How Do Organisms Reproduce

Target 100

HOW TO STUDY THE NOTES?

Apni Kaksha

-Coloured and double sided print
- Revise the notes at least 3-4 time
- Write to revise | 10% rule
- Keep track of previous year qs
- See the marking scheme

How Do Organisms Reproduce

Reproduction is a Biological Process by which an organism reproduces an offspring's, who is biologically similar to the organism, Reproduction ensures the continuity of species.

- Reproducing organisms create new individual that look very much like themselves.
- Organisms look similar because their body designs are similar and the blueprints for these designs are similar.
- Chromosomes in the nucleus of a cell contains information for inheritance of features from parents to next generation in the form of DNA (Deoxyribose Nucleic Acid)
- DNA in the cell nucleus is the source of information for making proteins. If the DNA is changed, different proteins will be made, leading to altered organisms.
- Therefore during reproduction it is important that the DNA copy is created.
- DNA copying during cell division always causes some or other type of variations in newly formed cells. However, No biochemical reaction is absolutely reliable and therefore certain variations will arise during the process of copying the DNA.
- Variations are important, because variations during reproduction is the basis for evolution.

- Population of organisms fill well-defined places, or niches, in the ecosystem, using their ability to reproduced. If the reproducing organisms were suited to a particular niche, and if the niche were drastically altered, the population could be wipe out

Previous Years Questions

Q. Newly formed DNA copies may not be identical at times. Give one reason. **[AI – 2017]**

Ans. The process of copying the DNA leads to some variations each time.

Q. When a cell reproduces, what happens to its DNA? **[AI – 2017]**

Ans. When a cell reproduces, DNA replication occurs. Which forms two similar copies of DNA.

Q. Name the life process of an organism that helps in the growth of its population? **[AI – 2015]**

Ans. Reproduction

Q. What is the effect of DNA copying, which is not perfectly accurate, on the reproduction process? How does the amount of DNA remain constant through each new generation in a combination of DNA copies of two individuals? **[AI – 2014]**

Ans. In the process of reproduction, if DNA copying is not perfectly accurate, variation occurs. These in turn may allow few individual of a population to survive in an altered niche and become the basis of evolution.

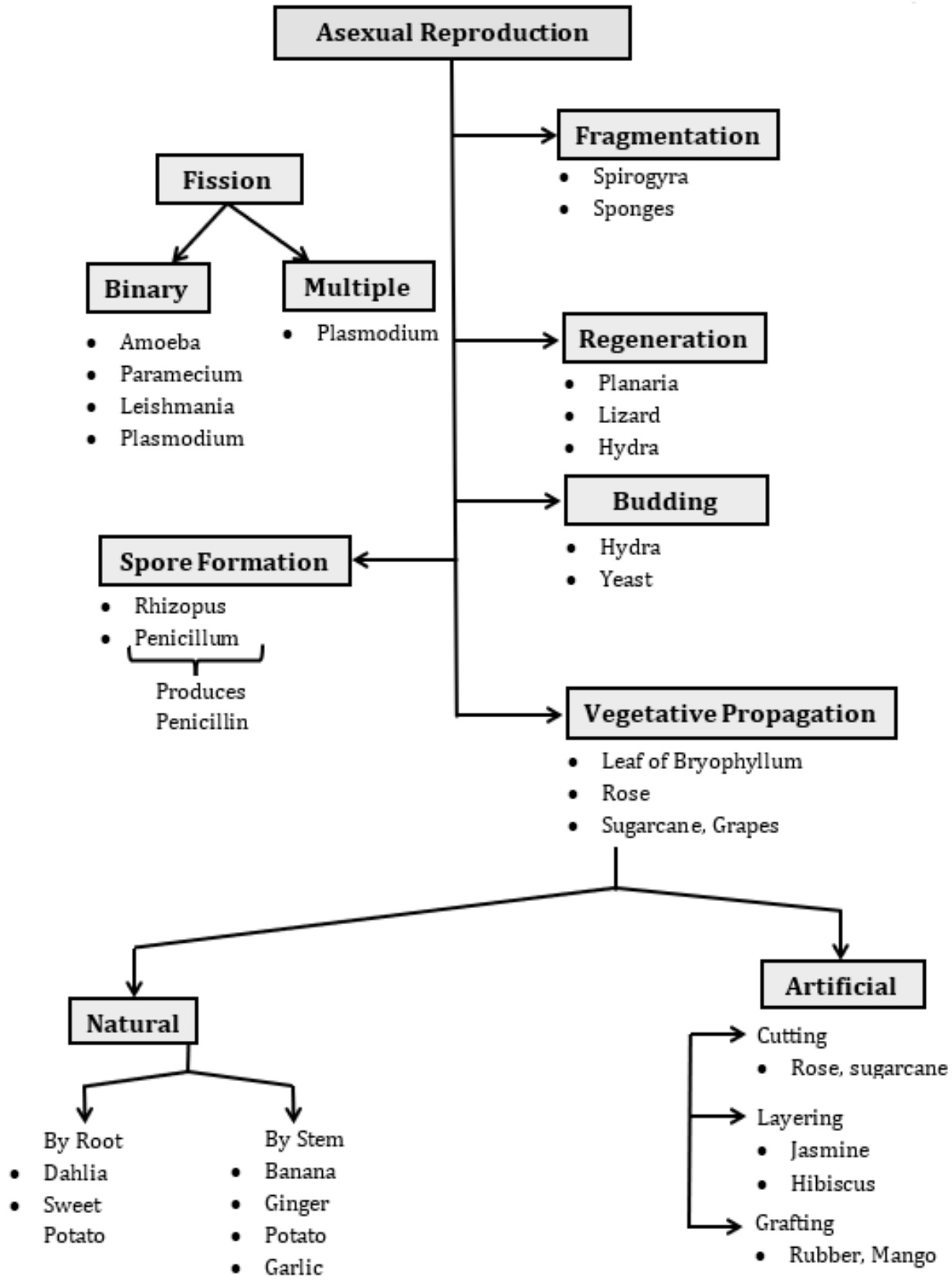
The combination of DNA copies of two individuals occurs during sexual reproduction. Reduction division (meiosis) during gamete formation halves the chromosomes number in both male and female gametes. Since these two gametes fuse during fertilisation, the original number of chromosomes is restored in the off spring. By this way the amount of DNA remains constant in each new generation.

