



**NCERT SOLUTIONS**

**CHAPTER - 3**

**HUMAN  
REPRODUCTION**

**BIOLOGY CLASS 12**

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**Q1. Fill in the blanks:**

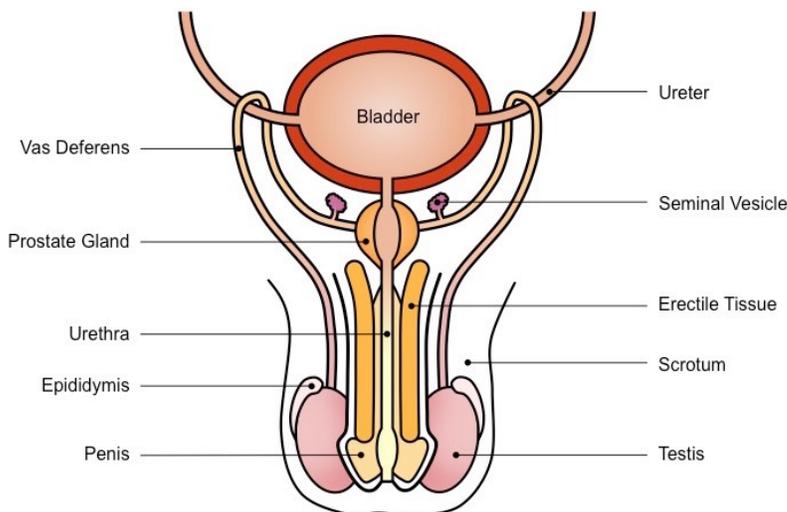
- (a) Humans reproduce \_\_\_\_\_. (asexually/sexually)
- (b) Humans are \_\_\_\_\_. (oviparous/viviparous/ovoviviparous)
- (c) Fertilization is \_\_\_\_\_ in humans. (external/internal)
- (d) Male and female gametes are \_\_\_\_\_. (diploid/haploid)
- (e) Zygote is \_\_\_\_\_. (diploid/haploid)
- (f) 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 male and female gametes is called \_\_\_\_\_.
- (i) Fertilisation takes place in \_\_\_\_\_.
- (j) Zygote divides to form \_\_\_\_\_ which is implanted in the uterus.
- (k) The structure which provides vascular connection between the fetus and uterus is called \_\_\_\_\_.

**Answer:**

- (a) sexually
- (b) viviparous
- (c) internal
- (d) haploid
- (e) diploid
- (f) ovulation
- (g) LH (Luteinizing hormone)
- (h) fertilization
- (i) ampullary-isthmic junction (fallopian tube)
- (j) blastocyst
- (k) placenta (Umbilical cord)

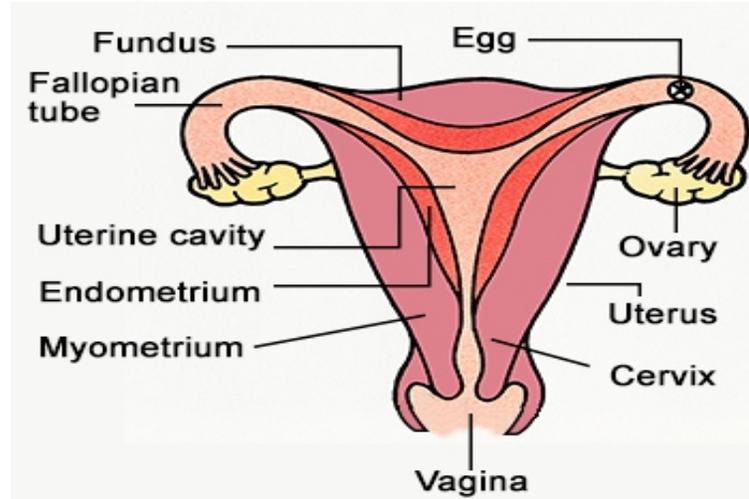
**Q2. Draw a labeled diagram of male reproductive system.**

