

SCIENCE

(Biology)

Chapter 7: How Do Organisms Reproduce?



How Do Organisms Reproduce?

Reproduction

Reproduction is the ability of living organisms to produce living beings similar to themselves.

The two modes of reproduction, i.e. asexual reproduction and sexual reproduction can be seen in animals.

Importance of Variation

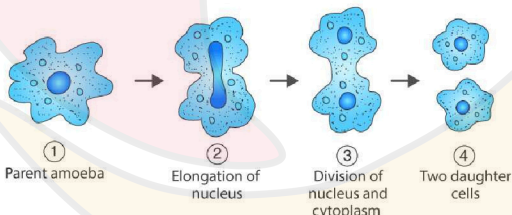
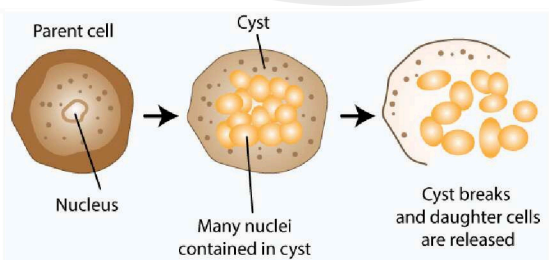
- Sexual reproduction provides great scope for variation.
- Variation is important for the survival of a species.
- Variation helps a species to adapt to different environmental changes.

Reproduction and its Kinds

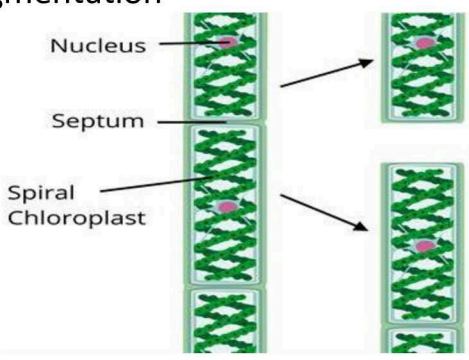
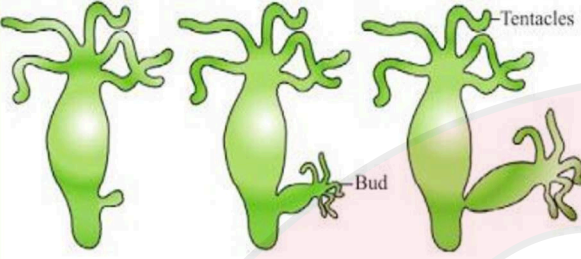
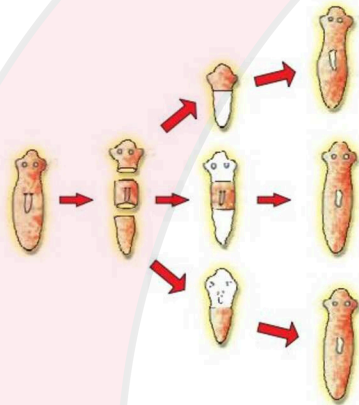
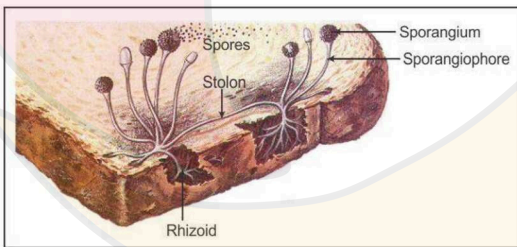
Sexual Reproduction	Asexual Reproduction
<ul style="list-style-type: none"> • It involves the formation of special reproductive cells called gametes. • Male and female gametes fuse to form the zygote which develops into a new individual. 	<ul style="list-style-type: none"> • It does not involve the formation of gametes. • New organisms are formed either by the division of the parent body or by the differentiation of the parent body.

Modes of Asexual Reproduction

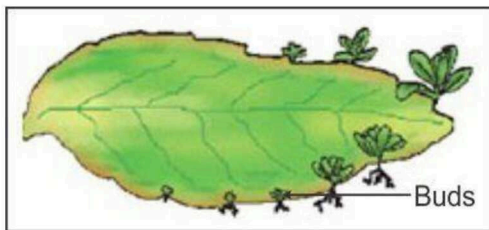
Plants and animals from lower classes reproduce by asexual methods.

Method	Description	Example
Binary Fission  <p>① Parent amoeba → ② Elongation of nucleus → ③ Division of nucleus and cytoplasm → ④ Two daughter cells</p>	<ul style="list-style-type: none"> • Most common method in unicellular organisms. • It is division of the parent cell into two identical daughter organisms. 	Amoeba, Paramecium, bacterium
Multiple Fission  <p>Parent cell → Cyst (Many nuclei contained in cyst) → Cyst breaks and daughter cells are released</p>	<ul style="list-style-type: none"> • Parent cell divides to produce many identical new individuals. 	<i>Plasmodium vivax</i> , <i>Leishmania</i>



<p>Fragmentation</p> 	<ul style="list-style-type: none"> Adult organisms, on maturation, break up into smaller fragments. Each fragment develops into a new individual. 	Spirogyra
<p>Budding</p> 	<ul style="list-style-type: none"> A small outgrowth called a bud arises on the parent body. The bud grows by repeated cell divisions. It then breaks off from the parent body and develops into a new individual. 	Hydra, sponges, corals, yeast
<p>Regeneration</p> 	<ul style="list-style-type: none"> Regeneration is the ability of organisms to generate lost or damaged body parts. Regeneration is carried out by specialised cells. These form a mass of cells which undergo changes to form cells specialised in different functions. If planaria is cut into small pieces, then each piece develops into a new planaria. 	Lizard, starfish, planaria, hydra
<p>Spore Formation</p> 	<ul style="list-style-type: none"> Spores are special structures produced in sacs called sporangia. When spores mature, sporangia burst and spores are carried by air or water to different places. When spores fall on a suitable ground, they germinate and give rise to new plants. 	Moss, Fern, Fungi

Vegetative Propagation



Vegetative propagation in *Bryophyllum*

- Several plants are capable of producing naturally through their roots, stems and leaves. Such type of reproduction is called vegetative propagation.