Mode of Reproduction:

1. **Asexual Reproduction:** **[Delhi – 2014]**

"It involves the production of an organism from a single parent without the fusion of gametes"

- Features of Asexual Reproduction
  i) It is rapid mode of multiplication
  ii) The individual formed are genetically identical to the parent.
  iii) All the divisions are mitotic in nature



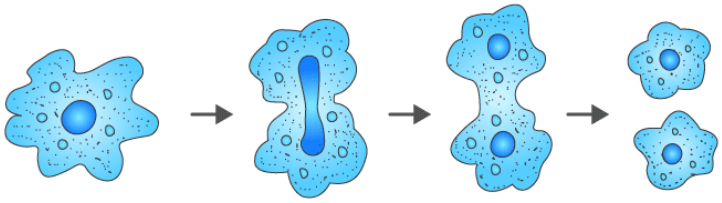
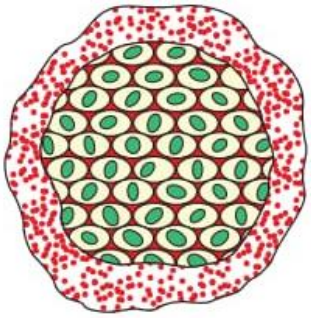
Fission: [Foreign – 2014, Delhi – 2015, 2016, 2011]

"Division of a unicellular organism into two daughter cells"

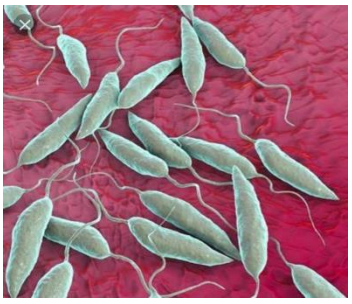
Teacher: What is binary fission?

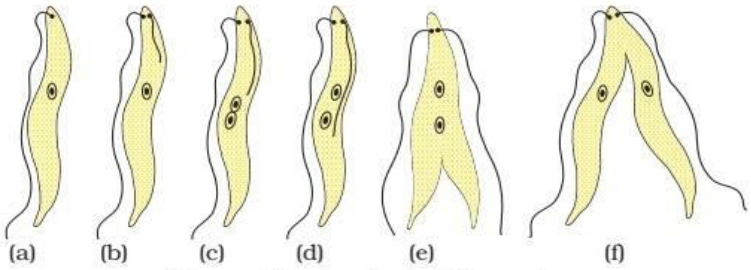
Me; an intellectual:

Diff. between Binary and multiple fission

Binary Fission	Multiple Fission
Division of parent body into two equal and identical daughter cells. e.g. **Amoeba, Paramecium** 	Division of parent body into many individuals e.g. **Plasmodium** 

"In Amoeba, the splitting of the two cells take place in any plane"
"In Leishmania which have whip like structure at one end, division take place in a definite orientation"

