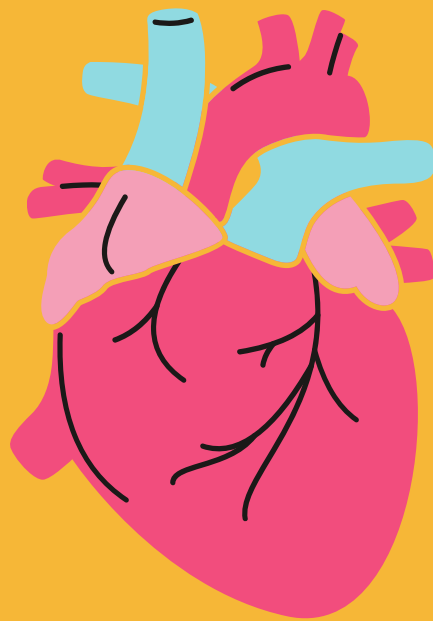
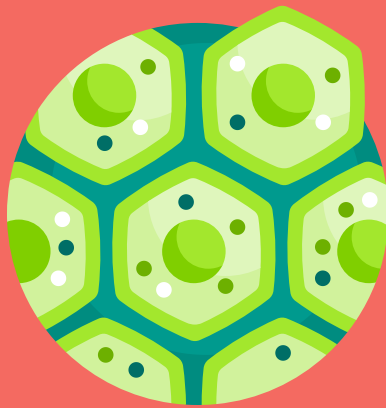
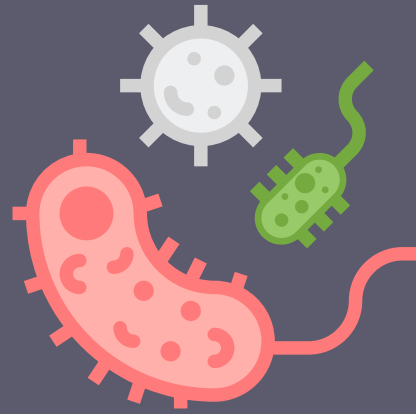




CLASS 10 NOTES

SCIENCE

Reproduction

PRASHANT KIRAD

REPRODUCTION

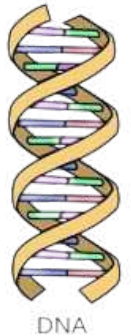
The term for creating new life from existing life is Reproduction. Its significance lies in:

- Replacing deceased organisms.
- Ensuring the continuity of life on Earth.

There are mainly two forms of reproduction: asexual and sexual.

DNA (Deoxyribonucleic Acid):

The resemblance among individuals in reproduction arises from the shared DNA with their parents, resulting in a similarity between the offspring and their progenitors.



Significance of DNA Replication:

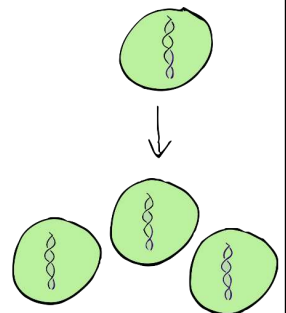
- Preserves body structure.
- Facilitates the inheritance of traits.
- Introduces diversity during the DNA replication process.

Significance of variation:

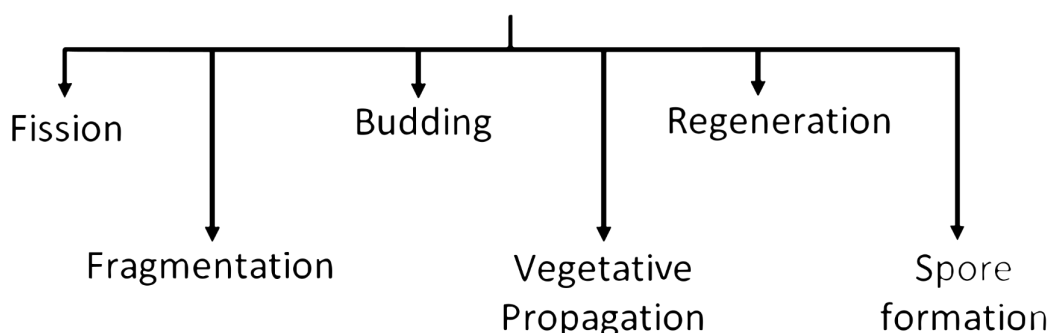
- Essential for evolutionary processes.
- Enables adaptation to changing environments.
- Contributes to the resilience and survival of populations.

