

## Reproduction



### Introduction

Reproduction is the biological process, which helps us to produce new offspring or individuals of similar types. It is a fundamental feature of all living organisms.

There are two methods of reproductions: sexual and asexual.

In asexual reproduction, single individual can reproduce without involvement with another individual of that species. For example, the division of a bacterial cell into two daughter cells or reproductions in plant. In sexual reproduction, two organisms are involved in the process of reproduction. The two organisms are male and female of a particular species.



### Asexual Reproduction in Plants

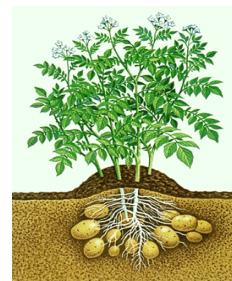
In asexual reproduction, the organisms create genetically similar or identical copy of itself. There is no contribution of genetic material from other individuals. Many single cellular organisms, like bacteria can divide asexually via binary fissions. Some other organisms, like amoeba and hydra also produce by binary fissions. The different methods of asexual reproductions are: fission, regeneration, budding, spore formations, vegetative propagations and fragmentations. Virus reproduces in the body of the host to produce more organisms of its kind. Hydra and yeasts are produced by budding. These organisms often do not possess different sexes. They are capable of breaking themselves into two or more cells and develop into individuals. Most of the plants are capable of reproducing by the process of vegetative propagations. In this process, the new plants are produced from the parts of the parent plants. For example, Bryophyllum, potato, tuber plants etc.



**Bryophyllum**



**Tuber**



**Potato**



### Stems

In some plant species, stems develop new roots when exposed to suitable conditions, forming new plants. The horizontal above-ground stems, called stolons, of the strawberry produce new daughter plants at alternate nodes. In some plants underground stems produce new plants. For example, rhizomes, bulbs, corns and tubers.





## Leaves

Some plants, such as, Bryophyllum reproduce through their leaves.



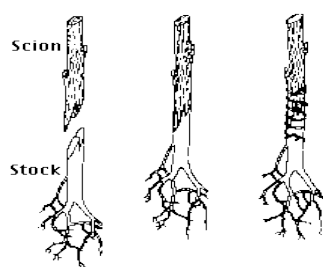
## Roots

Some plants such as dandelion, poplar or aspen, use their root for reproduction. They send up new stems from their roots, which develop into new plants.



## Grafting

This method is widely used for propagating desired variety of shrub or tree. All the varieties of apple is propagated by this method.



## Commonly Asked QUESTIONS



There are two different methods of reproduction, asexual and sexual. Which one of the following organisms reproduces by asexual method?

- (a) Cats
- (b) Birds
- (c) Humane
- (d) Hydra
- (e) None of these

**Answer: (d)**

### Explanation

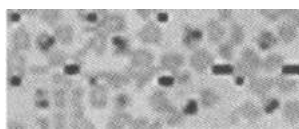
In cats, birds and human beings both male and female are separate, and hence they cannot reproduce by the asexual method. Hydra is a unicellular organism and hence reproduces by asexual method.



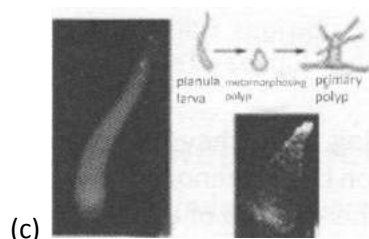
There are different methods of asexual reproductions. Which one of the following organisms given below reproduce by binary fission?



(a)



(b)



(c)

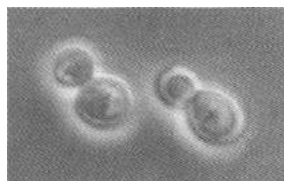
(e) None of these

**Answer: (a)**

**Explanation**

Since we know that option B, C, D, are multicellular and A is unicellular flagella, hence it reproduce by binary fission.

(d)



## A sexual Reproduction in Animals

There are some animals, which reproduce by the process of asexual reproduction. The different methods of asexual reproductions are:



### Budding

In this method, the organism develops a out-growth on its body. This out growth gets detached after some time and grow independently. The organisms like jellyfish and echinoderms, develops bud on their body which breaks away as they grows up and takes up an independent existence. Other animals like corals, the bud remains attached to the parent and form colonies of animals. This method is also common in parasitic animals like tapeworms.



### Fragmentation

In this method, the organism spontaneously breaks up into several pieces, and each piece develops into separate individuals. For example, the spirogyra reproduces by this method.