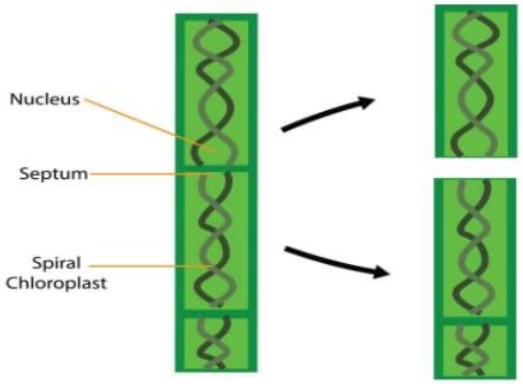




Binary fission in Leishmania

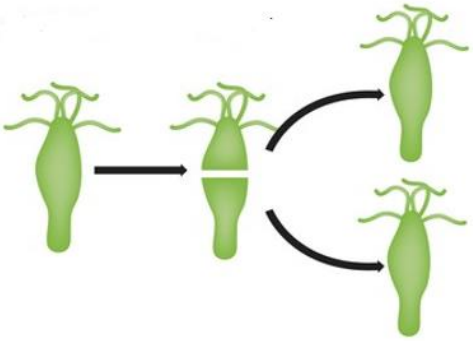
Fragmentation: [Delhi – 2011]

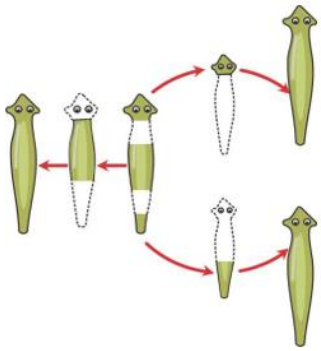
- Entire body of the organism gets divided into several parts or Fragments, each of which is capable of growing into a new individual.
- Spirogyra, simply breaks up into smaller pieces upon maturation



Regeneration: [AI – 2016, 2014, Delhi – 2011, 2014]

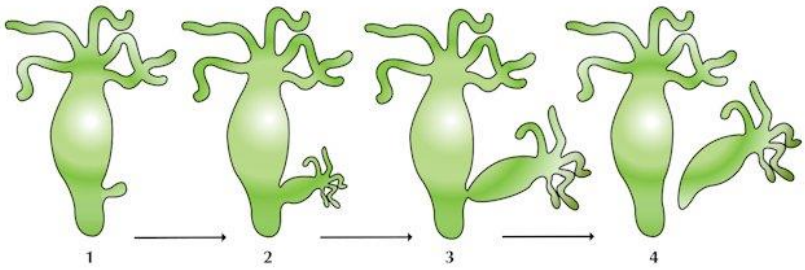
- Many fully differentiated organisms have the ability to give rise to new individual organisms from their body parts.
- Body that get detached due to accident or injury
- Regeneration is carried out by specialised cells
- Regeneration is not the same as reproduction, since most organisms would not normally depend on being cut up to be able to reproduce.
  e.g., **Planaria, Hydra**





Budding: [AI – 2011]

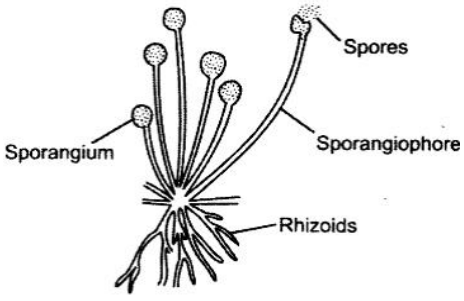
1. A small out growth called a bud arises on the body of an organism.
2. The bud grows and develops into a new individual that finally gets detached from the parent.
3. Common example of budding is Hydra,
4. **Hydra** uses regenerative cells for reproduction in budding



[AI – 2014, Delhi – 2015]

Spore Formation: [AI – 2012, 2017, Delhi - 2015]

1. Some bacteria, Fungi and ferns reproduce by forming spores
2. Spores are unicellular, tiny, spherical bodies protected by thick wall.
3. Spores are formed in spore sac; Favourable conditions for spores to germinate are moisture and temperature.
   e.g., **(Rhizopus) Bread mould**



Spore formation in *Rhizopus*

Vegetative Propagation: [Delhi – 2014, 2012]

1. In some flowering plants, a new plant can be developed from a vegetative part like root, stem or leaf.
2. It takes place in plant which do not produce seeds.