Sweet potato (by roots)
Bryophyllum (by leaves)
 Ginger (by stem)

Different methods used to develop plants which can bears fruits and flowers by vegetative propagation are as follows:

- Stem cutting:** This involves cutting a part of the stem and planting it in the soil to allow the growth of roots and buds into shoots.
 Examples: sugarcane, pear, china rose
- Grafting:** In grafting, the stem or bud of two best quality plants is combined to form a new plant. Examples: guava, apple, mango
- Layering:** In this, the lower branch of a plant is bent and covered with soil. Once new roots start developing on the branch, it is cut from the parent plant and allowed to grow as an individual plant. Examples: rose, jasmine

Tissue Culture

- Cells from the growing tip of a plant are separated and are grown on a nutrient medium containing all nutrients and hormones necessary for plant growth.
- These cells form a mass called callus.
- The callus develops plantlets.
- These plantlets are transferred to the soil and grow as new individuals.

Advantages of Vegetative Reproduction

New plants show the exact characteristics as those of the parent plant.

This method is faster and certain.

Plants not capable of producing sexually can be produced by this method.

Examples: Seedless bananas and grapes

Disadvantages of Vegetative Reproduction

There is no possibility of variation.

The new plant grows in the same area as the parent plant which leads to competition for resources.



Sexual Reproduction

- The sexual mode of reproduction involves two organisms, a male and a female to create a new organism or offspring.
- The sexual reproduction allows greater variations in a species as the two individuals involved in producing the offspring would have different patterns of variations. This process includes the combination of DNA of two different individuals and the resultant combination and variation would be unique.
- Hence this ensures a mixing of the gene pool of the species within a population and it also ensures the survival of the species as this process generates more variations due to the genetic recombination.
- The process of combining DNA of two different individuals during sexual reproduction will lead to an offspring with twice the amount of DNA than their previous generation.
- The solution to this lies in the fact that there are certain specialised cells in such organisms called germ cells or gametes. These have half the number of chromosomes and, therefore half the amount of DNA in comparison to the other non-reproductive cells. The combination of these germ cells from two different individuals during the process of sexual reproduction restores the original number of chromosomes and DNA content in the new offspring.
- The germ cells may be similar and not much different from each other in simple organisms. With the complexity of the organisms the germ cell also becomes specialised. One of the germ cells becomes large and stores food. This is known as the female gamete. The other germ cell which is small and motile is called the male gamete. These gametes lead to the differences in the bodies and reproductive systems of males and females.

Sexual Reproduction in Flowering Plants



A **flower** is the reproductive organ in angiosperms.

Stalk/Pedicle

- Point of attachment.

Thalamus

- It is an enlarged, flattened tip of the stalk.
- Petals and other parts arise from the thalamus.

Calyx

- Outermost whorl of the flower consisting of sepals.
- The calyx protects the inner parts of the flower in their bud stage.

Corolla

- Second whorl of the flower which is made up of petals.
- Helps flowers in attracting insects to carry out pollination.

Androecium

- Third whorl and the male organ of the flower.
- Consists of stamens.
- Each stamen is made of the filament and anther.
- Anthers store pollen grains.

Gynoecium

- Innermost whorl and the female reproductive organ.
- Consists of pistils or carpels.
- Carpel is made of stigma, style and ovary.

Pollination

The process of sexual reproduction in plants starts with the transfer of pollen grains from the anther of the stamen to the stigma of the pistil. This process is termed as pollination.

This is facilitated by pollinating agents like wind, birds, animals, water etc. which transfer the pollen grains.

There can be two types of pollination as follows:

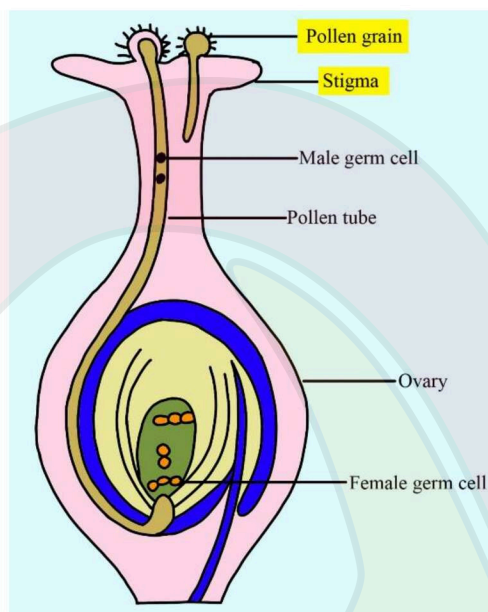
Self-pollination	Cross-pollination
This involves the transfer of pollen grains from the anther to the stigma of the same flower. Example - wheat, peanut, etc.	This type of pollination involves the transfer of the pollen grains from the anther of one flower to the stigma of another flower of the same species. Example - apples, pumpkin etc.

Different agents help to bring about cross pollination. They are insects, wind, water, etc.

Fertilisation



Through the process of pollination, the pollen is deposited in the style of the pistil. For the next process in reproduction, it needs to reach the female germ-cells which are present in the ovary. To facilitate this, a tube grows out of the pollen grain and reaches the ovule in the ovary of the pistil. Here in the ovule the male germ-cell fuses with a female germ-cell to form a zygote. This process of fusion of the gametes is termed as **fertilisation**. After the process of fertilization, the zygote thus formed, divides repeatedly to form an embryo inside the ovule. The ovule later develops into a seed. And meanwhile the ovary grows and ripens into a fruit and the other parts of the flower, namely the petals, sepals, stamens, style and stigma may be shed off. The seed present inside the fruit encloses the future plant in its embryo.



Fruit and Seed Formation

- The seed that contains the new plant or embryo develops into a seedling when the conditions are suitable. This process is termed as germination. Certain conditions like nutrients, water and proper temperature are necessary for the process of germination.
- The embryo gets its food from the reserve food material stored in the cotyledons. It also has a protective outer covering known as seed coat.

Reproduction in Human Beings

The mode of reproduction in human beings is sexual mode. The reproductive phase of an individual is that phase of life when the individual is ready to reproduce an offspring. Changes are noticed at every phase of growth right from birth.

But there are some changes that begin in the teenage age that start to prepare us for the reproductive phase of life. This period of adolescence leads to sexual maturation. The body needs to create specialised germ-cells to take part in the sexual reproduction. The period of maturation of the reproductive tissues in the body is termed as puberty.

Numerous changes are noticed in both boys and girls during this period. The boys start to have hair growth on their face and body, voice change, active functioning of sweat and sebaceous glands, enlargement of penis etc. The changes in the girls include growth of pubic hair, enlargement of breasts, oily skin leading to pimples, onset of menstruation etc. Both of them undergo changes in their body appearance and they become more conscious of these bodily changes.