**Answer:**



**Q3. Draw a labeled diagram of the female reproductive system.**

**Answer:**



**Q4. Write two major functions each of testis and ovary.**

**Answer:**

**Functions of the Testis:**

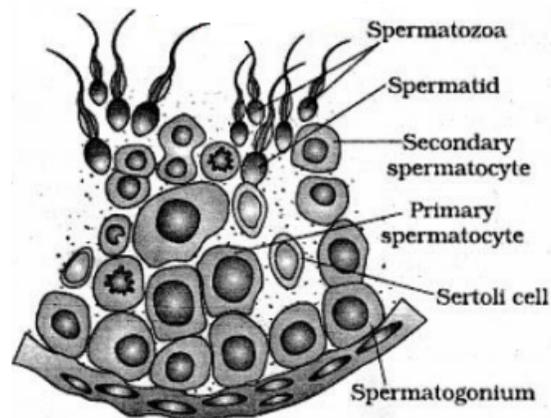
- (a) They produce male gametes called spermatozoa by the process of spermatogenesis.
- (b) The Leydig cells of the seminiferous tubules secrete the male sex hormone called testosterone. Testosterone aids the development of secondary sex characteristics in males.

**Functions of the ovary:**

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

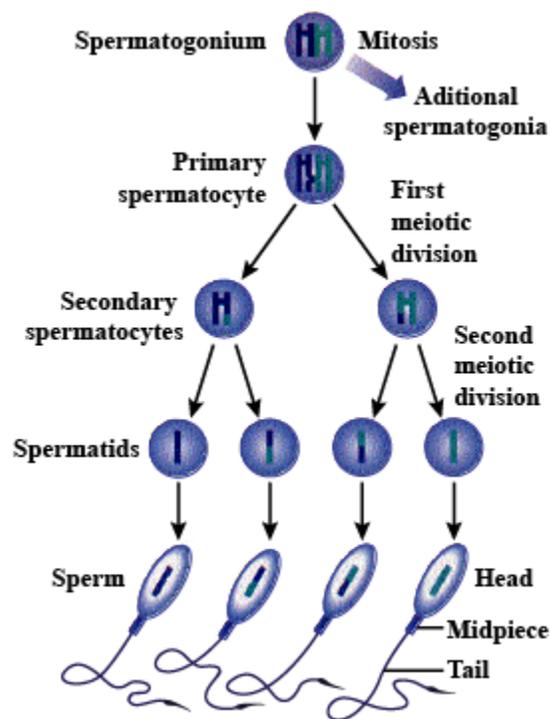
**Q5. Describe the structure of a seminiferous tubule.**

**Answer:** The seminiferous tubule is a structural unit in the adult testis. The seminiferous tubules are situated in testicular lobules. A seminiferous tubule consists of two types of cells – Sertoli or supporting cells & spermatogenic cells. Sertoli cells are elongated and pyramidal & partially envelop the spermatogenic cells. The cells provide nourishment to the developing spermatogenic cells. Spermatogenic cells are stacked in 4-8 layers. These cells divide several times & differentiate to produce spermatozoa. Between seminiferous tubules lie the interstitial cells or Leydig cells which produce testosterone hormone.



**Q6. What is spermatogenesis? Briefly describe the process of spermatogenesis.**

**Answer:** Spermatogenesis is the process of producing sperms with half the number of chromosomes (haploid) as somatic cells. It occurs in seminiferous tubules. Sperm production begins at puberty and continues throughout life with several hundred million sperms being produced each day. Once sperm are formed they move into the epididymis, where they mature and are stored. During spermatogenesis one spermatogonium produces 4 sperms. Spermatogenesis completes through the following phases – multiplicative phase, growth phase, maturation phase & spermiogenesis. In the multiplicative phase the sperm mother cells divide by mitosis & produce spermatogonia. The spermatogonia grow in size to form large primary spermatocytes by getting nourishment from sertoli cells in the growth phase. Maturation phase involves meiosis I in which primary spermatocytes divide to produce secondary spermatocytes and meiosis II which produces spermatids. Thus each primary spermatocyte gives rise to four haploid spermatids. Spermiogenesis or spermateliosis is the process of formation of flagellated spermatozoa from spermatids. Spermiogenesis begins in the seminiferous tubules but is usually completed in epididymis.