Advantages of Vegetative Propagation:

1. Plants raised by vegetative propagation can bear flower and fruits earlier than those produced from seeds
2. All plants produced are genetically similar enough to the parent plant to have all its characteristics.
3. Mass production of plants using plant parts of parent plant. **[Delhi – 2014 , 2012]**

Natural Vegetative Propagation	Artificial Vegetative Propagation
1. **By Root:** Plants like sweet potato and dahlia have fleshy tuberous root. 2. **By Underground Stem:** The underground stem of some plants have buds that serve as means of vegetative propagation e.g. **Ginger, Banana, Potato** etc.	• Vegetative Propagation is a faster method of Reproduction, hence it is used in gardens and Nurseries. • The method which have been adopted by human beings for vegetative propagation are called artificial propagation.

Cutting:

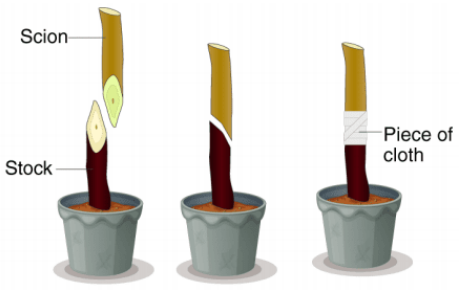
1. In this method, a part of stem with an axillary bud is cut from a healthy plant and planted in moist soil.
2. Over a period of time, roots develop at the lower end of the cutting and new leaves develop from the buds at its upper end to form a new plant.
3. It is extensively used by gardeners for growing **rose, Bougainvillea** and **Cacti**.
4. **Sugarcane** and **Pineapple** are also grown from stem cutting.

Layering:

1. In this method, a branch of the plant is bent and a part of it is covered under the soil.
2. Branch is then cut off from the main plant and made it grow as a new plant.
3. **Lemon, rose** and **Jasmine** are propagated in this manner

Grafting:

1. It is a method in which two different plants are combined to obtain a plant of superior quality.
2. A stem cutting called scion from one plant is attached and tied to the rooted stem called stock of another plant.
3. After few days the stock and the scion merge together due to rapid division of cells.
4. Stock supplies essential nutrients to scion.
5. Grafting help in developing new varieties by combining the features of two plants.
   e.g. **Mango, rose** to get flowers of different colour



Tissue Culture:

1. New plants are grown by removing tissue or separating cells from the growing tip of a plant
2. This tissue is Grown in a suitable nutrient medium
3. They divide rapidly to form a small group of cells or cell us.
4. The cell us is transferred to another medium containing hormones for growth and differentiation.
5. The plantlets are then placed in the soil so that they can grow into mature plant
6. One advantage of tissue culture is, plants can be grown from one parent in disease – free conditions
7. This technique is commonly used for ornamental plants.
   e.g. **Banana, egg plant, rose** etc.

Previous Years Questions

Q. Name the method by which spirogyra reproduces under favourable conditions. Is this method sexual or Asexual? **[Delhi – 2017]**

Ans. Spirogyra reproduces under favourable conditions by Fragmentation, and this is an Asexual mode of reproduction.

Q. Name two simple organisms having the ability of regeneration. **[AI – 2015]**

Ans. Hydra and planaria

Q. Name the causative agent of the disease "Kala – azar" and its mode of asexual reproduction. **[Foreign – 2015]**

Ans. Causative agent of kala – azar is Leishmania, It reproduces by Binary Fission.

Q. Name the part of Bryophyllum where the buds are produced from vegetative propagation. **[Delhi – 2016, 2020]**

Ans. Bryophyllum propagates vegetatively by the buds produced at the margins of leaves.

Sexual Reproduction:

"Sexual reproduction is defined as the production of off springs by the fusion of two gametes (one from male parent and another from female parent) to form a zygote, which develops into a mature organism.

Features of Sexual Reproduction: [CBSE – 2018]

1. Involves two parents (Male and Female)
2. Each parent produces special cells or Germ cell called gametes.
3. Fusion of male and female gametes result in the formation of Zygote.

Advantages of Sexual Reproduction over sexual Reproduction: [Delhi – 2013]

1. Gametes come from two different and sexually distinct individuals, the offspring exhibit diversity of characters.
2. Meiosis during gamete Formation provide opportunities for new combination of genes

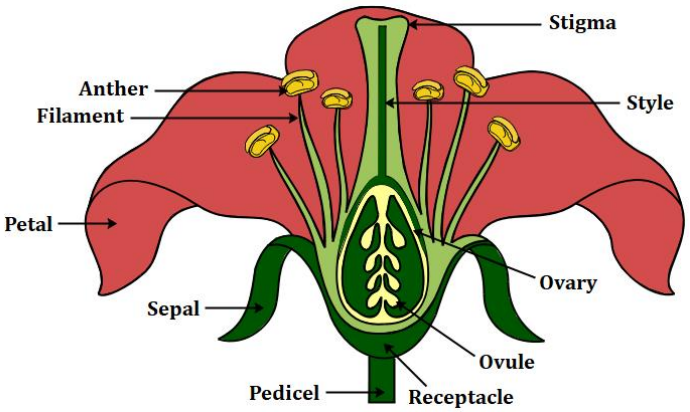
Sexual Reproduction in Flowering Plants:

Flower is the Reproductive part of Angiosperm.