Asexual Reproduction: Exam me aayega

Offspring produced by a single parent, with or without the involvement of gamete formation, represent a reproductive process wherein a lone parent gives rise to progeny. This mode of reproduction may or may not include the formation of specialized reproductive cells called gametes.



TYPE OF ASEXYAL REPRODUCTION



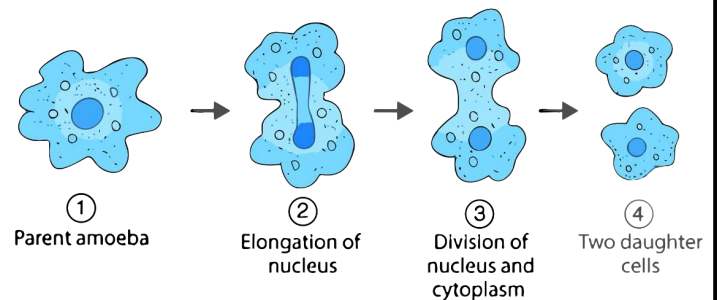
Fission:

A unicellular organism, such as bacteria, undergoes division into two or more organisms. Generally categorized into two types, this process involves binary fission and multiple fission.

Binary fission: Involves the splitting of an organism into two new organisms under specific conditions.

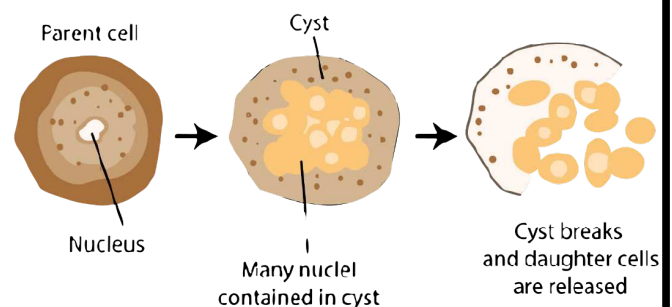
Binary fission in Amoeba:

Initially, the nucleus undergoes division into two, followed by the division of cytoplasm. Ultimately, the parent cell splits into two daughter cells.



Multiple fission:

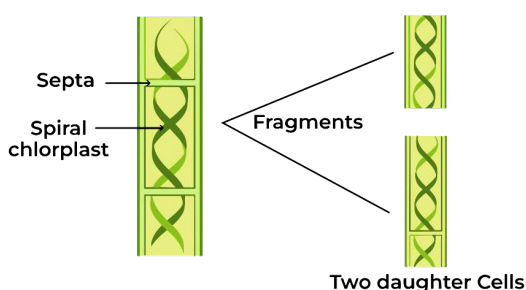
Multiple fission involves the parent organism dividing into numerous identical daughter organisms simultaneously. This reproductive mechanism is observed in certain organisms, including Plasmodium, the malarial parasite.



Fragmentation:

Fragmentation is the process wherein the body of a simple multicellular organism breaks into two or more pieces as it matures. Each fragment then develops into a new organism.

Fragmentation in spirogyra



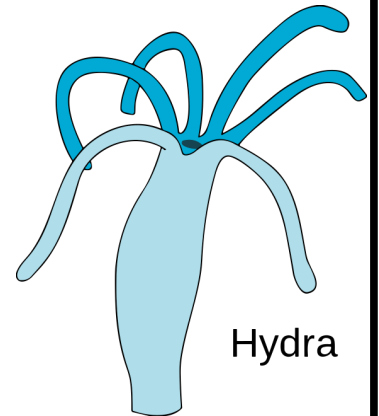
Example: Algae (Spirogyra) undergo maturation and subsequently break into two or more small fragments. Each of these fragments then grows independently, eventually developing into a completely new organism.