### Parthenogenesis

In this method the female produces egg, which develops into young one without ever being fertilized. It is also known as virgin birth. This method of reproductions is found in many fish, few species of frogs and lizard.

## Illustrative EXAMPLE



- ❖ Aphids use parthenogenesis in the spring, when they find themselves with ample food. In this species, reproduction by parthenogenesis is more rapid than sexual reproduction. The use of this method of asexual reproduction permits the animals to quickly exploit the available resources.
- ❖ Female Komodo dragons (the largest lizard) can reproduce offspring by parthenogenesis, when no male is available for sexual reproduction. Their offspring are homozygous, at every locus including, having identical sex chromosomes. Thus, the females reproduce all the males species, because unlike mammals, females are the heterogametic sex (ZW), while males are homogametic (ZZ).

## Commonly Asked QUESTIONS



There are many animals, which reproduce by the asexual methods. There are different methods of asexual reproduction and Parthenogenesis is one such method. Which one of the following organisms reproduces by this method?

- (a) Komodo
- (b) Aphids
- (c) Tapeworm
- (d) Hydra
- (e) None of these

**Answer: (b)**

**Explanation**



Only Aphids reproduces by Parthenogenesis, and rest reproduce by other methods of asexual reproduction. There are many microorganisms, which reproduce by the asexual method. Which one of the following organisms reproduce by asexual method?

- (a) Bacillus
- (b) Fly
- (c) Mosquito
- (d) Silk moth
- (e) None of these

**Answer: (a)**

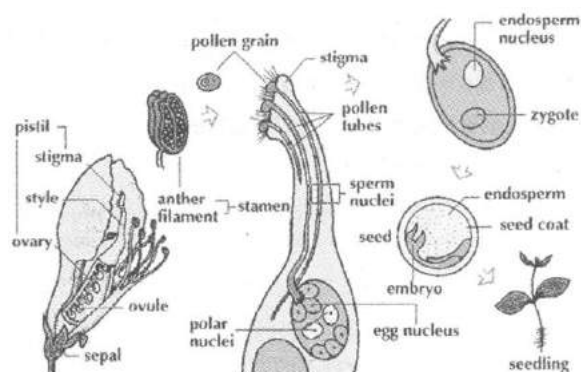
**Explanation**

Only Bacillus reproduce by binary fission, and rest of the organism reproduce by sexual method.



## Sexual Reproduction

The method of reproduction, in which both male and female are involved, is called sexual reproduction. The male and female mate with each other, and their egg fertilized to produce the new offspring. Each of the two parents contributes half of the offspring genetic makeup by creating the haploid gametes. In these anisogamous species, the male produces sperm and female produces ova. In isogamous species, the gametes are similar, but they have separable properties. For example, the green algae, *chlamydomonas reinhardtii*. There are many animals and plants, which reproduce sexually. The new offspring inherit the trait of both the parents. In plants, Bryophytes reproduces sexually; but they are normally haploid which produce gametes.





## Allogamy

In this method, the ovum of one individual fertilized with the spermatozoa of another individual.



## Autogamy

It is also known as self fertilization, which occurs in hermaphrodite organisms. In this organisms, both the male and female sex are present in the same individual.



## Mitosis and Meiosis

There are the two methods of cell division, mitosis and meiosis. The mitosis occurs in somatic cells, where as meiosis occurs in reproductive cell orgametes. In mitosis, the number of cell after the cell division is doubled, but the number of chromosomes remains the same as in the parent cell. In meiosis, the number of cell becomes four times, but the number of chromosomes is reduced to half. This process occurs in two phase, meiosis I and meiosis II.

## Commonly Asked QUESTIONS



There are different methods of cell division in the multicellular organisms, which helps in its growth and development. The method of cell division, which takes place in the reproductive cell for reproductions is?

- (a) Mitosis
- (b) Meiosis
- (c) Prophase
- (d) Anaphase
- (e) None of these

**Answer: (b)**

### Explanation

The cell division in the reproductive cell is by the method of meiosis and cell division in rest of the body parts is through mitosis.



Some organisms have both the sex, while, most of the other multicellular organisms have male and female on different organisms. The organisms, in which have both male and female sex are present is called hermaphrodite. Which one of the following organisms given below is hermaphrodite?