Different parts of flower

- Sepals (green)
- Petals (coloured)
- Stamen
- Carpel

} Reproductive part of the plant



- Male part/Stamen = **Androecium**
- Carpel/Female part = **Gynoecium**

Anther + Filament = Stamen

Stigma + Style + ovary = pistil/Carpel

Contains ovules

Each ovule has an egg cell

Types of Flowers **[AI – 2012]**

Unisexual	**Bisexual** **[Delhi – 2013]**
When it contains either stamens or carpels e.g. **Papaya** and **Watermelon**	When it contains Both Stamen and Carpels e.g. **Hibiscus, Mustard**

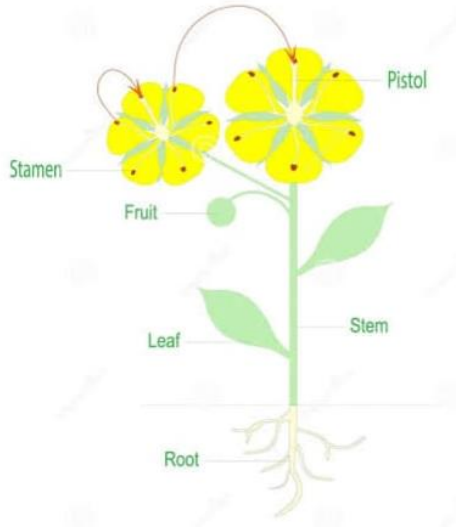
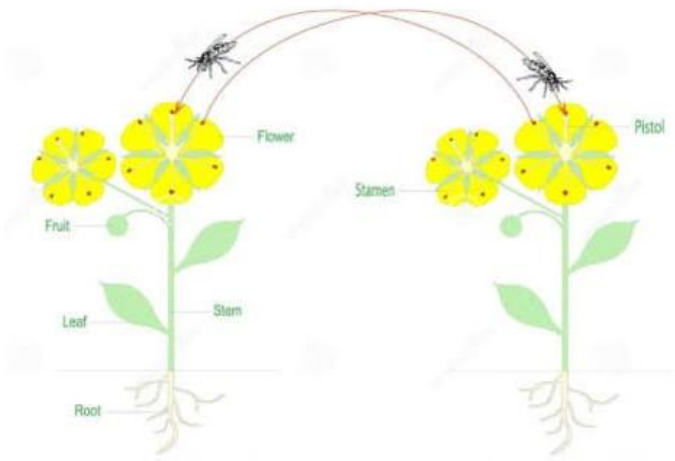
The male germ cell produced by pollen grain fuses with the female gamete present in the ovule to give **zygote**, which is capable of growing into a new plant

Pollination: [Delhi – 2016, 2012, AI – 2014]

Transfer of pollen grains from anther to the Stigma of a pistil is termed as pollination

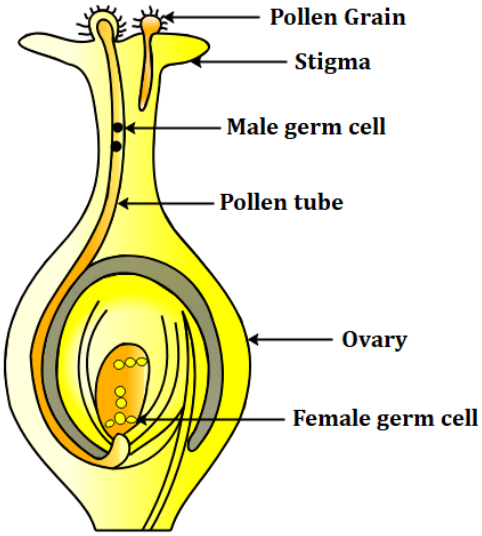
The process of pollination begins when the pollen grains from one flower lands on the stigma and form a pollen tube with the style length, which connect both the stigma and ovary, the pollen grains starts transmitting male gamete.