Budding:

In the process of budding, small outgrowths called "buds" emerge from the body of the parent organism. These buds eventually detach and give rise to new organisms. Examples include Hydra and yeast.

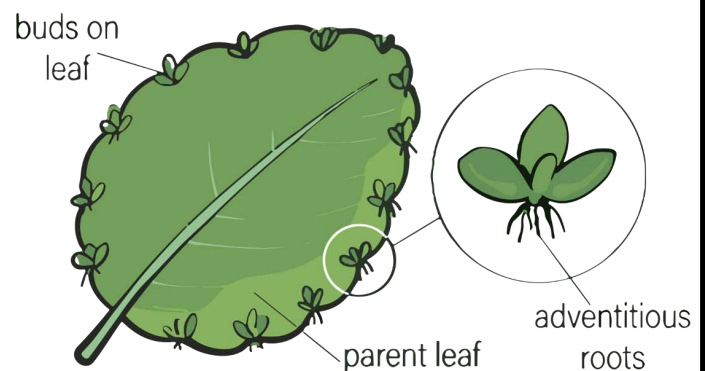
Hydra:

- Hydra, a simple multicellular organism, reproduces asexually through budding utilizing regenerative cells.
- Initiation involves a small bud forming on one side through simple mitotic division.
- The bud matures, developing a mouth and tentacles.
- Ultimately, the new Hydra detaches from the parent's body to live independently as a singular organism.



Vegetative Propagation:

Vegetative propagation involves obtaining new plants from portions of an old plant without the involvement of reproductive structures. Typically, this process centers on the growth and development of a single bud on an existing plant part to give rise to a new plant. Examples include potato buds, onion bulbs, leaf buds of Bougainvillea, and Dahlia roots. This method is a form of natural propagation.



Artificial propagation involves growing multiple plants from a single plant using man-made methods.

- **Common methods include:**

1. **Cutting:** Removal of a small plant part using a sharp knife, e.g., sugarcane, bananas, cactus.

2. **Layering:** Bending a part, typically a branch, toward the ground, allowing the tip to remain exposed while the rest is covered by soil, e.g., Jasmine, or lemon.

3. **Grafting:** Joining the stems of two plants (one with roots and the other without) to grow as a single plant, e.g., apple, or pear.

- These techniques are employed for efficient and controlled plant reproduction.

Advantages of Artificial Plant Propagation:

- Ensures that new plants inherit precisely the desired characteristics of the parent.
- Requires less attention for the growth of plants propagated through this process.
- Allows the generation of multiple plants from the same parent, increasing efficiency and productivity.

Tissue Culture:

Tissue culture generates new plants from a small piece of plant tissue or cells taken from a growing plant. This tissue is then cultivated under suitable conditions.

Advantages:

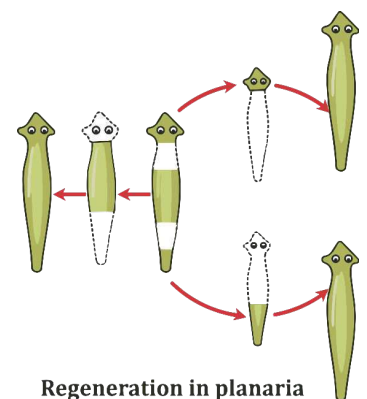
- Rapid plant growth characterizes tissue culture, making it a quick technique.
- Plants produced through tissue culture are free from diseases.
- It results in many plants in a short period, typically weeks, and requires minimal space for growth.

Regeneration:

Regeneration is the reconstruction of a complete organism from a specific body part.

Challenges in Complex Multicellular Organisms:

- Regeneration is viable in organisms with simpler body structures than cellular organization.



