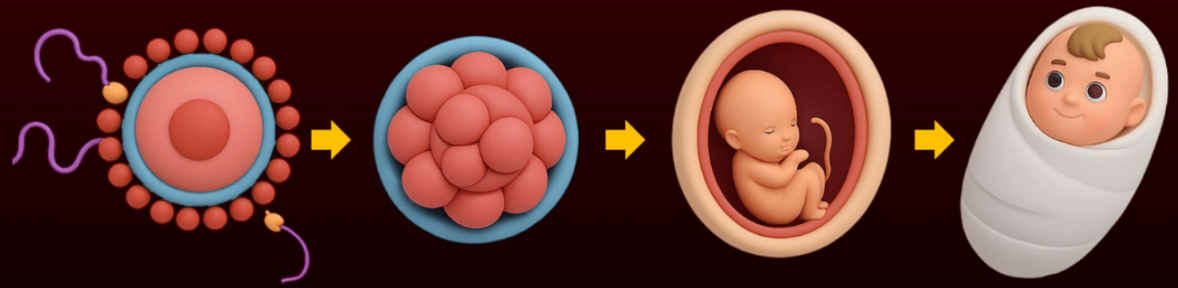
2. Zygote formation and division:
The zygote divides repeatedly to form a ball of cells.

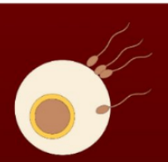
3. Embryo formation:
This ball of cells travels down to the uterus and gets implanted in the lining of the uterus (endometrium), forming an embryo.

Learn

4. Foetus formation:
As the embryo continues to develop and body parts start forming, it is called a foetus.



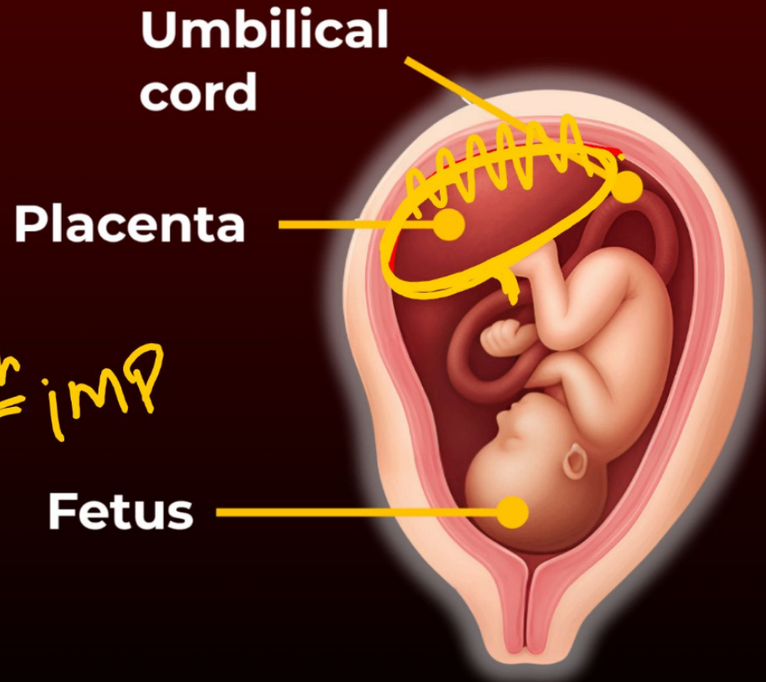


Male Gamete (Sperm) 	Female Gamete (Egg or Ovum) 
Smallest cell	Largest cell
Motile (swim using tails)	Non-motile
Do not store food	Store food
Produced in Testis	Produced in Ovaries
Produced in large numbers	Only One is released per month

PLACENTA

1. Disc shaped tissue develops inside uterus during pregnancy
2. Placenta is attached to Uterus lining and umbilical cord
3. Placenta has villi which provides large surface area for the exchange of substances between mother and developing foetus
4. Placenta helps in

- exchange of glucose and oxygen to pass from the mother to the developing embryo
- wastes to pass from the embryo to the mother through the Umbilical cord



The incorrect statement about placenta is:

CBSE 2018, 2020, 2022, 2024

A. It is a disc embedded in the uterine wall.

B. It contains villi on the embryo's side of the tissue.

C. It has a very small surface area for glucose and oxygen to pass from mother to the embryo.

D. The embryo gets nutrition from the mother's blood through it.

Explain the events that take place once a sperm reaches the oviduct till it becomes a foetus.
Write the role of the placenta in pregnancy.

CBSE 2018, 2020, 2022, 2024

IMP

1. Fertilization:
When a sperm reaches the oviduct (fallopian tube), it fuses with ovum (egg cell) to form a zygote.

2. Zygote formation and division:
The zygote divides repeatedly to form a ball of cells.

3. Embryo formation:
This ball of cells travels down to the uterus and gets mplanted in the lining of the uterus (endometrium), forming an embryo.