Self-Pollination	**Cross Pollination** **[AI – 2014]**
• Transfer pollen grains from the anther to the stigma of the same flower • This process can takes place in the same flower or a different flower of the same plant • If occurs in the Flowers which are genetically identical • No need for specific pollinator to transfer pollen grain	• Transfer pollen grains from the anther to the stigma of a different flower • This process can take place between two flowers present on different plants. • Occur in the flowers which are genetically different. • Require pollinators to transfer pollen grains e.g. **Tomato, grasses** etc.

eg. **Papaya, Watermelon, Peanuts, Wheat, Rice** 	

Germination of Pollen on Stigma: [Delhi – 2013, CBSE - 2020, AI – 2014]

1. After pollination, pollen grain on the stigma germinates and grows a pollen tube downward through style to the ovary.
2. After reaching the ovary, pollen tube enters the ovule through the micropyle, and fusion of mall and female gamete takes place.
3. After fertilisation, the zygote divides several times to form on embryo with in the ovule
4. The ovule develops a tough coat and is gradually converted into a seed
5. Ovary grows rapidly and ripens to form the Fruit



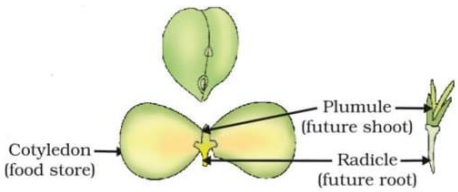
Events after Fertilisation: [CBSE - 2020, AI – 2014]

1. The zygote divides several times to form an embryo within the ovule.
2. The ovule develops a tough coat and is gradually converted into seed.
3. The ovary grows rapidly and ripens to form a fruit.
4. The Petals, sepals, stamens, style and Stigma may wither and fall off.

Seed Germination:

Seed germination may be defined as the fundamental process by which different plant species grows from a single seed into a plant.

Seed contains the future plant or embryo, which develops into seedling under appropriate conditions.



Gerimnation of a seed

1. Water
2. Oxygen
3. Light

Conclusion:

Process of Reproduction of Plants:

1. Pollination
2. Fertilisation
3. Formation of Seed
4. Germination

Reproduction in Human beings:

1. Human beings are unisexual
2. The reproductive system of male and Female consist of many organs.
3. **Primary Sex organs:** Essential organ which form gametes, primary sex organs are called gonads, The gonads of male are testis and female are ovaries
4. **Secondary sex organs:** Include reproductive ducts, that transport gametes.
5. Period of Sexual maturity during adolescent when reproductive organs become Functional is called puberty.

Characteristics of Puberty:

In males:

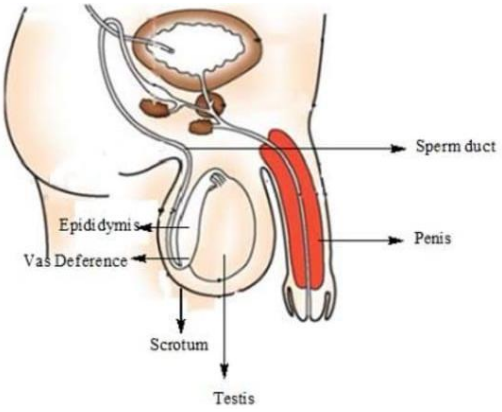
1. Broadening of shoulders and increased muscle development
2. Depending of the voice.
3. Enlargement of Penis and Scrotum
4. Growth of Public Hair and Hair on the face, in the armpits and on the chest

In Females:

1. Broadening of Pelvis
2. Female Start to menstruate and ovulation
3. Growth of Breasts and external genitalia
4. Hair on beard, moustache and chest are lacking

Male Reproductive System:

- Testis
- vas deferens
- Urethra
- Penis
- Accessory reproductive glands
  - Seminal Vesicles
  - Prostate Glands
  - Couper's glands



Testis: [Delhi – 2012]

- Paired, oval shaped male sex organs.
- Present outside the abdominal cavity in a pouch
- Produce a male sex hormone called "Testosterone" which bring about changes in appearance of body at Puberty
- Site of Production of male gamete known as "sperms"

Scrotum: [Delhi – 2012]

- Small pouch that contains testis
- Present outside the abdominal cavity which keeps the testicular temperature $2° - 3°$ lower than that of Normal Body temperature

Vas deferens:

Long tubular structure present in pair that carries sperm to seminal vesicles that stores sperm.

Urethra:

Common passage for both the sperms and urine. It never carries both of them at the same time.