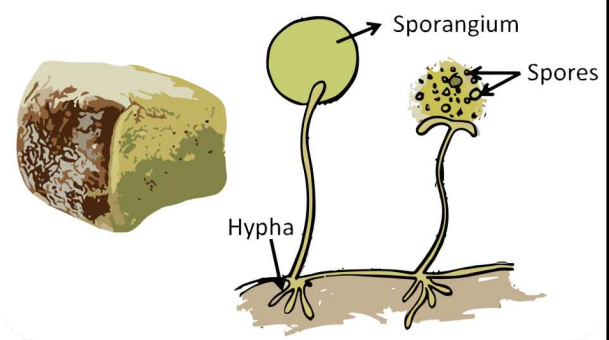
Regeneration in planaria

- In complex multicellular organisms, cells assemble into tissues, tissues into organs, organs into organ systems, and ultimately, organ systems constitute the entire organism.
- The intricate hierarchy of organization in complex multicellular organisms hinders the formation of a complete individual from a cultured body part.

Spore formation:

In spore formation, a parent plant generates numerous microscopic reproductive units known as spores. Upon bursting the plant's spore case, these spores disperse into the air. Subsequently, airborne spores settle on the soil, and under favorable conditions, they initiate germination, giving rise to new plants.

SPORE FORMATION IN RHIZOPUS



Secret Questions:

1) Give an advantage of vegetative propagation.

Solution: Vegetative propagation can be practiced for growing such plants which usually do not produce seeds or produce non-viable seeds.

2) Give reasons as to why the following processes are different from each other: a. Fission in Amoeba and Plasmodium. b. Binary fission and Fragmentation

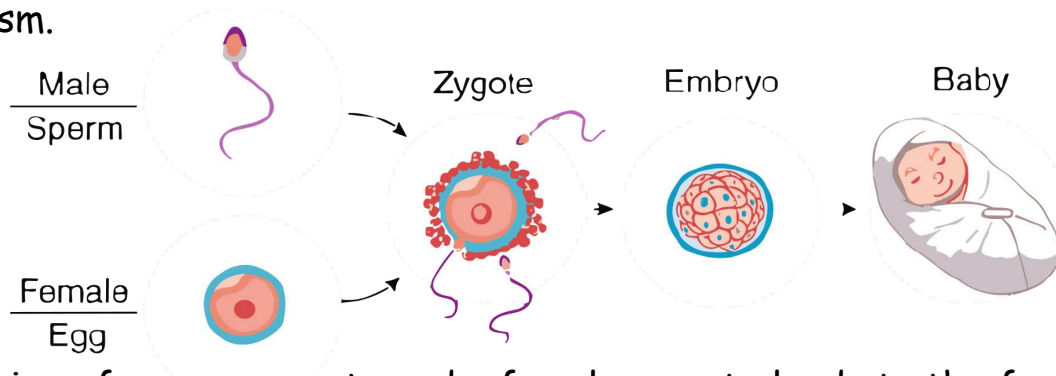
Solution:

a. Amoeba undergoes binary fission, resulting in two daughter cells, while Plasmodium undergoes multiple fission, producing many daughter cells.

b. Binary fission yields two daughter cells, while fragmentation in multicellular organisms leads to the division of the body into two or more parts.

Sexual Reproduction: E.M.A

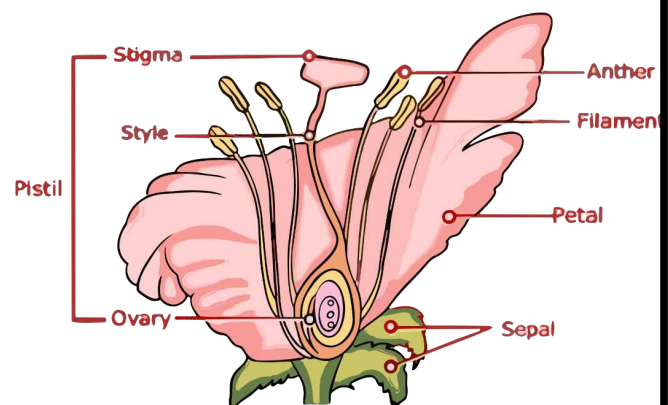
Sexual reproduction involves the union of two specialized reproductive cells known as "sex cells," alternatively referred to as "gametes" or "germ cells." There are two types: male gametes (sperm) and female gametes (egg). The fusion of a male gamete with a female gamete results in the formation of a "zygote" cell, which subsequently develops into a new organism.