- (a) Leach
- (b) Earthworm
- (c) Tapeworm
- (d) Silkworm
- (e) None of these

**Answer: (b)**



## Asexual vs. Sexual Reproduction

The organisms, which reproduces sexually tend to grow exponentially in numbers, but rely on mutation for variations in DNA. They have similar vulnerabilities. The organisms that reproduce sexually, yield less number of offspring. They show large amount of variations in their genetic make up. It makes them less

susceptible to disease. There are many organisms that can reproduce both sexually and asexually. For example, aphids, slime molds, sea anemones, some species of starfish and many species of plants. Asexual reproduction is employed when the environmental conditions, such as, abundant food supply, adequate shelter, favorable climate, etc is suitable for survival. When these conditions get depleted, the organism switch on to sexual mode of reproductions. The variations found in the offspring are more, that reproduce through sexual mode. The variations in the offspring help them to survive better in the changing climatic conditions. In addition/sexual reproduction usually results in the formation of life stage that endures the conditions, which threatens the offspring of an asexual parent. Thus, the seeds, spores, eggs, pupae, cysts or other "over-wintering" stages of sexual reproduction ensure the survival during unfavorable conditions. The organism can "wait out" adverse conditions until a swing back to suitability occurs.



### Why to Choose Asexual Reproduction

The sexual reproduction is more efficient way to reproduce more organisms. Sexual reproductions requires both male and female for the process to be completed. Two general explanations for the overwhelming prevalence of sexually-reproducing species over asexual ones are:

- (i) It provides a mechanism to weed out harmful mutations, that arise in the population reducing its fitness.
- (ii) Perhaps it is the ability to adapt quickly to a changing environment, which has caused sex to remain the method of choice for most living things.

### Commonly Asked QUESTIONS



The population of the organisms, which reproduces by the sexual method is large, as compared to the population of the organisms reproduce by the sexual method. In asexual method, large number of new organisms is produced at a time. Thus, we can say that the number of population in asexual reproduction increases\_\_\_\_\_.

- (a) Proportionally
- (b) Inversely
- (c) Exponentially
- (d) Linearly
- (e) None of these

**Answer: (c)**

#### Explanation

The population in asexual method increases exponentially.



### Which of the following statement is correct?

**Statement 1:** In asexual reproduction, the organisms rely on mutation for variation in DNA.

**Statement 2:** In asexual reproduction the organism can reproduce in different condition.

- (a) Both the statement 1 and 2 are correct
- (b) Statement 1 is correct and 2 is incorrect
- (c) Statement 1 is incorrect and 2 is correct
- (d) Both statement 1 and 2 are incorrect
- (e) None of these

**Answer: (a)**

**Explanation**

Since both the statement I and II regarding the asexual reproduction is correct.



## Reproductive Parts of a Flower

The plants, that reproduce sexually have the reproductive structures called the flowers. The flower is a condensed shoot, with the nodes present very close to each other. The different parts of the plant are attached to the nodes. All the structures present at one node are collectively called the whorl. The first or the outermost two whorls are called the non-reproductive whorls. They are, the calyx and corolla. The inner two whorls, which are the reproductive whorls are androecium and gynoecium.



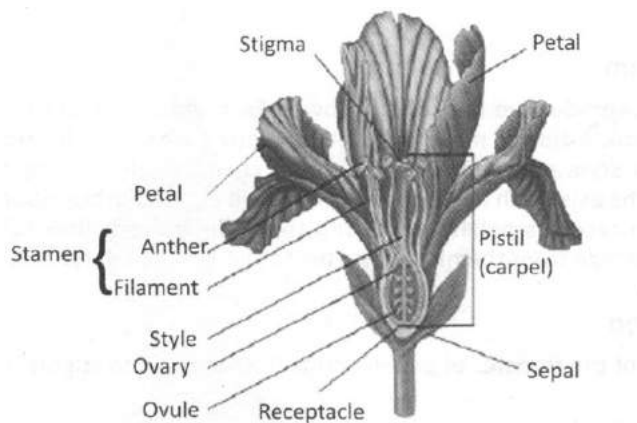
### Calyx

It is the outermost and often green in colour. The individual units of calyx is called the sepals. It protects the inner whorls at bud stage.



### Corolla

It is the next inner part of the whorl, and is coloured differently. The individual units of the corolla are called petals. They act as an attraction for bees, birds, etc, which are the agents of pollination.

