



/padhleakshay



How do Organisms Reproduce?



NO BAKWAS



padhle.akshay

Visit website padhleakshay.com for more

WHY THESE NOTES?

- ✓ TOUCHES EVERY CORNER OF NCERT
- ✓ INCLUDES NCERT ACTIVITIES (AKQ), BOXES(BKQ) & EXEMPLAR (EKQ)
- ✓ EACH LINE, FLOWCHART & DIAGRAM IS MOTIVATED FROM PYQs
- ✓ APPROVED BY 3 CBSE TOPPERS

SCAN
&
DONATE



Reproduction

Production of new organism from the existing organism of the same species.

Variation

Are difference in structure physiology and other traits found in individual of same species.

Significance of reproduction

- For maintain a continuity of a species.
- For adding variation
- For evolution
- For maintenance of population size.

Types of reproduction

Asexual reproduction: The production of new organism from a single parent without the involvement of sex cells(or gamete).

It does not use special cells called "Sex cells (or gamete) for producing a new organisms. In asexual reproduction a part of the parent organism separates off and grows into a new organisms. Thus, in asexual reproduction, only one parent is needed to produce a new organism. But no Sex cells are involved in asexual reproduction.

Example: Binary fission, budding, regeneration, fragmentation, Vegetative propagation, spore formation.

Sexual reproduction

The production of a new organism from two parents by making use of their sex cells (or gamete).

In this, the sex cell of one parent fuses with the Sex cell of the other parent to form a new cell -called 'Zygote'. This zygote then grows and develops to form a new organism. The two parent which are involved in sexual reproduction are male and female.

Example: humans, fish, frogs, hens, cats, dogs, cows etc.

P.Y.Qs

Question: How are the modes of reproduction different in unicellular and multicellular organisms?

Answer:

Unicellular organisms mostly reproduce asexually.

e.g. Amoeba and paramecium- by fission

Yeast - by budding

In unfavourable condition unicellular organisms may also reproduce sexually by conjugation forming sex- pili e.g. paramecium

Multicellular organisms depending on their complexing reproduce either sexually or asexually.

Asexual e.g. (i) budding in hydra

(ii) fragmentation in planeria

(iii) spore formation in fungi

Sexually : by gamete formation e.g. complex plants and animals.

P.Y.Qs

Question: What is meant by DNA copying? Mention it's importance in reproduction.

Answer: Cells use chemical reactions to build copies of their DNA. This creates two copies of the DNA in a reproducing cell. DNA copying is accompanied by the creation of an additional cellular apparatus to facilitate the DNA copies to separate with its own cellular apparatus. DNA copying gives rise to some inbuilt tendency for variation during reproduction which is the basis for evolution.

P.Y.Q8

Question: How does reproduction help in providing stability to populations of species?

Answer: Population of organisms fill well defined places or niches in the ecosystem using their ability to produce. The rate of birth must be at par with the rate of death to provide stability to population of a species and it is possible only by reproduction. Further, the consistency of DNA copying during reproduction is important for the maintenance of body design features that allow the organism to use the that particular niche. Reproduction is therefore linked to the stability of population of a species.

activity 8.1

Observation: we see yeast reproducing by forming bud.



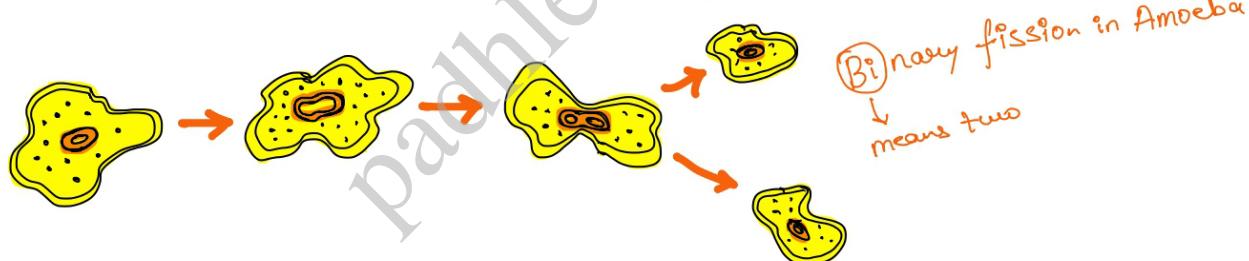
Types of asexual reproduction

Fission

It is the process in which a unicellular organisms splits (or divide) to form two (or more) new organism. For unicellular organism, cell division or fission leads to the creation of new individuals.