The process of fusion of germ-cells in sexual reproduction, the actual transfer of these germ-cells needs to be done. For the same special organs need to be present like penis in males and uterus in females for carrying the baby.

Growth and Development

- Growth and development are gradual and irreversible processes.
- Size and complexity of the body increase gradually.
- Growth in humans is divided into the following stages:

Infant	<ul style="list-style-type: none"> • Children between 1 month and 1 year of age are called infants.
Toddler	<ul style="list-style-type: none"> • Children between 1 to 4 years of age. • Growth is fast. • Children learn to balance the body.
Adolescent	<ul style="list-style-type: none"> • Children between the ages of 11 to 19 years. • The period of transition from childhood to adulthood is called adolescence
Adulthood	<ul style="list-style-type: none"> • It is from the age of 18 years onwards. • An individual attains full growth and emotional stability. • Career and shouldering responsibilities are priorities.



Puberty is the period during which the reproductive system matures in boys and girls.

- In girls, puberty begins at the age of 11 years.
- In boys, it begins at the age of 12–14 years.
- Puberty continues till the age of 18 years.

Changes Which Occur At the Time of Puberty

Changes in Boys	Changes in Girls
Testes mature and start producing sperms.	Ovaries mature and start producing ovum. The menstrual cycle begins.
Pectoral girdle (shoulder girdle) grows.	Pelvic girdle (hip girdle) becomes broad.
Hair growth in the pubic region.	Hair growth in the pubic region.
The skin in the pubic region becomes darker.	The skin in the pubic region becomes darker.
Development of moustache and beard.	Enlargement of breasts.
Development of a deep voice.	The voice becomes shrill.

Problems Related to Adolescence

Adolescence is a period of physical, mental and emotional changes.

- The spurt of growth in certain body parts creates confusion in teenagers. They start worrying about it. They start feeling lonely and do not feel comfortable to share their problems with others.
- Teenagers become highly sensitive about someone's opinion.
- They tend to become angry or upset very easily.
- They prefer the company of persons their age.
- Due to hormonal changes, they experience depression.
- They feel the urge to become independent but are unsure about themselves.
- They have many questions about sex.
- This makes it important to counsel them in the right manner.

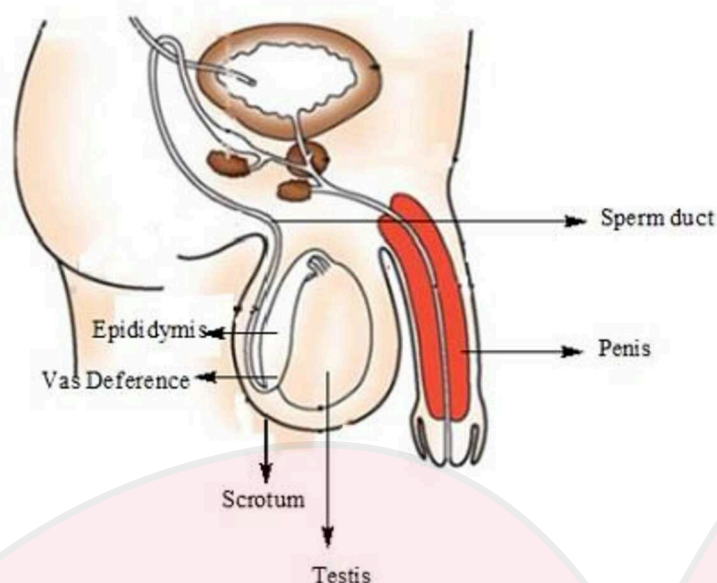
Menstrual Cycle

- Menstruation is the cyclic event of the release of the ovum from the ovary and its removal from the body when fertilization does not happen.
- During menstruation, the blood-rich endometrium of the uterus also breaks down while the ovum is being removed from the body.
- Two pituitary hormones, LH and FSH and two ovarian hormones, estrogen and progesterone, all have their roles in menstruation.



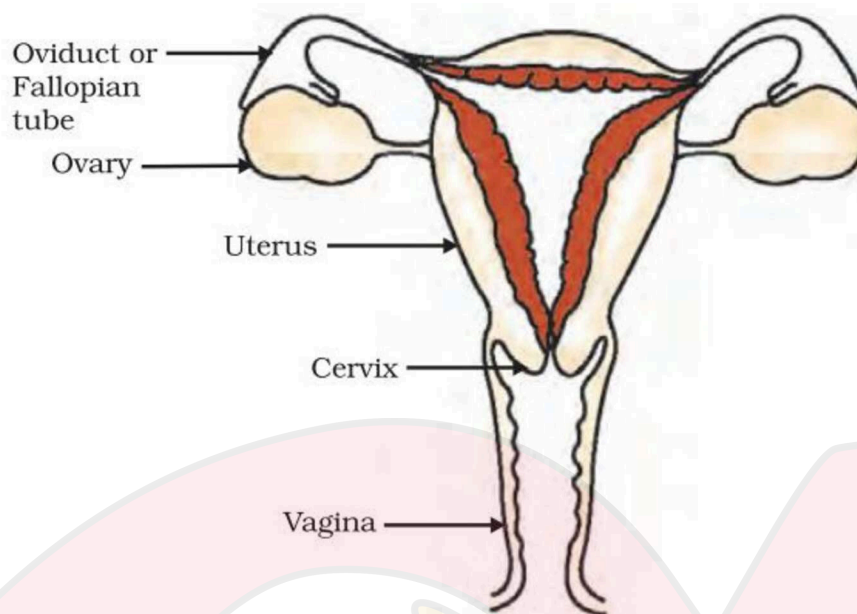
- In humans, the cycle repeats every 28 days.