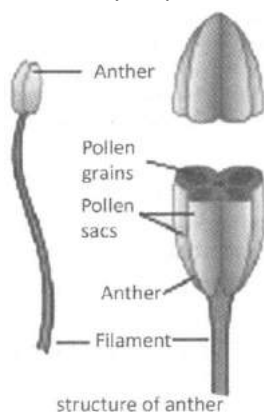


**The reproductive part of the flowers**



### Androecium

It is the male reproductive part of the flowers. The male organ is called stamens. Each stamen has a thread like filament at its free end, which is attached to the four lobed anther. The anther has four pollen sacs in each lobe. These pollen sacs contain microscopic cell called pollen grains. Each microspore divides once mitotically to produce two male gametes or the sperm cell. Each mother cell produces 8 sperm cells.



### Gynoecium

It is the female reproductive part of the flower. Each individual unit is called the carpel or pistil. A flower may have one or many carpels. Each carpel is made up of ovary, style and stigma. Ovules are the chamber where many ovules are attached to the axis. Each ovule consists of haploid egg and other associated cells. The stigma receives pollen grains and the style is the hollow tube, that provides passage from the male gametes to the female ovary.

### Pollination

It is the process of the transfer of pollen grains from stamen to stigma. It is of two types:

(i) Self pollination

(ii) Cross pollination

The self pollination, also known as autogamy, is the pollination in which pollens are transferred to the stigma of the same flower. Whereas, in cross pollination the pollens are transferred to the stigma of the different flowers. It is also known as allogamy. The various agents of cross pollinations are wind, water, bees, bats and many other animals.

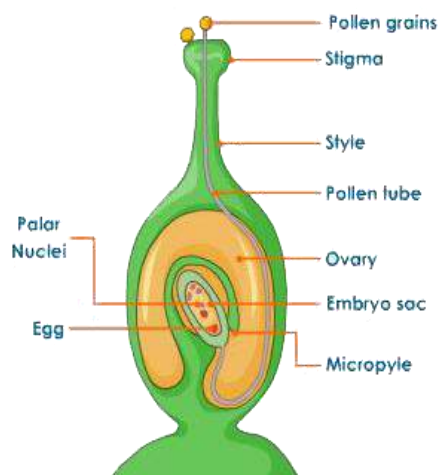


**Pollination**

### Fertilization

On reaching the stigma, the pollen grains produce a tube. This is called germination of the pollen grain.

The upper most part of the tube contains the male nuclei, which grows and enters into the ovules. It bursts at the tip releasing the male gametes. The male gametes fuse with the egg, resulting in the formation of zygote that is diploid. This fusion is called fertilization. The zygote then develops into the embryo.



**Fertilization in a flowering plant**

## Commonly Asked QUESTIONS



In some plants, male and female reproductive part are present in the same flower; but in some plant they are present in different flowers. The male reproductive part of the flower is called:

- (a) Androecium's
- (b) Gynoecium's
- (c) Carpel
- (d) Cylax
- (e) None of these

**Answer: (a)**

### Explanation

The gynoecium is female reproductive part of the flower, where as carple and cylax are part of reproductive system of the flower.



In plants fertilization takes place by transfer of pollen grains. This transfer of pollens is called pollination. It may be self pollination or cross pollination. The self pollination is also called:

- (a) Allogamy
- (b) Autogamy
- (c) Monogamy
- (d) Polygamy
- (e) None of these

**Answer: (a)**

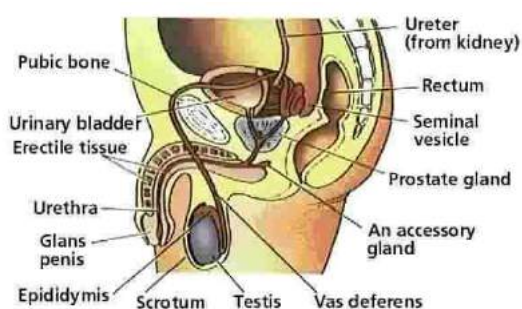
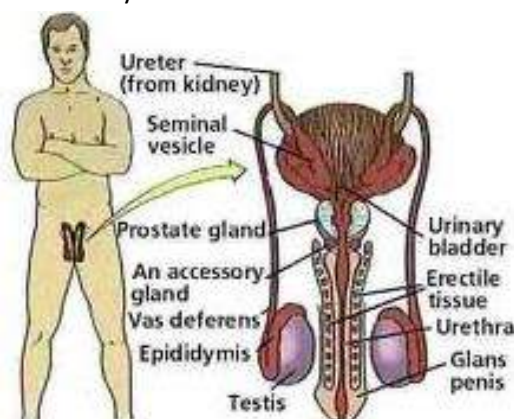
### Explanation

The other name of self pollination is allogamy.