The union of a male gamete and a female gamete leads to the formation of a "zygote" cell, which subsequently develops into a new organism.

Sexual Reproduction in flowering plant: E.M.A

Angiosperms, or flowering plants, are characterized by sex organs in their flowers, with seeds enclosed within fruits. These plants exhibit a variety of reproductive structures. Bisexual flowers contain both male and female reproductive organs within the same flower. In contrast, unisexual flowers have either male or female reproductive parts within a single flower.

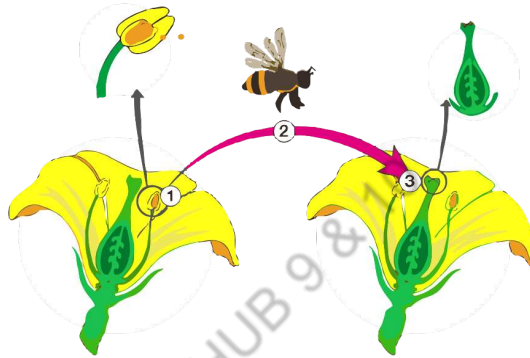


- **Stamen:** The stamen is the male part of the flower responsible for reproduction. A single flower can have several stamens.
- **Anther:** The anther is a two-lobed structure located at the tip of the stamen. It contains two pollen sacs, producing yellowish pollen grains.

- **Carpel:** The carpel is the female reproductive part located at the center of the flower.

It consists mainly of three parts:

- **Stigma:** The stigma is the terminal part of the carpel and may be sticky. It plays a role in receiving pollen grains during pollination.
 - **Style:** The style is the elongated middle part of the carpel. It aids in connecting the stigma to the ovary.
 - **Ovary:** The ovary is the swollen bottom part of the carpel. It contains ovules that house the egg cell, the female gamete.
- **Pollination:** Pollination is the transfer of pollen grains from the anther of the stamen to the stigma of a flower.



- **Self-pollination:** In self-pollination, pollen from the stamen of a flower is transferred to the stigma of the same flower.
- **Cross-pollination:** Cross-pollination involves the transfer of pollen from the stamen of one flower to the stigma of a different flower.

Fertilization:

- Following pollination, fertilization occurs in plants, involving the fusion of male germ cells with female gametes, forming a zygote.
- Upon landing on a suitable stigma, pollen reaches the female germ cells in the ovary through a pollen tube, growing from the pollen grains, traveling through the style, and reaching the ovary.
- After fertilization, the zygote undergoes multiple divisions, forming an embryo within the ovule. The ovule develops a sturdy coat and transforms into a seed.

- The ovary enlarges and matures into a fruit. The seed contains a future embryo, which, under favorable conditions, grows into a seedling in a process called germination.

Sexual Reproduction in Human Beings:

Puberty: Puberty is the stage when "sex hormones" are produced, marking the sexual maturity of a boy or girl.

Age of Puberty:

- Boys: 13-14 years
- Girls: 10-12 years

Sex Hormones:

- Testis produces the male sex hormone testosterone.
- Ovaries produce two female sex hormones, estrogen and progesterone.

Common Changes in Both Genders:

- Growth of thick, darker hair in new body parts like armpits and the genital area.
- Thinning of hair on arms, legs, and face.
- Skin becomes oily with the development of pimples.

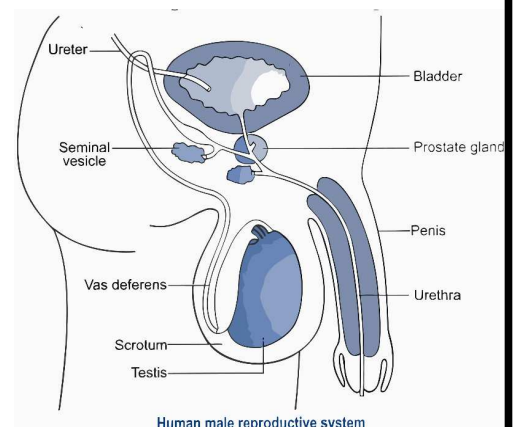
Changes in Girls:

- Increase in breast size.
- Darkening of the nipple tips.
- Onset of menstruation.