Male Reproductive System



1. Testes (Testicles)	<ul style="list-style-type: none"> • A pair of testes is located below the abdomen in the scrotal sac or scrotum. • The testes produce male gametes or sperms (germ cells). • To maintain the temperature 2–3°C below the body temperature, the scrotum is located outside the body cavity.
2. Epididymis	<ul style="list-style-type: none"> • Tubes present in the testes join to form the epididymis. • The epididymis stores sperms temporarily.
3. Vas deferens (sperm duct)	<ul style="list-style-type: none"> • Each epididymis continues further as the sperm duct or vas deferens. • Each vas deferens unites with a tube coming from the urinary bladder on either side. • Thus, the urethra is the common passage for sperms and urine.
4. Seminal vesicles	<ul style="list-style-type: none"> • The seminal vesicles produce a secretion which is responsible for the transport of sperms.
5. Prostate gland	<ul style="list-style-type: none"> • It is a bilobed structure which surrounds the urethra. • It pours an alkaline secretion into the semen.
6. Cowper's gland	<ul style="list-style-type: none"> • These are two small ovoid glands. • They open into the urethra. • Their secretion serves as a lubricant.
7. Penis	<ul style="list-style-type: none"> • The urethra passes through the penis. • It carries either urine or semen at a time.

Female Reproductive System



1. OVARIES	<ul style="list-style-type: none"> Two ovaries are present in the pelvic cavity, one on each side of the uterus. Ovaries produce ova which are female gametes. One ovum is released by one ovary every month.
2. OVIDUCTS (Fallopian tube)	<ul style="list-style-type: none"> Two oviducts or fallopian tubes are present, each close to one ovary of its side. When the egg is released by the ovary, it passes down to the uterus through the oviduct.
3. UTERUS (Womb)	<ul style="list-style-type: none"> The uterus is a hollow pear-shaped, muscular organ. The inner lining of the uterus called endometrium protects and nourishes the developing embryo.
4. VAGINA (Birth canal)	<ul style="list-style-type: none"> The uterus opens into the vagina. The vagina is a muscular, narrow tube.
5. VULVA	<ul style="list-style-type: none"> The vagina and urethra both open into the vulva.

Fertilisation

The process of fusion of the male gamete with the female gamete is called **fertilisation**.

The process of fertilization of a male and female gamete or sperm and egg starts when the sperm enters the female reproductive system through the vaginal passage during a sexual intercourse. From the vaginal passage they move up through the uterus towards the fallopian tubes.

The eggs are present in the fallopian tube, meet the sperm and get fertilized.

The fertilized egg, which is known as the zygote, starts dividing repeatedly and travels down the fallopian tube to the uterus.

The ball of cells or embryo gets implanted in the endometrial lining of the uterus and



continues to grow into a foetus. The embryo gets its nourishment from the mother through a special tissue called the placenta which acts as a connection between the mother and the developing embryo. It helps to transport glucose and oxygen to the embryo and remove the wastes generated by the embryo.

It takes about nine months for the complete development of the child inside the mother's body. The child is born due to the rhythmic contractions of the uterine muscles.

What Happens When the Egg is Not Fertilized?

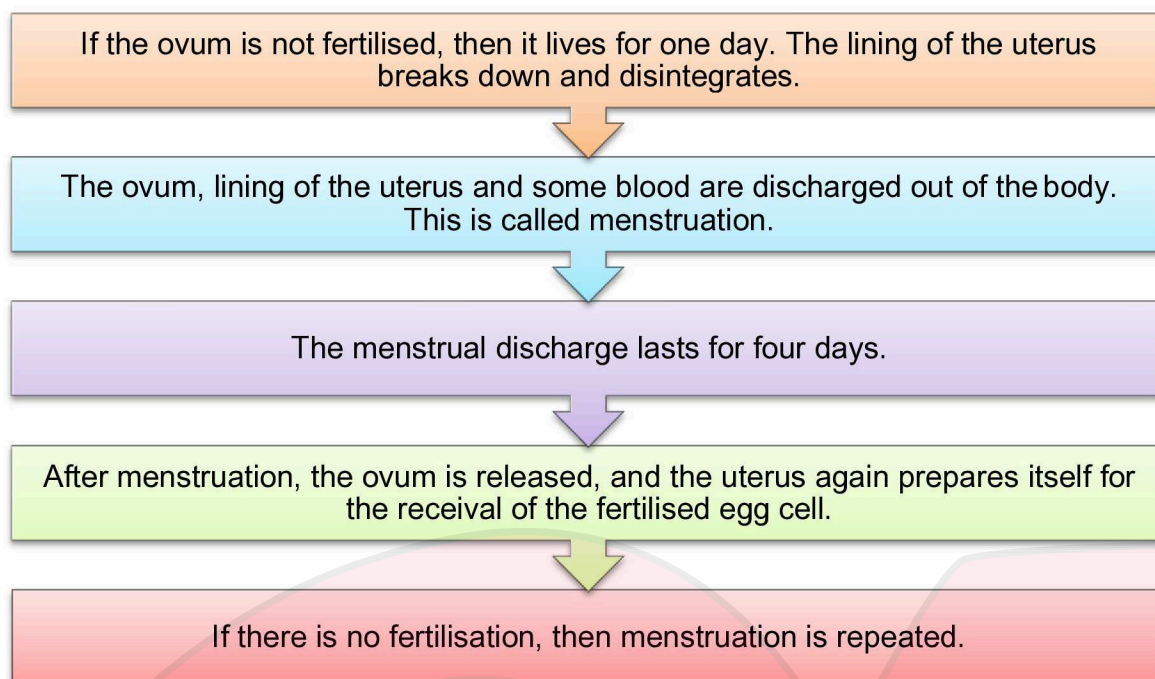
An egg is released by the ovary every month in anticipation of it getting fertilised. In case the egg does not get fertilized, it can survive for only a day. Similar to the ovary releasing an egg every month, every month, the uterus too prepares itself to the fertilized egg by creating a thick and spongy lining in order to provide nourishment to the embryo.

When the fertilization does not occur, this lining too is not required and this lining and the egg is shed as blood and mucous through the vagina. This is called menstruation. This cycle occurs every month and lasts for about 2 - 8 days roughly.

Implantation

- As soon as the zygote is formed, it starts developing.
- By the time it reaches the uterus, it is a mass of cells known as an embryo.
- It remains attached to the wall of the uterus throughout its development.
- The period of development of the embryo inside the uterus is called the **gestation period**.
- In humans, the gestation period is of 9 months, i.e. about 280 days.
- The embryo after completing three months of development is called the foetus.
- The placenta is a special tissue which provides food and oxygen to the foetus.