## The Male Reproductive System in Human

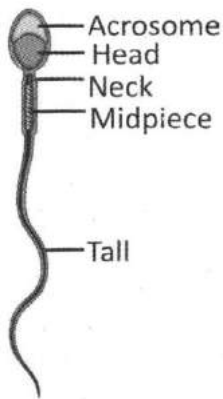
The male reproductive system consists of scrotum, which is suspended outside the abdominal cavity. This pouch keeps the testis temperature below the body temperature, which is necessary for the development of sperm. The tubules inside testis are about 250 meter long. The testis is connected to the vas deferens, which carries sperm to the prostate glands where it mixes with the seminal vesicles to form a viscous liquid/ so that it can easily flow out. This in turn is connected with the urethra then to the penis.



**The Male Reproductive System**

## Spermatogenesis

Sperm production begins at the age of puberty. It continues throughout the life, with several hundred million sperm being produced each day. Once sperm is formed/ it moves into the epididymis, where they mature and are stored.



## Male Sex Hormones

The pituitary gland produces follicle stimulating hormone (FSH) and luteinizing hormone (LH). It stimulates the cell, which secrete testosterone hormone that helps in productions of sperms.

## Commonly Asked QUESTIONS



**The male reproductive organ is testis. It lies in the pouch like structure called scrotum. The tube like structure which carries sperm from testis to outside is called:**

- (a) Ureter
- (b) Vas deference
- (c) Urethra
- (d) Prostate gland
- (e) None of these

**Answer: (b)**

**Explanation**

All are the parts of male reproductive system, but vas deference helps in carrying of sperm to outside.



**The hormones are the substance which regulates the functioning of our body. It also plays important role in our reproductive system. The hormones, which stimulates the formation of sperms in male is called:**

- (a) Progesterone
- (b) Estrogen
- (c) Testosterone
- (d) FSH
- (e) None of these

**Answer: (c)**

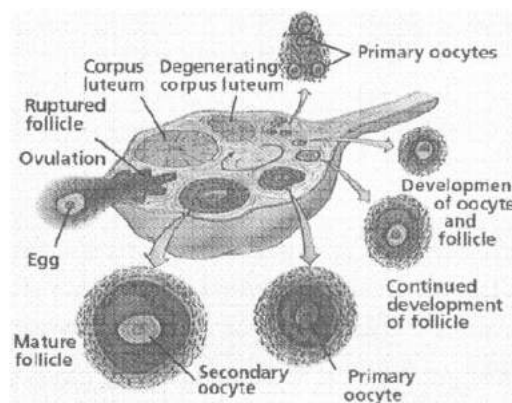
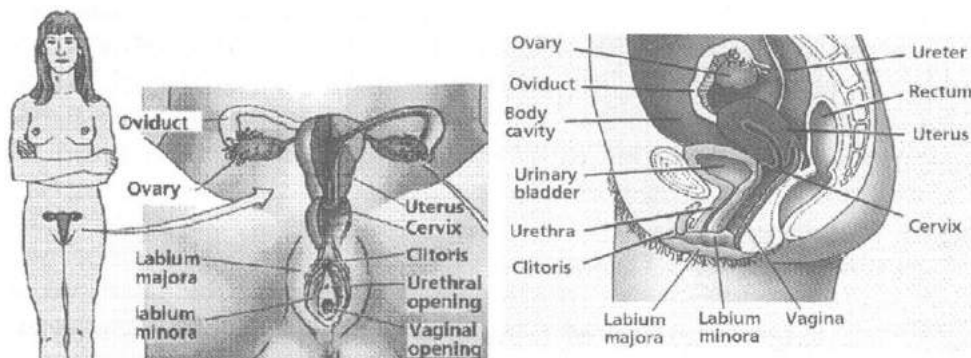
**Explanation**

All of the options is hormones but option C is male reproductive hormones and the rest are female sex hormones.