Male Reproductive System: ← E.M.A

Testis:

The testis is responsible for the production of germ cells or sperm. It is situated outside the abdominal cavity within the scrotum, a positioning essential for sperm formation as it necessitates a lower temperature than the body's normal operating temperature.



→ **Sperm** are small entities comprising a lengthy tail, facilitating their movement toward the female germ cell.



Vas Deferens:

The vas deferens transports the formed sperm, which combines with a tube originating from the urinary bladder.

Urethra:

The urethra is a duct that conveys urine from the bladder and serves as a passage for semen in males.

Prostate Gland and seminal Vesicle:

Secretes fluid to make transport easier for the sperm. This fluid also provides nutrition.

Scrotum:

The scrotum is a small pouch housing the testes, located outside the abdominal cavity. Because sperm formation occurs here, a lower temperature than the body's norm is necessary for this process.

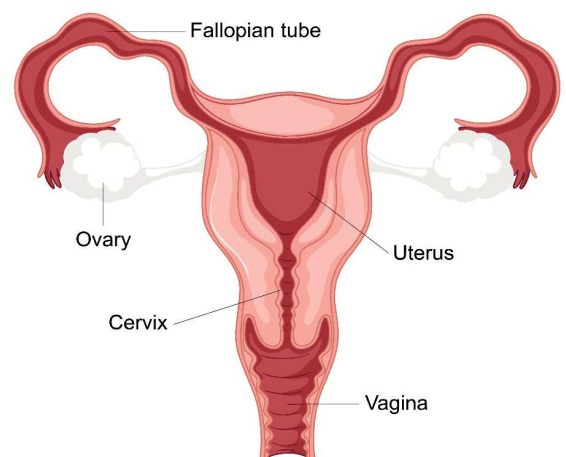
Penis:

The penis is the external male reproductive organ that transfers sperm into the female vagina during copulation.

Female Reproductive System: ← **E.M.A**

Ovaries:

Paired, oval-shaped organs are located in the abdominal cavity near the kidney. It produces thousands of Ova or egg cells. and secrete female sex hormones like estrogen and progesterone.



Oviduct (fallopian tube):

The oviduct, also known as the fallopian tube, transports eggs from the ovary to the uterus. It serves as the site for fertilization and features a funnel-shaped opening near the ovary, with additional openings connecting to the uterus on both sides.

Uterus (womb):

A Hollow, pear-shaped bag-like structure where the growth and development of the fetus take place.

Vagina:

It receives sperm from the male partner, and serves as a birth canal.

Cervix:

lower and the narrower portion of the uterus which opens into the vagina

Fertilization or Sexual Reproduction in Animals:**1. Sperm and Ovum Production:**

- Male parent produces sperm.
- Female parent produces ovum.

2. Fertilization Process:

- During copulation, sperm enters the ovum.
- Fertilization occurs, resulting in the formation of the first cell, known as a zygote.

3. Embryo Formation:

- The zygote undergoes various divisions to form an embryo.

4. Implantation:

- The embryo embeds itself into the soft and thick lining of the uterus.
- This process is known as implantation.

5. Placenta Development:

- During pregnancy, the placenta grows into a disc between the uterine wall and the embryo.

- The placenta forms finger-like projections called villi towards the embryo.

6. **Child Development:**

- The development of the child inside the mother's body takes approximately nine months in humans.

7. **Childbirth Process:**

- Strong rhythmic muscular contractions in the uterus cause childbirth if the egg is not fertilized.

8. **Unfertilized Egg Outcome:**

- If the egg is not fertilized, menstruation occurs.