(i) **Binary fission** The parent organisms splits (or divides) to form two new organism.

- Transverse binary fission is the splitting of the cells along any plane during division. e.g. amoeba.
- Longitudinal binary fission is the division occurring in a definite orientation in relation to the whip-like structures located at one end of the cell. e.g. Leishmania (cause kala-azar).



(ii) **Multiple fission** is the division of mother cells into many daughter cells simultaneously.
e.g. Plasmodium (malarial parasites).

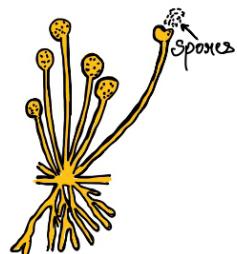
activity 8.2

Observation:

A layer of white mass is seen on the slice. It is a mould called Rhizopus.

Area of white mass is increased on subsequent days.

The thread-like structures that developed on the bread are the hyphae of the bread mould



activity 8.3

Observation:

In the first slide, an Amoeba cell contains normal cytoplasm and nucleus.

In second slide showing binary fission, dividing nucleus and the constriction in cytoplasm are observed. It indicates that the Amoeba is undergoing binary fission forming two daughter nuclei.

Fragmentation

This is the process in which the organism breaks up into smaller pieces on maturation. Each fragment grows into a new individual e.g. Spirogyra.

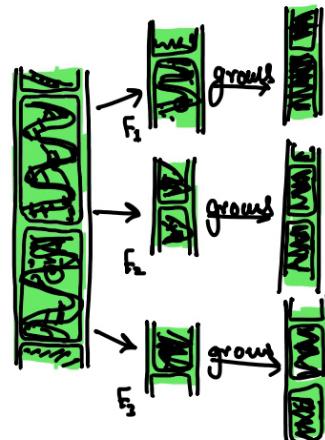
A basic strategy used in multicellular organism is that different cell types perform different specialised function.

- It can not simply divide cell-by-cell.
- Specialised cells are organised as tissue, and tissues are organised into organs which then have to be placed at definite positions in the body.

activity 8.4

Answer

Yes. Spirogyra filament consists of many cells attached to form a filament. Spirogyra simply breaks up into smaller pieces upon maturation. These pieces or fragments grow into new individuals.



Regeneration

The process of getting back a full organism from its body part. e.g. Hydra and planaria.

In complex multicellular organisms, specialised cells make up tissues; tissues make up organs; organs make up organ systems; and finally organ system make up organisms. Since complex multicellular organism have a very high degree of organisation in their body, they cannot be reproduced from their cut body parts by the process of regeneration.

For example: a dog is a complex multicellular organism which cannot be regenerated from its cut body part; say, a cut tail. This is because the cells present in the cut tail of a dog cannot produce dog's organs like heart, brain, lungs, stomach, intestines and limbs etc, needed for the making of a complete dog. The complex multicellular organism need more complex way of reproduction like sexual reproduction.

P.Y.Q8

Question:

Explain the process of regeneration in planaria. How is this process different from reproduction?

Answer: Planaria gets cut into many pieces, each piece grows into separate individual, specialised cell proliferate mass of cells get differentiated into various cells and tissues.

Regeneration is not the same as reproduction as most of the organism would not normally depend on being cut up to be able to reproduce. (It is normally for repair of the damaged part.)

P.Y.Q8

Question: 'Regeneration is not reproduction'. Justify this statement with reason.

Answer: When a piece is cut from an organism, it grows into complete organism. Regeneration is carried out by specialised cells. It is not reproduction since most organisms would not be able to grow through pieces.

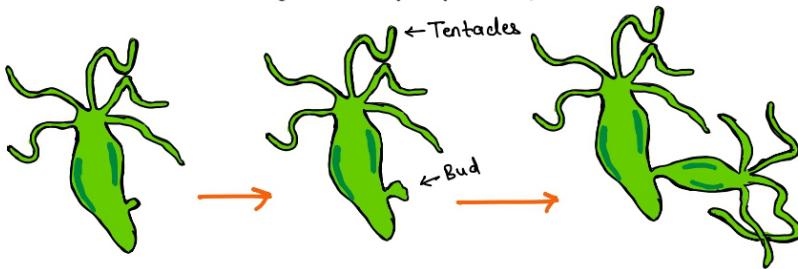
Budding

A protuberance like outgrowth called as bud grows and detaches from the parent to develop into a separate organism. Each bud develops into a tiny individual. e.g. Hydra and yeast.