## The Female Reproductive System in Human

The female reproductive system consists of gonads and ovaries, which are located within the lower abdominal cavity. The ovary contains many follicles consist of developing egg cells. It is surrounded by an outer layer of follicle cells. At birth each female carries a lifetime supply of developing oocytes, each of which is in Prophase I. A developing egg is released each month at the onset of puberty until menopause. After puberty, the menstrual cycle begins. These cyclic phases are interrupted only by pregnancy and continue until menopause, when the reproductive capability ends. The egg cells from ovary then pass onto the fallopian tube, which in turn is connected to the uterus. The fertilized egg cells are then implanted on the inner lining of the uterus. At the lower end of the uterus, lies the cervix, which connects the uterus to the vagina. The vagina receives the penis during the intercourse and serves as the birth route.



**The Female Reproductive System**



### External Genitals

The external genitals of the female are collectively known as the vulva. The labia minora is a thin membrane of folded skin just outside the vaginal opening. The labia majora cover and protect the genital area. The clitoris is important in arousal and is a short shaft with a sensitive tip covered by a fold of skin.



### Hormones in Female

There are two types of female sex hormones, which help in controlling the process of reproductions. These hormones are estrogen and progesterone. Menstrual cycles varies between 15 to 31 days. The first day of the blood flow (day 0) known as menstruation. During menstruation the uterine lining is broken down and shed as menstrual flow. FSH and LH are secreted on day 0. Both FSH and LH stimulate the maturation of a single follicle in one of the ovaries and the secretion of estrogen. Rising levels of estrogen in the blood

trigger secretion of LH, which stimulates follicle maturation and ovulation (day 14, or midcycle). LH stimulates the remaining follicle cells to form the corpus luteum, which produces both estrogen and progesterone.

## Commonly Asked QUESTIONS



**The external genital of female, which consist of labia minora, labia majora and clitoris collectively called:**

- (a) Ovary
- (b) Fallopian tube
- (c) Vagina
- (d) Vulva
- (e) None of these

**Answer: (d)**

**Explanation**

The external genital organ of female is called vulva.



**The ovary contains many follicles consists of a developing egg cells surrounded by an outer layer of follicle cells. At birth each female carries a lifetime supply of developing such follicles. These follicles are called:**

- (a) Eggs
- (b) Gametes
- (c) Oocytes
- (d) Zygotes
- (e) None of these

**Answer: (c)**

**Explanation**

Gametes, zygote and eggs are the reproductive cell of the organisms and oocytes is the outer layer of the follicle cell.



## Sex Determination

The sex of an individual is determined by the combination of sex chromosomes X and Y. If the chromosomal combination is XX, it results in female child. On the other hand, if it is XY, it results in male child. These chromosomes help in the exchange of genetic material.



## Puberty and Adolescence

At the age of adolescence, some major changes occur in boys and girls, in physic as well as, in behavior. Some of the changes seen in boys are, cracking of voice, cranky, growth of hair in armpit and genital areas, growth of body muscles and more importantly production of sperms and arousal of sexual feelings. On the other hand, in girls growing of breast, growth of hair in genital areas, onset of menstrual cycle and growth of body muscles are seen. They also show behavioral changes. While puberty covers the physical changes, adolescence deals with the mental changes and has been described as a 'psychosocial process characterized by mental and social growth, and often extending from puberty to the early 20 s and sometimes beyond.' These transformations in the girls are seen between the ages of 8 and 12 years, while in boys it is seen couple of years later. But still, there is no strict time frame for the onset of puberty.



## Behavior Changes

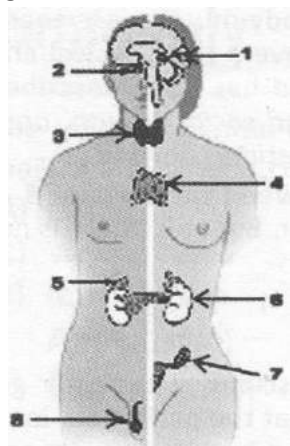
Most adolescents are uncomfortable and unconscious about their growing breasts and suddenly awkward limbs. They feel that the people are looking at them differently. Every pimple seems magnified a hundred times, and girls hunch over trying to conceal their growing waist lines. To make matters worse, most parents are at a loss when faced with their children's budding sexuality. They cannot accept the fact that their 'babies' are talking and thinking about sex. As a result, adolescents are ecstatic one minute, irritable and moody the next. On one hand, they display a new-found maturity in keeping with their 'adult' status. On the other, they throw tantrums, that could rival a three-year-old.

Puberty and adolescence bring with them a lot of emotional baggage. People in their adolescent years feel as if they are in a twilight zone, hanging somewhere in between childhood and adulthood. As if they're sitting on an emotional seesaw, feeling 'up' one minute, down the next; feeling old on some days, and like a child on others. It is a difficult time, but it makes one feel better to think that everyone has gone through it.



