

NCERT Solutions for Class-XII Biology

Chapter -2

NCERT Biology Class 12

1. Fill in the blanks:

- (a) Humans reproduce _____. (asexually/sexually)
- (b) Humans are _____. (oviparous/viviparous/ovoviviparous)
- (c) Fertilization is _____ in humans. (external/internal)
- (d) Male and female gametes are _____. (diploid/haploid)
- (e) Zygote is _____. (diploid/haploid)
- (f) The process of release of the ovum from a mature follicle is called _____.
- (g) Ovulation is induced by a hormone called the _____.
- (h) The fusion of the male and the female gametes is called _____.
- (i) Fertilization takes place in the _____.
- (j) The zygote divides to form _____, which is implanted in uterus.
- (k) The structure which provides vascular connection between the fetus and uterus is called _____.

1. (a) Humans reproduce *sexually*.

(b) Humans are *viviparous*.

(c) Fertilization is *internal* in human.

(d) Male and female gametes are *haploid*.

(e) Zygote is *diploid*.

(f) The process of release of the ovum from a mature follicle is called *ovulation*.

(g) Ovulation is induced by a hormone called the *luteinizing hormone*.

(h) The fusion of the male and the female gametes is called *fertilization*.

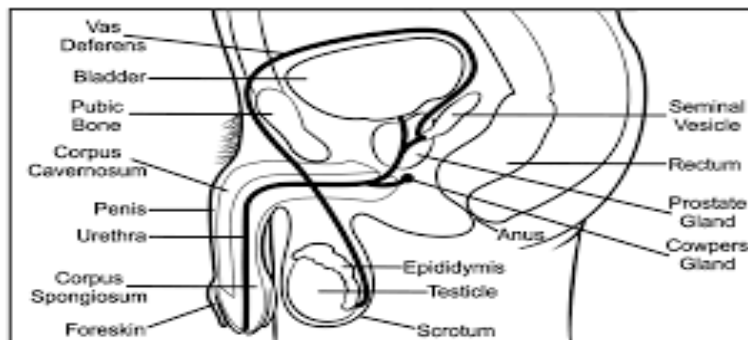
(i) Fertilization takes place in the *fallopian tube*.

(j) The zygote divides to form *blastocyst*, which is *fertilization* implanted in uterus.

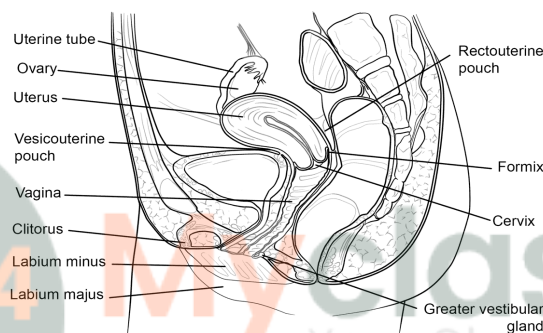
(k) The structure which provides vascular connection between the fetus and uterus is called *placenta*.

2. Draw a labeled diagram of male reproductive system.

2. Diagrammatic representation of male reproductive system:



3. Draw a labeled diagram of female reproductive system.
3. Diagrammatic representation of female reproductive system:



The Female Reproductive System

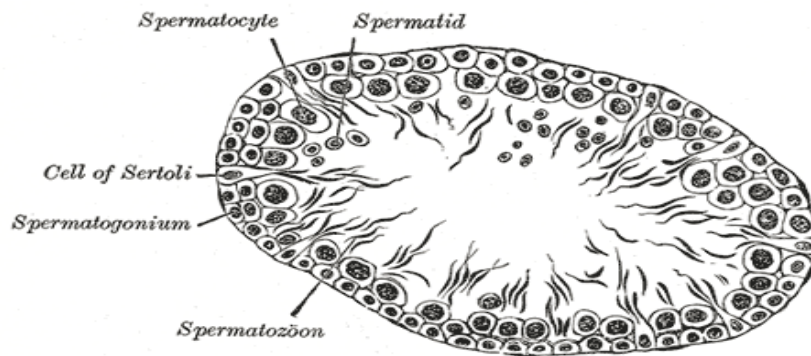
4. Write two major functions each of testis and ovary.
4. Functions of the Testis
 - They produce male gametes called spermatozoa by the process of spermatogenesis.
 - The Leydig cells of the seminiferous tubules secrete the male sex hormone called testosterone. Testosterone aids the development of secondary sex characteristics in males.