Reproductive Health

Sexually Transmitted Diseases

- 1. AIDS (Acquired Immuno Deficiency Syndrome):** The most common and chronic sexually transmitted disease is AIDS. It is caused by HIV (Human Immunodeficiency Virus). Generally, the immune system is destroyed by HIV, and the body becomes weak. When a person is infected by AIDS, he is susceptible to various other diseases. Direct sexual contact is the most probable way of transmission of HIV. The initial symptoms of HIV are headache, swollen lymph nodes, rashes, fever and chills, and nausea. No cure for AIDS has been found so far, but effective treatment can increase the lifetime of the patient for a few years. AIDS can be prevented by ensuring protective sexual intercourse.
- 2. Gonorrhoea:** The bacteria, *Neisseria gonorrhoeae*, is the agent of this STD. In this disease, both males and females can be affected. The urogenital pathway, including the rectum, urethra, and cervix (in females only), are mostly affected. Gonorrhoea, like other STDs, is majorly transmitted through direct sexual contact. Oral and anal sex are also the ways through which gonorrhoea is transmitted. The symptoms of gonorrhoea are- discharge of pus from the penis, burning sensation during urination (in males), and similarly discharge of pus from the vagina, pelvic or abdominal pain (in females). Gonorrhoea can be prevented by protected sexual intercourse.
- 3. Syphilis:** The bacteria, *Treponema pallidum*, is the causative agent of this STD. The bacteria find their path in the body through various wounds. Syphilis can also be transmitted from infected pregnant mothers to their children. The early symptoms include a sore that is termed as 'Chancre'. The other symptoms include headache, loss of weight, fatigue, rashes, fever, etc. In the later stages, it may lead to a complete stop of



mental growth, loss of vision, heart disease, etc. Syphilis can be prevented by avoiding unprotected sexual contact and other steps as taken for any STD.

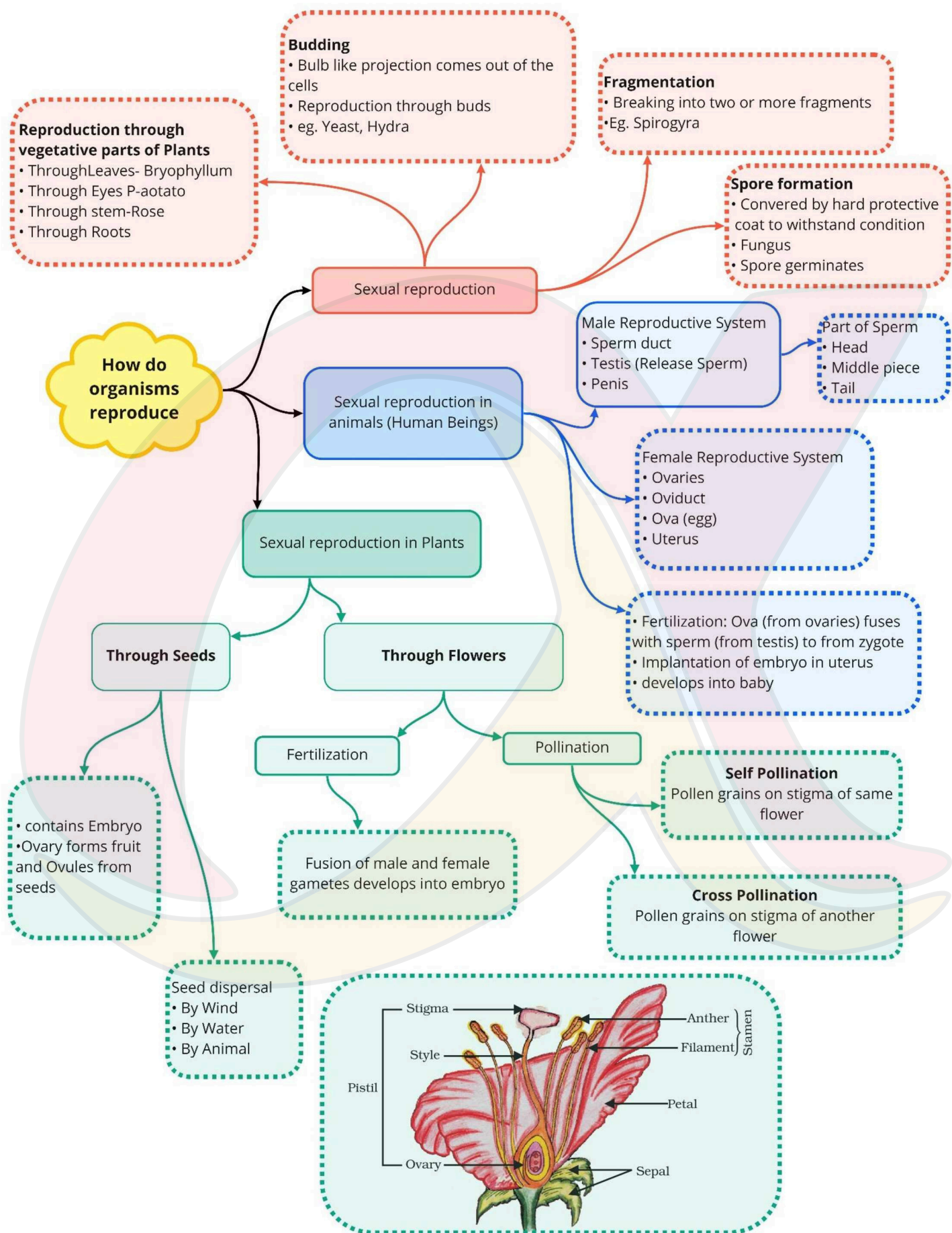
4. **HPV (Human Papillomavirus):** As the name suggests, it is a viral disease. The most common symptoms include warts on the buccal cavity, throat, and external genitals. If left untreated, HPV may lead to other chronic diseases like cervical cancer, oral cancer, rectal cancer, etc. No treatment has been found for HPV so far.

Different methods are available in order to prevent pregnancy:

1. **Hormonal Method:** Various hormonal preparations come in the form of tablets or pills, commonly called contraceptive pills.
2. **Barrier Methods:** Condoms, diaphragms and spermicidals are used, Condoms are used by males while diaphragms and spermicidals are used by females.
3. **Intra-uterine Devices (IUDs):** IUDs such as Lippe's loop and copper – T are fitted in the uterus. They prevent fertilisation.
4. **Surgical Methods:** In females, the fallopian tubes are ligated. This is called tubectomy. In males, the vas deferentia are ligated. This is called vasectomy.
5. **Induced Abortion:** It is also known as Medical Termination of Pregnancy (MTP).

If a woman becomes pregnant and the couple is not willing to have a baby, then the option of induced abortion is chosen.