## Endocrine System

The endocrine system is made up of a series of ductless glands that produce hormones. A number of glands that signal each other in sequence are usually referred to as axis. Some of the endocrine glands are pituitary, thyroid and adrenal glands. The features of endocrine glands in general are, their ductless nature, their vascularity and usually, the presence of intracellular vacuoles or granules storing their hormones. On the other hand exocrine glands such as, salivary glands, sweat glands and the glands inside the gastrointestinal tract are less vascular and have ducts to store the hormones. The major endocrine glands found in male and female are pineal gland, pituitary gland, thyroid gland, adrenal gland, pancreas, ovary, testis and thymus gland.



**Endocrine System**



## Cross Breeding

It is usually referred to an animal with purebred parents of two different breeds or varieties. It can also be defined as the breeding of animals of desired traits with the animals of other traits. The term is also used at times, to refer to a domestic animal of unknown ancestry, where the breed status of only one parent or grandparent is known, though the term "mixed breeding" is technically more accurate. The term outcross is used to describe a type of crossbreeding, used within a purebred breed to increase the genetic diversity within the breed, particularly when there is a need to avoid inbreeding.

## Commonly Asked QUESTIONS



The new born baby will be a male or female depends on the type of the combination of sex chromosomes. The types of sex chromosomes present in human are X and Y. Which one of the following combination given below will give birth to a male child?

- (a) XX
- (b) XY
- (c) XXX
- (d) YY
- (e) None of these

**Answer: (b)**



There are two types of gland in our body, some are ductless and other is with duct. A number of gland that signals each other in a sequence are usually referred as:

- (a) Endocrine
- (b) Exocrine
- (c) Axis
- (d) Vascularity
- (e) None of these

**Answer: (c)**

### Explanation

The glands which works in a sequence are referred as axis, while ductless gland are called endocrine and duct gland are called exocrine.



## Heredity and Evolution

Heredity is the transmission of the characters of the parents to their offspring from one generation to the next. The characteristics include physical, physiological and psychological behavior of the organisms. Gregore Mendel carry out his experiment with the pea plant, as they show many contrasting traits, that were easy to track through the generations. In his first experiment, he considered only one trait, such as, height, colour, shape of the seed, etc. This is known as monohybrid. According to him, the genotype is made of certain structure, which controls the inheritance of all traits. The different expression of the gene is called alleles, in which each trait is represented by a letters. According to law of inheritance, all the traits have separate entities by themselves, which are controlled by the genes. The genetic material is a nucleoprotein called chromatin. It is made up of DNA and protein.



## Variation

It is defined as the difference among individuals of the species. There are two types of variations, such as, somatic and non-inheritable. Variation helps the organisms to adapt to the changing conditions. The different theories of evolutions are:



## Organic Evolution

Evolution is regarded as the gradual development of more complex species from the pre-existing simpler species. This takes place over the millions of years, which is clear from the evidences of fossils. According to the theory of organic evolutions, continuous use of an organ results in well developed organs and less used or unused organ over a long period of time will result in disintegration of the organ. For example, the giraffes were forced to extend their neck, and stretch their legs to reach higher vegetations. There are many evidences of evolutions; study of fossils of plants and animals helps us to understand the theory of evolutions. The geological distribution of organisms on the earth is also an important part of study. The embryological study of the organisms also helps to study the evolution theory.

### Commonly Asked QUESTIONS



**Heredity is the transmission of character from one generation to the next. The genotype is made of certain structure, which controls the inheritance of all traits. The different expression of the gene is called:**

- (a) Genotype
- (b) Alleles
- (c) Phenotypes
- (d) Inheritance
- (e) None of these

**Answer: (b)**



**Variation is defined as the difference in the organisms, which arises from one generation to the next. The variation which arises in the organism is either due to the genetic mapping or due to the external conditions. The traits, which the organisms develop due to the external conditions are called:**

- (a) Inherited traits
- (b) Desired traits
- (c) Acquired traits
- (d) Mixed traits
- (e) None of these

**Answer: (c)**

### You Must KNOW

- ❖ During the entire life time, a female oyster produces 100 million young ones and a hen lays 19 dozen eggs in a year.
- ❖ A disease called cirrhosis is more prominent in men without hair on his chest.
- ❖ The number of bacteria on each feet of human is about one trillion.
- ❖ The amount of heat given off by our body in thirty minutes can boil half a gallon of water.
- ❖ The teeth in human starts growing six month before the baby are born.