P.Y.Q8

Question: Draw a labelled diagram in proper sequence to show budding in hydra.

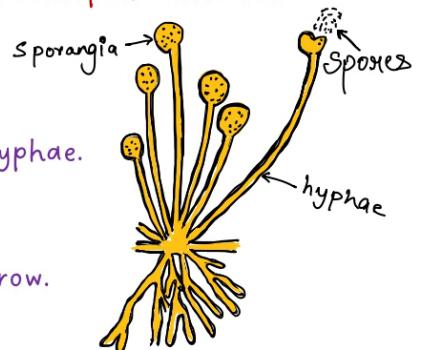
Answer:



Spore formation

The parent plant produces hundreds of microscopic reproductive units called 'spores'. When the spore case of the plant burst, then the spores spread into air. When these air-borne spores land on food (or soil) under favourable condition, they germinate and produce new plant. e.g. Rhizopus, mucor etc.

- Spores are very light and are covered by thick walls that protect them. Spores germinate into new individual on moist surfaces.
- The thread like structure that developed on the bread mould are the hyphae.
- Thin stems having knob like structure called sporangia.
- The spores are covered by thick walls that protect them until they come into contact with another moist surface and can begin to grow.



Vegetative propagation

This is the mode by which plants reproduce asexually. It involves the production of new plants from the vegetative parts of an existing plants.

Advantage

- Plants raised by vegetative propagation can bear flowers and fruits earlier than those produce seeds.
- All plants produced are genetically similar enough to the parent plant to have all its characteristics.
- Allow propagation of plants (banana, orange, etc.) that loss capacity to produce seeds.

P.Y.Q8

Question: How does vegetative propagation occur in nature? Explain with four different example.

Answer: There are many plants in which parts like the root, stem and leaves develop into new plants under appropriate conditions. This is called as vegetative propagation.

Example of vegetative propagation are

(i) **Adventitious buds** In Bryophyllum, adventitious buds grow in the notches along the leaf margin, which when fall on the soil, develops into a new plants.

(ii) **Cutting** A piece of stem, root, leaf or even a bulb scale is placed partly under moist soil which grow into a new plant, e.g., rose.

(iii) **Layering** A part of the stem is pulled out and buried in the soil. The layered stem grows into a new plant, e.g., pudina.

(iv) **Grafting** In grafting, two parts from two different plants are joined together so that they can unite and grow into a new plant, e.g., sugarcane.

Tissue Culture (Box Wala)

The production of new plants from a small piece of plant tissue (or cells) removed from the growing tips of a plant in a suitable growth medium (called culture solution) is called tissue culture.

Process of tissue culture

A small piece of plant tissue is taken from the growing point of the plant (tip of the plant) and placed on a sterile jelly which contains nutrients and plant hormones. The hormones make the cells in the plant tissue divide rapidly producing many cells which form a shapeless lump of mass called 'callus'.

- The callus is then transferred to another jelly containing suitable plant hormones which stimulate the callus to develop roots.
- The callus with developed roots is then put on a yet another jelly containing different hormones which stimulate the development of shoots.
- The callus having roots and shoots separates into tiny plants. In this way, many tiny plants are produced from just a few original plant cells (or tissue).
- The plantlets thus produced are transplanted into pots or soil where they can grow to form mature plants.

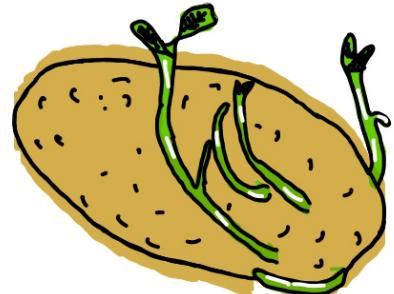
activity 8.5

observation:

The potato pieces having buds gradually grows and develops.
But there is no growth and development in potato pieces without buds.
Which are the potato pieces that give rise to fresh green shoots and roots?