Functions of the ovary

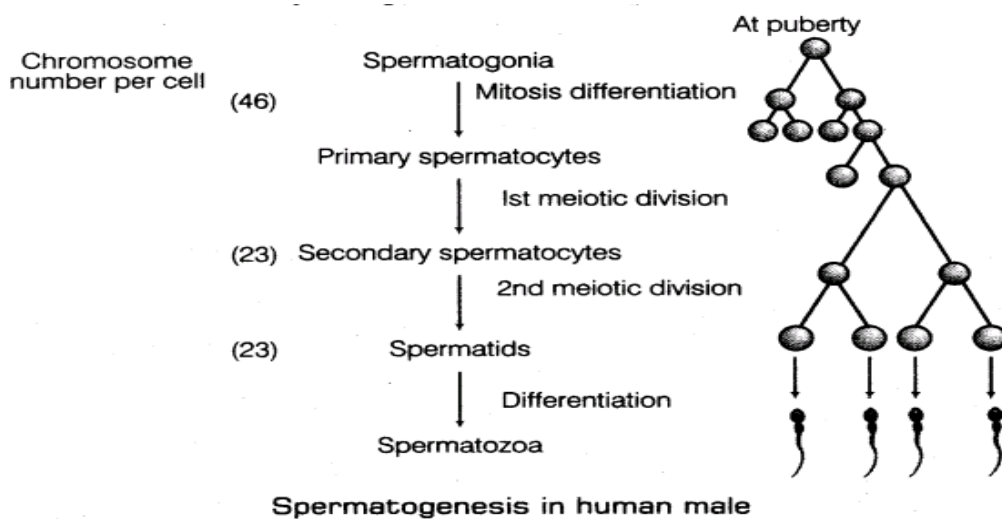
- They produce female gametes called ova by the process of oogenesis.
- The growing Graafian follicles secrete the female sex hormone called estrogen. Estrogen aids the development of secondary sex characteristics in females.

5. Describe the structure of a seminiferous tubule.
5. The seminiferous tubule is a highly coiled structure, located in testicle lobules, where the production of sperms occurs and the process is called as spermatogenesis. Each seminiferous tubule is lined by germinal epithelium, on the inner side it is lined by two types of cells called i) spermatogonia – male germ cells that produce primary

spermatocytes by meiotic divisions forms secondary spermatocytes which again undergoes meiotic division to form spermatids, that metamorphoses into male gametes called spermatozoa.ii) Sertoli cells – are also called as nurse cells of the testis as they provide nourishment to the germ cells.They are large and polygonal also called as interstitial or leydig cells,these cells secrete the male hormone called testosterone. Diagrammatic representation of a seminiferous tubule as below:

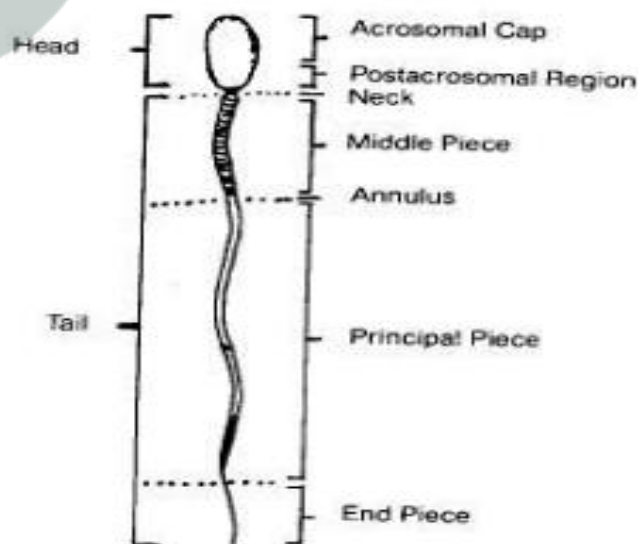


6. What is spermatogenesis? Briefly describe the process of spermatogenesis.
6. Spermatogenesis is the process of the production of sperms from the immature germ cells in males. It takes place in seminiferous tubules present inside the testes. During spermatogenesis, a diploid spermatogonium (male germ cell) increases its size to form a diploid primary spermatocyte. This diploid primary spermatocyte undergoes first meiotic division (meiosis I), which is a reductional division to form two equal haploid secondary spermatocytes. Each secondary spermatocyte then undergoes second meiotic division (meiosis II) to form two equal haploid spermatids. Hence, a diploid spermatogonium produces four haploid spermatids. These spermatids are transformed into spermatozoa (sperm) by the process called spermiogenesis.