Class : 10th Biology
Chapter-8 How do Organisms Reproduce



Important Questions

➤ Multiple Choice Questions:

1. Binary fission is a method of asexual reproduction in:
 - (a) amoeba
 - (b) hydra
 - (c) fern
 - (d) none of these.
2. What is present in pollen Sac?
 - (a) Calyx
 - (b) Ovary
 - (c) Ovule
 - (d) Pollen grains
3. During the process of fertilization in plants, male gamete fuses with the egg and the second with the secondary nucleus. This is known as:
 - (a) simple fertilization
 - (b) double fertilization
 - (c) fusion
 - (d) all these.
4. Budding is found in:
 - (a) Planaria
 - (b) Hydra
 - (c) Leishmania
 - (d) All of these
5. In tissue culture method a small piece of tissue grows and forms:
 - (a) callus
 - (b) monocytes
 - (c) synaps
 - (d) homeostasis
6. During pregnancy menstruation is:
 - (a) present
 - (b) absent
 - (c) intermittent
 - (d) present with pain



7. Vegetative reproduction is possible by:

- (a) root
- (b) stem
- (c) leaves
- (d) all these

8. After fertilization which structure forms fruit:

- (a) calyx
- (b) corolla
- (c) stamen
- (d) ovary

Answer:

- (d) ovary

9. How many male gametes are found in pollen tube:

- (a) one
- (b) two
- (c) three
- (d) four

10. In boys the puberty occurs at the age of:

- (a) 10-12 years
- (b) 12-14 years
- (c) 16-18 years
- (d) 20-22 years

➤ Very Short Question:

1. Write the full expansion of HIV.
2. Write the full form of IUCD.
3. Name the type of fission carried out by Amoeba.
4. What is vegetative propagation?
5. List two functions performed by ovaries in a human female.
6. What is the effect of DNA copying which is not perfectly accurate in the reproductive process?
7. Name the hormone, secretion of which is, responsible for dramatic changes in appearance in girls when they approach 10-12 years of age.
8. Why is DNA copying an essential part of the process of reproduction?



9. Mention the common mode of reproduction found in

- Amoeba
- Planaria.

10. Name any two types of asexual reproduction.

➤ Short Questions:

1. List any two differences between pollination and fertilization.
2. What is reproduction? Mention the importance of DNA copying in reproduction.
3. Define variations in relation to a species. Why is variation beneficial to the species?
4. Mention the information source of making proteins in the cell. What is the basic event in reproduction?
5. Name one sexually transmitted disease each caused by a bacterial infection and viral infection. How can they be prevented?
6.
 - (a) In human body what is the role of
 - seminal vesicles and
 - prostate gland.
 - (b) List two functions performed by testes in human beings.
7. Name the male and female gametes in animals. What is fertilization and where does it take place in human females?
8. What is reproduction? What are the two types? Which one of the two confers new characteristics on the offspring and how?

➤ Long Questions:

1. Draw the diagram of a flower to show its male and female reproductive parts. Label the following in it;

Ovary

Anther

Filament

Stigma.

What is the function of anther? How does fusion of male and female gametes take place in plants?

2.
 - (a) Draw a diagram showing germination of pollen on stigma of a flower.
 - (b) Label pollen grain, male germ cells, pollen tube, stigma, ovary and female germ cell in the above diagram.



(c) How is zygote formed?

3. Draw a longitudinal section of a flower and label the following parts:

- Part that produces pollen grains,
- Part that transfers male gametes to the female gametes.
- Part that is sticky to trap pollen grain,
- Part that develops into a fruit.

➤ Assertion Reason Questions:

1. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- a. Both A and R are true, and R is correct explanation of the assertion.
- b. Both A and R are true, but R is not the correct explanation of the assertion.
- c. A is true but R is false.
- d. A is false but R is true.

Assertion: Internal fertilisation occurs in mammals and birds.

Reason: External fertilisation occurs in reptiles, amphibians, and fishes.

2. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- a. Both A and R are true, and R is correct explanation of the assertion.
- b. Both A and R are true, but R is not the correct explanation of the assertion.
- c. A is true but R is false.
- d. A is false but R is true.

Assertion: Seeds are matured ovules.

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

➤ Case Study Questions:

1. Read the following and answer any four questions from (i) to (v).

A married woman used a device X made of common metal for preventing pregnancy. This device was put into her uterus by some trained medical professional. Unfortunately, she got pregnant after two months of insertion of device. She was in shock to learn that her birth control device has failed.

- i. What is the name of birth control device used by the woman?
 - a. Foam tablets.
 - b. Copper T.



- c. Diaphragm.
 - d. Both (a) and (b).
 - ii. Which metal is commonly used for making device X?
 - a. Iron.
 - b. Copper.
 - c. Silver.
 - d. Gold.
 - iii. How does device X prevent pregnancy?
 - a. It prevents ovulation.
 - b. It prevents copulation.
 - c. It suppresses fertilising capacity of sperm.
 - d. None of these.
 - iv. Why do you think the woman got pregnant even after using device X?
 - a. Device X might have got expelled without the knowledge of woman.
 - b. Device X might be defective and was not working from the beginning.
 - c. Device X could have been destroyed by the uterine fluid.
 - d. None of these.
 - v. Select the correct statement regarding device X.
 - a. Device X is very effective in preventing sexually transmitted diseases.
 - b. Device X can be inserted in uterus by woman herself.
 - c. Device X prevents menstrual cycle in women.
 - d. Device X can cause heavy painful and longer duration periods or menstruation.
2. Read the following and answer any four questions from (i) to (v).

A newly married couple does not want have children for few years. They consulted a doctor who advised them barrier method and chemical method of birth control. Yet another couple who already have two children and are middle aged also consulted doctor for some permanent solution to avoid unwanted pregnancy. Doctor advised them surgical method of birth control.

- i. What are the barrier methods of birth control?
 - a. Condom.
 - b. Diaphragm.
 - c. Oral pills.
 - d. Both (a) and (b).
- ii. How physical barrier prevent pregnancy?