Penis:

- External male genital organ
- It is a copulatory oxygen, transfer sperms into the vagina of Female

Sperms: [AI – 2012]

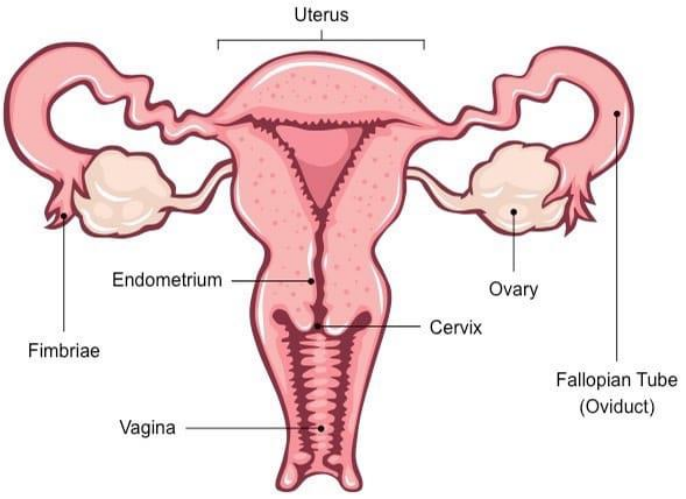
Tiny and motile body that uses their long tail to move through the female reproductive tract.

Accessory Reproductive glands:

- **Seminal Vesicles:**
  One pair sac like, present between rectum and urinary bladder and secrete mucus and alkaline fluid that contains fructose (source of Energy of sperms) which help in movement of sperms.
- **Prostate gland:** **[Delhi – 2012]**
  Single, large, surrounds urethral, secreate milky fluid into urethra that helps sperms to swim.
- **Cowper's gland:**
  On pair, very small, present at both sides of urethra secrete mucus to lubricate the end of penis, secrete alkaline fluid that neutralises the acids from the urine.

Female Reproductive System

- Ovaries (Paired)
- Fallopian tubes (oviducts)
- Uterus (single)
- Vagina (Birth canal)



Ovaries: [AI – 2012]

- Present in the lower abdominal Cavity near kidney
- They are primary sex organs and perform two functions
  Production of female gamete (egg/ova)
  Production sex hormones **[Estrogen and Progesterone]**
- Mature ovary contains a large number of ova.
- Formation of ova begins in female fetus before birth.
- One mature ovum is released from either of the ovary at the interval of every 28 days during reproductive phase.

Fallopian tubes (oviduct):

Paired tubes originating from uterus, on either side extend up to ovary of their respective sides.

Uterus:

- Single, inverted pear – shaped, muscular structure present in the pelvic cavity
- Development of fetes occur inside it, hence called womb; lower part of uterus is called cervix, which leads into vagina.

Vagina:

- About 7 – 10 cm long tube where penis discharges sperms.
- Vaginal acts as the passage for menstrual Flow and also act as birth canal parturition.

Fertilisation:

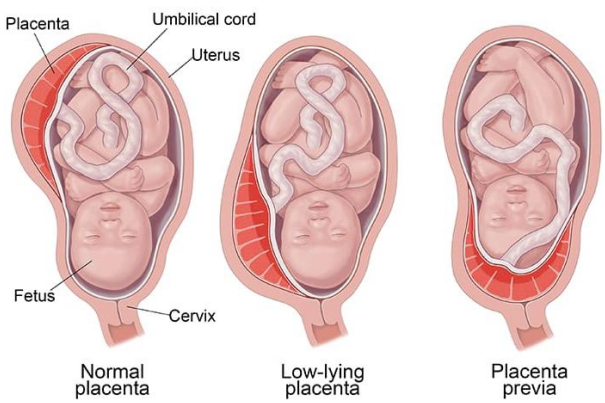
- The sperm produced in testes of male are transferred into the vagina of female during during intercourse.
- The ovum released from the ovary during ovulation, move to adjacent fallopian tube where fusion of male and female gamete takes place.
- It result in the formation of zygote

Menstrual Cycle:

- Sexual cycle begins in a female, when she attains puberty
- It occurs due to the release of sex hormones and repeats every 28 days. It is marked by menstrual flow
- Uterus, becomes ready to receive zygote after fertilisation
- In the absence of fertilisation, the egg is removed through vagina along with uterus living. This is called menstruation.

Placenta:

- The embryo gets nutrition from the mothers blood with the help of a special tissue known as placenta
- This is a disc which is embedded in uterine wall
- It contains villi on the embryo's side of the tissue this provides a large surface area for glucose
- Waste product generated by developing embryo which can be removed by transferring them into mother's blood through the placenta.
- Child is born as a result of rhythmic contraction of the muscles in the uterus.



Reproductive Health:

Reproductive health is a total well – being in all aspect of reproduction, i.e., physical, emotional, social and behavioural.