Menstruation:

Each month, the ovary releases a single egg, prompting the uterus to prepare itself for the potential arrival of a fertilized egg. This preparation involves the thickening and spongy transformation of the uterine lining. If the released egg remains unfertilized, its lifespan is approximately one day. In the absence of fertilization, the thickened uterine lining is deemed unnecessary. Consequently, the lining gradually breaks down and is expelled through the vagina as a combination of blood and mucous. This natural process, known as menstruation, recurs roughly every month and typically spans a duration of about two to eight days.

Birth Control:

Health Consequences of Unprepared Pregnancy:

- If a woman is not ready for pregnancy, it can negatively impact her health.

Contraception or Birth Control:

- Methods to prevent pregnancy are collectively known as contraception or birth control.

Mechanical Barrier Method:

- Condoms on the penis or similar coverings in the vagina act as a mechanical barrier, preventing sperm from reaching the egg.

Chemical Methods:

- Oral pills alter the hormonal balance, inhibiting the release of eggs and preventing fertilization.
- However, they may cause side effects.

Intrauterine Devices:

- Loops or Copper T devices placed in the uterus help prevent pregnancy.
- They may cause side effects due to irritation.

Surgical Methods:

- Blocking the vas deferens in males prevents sperm transfer while blocking the fallopian tube in females prevents egg movement.
- Surgical methods are more permanent and involve creating blocks.

Sexually Transmitted Diseases (STDs):

- Diseases transmitted through sexual contact are known as sexually transmitted diseases (STDs).
- Examples include AIDS (Acquired Immuno Deficiency Syndrome) and genital warts, often caused by infections like gonorrhea.

Importance of Safe Practices:

- Raising awareness about safe practices and preventive measures is crucial for safeguarding sexual health.

#Top Seven Question:

1) What is the main difference between sperm and eggs of humans?

Solution:

Sperms are motile, and produced in large numbers by males. Eggs are non-motile, produced one at a time by females. Sperms travel to the egg for fertilization, forming a zygote. The zygote develops into a fetus and eventually a baby, protected inside the female's body.

2) List any two differences between pollination and fertilization.

Solution:

	Pollination	Fertilization
1.	It is the transfer of pollen grain from the anther to the stigma of flower.	It is the fusion of male gamete with female gamete (egg).
2.	It is achieved by agents like wind, water or animals.	It is achieved by the growth of pollen tube so that the male gamete reaches the female germ cells.
3.	It leads to fertilization.	It leads to formation of seeds
4.	It is an external process	It is an internal process.

3) Define reproduction. How does it help in providing stability to the population of species? [CBSE 2015 C]

Solution:

- a. Reproduction is the vital process ensuring the continuity of a species by generating individuals of its own kind.
- b. The sustained stability of a population necessitates the replacement of members lost to factors like old age, disease, and accidents, ensuring a balanced and functioning community.
- c. Through reproduction, genetic variation is introduced, facilitating better adaptation and the evolutionary progression of species, ultimately leading to the emergence of new ones.
- d. While individual survival may not hinge on reproduction, it is indispensable for the survival and perpetuation of a species.

4) What is vegetative propagation? List two advantages and two disadvantages of vegetative propagation.

Solution: Vegetative propagation is a method of generating new plants from vegetative parts such as roots, stems, and leaves.

Advantages:

- a. Plants produced through vegetative propagation exhibit earlier flowering and fruiting compared to sexually propagated ones.
- b. In cases where plants have lost the ability to produce seeds, vegetative propagation becomes essential for their reproduction.

Disadvantages:

- a. Genetically, plants derived from vegetative propagation closely resemble parent plants, making them susceptible to infections and diseases.
- b. The lack of genetic variation in such plants hinders their adaptability to changing environments, impeding the evolutionary development of the plant species.

5) List three techniques to prevent pregnancy. Which of them is not meant for males? How does the use of such techniques have an impact on the health and prosperity of a family?

Solution:**Three pregnancy prevention techniques include:**

- a. Mechanical barriers for both males and females.
- b. Hormonal methods such as oral pills, alter the hormonal balance, preventing egg release.
- c. The use of intrauterine devices like the loop or Copper-T.
- d. Surgical methods like tubectomy for females or vasectomy for males.