- a. They kill the sperms.
 - b. They kill the ovum.
 - c. They prevent sperms from meeting the ovum.
 - d. They prevent intercourse.
- iii. How chemical methods prevent pregnancy?
- a. Vaginal pills contain chemical called spermicides which kill the sperms.
 - b. Oral pills prevent ovulation, so there will be no fertilisation.
 - c. Oral pills stop menstruation in females.
 - d. Both (a) and (b).
- iv. Select the correct statement regarding surgical method of birth control.
- a. It involves termination of pregnancies in women particularly after eight weeks of conception.
 - b. Small portion of sperm duct or vas deference in males is removed by surgical operation and both cut ends are ligated properly.
 - c. Small portion of oviducts in females is removed by surgical operation and cut ends are ligated.
 - d. Both (b) and (c).
- v. Select the correct statement regarding birth control methods.
- a. Barrier method of birth control also protects the couple from sexually transmitted diseases.
 - b. Some women experience unpleasant side effects on taking oral pills because of change in hormonal balance in body.
 - c. Surgical method in males is called vasectomy and in females is called tubectomy.
 - d. All of these.

✓ **Answer Key-**

➤ Multiple Choice Answers:

- 1. (a) amoeba
- 2. (d) Pollen grains
- 3. (b) double fertilization
- 4. (a) Planaria
- 5. (a) callus
- 6. (b) absent
- 7. (d) all these



8. (d) ovary
9. (b) two
10. (b) 12-14 years

➤ Very Short Answers:

1. Answer: Human immuno-deficiency virus.
2. Answer: Intra-uterine contraceptive device.
3. Answer: Binary fission.
4. Answer: It is the formation of new plants from vegetative parts (e.g., stem, leaf, root, bud) of a parent plant.
5. Answer: Formation of ova Secretion of hormones, estrogen and progesterone.
6. Answer: It produces mutations which give rise to useful, harmful and neutral variations in the progeny.
7. Answer: Estrogen (= oestrogen) produced by growing follicles inside the ovary.
8. Answer: Cell multiplication is essential for reproduction either as a means of multiplication in unicellular organisms or as a means of development of multicellular body from a single celled zygote. Cell multiplication cannot occur without DNA replication or DNA copying because each new cell must carry the full DNA complement.
9. Answer:
 - Amoeba Binary fission in any plane.
 - Planaria: Transverse binary fission.
10. Answer: Fission, Spore formation.

➤ Short Answer:

1. Answer:



Pollination	Fertilization
1. Definition. It is transfer of pollen grains from anther to the stigma of a flower.	It is the fusion of male and female gametes.
2. Step. Pollination precedes fertilization.	Fertilization occurs only after pollination when the pollen grain has germinated and male gametes are carried into ovule.
3. Purpose. It carries the male gamete producing pollen grains to the female sex organ.	It actually brings about fusion of gametes.
4. Process. Pollination is a physical process.	Fertilization is a physico-chemical (biological) process.
5. Occurrence. It occurs only in seed plants.	It occurs in both plants and animals of various types.

2. Answer: Definition: Reproduction is the process of producing new young individuals of similar type by the mature individuals.

Importance of DNA Copying.

DNA carries hereditary information not only for controlling cellular functions but also all the structural and functional traits of organism. It is because of the latter that single celled zygote is able to form the whole multicellular organism. During reproduction there is formation of new cells which must carry the same amount and type of hereditary information as present in the parent cell. This is accomplished by DNA copying, which occurs prior to each cell division. DNA copying is not error proof. Errors give rise to variations.

3. Answer: Definition: Variation is differences in structure, physiology and other characters found in the individuals of the same organism.

Benefits of variations to species.

Many of the variations are pre-adaptations which have no immediate benefit to the individuals. However, they remain in the population. Whenever, environment undergoes a drastic change, the pre-adaptations present in some members of the population allow the latter to survive, grow and regain its former size. Therefore, it is not necessary that variations are beneficial to individuals developing them but can prove useful to the species.

4. Answer: Information Source: The information source of making proteins in a cell is its DNA.

Basic Event in Reproduction: The basic event in reproduction is replication of DNA, growth of cellular machinery and cell division.



5. Answer: Bacterial STD. Gonorrhoea caused by *Neisseria gonorrhoeae*. Viral STD. Genital warts caused by Human Papilloma virus.

Prevention. Avoiding multipartner sex, use of condoms and clean toilet habits.

6. Answer:

(a)

Seminal Vesicles: They secrete 60-70% of semen plasma that is alkaline and viscous having fructose (for nourishing the sperms), fibrinogen, proteins and prostaglandins. Prostaglandins cause movements in the genital tract of the female. Sperms are also activated by secretion of seminal vesicles.

Prostate Gland: It produces 20-30% of semen plasma. The secretion is alkaline and viscous. It has clotting enzyme and chemical essential for sperm activity.

(b) Function of Testes,

Formation of sperms from germinal cells of seminiferous tubules.

Secretion of testosterone by Leydig cells present in the connective tissue in between the seminiferous tubules.

7. Answer:

Male Gamete: Sperm (= spermatozoan)

Female Gamete: Ovum.

Fertilization: It is the fusion of two compatible gametes (e.g., sperm and ovum) to form diploid zygote during sexual reproduction.

In human females fertilization occurs in fallopian tube.

8. Answer:

Reproduction: Reproduction is the process of producing new young individuals of similar type by the mature individuals.

Importance of DNA Copying.

Types. Asexual reproduction and sexual reproduction.

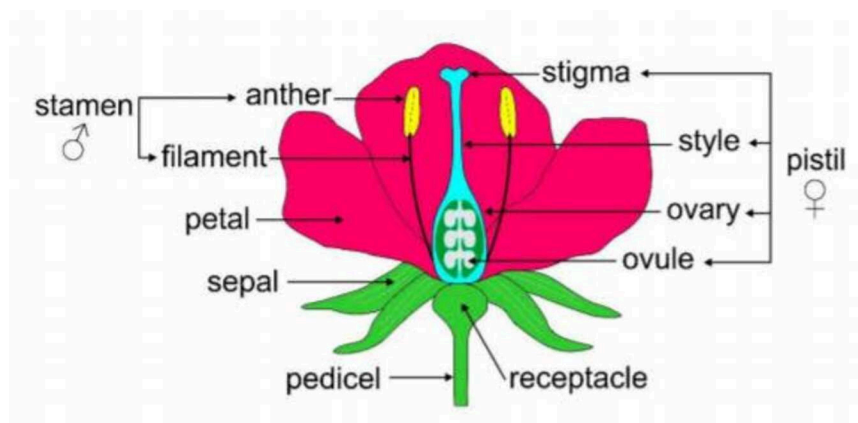
New Characteristics: New characteristics appear only in sexual reproduction due to

- Chance separation of chromosomes during meiosis required for gamete formation,
- Crossing over during meiosis.
- Chance coming together of chromosomes during fertilization,
- Mutations or mistakes during DNA replication.