Importance of Reproductive Health:

1. Proper medication and check up will help in the production of Healthy Children
2. Better sex education and awareness help in the maintaining of the population and prevent the population explosion
3. It prevents the spread of various sexually transmitted Diseases (STD's)

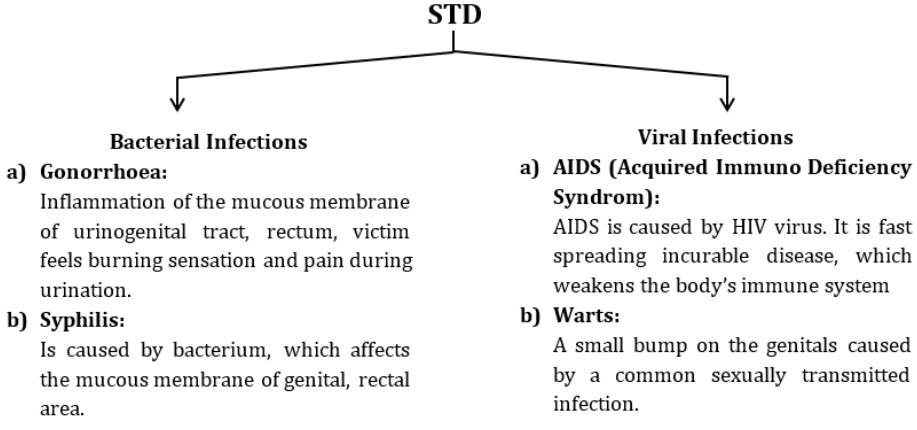
Population Control:

- Increase in population may cause scarcity of food, other natural resources, proper housing and medical care.
- Frequent pregnancies also deteriorate mother's health so, regulation of conception is required. "Preventive measures to avoid the pregnancy are called contraception"
- Sexual act always has the potential to lead pregnancy
- Females health will be adversely affected, if she is not ready for it.

1. **Barrier Method:**
   Physical device that prevent the entry of sperms into the vagina during copulation this method is best because, it also protect individuals from STDs
   - Condoms : Thin rubber covering over the penis which prevents transfer of sperms into female body
   - Diaphragm or Cervical Cap: Rubber cover that fits over the cervix in vagina.
2. **Chemical Method:**
   - Spermicide creams and Jellies are applied in Vagina to kill the sperms.
   - Oral contraceptive pills contains hormones like estrogen and Progesterone that prevent ovulation
3. **IUCDs (Intrauterine Contraceptive Devices)**
   - Copper – T → made up of copper, placed in the uterus to prevent pregnancy.
   - But copper – T can cause irritation to uterus.
4. **Natural Method:**
   Include rhythm method that is to avoid copulation around the time of ovulation.
5. **Surgical Method (Sterilisation):**
   a) **Vasectomy:** Vas deferens in the male is blocked, sperm transfer will be prevented
   b) **Tubectomy:** Procedure done on females involving removal of a small portion of fallopian tube

Sexually Transmitted Diseases:

STDs are communicable diseases caused by Bacteria, Protozoa and viruses, which spread from an infected person to a healthy person by sexual contact



Previous Years Question

Q. What is the main difference between sperms and eggs of humans? Write the importance of this difference? **[AI – 2014]**

Ans. The main difference between sperms and eggs of humans is that, the sperms has XY chromosome where egg has XX chromosome, this help in determination of sex of a child.

Q. "The chromosomal number of the sexually producing parent and their offspring is same". Justify the statement. **[AI – 2014]**

Ans. In sexual reproduction, two gametes, male and female combines together to form a new cell 'zygote'. The reproductive cells or gametes contains only half the amount of DNA as compared to the Non-reproductive cells of an organisms. So, when a male gamete combines with a female gamete during sexual reproduction, then the new cell 'zygote' will have normal amount of DNA

Q. Describe the role of fallopian tubes in the female reproductive system. **[AI – 2011]**

Ans. Fallopian tubes are a pair of elongated, ciliated muscular, tubular structure, It is the site of fertilisation

Q. State the basic requirement for sexual reproduction write the importance of such reproduction in nature **[Delhi – 2017]**

Ans. The basic requirement for sexual reproduction is involvement of both male and female to produce off springs. The importance of sexual reproduction in nature is to exhibit diversity of characters in offspring. Meiosis during gametogenesis provides opportunities for new combination of genes, which leads to variation required for evolution

Q. State the changes that take place in the uterus when: **[Delhi – 2017]**

a) Implantation of embryo has occurred

b) Female gamete/egg is not fertilised.

Ans. a) Implantation is the close attachment of embryo to uterine wall. It is followed by a number of developmental changes in the thickened wall of uterus. Connection between the foetal membrane and the uterine wall called placenta is formed

b) Uterus living breaks and comes out through vagina as blood and mucus

Biology teacher skips
"Reproduction" chapter
Every boy in the class:-