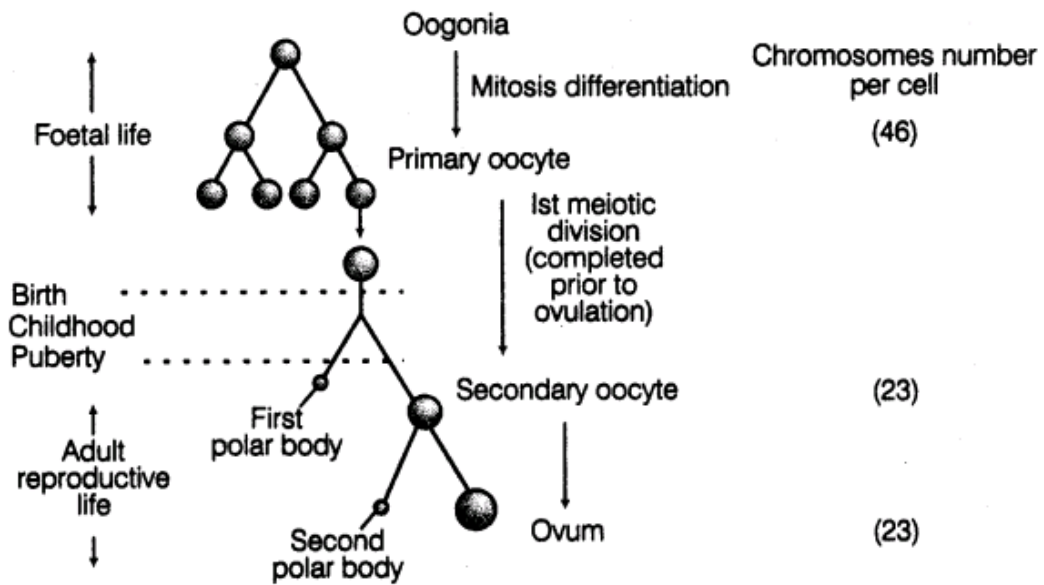
7. Name the hormones involved in regulation of spermatogenesis.
7. The hormones involved in regulation of spermatogenesis are : (i) Follicle stimulating hormone(FSH) and (ii) Luteinizing hormone (LT).Both the hormones are secreted by gonadotropin releasing hormones from the hypothalamus, they regulate the process of spermatogenesis. FSH acts on the sertoli cells(nurse cells) and LT acts on leydig cells to stimulate the process of soermatogenesis.
8. Define spermiogenesis and spermiation.
8. Spermiogenesis
It is the process of transforming spermatids into matured spermatozoa or sperms.
Spermiation
It is the process when mature spermatozoa are released from the sertoli cells into the lumen of seminiferous tubules.
9. Draw a labeled diagram of sperm.
9. Spermatozoon is a mature male gamete or reproductive cell.A sperm cell comprises of a round or cylindrical nucleated cell.a short neck, anda thin motile tail. The structure of sperm is very important for its motility and function in sexual reproduction.The nucleus contains half of the genetic information and fuses with the ovum (female gamete) to form a zygote.A sperm cell determines the sex of its offspring in mammals,if it bears Y chromosome,then male offspring will be the result and if X chromosome the female offspring.

Diagrammatic representation of a sperm:



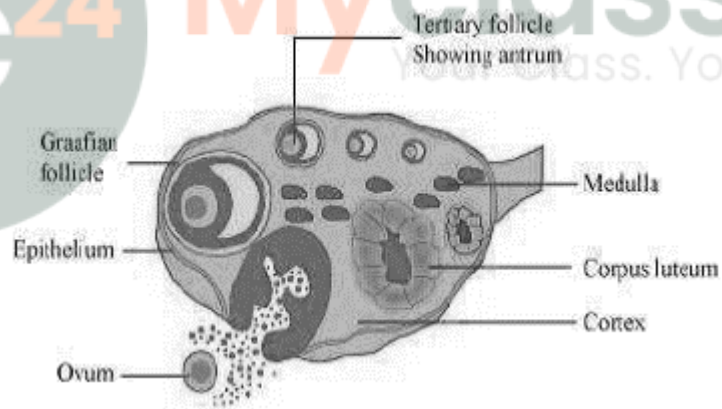
10. What are the major components of seminal plasma?