➤ Long Answer:

1. Answer:

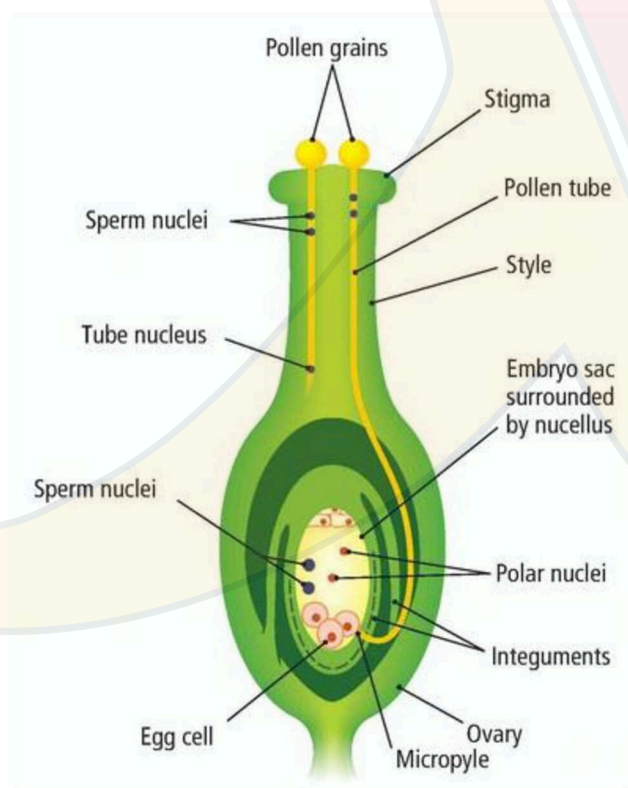




Function of Anther. To produce haploid pollen grains which on growth form pollen tubes, each containing two male gametes.

Fusion of Male and Female Gametes. On germination over stigma, a pollen grain forms a long pollen tube carrying two male gametes. Pollen tube enters an ovule and bursts open in the embryo sac. One male gamete fuses with the egg to form diploid zygote. It is generative fertilization. The second male gamete fuses with diploid secondary nucleus of central cell to form triploid primary endosperm cell. It is vegetative fertilization. The phenomenon of two male gametes fusing with different cells in the same embryo sac to produce two different structures is called double fertilization.

2. Answer: (a)



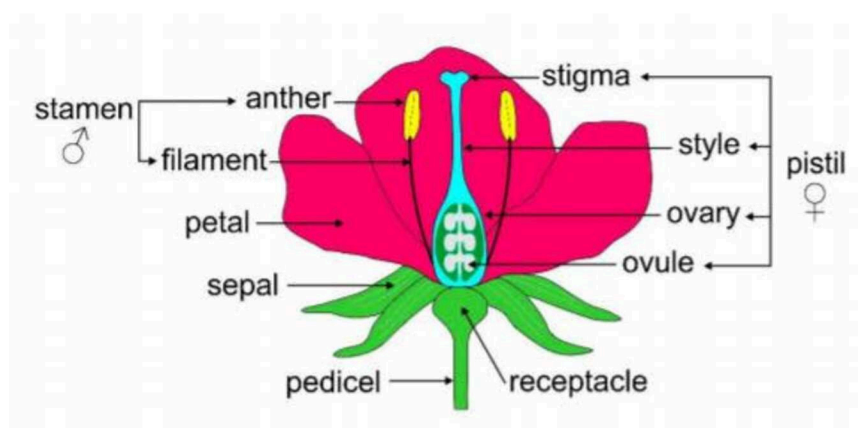
Fertilization in a flowering plant

(b) Label as required.

(c) Zygote or first diploid cell is formed by fusion of a male gamete (brought by pollen tube) with oosphere or egg inside the embryo sac.



3. Answer:



Labelling,

Anther—part that produces pollen grains.

Style—part that transfers male gametes to female gametes, by providing growth medium to pollen tubes.

Stigma—part that is sticky to trap pollen grain.

Ovary—part that develops into a fruit.

➤ Assertion Reason Answer:

1. (c) A is true but R is false.

Explanation:

The fertilisation which occurs inside the female body is called internal fertilisation. Reptiles show internal fertilisation

2. (b) Both A and R are true, but R is not the correct explanation of the assertion.

Explanation:

Ovule is gradually converted into a seed. A seed is the reproductive unit of a plant. The seed contains a baby plant (or embryo) and food for the baby plant. The part of baby plant in seed which develops into shoot with leaves is called plumule and the part which develops into root is called radicle. The part of seed which contains stored food for the baby plant is called cotyledon.

➤ Case study Questions:

1. i (b) Copper T.

Explanation:

Intrauterine device is placed inside the uterus by a doctor or a trained nurse. Copper T is a common intra-uterine device.

- ii. (b) Copper.
- iii. (c) It suppresses fertilising capacity of sperm.
- iv. (a) Device X might have got expelled without the knowledge of woman.



Explanation:

Intra-uterine devices are highly effective in preventing unwanted pregnancies. But they come with one disadvantage, that is they can get expelled anytime without the knowledge of women. Couple continue active sexual life thinking that their birth control device is still in action.

- v. (d) Device X can cause heavy painful and longer duration periods or menstruation.

Explanation:

Intra-uterine devices do not protect against sexually transmitted diseases. Periods may become heavier, longer, and more painful and there are chances of pelvic infection.

2. i (d) Both (a) and (b).

Explanation:

In barrier methods of preventing pregnancy, the physical devices such as condom and diaphragm are used. Condoms are rubber tubes used by males whereas diaphragm are rubber cups used by females.

- ii. (c) They prevent sperms from meeting the ovum.

Explanation:

Physical barriers prevent the sperm from meeting the ovum by acting as a barrier between them.

- iii. (d) Both (a) and (b).

Explanation:

Chemical methods of birth control include oral pills and vaginal pills. Oral pills are combination of estrogen and progesterone which prevent ovulation (release of egg during monthly cycle), so they prevent fertilisation. Vaginal pills are inserted in vagina before intercourse and release spermicides which kill sperms.

- iv. (d) Both (b) and (c).

- v. (d) All of these.