Hormonal preparations are not designed for males.**Effects on Health and Prosperity:**

- a. Women's health is preserved.
- b. Parents can devote more attention to their children.
- c. Additional resources become available.

6) Why are the testes located outside the abdominal cavity? Mention the endocrine and exocrine function of the testes.

Solution:

Sperm formation necessitates a temperature of $1-3^{\circ}\text{C}$ lower than the body's normal temperature. The testes are positioned outside the body, allowing the scrotum to maintain an optimal temperature for sperm development.

Endocrine function:

The production of the male hormone (testosterone).

Exocrine function:

The generation of male gametes (sperms).

7) What is placenta? Explain its function in human females.

Solution: Placenta is a specialized tissue embedded in the uterine wall. It contains villi on the embryo's side and blood spaces on the mother's side.

Function:

- Helps in passing of nutrients from mother to fetus.
- Exchange of oxygen and carbon dioxide gases.
- Passing of waste materials from the embryo to the mother.

#Competency-Based Question:

1. In an experiment, a scientist removed some cells from the growing point of a plant and placed it a suitable medium containing nutrients and plant hormones leading to the formation of shapeless lump or mass called X. X is then transferred to another medium which lead to development of roots. X with developed roots is then transferred into another medium that induced the development of shoots. X in this way differentiated into tiny plantlets which were transplanted into pots where they grew into mature plants.

(i) What is X in the given paragraph?

- (a) Plantlet (b) Callus (c) Embryoid (d) Tissue

(ii) Which technique has the scientist used for the propagation of plant?

- (a) Layering (b) Grafting (c) Tissue culture (d) Cutting

(iii) What is the advantage of the technique mentioned in the paragraph?

- (a) It helps in production of disease free plants.
 (b) It is a very fast technique as thousand of plantlets can be produced in a few weeks time.
 (c) It is also known as micropropagation due to extremely small amount of plant material used for propagation.
 (d) All of these

(iv) Select the incorrect statement regarding the propagation technique mentioned in the paragraph.

- (a) It is used in the production of ornamental plants like orchids, carnation, Chrysanthemum, etc.
 (b) It is a modern method of artificial propagation of plants.
 (c) Plants produced by this methods are genetically different from the parent plant.
 (d) Very little space is needed for developing new plants by this technique.

(v) Which of the following statements is incorrect?

- (a) Virus free plants cannot be produced by tissue culture technique.
 (b) Tissue culture technique is useful in obtaining homozygous diploid.
 (c) Tissue culture is useful in quick propagation of *Gladiolus*.
 (d) Tissue culture is artificial method of vegetative propagation.

2. P and Q are two monoecious plants. P bears bisexual flowers whereas Q bears unisexual flowers. P does not need a pollinating agent whereas pollinating agent is required in case of Q.

(i) Select the option that correctly identifies plant P and Q.

- (a) P Papaya, Q - Marigold
- (b) P-Pea, Q - Cucurbit
- (c) P-Sunflower, Q - Orchids
- (d) P-Tulip, Q - Daffodil

(ii) Select the correct option regarding plants P and Q.

- (a) Seed setting is assured in plant P even if all its flowers are emasculated.
- (b) Male flowers of plant Q always open only after the female flowers of the plant are pollinated.
- (c) Female flowers of plant Q can reproduce by cross pollens or self pollens depending upon the genus to which plant Q belongs to.
- (d) P is a cross pollinated plant whereas Q is a self pollinated plant.

(iii) How can self pollination be avoided in plant P?

- (a) By removing all the flowers of plant P
- (b) By removing all the anthers of all the flowers
- (c) By removing all the carpels of all the flowers
- (d) None of these

(iv) Which of the following holds true for plant Q?

- (a) Plant Q bears complete flowers.
- (b) Plant Q bears either male flowers or female flowers but never both.
- (c) Sexual reproduction in plant Q may or may not give rise to genetic variations.
- (d) All of these