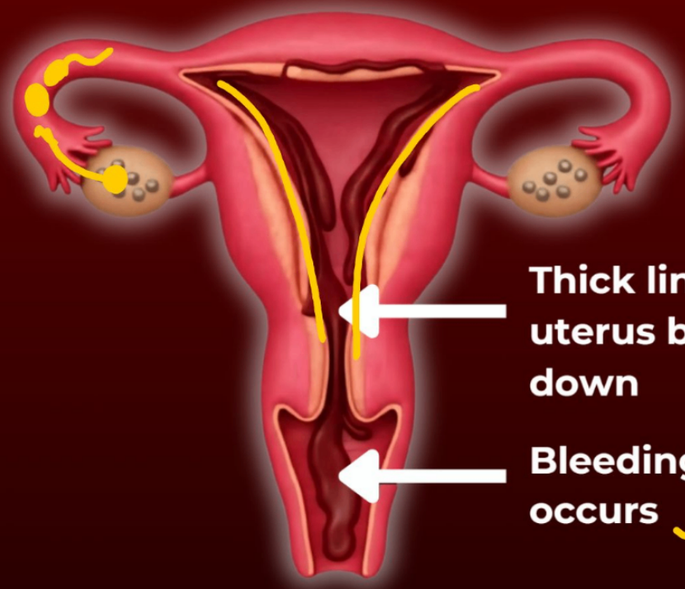
4. Foetus formation:
As the embryo continues to develop and body parts start forming, it is called a foetus.

- Placenta helps in
- exchange of glucose and oxygen to pass from the mother to the developing embryo
- wastes to pass from the embryo to the mother through the Umbilical cord

MENSTRUATION

Menstruation is the monthly process in which the uterus sheds its lining along with blood through the vagina. It occurs in females, usually once every 28 to 30 days

- The ovary releases one egg every month
- The uterus also prepares itself every month to receive a fertilised egg
- Thus its lining becomes thick and spongy for nourishing the embryo if fertilization had taken place



if fertilisation of egg does not occur , this thick lining of uterus breaks and bleeding occcurs

GIRL CHILD → MENARCHE (10-12-14) → MENOPAUSE (45-50) → OLD AGE

Beginning of Menstruation

Stoppage of Menstruation

Match Column-I with Column-II and select the correct option from the choices provided.

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Column–I		Column–II	
a.	Site of fertilisation of egg with the sperm	(i)	Vagina
b.	Site of implantation of embryo	(ii)	Uterus
c.	Site of entry of sperm into the female reproductive tract	(iii)	Oviduct
d.	Site through which the waste materials generated by the developing embryo are removed	(iv)	Placenta
		(v)	Cervix

A a- (ii), b-(i), c-(v), d-(iv)

B a- (iii), b-(i), c-(v), d-(iv)

C a- (iv), b-(ii), c-(iii), d-(i)

D a- (iii), b-(ii), c-(i), d-(iv)

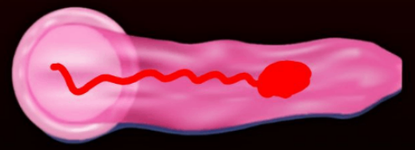
Reproductive Health - Contraceptive Methods

Physical/Mechanical Barrier

1. To prevent union of sperm & egg.
2. Protection from sexually transmitted diseases (STD) such as (bacterial infections - Gonorrhoea, Syphilis, Viral infections-HIV-AIDS, Warts)

E.g; Condoms

3. Side effects - Latex Allergy , Vaginal or Penile irritation



Hormonal Barrier

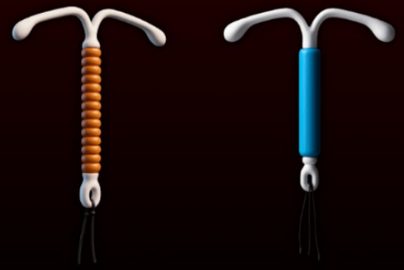
Pills

1. Oral contraceptive (OCPs) – changes the hormonal balance to prevent the egg release in females.
2. Taken orally.
3. Side Effects - Headache , Irregular Periods , Dizziness

IUCD

Females

1. Intrauterine contraceptive device (Copper-T or loop) is placed in uterus to prevent pregnancy 3-4 years.
2. Can cause irritation of uterus.
3. Side Effects - Irreguular Periods, Backache, Vaginal discharge



Surgical Barrier

1. In Vasectomy, the vas deferens of male is blocked to prevent sperm transfer.
2. In Tubectomy, the fallopian tube of female is blocked to prevent egg from reaching uterus.
3. Side Effects- Dizziness , Weakness, Nausea