Answer:

The pieces with buds give rise to fresh green shoots and roots.



activity 8.6

Answer:

- Portion of Money plant with at least one leaf grows and gives rise to fresh leaves. But money plant without leaf dies.
- Money plant with green leaves can synthesize food through photosynthesis and able to grow into a plant, through vegetative propagation.

Sexual Reproduction

Sexual reproduction in flowering plant

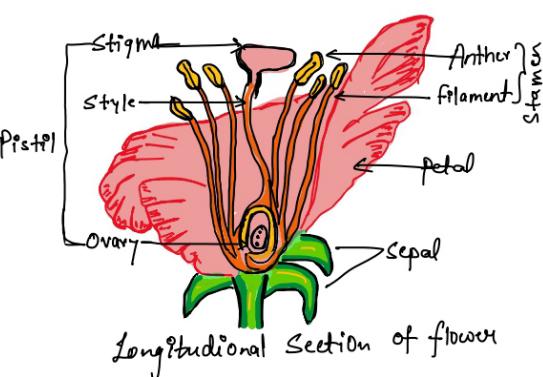
Angiosperm: The plants in which the Sex organs are carried within the flowers and the seeds are enclosed in a fruit are called angiosperm.

Gametes: The cells involved in Sexual reproduction are called gametes.

Zygote: In sexual reproduction a male gamete fuses with a female gamete to form a new cell called 'zygote'.

The main parts of a flower

- **Receptacle:** The base of a flower to which all the parts of a flower are attached.
- **Sepals:** The green leaf-like parts in circle of a flower are called sepals. All the sepals taken together are called 'Calyx'.
- **Petals:** The colourful parts of a flower are called petals. All the petals together are called 'Corolla'. It attracts insects for pollination and to protect reproductive organ.



- **Stamen:** The little stalks with swollen tops just inside the ring of petals in a flower are called stamen. It is male reproductive organ of the plant.

→ The stalk of stamen is called filament.
→ The swollen top of stamen is called anther.

Pollen grain: It appear to be yellow, powder like substance. It contain the male gametes of the plant.

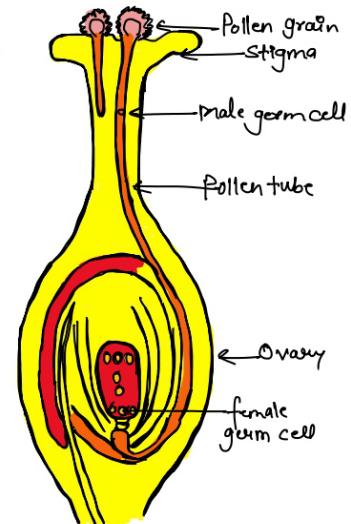
Carpel: In the centre of a flower, there is a flask-shaped organ called Carpel. It is female reproductive Organ.

→ The top part of carpel is called Stigma.
→ The middle part of carpel is called Style.
→ The swollen part at the bottom of a Carpel is called Ovary.

Ovules contain the female gametes of the plant.

Unisexual flowers: The flowers which contain only one sex organ, stamen or either Carpels. e.g. Papaya, watermelon

Bisexual flowers: The flowers which contain both the sex organ, stamen as well as carpel. e.g. Hibiscus, mustard.



Germination of pollen on stigma

The Sexual reproduction in plants take place in the following steps:

- ① The male organ (stamen) make the male gametes of the plant. These male gametes, are present in pollen grain.
- ② The female organ (carpel) makes the female gamete of the plant. These females gametes are present in ovules.
- ③ The male gametes present in pollen grain fertilise the female gametes or egg cells present in ovules.
- ④ The fertilised egg cell grow within ovules and become seed.
- ⑤ The seeds produced new plant on germination under suitable condition of water, warmth, air and light etc.

pollination

The transfer of pollen grains from the anther of a stamen to the stigma of a carpel is called pollination.

- **Self-pollination:** when the pollen grain from the anther of a flower are transferred to the stigma of the same flower, it is called self-pollination.
- **Cross-pollination:** when the pollen grain from the anther of a flower on one plant are transferred to the stigma of a flower on another similar plant, it is called cross-pollination.

Fertilisation: The fusion of the male gamete present in pollen grain joins with the female gamete(or egg) present in ovule.