- 10.** Semen (produced in males) is composed of sperms and seminal plasma. The major components of the seminal plasma in the male reproductive system are mucus, spermatozoa, and various secretions of accessory glands. The seminal plasma is rich in fructose, calcium, ascorbic acid, and certain enzymes. It provides nourishment and protection to sperms.
- 11.** What are the major functions of male accessory ducts and glands?
- 11.** The male accessory ducts comprises of : i) vasa efferentia, ii) epididymis, iii) vas deferens and iv) rete testis. These ducts play an important role in the transport and temporary storage of sperms. Whereas, the male accessory glands comprises of : i) seminal vesicles, ii) prostate glands and iii) bulbourethral glands. Their functions are to secrete fluids that lubricate the reproductive system and sperms. The sperms remain dispersed in the fluid and therefore transportation into the female body becomes smoother. The fluid is rich in ascorbic acid, fructose and certain enzymes. Hence they provide nutrients to sperms and keep them activated.
- 12.** What is oogenesis? Give a brief account of oogenesis.
- 12.** Oogenesis is the process of the formation of a mature ovum from the oogonia in females. It takes place in the ovaries. During oogenesis, a diploid oogonium or egg mother cell increases in size and gets transformed into a diploid primary oocyte. This diploid primary oocyte undergoes first meiotic division i.e., meiosis I or reductional division to form two unequal haploid cells. The smaller cell is known as the first polar body, while the larger cell is known as the secondary oocyte. This secondary oocyte undergoes second meiotic division i.e., meiosis II or equational division and gives rise to a second polar body and an ovum. Hence, in the process of oogenesis, a diploid oogonium produces a single haploid ovum while two or three polar bodies are produced.



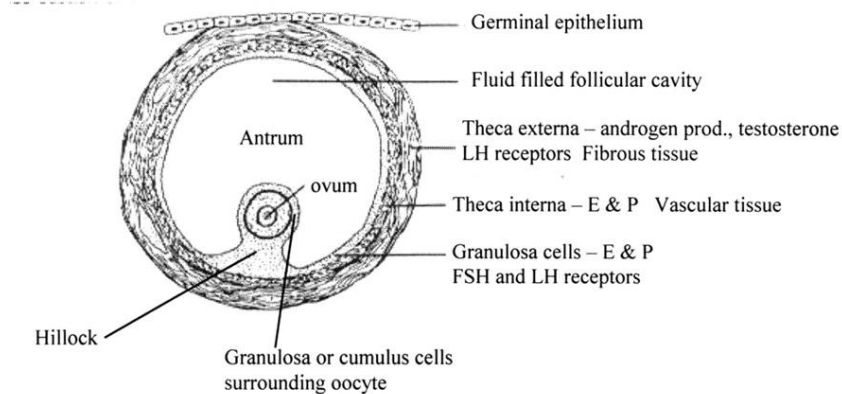
Oogenesis in human female showing formation of ovum

13. Draw a labelled diagram of a section through ovary.
13. Diagrammatic representation of a section through ovary (ovum – egg) - the female gonad.



14. Draw a labeled diagram of a Graafian Follicle?
14. A labelled diagrammatic representation of Graffian follicle.

CROSS SECTION OF GRAAFIAN FOLLICLE



15. Name the functions of the following:

- (a) Corpus luteum
- (b) Endometrium
- (c) Acrosome
- (d) Sperm tail
- (e) Fimbriae

15. (a) *Corpus luteum* – Corpus luteum is formed from the ruptured Graafian follicle. It secretes progesterone hormone during the luteal phase of the menstrual cycle. A high level of progesterone inhibits the secretions of FSH and LH, thereby preventing ovulation. It also allows the endometrium of the uterus to proliferate and to prepare itself for implantation.

(b) *Endometrium* – It is the innermost lining of the uterus. It is rich in glands and undergoes cyclic changes during various phases of the menstrual cycle to prepare itself for the implantation of the embryo.