## SUMMARY



- ❖ Reproduction enables the organisms to live generation after generation. It is normally of two types; sexual and asexual. Asexual reproduction does not involve male and female organisms, while the sexual reproduction involves both the male and female. The offspring formed in asexual reproduction are normally identical, and are referred as clones. Unicellular organisms reproduce by asexual method.
- ❖ Sexual method involves the formation of gametes. It is a very complex process and takes longer time. Organisms may be bisexual in which both male and female sex organ are present. Plants can also reproduce by sexual method. Both male and female sex organ may present in the same plant or may present on different plant. The transfer of pollen is of two types: self pollination or cross pollination. In flowering plants, after fertilization, ovary develops into fruit and ovules mature into seeds. Inside the mature seeds is the progenitor of the next generation, called the embryo.

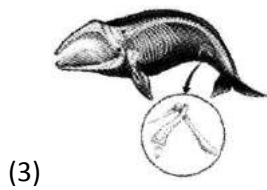
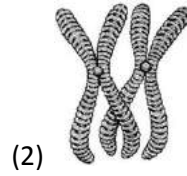
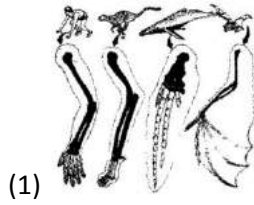
# Self Evaluation **TEST**



Duration  
10 Minutes

- 
1. If the trait X exists in 10% of a population of an asexually reproducing species, and a trait Y exists in 60% of the same population, which trait is likely to have arisen earlier?
- (a) X (b) Y  
(c) XY (d) Both X and Y  
(e) None of these
- 
2. According to the second law of inheritance: inheritance of more than one pair of traits is a cross, simultaneously, the ratio of each phenotype in the seed in regeneration is:
- (a) 4 : 2 : 2 : 1 (b) 1 : 2 : 2 : 1  
(c) 1:3:3:1 (d) 9:3:3:1  
(e) None of these
- 
3. Mendel chose a specific plant to carry out his experiment to study the various traits. He chose the plant, because it has number of difference, easy to tell apart and not available in other plants. Which one of the following the plants he used for his study:
- (a) Papaya (b) Potato  
(c) Pear (d) Pea  
(e) None of these
- 
4. The gene of red hair is recessive to the gene for black hair. What will be the hair color of a person if he inherits a gene for red hair from his mother and a gene for black hair from his father?
- (a) Red (b) Black  
(c) Brown (d) Grey  
(e) None of these
- 
5. A man having blood group O married a women with blood group B and they have a girl child after one year. The blood group of the girl child will be:
- (a) O (b) B  
(c) BO (d) Equally likely  
(e) None of these
-

6. Which one of the following are homologous organ?



(a) 1, 2

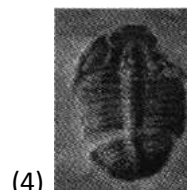
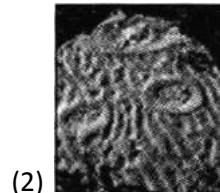
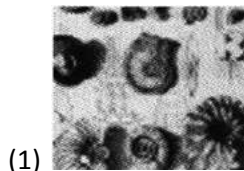
(b) 2, 3

(c) 3, 4

(d) 4, 1

(e) None of these

7. Which one of the following is a fossil?



(a) 1, 2

(b) 2, 3

(c) 3, 4

(d) All of these

(e) None of these

8. During the evolution process, in which of the following organisms eyes appeared first?





(c)

(e) None of these



(d)

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9. Human evolution has been studied by using various tools of tracing evolutionary relationships, like excavation, carbon dating and study of fossils. Accordingly, it was found that, there was no biological difference in the race of all human being. The earliest member of human being came from which one of the following country?

- (a) America (b) Australia  
(c) Africa (d) Antarctica  
(e) None of these

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10. The gas, which are present in the earth atmosphere today, were not present in early days. According to the research, the main gas in the earth atmosphere, in the beginning, were methane, ammonia, etc. Which one of the following gases were not present in the early days in the earth atmosphere?

- (a) Methane (b) Hydrogen sulphide  
(c) Oxygen (d) Nitrogen  
(e) None of these
- 

#### Answers – Self Evaluation Test

1. B	2. D	3. D	4. B	5. D	6. A	7. D	8. A	9. C	10. C
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