Process

- When a pollen grain falls on the stigma of the carpel, it bursts open and grows a pollen tube downward through the style towards the female gamete in the ovary.
- The pollen tube enters the ovule in the ovary. The tip of pollen tube bursts open and male gamete comes out of pollen tube. In ovary, the male gametes of pollen combines with the nucleus of female gametes or egg present in ovule to form a fertilise egg.

Formation of fruits and seeds

The fertilized egg (or zygote) divides several times to form an embryo within the ovule. The ovule develops a tough coat around it and is gradually converted into a seed.

↓
The ovary of flowers develops and becomes a fruit (with seeds inside it).

↓
The other parts of flower like sepals, petals, stamen, stigma, and style dry up and fall off. Only ovary is left behind.

↓
So, at the place on plant where we had a flower originally, we now have a fruit (which is the ovary of the flower containing seeds).

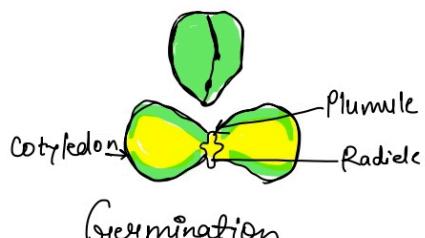
Germination of seeds

The beginning of the growth of seeds is called germination of seeds.

Plumule: The part of baby plant in seed which develops into shoot with leaves is called plumule.

Radicle: The part which develops into root.

Cotyledons: The part of seed which contains stored food for the baby plant is called cotyledon.



P.Y.Qs

Question: Define the term 'double fertilisation in plants'.

Answer: Double fertilisation It occurs when one male nucleus fertilises (fuses) with egg cell to form zygote cell and other male nucleus fuses with two polar nuclei to cause triple fusion. As these two types of fertilisation take place at the same time in the ovule of the plant, it is known as double fertilisation.

Sexual reproduction in animals

Puberty

The age at which the sex hormones (or gametes) begin to be produced and the boy and girl become sexually mature (able to reproduce) is called puberty.

Changes occur in boy

- Hair grow under armpits and genital area between the thighs.
- Thinner hair also appear on leg, Chest and faces.
- Skin frequently become oily and might begin to develop pimples.
- The voice deepen (or cracks).
- The penis occasionally begins to become enlarged and erect.



Changes occur in girl

- Hair grow under armpits and genital area between the thighs.
- Skin frequently become oily and might begin to develop pimple.
- Breast Size began to increase with darkening of the skin of the nipples at the tips of the breasts.
- Girls began to menstruate at around this time.
- Extra fat is deposited in various parts of the body like hips and thighs.

Male reproductive system

This system includes a pair of testis, vas deference and a muscular the organ, the penis.

Testes are placed in a structure called as **scrotum** which is located outside the abdominal cavity because sperm formation requires a lower temperature than the normal body temperature.

Testes produce the male gametes known as **sperms**. **Testosterone** is the male sex hormone secreted by the testes.

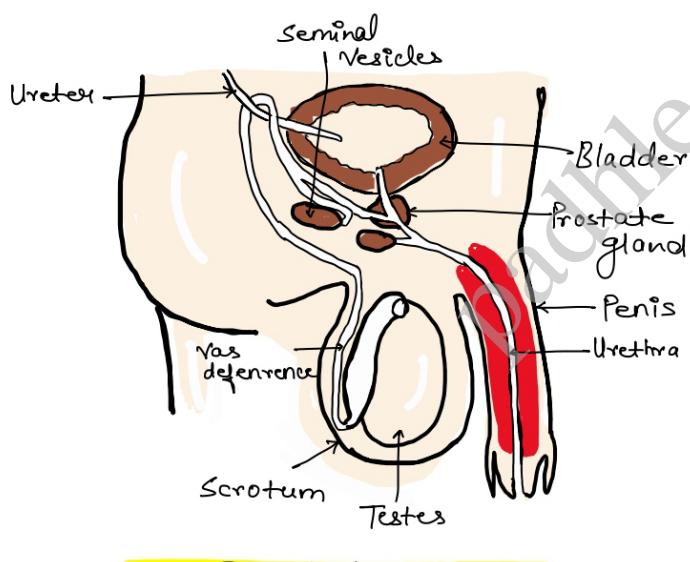
It regulate the development of sperm and the secondary sexual characteristic leading to puberty.