**Q7. Name the hormones involved in regulation of spermatogenesis.**

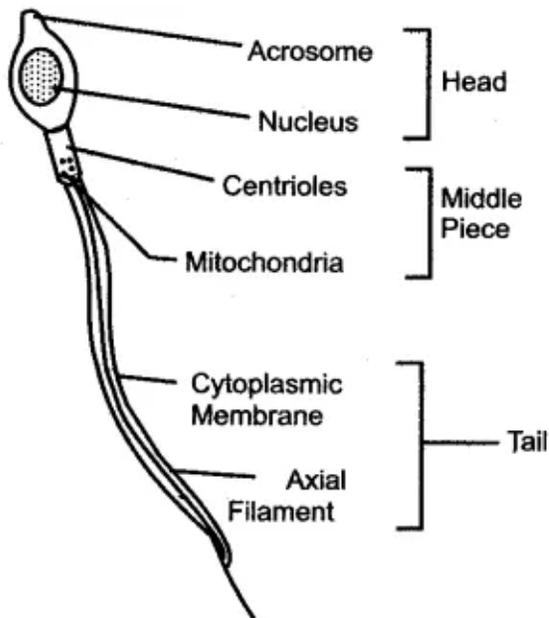
**Answer:** Follicle-stimulating hormones (FSH) and luteinizing hormones (LH) are secreted by gonadotropin releasing hormones from the hypothalamus. These hormones are involved in the regulation of the process of spermatogenesis. FSH acts on sertoli cells, whereas LH acts on leydig cells of the testis and stimulates the process of spermatogenesis.

**Q8. Define spermiogenesis and spermiation.**

**Answer:**

**Spermiogenesis:** It is the process of transforming spermatids into mature spermatozoa or sperms.

**Spermiation:** It is the process when mature spermatozoa are released from the sertoli cells into the lumen of seminiferous tubules.

**Q9. Draw a labelled diagram of sperm.****Answer:****Q10. What are the major components of seminal plasma?**

**Answer:** 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.

**Q11. What are the major functions of male accessory ducts and glands?**

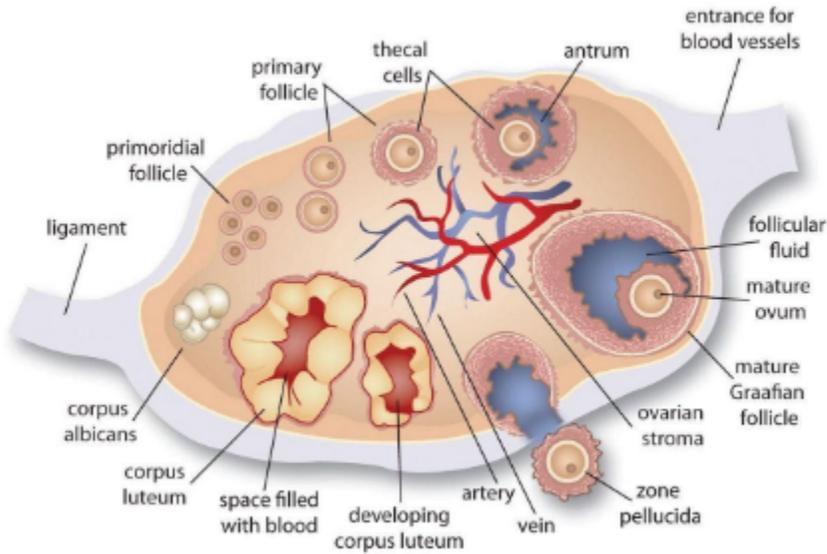
**Answer:** Male accessory ducts include rete testis, vasa efferentia, epididymis and vas deferens. These ducts store and transport sperm from the testis to the outside through urethra. The male accessory glands include paired seminal vesicles, a prostate and paired bulbourethral glands. Secretions of these glands constitute the seminal plasma which is rich in fructose, calcium and certain enzymes. The secretions of bulbourethral glands also help in the lubrication of the penis.