(c) *Acrosome* – It is a cap-like structure present in the anterior part of the head of the sperm. It contains hyaluronidase enzyme, which hydrolyses the outer membrane of the egg, thereby helping the sperm to penetrate the egg at the time of fertilization.

(d) *Sperm tail* – It is the longest region of the sperm that facilitates the movement of the sperm inside the female reproductive tract.

(e) *Fimbriae* – They are finger-like projections at the ovarian end of the fallopian tube. They help in the collection of the ovum (after ovulation), which is facilitated by the beating of the cilia.

16. Identify True/False statements. Correct each false statement to make it true.

- (a) Androgens are produced by Sertoli cells. (True/False)
- (b) Spermatozoa get nutrition from Sertoli cells. (True/False)
- (c) Leydig cells are found in ovary. (True/False)

- (d) Leydig cells synthesise androgens. (True/False)
- (e) Oogenesis takes place in corpus luteum. (True/False)
- (f) Menstrual cycle ceases during pregnancy. (True/False)
- (g) Presence or absence of hymen is not a reliable indicator of virginity or sexual experience. (True/False)

16. (a) False
(b) True
(c) False
(d) True
(e) False
(f) True
(g) True

17. What is menstrual cycle? Which hormones regulate menstrual cycle?

17. The menstrual cycle is a series of cyclic physiologic changes that take place inside the female reproductive tract in primates. The whole cycle takes around 28 days to complete. The end of the cycle is accompanied by the breakdown of uterine endothelium, which gets released in the form of blood and mucous through the vagina. This is known as *menses*.

The follicle stimulating hormone (FSH), luteinizing hormone (LH), estrogen, and progesterone are the various hormones that regulate the menstrual cycle. The level of FSH and LH secreted from the anterior pituitary gland increases during the follicular phase. FSH secreted under the influence of RH (releasing hormone) from the hypothalamus stimulates the conversion of a primary follicle into a graafian follicle. The level of LH increases gradually leading to the growth of follicle and secretion of estrogen. Estrogen inhibits the secretion of FSH and stimulates the secretion of luteinizing hormone. It also causes the thickening of the uterine endometrium. The increased level of LH causes the rupturing of the graafian follicle and release the ovum into the fallopian tube. The ruptured graafian follicle changes to corpus luteum and starts secreting progesterone hormone during the luteal phase. Progesterone hormone helps in the maintenance and preparation of endometrium for the implantation of the embryo. High levels of progesterone hormone in the blood decrease the secretion of LH and FSH, therefore inhibiting further ovulation.

18. What is parturition? Which hormones are involved in induction of parturition?

18. The process of giving birth to a baby (child birth) when the development of foetus completes in the mother's womb is called parturition. It is a neuroendocrine mechanism. Two major hormones involved in the process are:

(i) oxytocin – which leads to contract the smooth muscles of myometrium of the uterus and directs the full term foetus towards birth canal.i.e.fetal ejection reflex .

(ii) Relaxin hormone causes relaxation of the pelvic ligaments and prepares the uterus for child birth.

19. In our society the women are often blamed for giving birth to daughters. Can you explain why this is not correct?
19. All human beings have 23 pairs of chromosomes. Human males have 22 pairs of autosomes and contain one or two types of sex chromosome. They are either X or Y. On the contrary, human females have 22 pairs of autosomes and contain only the X sex chromosome. The sex of an individual is determined by the type of the male gamete (X or Y), which fuses with the X chromosome of the female. If the fertilizing sperm is X, then the baby will be a girl and if it is Y, then the baby will be a boy. Hence, it is incorrect to blame a woman for the gender of the child.
20. How many eggs are released by a human ovary in a month? How many eggs do you think would have been released if the mother gave birth to identical twins? Would your answer change if the twins born were fraternal?
20. When two babies are born or produced in succession then it is called twins. Generally every month single egg is released at a time from each of the ovary. But if two eggs are released from each of the ovary at the same time and fertilized by separate sperms, gives rise to fraternal or non identical twins. Thus the young ones developed will have separate genes. On the other hand, when a single egg separates into early blastomeres from first zygotic cleavage, and the young ones produced will have same genetic makeup, hence called identical twins.
21. How many eggs do you think were released by the ovary of a female dog which gave birth to 6 puppies?
21. Dogs and rodents are polyovulatory species. In these species, more than one ovum is released from the ovary at the time of ovulation. Hence, six eggs were released by the ovary of a female dog to produce six puppies.



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