The **vas deference** is a tube that carries sperm from the testes.

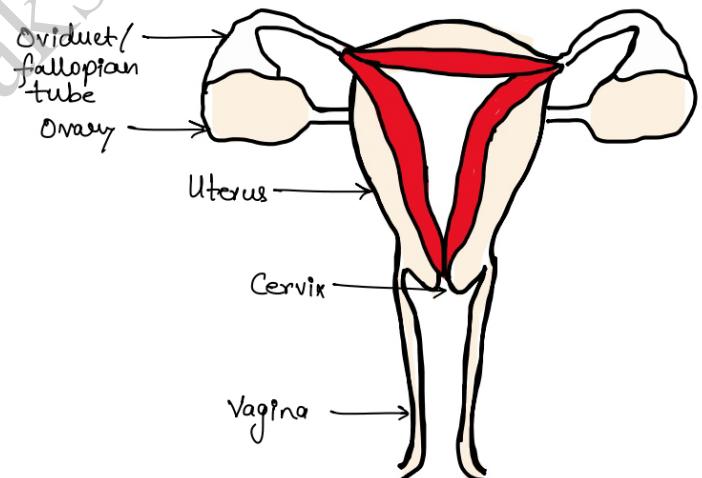
The **urethra** form a common passage for both the sperm and urine as it is just one tube that connect both the glands - **urinary bladder** and **vas deference**.

Prostate gland and seminal vesicles secrete **Semen** to make the movement of sperm easier and also provide nutrition.

The sperm are tiny bodies that consist of mainly genetic material and along tail that helps them to move towards the female germ cell.



Male Reproductive System



Female reproductive System

p.4.Q8

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

Answer: Sperm formation requires a lower temperature than the normal body temperature. This temperature is 1-3°C lower than the temperature of the body. Testes are thus located outside the body so that scrotum provides an optimal temperature for the formation of the sperms.

Endocrine function : production of male hormone (testosterone).

Exocrine function : production of male gametes (sperms).

Female reproductive system

This System Includes a pair of ovaries a pair of oviduct, uterus and vagina opening out through urethra.

Eggs, the female gametes develop inside the ovaries. One mature egg is released by either of the ovaries per month.

Ovaries Secrete two hormones namely **oestrogen** and **progesterone** which bring about secondary sexual character in females.

The egg is carried from the ovary to the uterus through a thin **oviduct** or **fallopian tube**.

The two oviduct combine and open into an elastic bag - like structure known as the **uterus**.

The uterus open into an vagina through **Cervix**. The uterus helps in the development of the foetus.

The sperm enter through the **Vaginal** passage during sexual **Intercourse**.

The Sperm begin moving up the vagina and uterus, finally reaching the fallopian tube.

The fertilised egg, the **zygote** gets implanted in the lining of the uterus and start dividing.

It divide repeatedly to form an embryo. Embryo get implanted in the lining of the uterus for further development.

The **placenta** is connective tissue established between foetus and the mother (uterus wall).

It contains villi on the embryos side of the tissue. It provide a large surface area for the nutrients and oxygen to pass from mother to the embryo.

It also helps in transporting excretory wastes from embryo to mother.

The development of the child inside the mothers body takes approximately nine months. The child is born as a result of rhythmic contraction of the muscles in the uterus.

P.Y.Qs

Question: What happens when the egg is not fertilised. Or Why does menstruation occur?

Answer: If the egg is not fertilized it lives for about one day. Since the ovary release one egg every month. The uterus also prepare itself every month to receive a fertilized egg. Thus its lining become thick and spongy. This would required for nursing the embryo if fertilization has taken place. Now, however, this lining is not needed in a longer so the line is slowly break and come out through the vagina as blood and mucous. This Cycle take place roughly every month and is known as mensuration. It usually last for about 2 - 8 days.

P.Y.Qs

Question: State the changes that take place in the uterus subsequent to implantation of young embryo. How does this embryo get nourishment inside the mother's body?

Answer: (i) The uterine wall thickness that is richly supplied with blood.

(ii) A special tissue called **placenta** develops which connects embryo to the uterine wall that provides nutrients and oxygen to it.