**Q12. What is oogenesis? Give a brief account of oogenesis.**

**Answer:** 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.

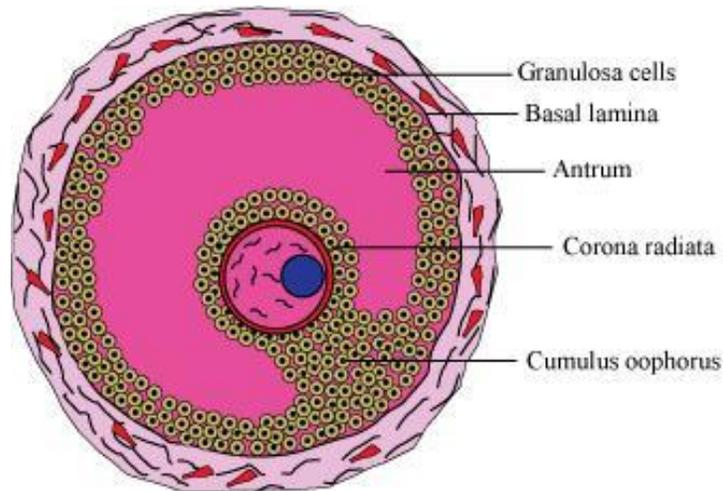
**Q13. Draw a labelled diagram of a section through the ovary.**

**Answer:**



**Q14. Draw a labelled diagram of a Graafian follicle.**

**Answer:**



**Q15. Name the functions of the following.**

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

**Answer:**

(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.

**Q16. 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 the ovary. (True/ False)**

**(d) Leydig cells synthesize androgens. (True/ False)**

**(e) Oogenesis takes place in corpus luteum. (True/False)**

**(i) 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)**

**Answer:**

(a) False, Androgens or male sex hormones (e.g, testosterone) are secreted by Leydig cells.

(b) True

(c) False, Leydig cells are found in testis.

(d) True

(e) False, Oogenesis takes place in the ovary.

(f) True

(g) True

**Q17. What is the menstrual cycle? Which hormones regulate the menstrual cycle?**

**Answer:** The menstrual cycle is a series of cyclic physiologic changes that take place inside the female reproductive tract in primates. This period is marked by a characteristic event repeated almost every month (28 days with minor variation) in the form of a menstrual flow (i.e. shedding of the endometrium of the uterus with bleeding. It may be temporarily stopped only in pregnancy.

**The hormones that regulates menstrual cycles are:**

(i) FSH (Follicle stimulating hormone),

(ii) LH (Luteinizing hormone),

(iii) Oestrogens,

(iv) Progesterone.

**Q18. What is parturition ? Which hormones are involved in induction of parturition?**

**Answer:** Parturition (or labour) means child birth. Parturition is the sequence of actions by which a baby and the afterbirth (placenta) are expelled from the uterus at childbirth. The process usually starts spontaneously about 280 days after conception, but it may be started by artificial means.

The process of parturition is induced by a complex neuroendocrine mechanism involving cortisol, estrogen and oxytocin.

**Q19. In our society the women are often blamed for giving birth to daughters. Can you explain why this is not correct?**

**Answer:** The sex chromosome pattern in the human females is XX and that of male is XY. Therefore, all the haploid female gametes (ova) have the sex chromosome X, however, the haploid male gametes have either X or Y. Thus 50% of sperms carry the X-chromosome while the other 50% carry the Y-chromosome. After fusion of the male and female gametes, the zygote carries either XX or XY depending upon whether the sperm carrying X or Y fertilizes the ovum. The zygote carrying XX would be a female baby and XY would be a male baby. That is why it is correct to say that the sex of the baby is determined by the father.

**Q20. 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?**

**Answer:** An ovary releases an egg every month. When two babies are produced in succession, they are called twins. Generally, twins are produced from a single egg by the separation of early blastomeres resulting from the first zygotic cleavage. As a result, the young ones formed will have the same genetic make-up and are thus, called identical twins.

If the twins born are fraternal, then they would have developed from two separate eggs. This happens when two eggs (one from each ovary) are released at the same time and get fertilized by two separate sperms. Hence, the young ones developed will have separate genes and are therefore, called non-identical or fraternal twins.

**Q21. How many eggs do you think were released by the ovary of a female dog which gave birth to 6 puppies?**

**Answer:** Since dogs have multiple births, several eggs mature and are released at the same time. If fertilised, the egg will implant on the uterine wall. Dogs bear their litters roughly 9 weeks after fertilisation, although the length of gestation can vary from 56 to 72 days. An average litter consists of about six puppies, though this number may vary widely based on the breed of dog. On this basis 6 eggs were released by the ovary of a female dog which gave birth to 6 puppies.

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