(iii) placenta is a disk which is embedded in the uterine wall. It contains villi on the embryo side of the tissue. On the mother's side are blood spaces, which surrounded the villi. These provide a large surface area for glucose and oxygen to pass from the mother to the embryo.

Reproductive Health

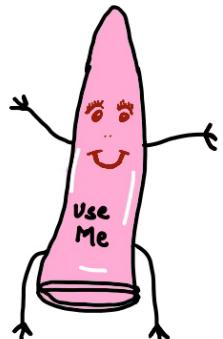
Reproductive health is concerned with healthy and safe sexual practise. Unhealthy practice can lead to the transmission of disease from one partner to another and even to the offspring. Reproduction health also depends on healthy behavior and outlook towards sex life. Sexual maturation and body growth are gradual process.

Device to protect

As sexual intercourse involves intimate physical contact between the male and female sex organ, it may transmit certain disease from one partner to another. Such diseases are called **Sexually transmitted diseases**.

STDs e.g. Bacterial infections such as gonorrhoea and syphilis, viral infections such as warts and HIV.

- **Contraceptive devices** are the device which block the entry of sperm into oviduct thereby by preventing the egg from being fertilised. These device help to prevent transmission of many infection to some extent. e.g. copper or intra uterine contraceptive device (IUCD) placed in the Uterus blocks the passing of sperm. Contraceptives drugs can also be taken orally as pills to avoid pregnancy.
- Condom on the penis or similar Covering in the vagina can also be used.
- **Surgical method** like **Vasectomy** in males to block the vas deference so that sperm transfer will be prevented and **tubectomy** in females to block the fallopian tube which makes the egg unreachable to uterus are proven to be contraceptive method. Surgical method are safe in long run.



Surgical can also be used for aborting unwanted pregnancies. However, this is often misused for illegally aborting female foetuses. To prevent female foeticide (killing of a foetus) prenatal sex determination has been prohibited by law.

Exemplar

Question: In a flower, the parts that produce male and female gametes (germ cells) are

- (a) stamen and anther
- (b) filament and stigma
- (c) anther and ovary
- (d) stamen and style

Answer: (c) anther and ovary

Question: Which of the following is the correct sequence of events of sexual reproduction in a flower?

- (a) pollination, fertilisation, seedling, embryo
- (b) seedling, embryo, fertilisation, pollination
- (c) pollination, fertilisation, embryo, seedling
- (d) embryo, seedling, pollination, fertilization

Answer: (c) pollination, fertilisation, embryo, seedling

Question: In tobacco plant, the male gametes have twenty four chromosomes. What is the number of chromosomes in the female gamete? What is the number of chromosomes in the zygote?

Answer: Number of chromosomes in both the gametes are equal hence number of chromosomes in a female gamete of tobacco plant is 24. Combining both number of chromosomes in a zygote is 48.

Question: Why cannot fertilisation take place in flowers if pollination does not occur?

Answer: Pollination is a process in which transfer of pollen grains from anthers to stigma takes place. If there is no pollination then there will be no fusion of gametes and fertilization do not take place.

Question: Is the chromosome number of zygote, embryonal cells and adult of a particular organism always constant? How is the constancy maintained in these three stages?

Answer: Meiosis is a way of cell division in which number of chromosomes get halved. After fertilization chromosomes become equal to that of somatic cells. After fertilization Mitosis takes place for the rest of the stages of life. Hence chromosomes remain constant.

Question: Describe sexually transmitted diseases and mention the ways to prevent them.

Answer: Disease that gets spread from person to person through sexual means are called sexually transmitted diseases. These include bacterial infections such as gonorrhoea and syphilis, and viral infections such as warts and HIV-AIDS.

Below are the ways to prevent sexually transmitted diseases

- Use of condoms or other physical barriers.
- Avoiding sexual contacts with unknown partners.
- Avoid sharing towels or underclothing.
- Get a vaccination for hepatitis B.

Question: Distinguish between a gamete and zygote. Explain their roles in sexual reproduction.

Answer:

Gamete

- Formed after Meiosis
- Gametes produce haploid number of chromosomes
- Male and female parts produce gametes
- Gametes are required for sexual reproduction

Zygote

- Formed by fusion of two gametes.
- produces diploid number of chromosomes
- Zygote formation takes place in female
- Zygote is the precursor for embryo formation