



**Mentor Guru**

**Class 12 – Biology**

## **Chapter 2 – Human Reproduction**

### **Short types question with answer**

**Q.1. State the significance of the following stages during the lifetime of a female.**

1. **Menarche**
2. **Menopause**

**A.1.** The first menstruation or onset of menstruation at puberty is referred to as menarche. It indicates the attainment of sexual maturity and the commencement of the fertile period. Menstruation cycle is the cycle of events from one up till the next menstruation and is repeated for about 28 days on an average wherein one ovum is released. Menopause, on the other hand, is when the menstruation cycle comes to a halt, indicating the end of the fertile period as the process of ovulation stops. Cyclic menstruation denotes a regular reproductive phase stretching from menarche to menopause.

**Q.2. a. How many spermatozoa does one secondary spermatocyte produce?**

**b. Where in zygote does the first cleavage division occur?**

**A.2. a.** The secondary spermatocytes undergo meiotic division – II to generate four haploid spermatids which through the process of spermiogenesis are transformed into spermatozoa.

**A.2. b.** Cleavage occurs within the fallopian tube and is holoblastic, dividing the zygote completely into blastomeres. The first cleavage divides the zygote longitudinally into two blastomeres wherein one is slightly larger than the other.

**Q.3. Why does corpus luteum stay active throughout pregnancy and in the absence of fertilization, is active only for 10-12 days?**

**A.3.** During the luteal phase, the leftover parts of Graafian follicle transform

into the corpus luteum. It discharges large quantities of progesterone hormone which is required for the maintenance of the endometrium. The endometrium is important for implantation of the fertilized egg and various other stages of pregnancy. Hence, corpus luteum has a long life in pregnancy. In the absence of fertilization, upholding of the corpus luteum is not required and thus it declines within 10-12 days, which causes the lining of the endometrium to menstruate and hence the onset of the new menstrual cycle.

**Q.4. What is foetal ejection reflex? How does it cause parturition?**

**A.4.** Foetal ejection reflex is the mild uterine contractions that arise from the parturition signals from the fully developed fetus and the placenta. This reflex stimulates the release of oxytocin, which causes uterine contractions, in turn, stimulating the increased secretion of oxytocin. This action of uterine contractions and oxytocin secretion further results in stronger contractions leading to the dilation and hence expulsion of the baby out of the uterus through the cervical canal, expelling placenta along, thus the parturition or childbirth.

**Q.5. What are the functions of placenta other than its endocrine function?**

**A.5.** The placenta promotes the supply of nutrients and oxygen to the embryo. It also facilitates the elimination of excretory wastes and carbon dioxide produced by the embryo. Placenta aids in the transportation of substances to and from the embryo as it is connected to the embryo through the umbilical cord.

**Q.6. Why is breastfeeding recommended during the initial stages of infant growth?**

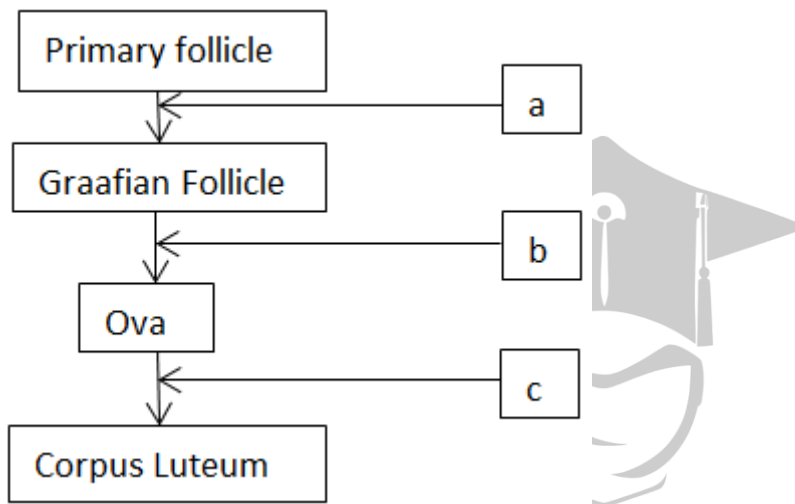
**A.6.** The mammary glands in females start producing milk towards the end of pregnancy through the process of lactation which helps the mother feed the newborn. Colostrum is the milk produced during the initial few days. Colostrum contains antibodies which are crucial in developing resistance in the newborns, hence it is recommended by doctors to bring up a healthy baby.

**Q.7. What are the different stages of the follicular phase of the menstrual cycle taking place in ovary and uterus?**

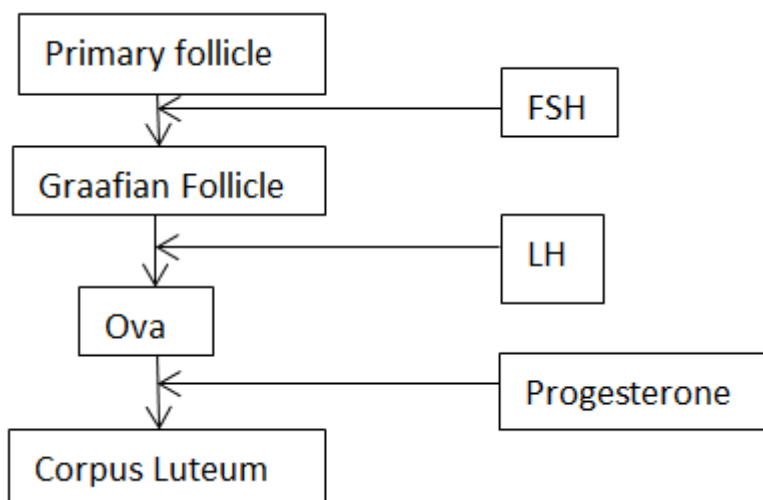
**A.7.** In this phase, primary follicles transform into the fully mature Graafian follicle in the ovary. The endometrium of the uterus simultaneously

regenerates through proliferation. Changes in the levels of ovarian and pituitary hormones induce changes in the uterus and ovaries. During this stage, the secretion of FSH and LH eventually increases and triggers the secretion and follicular development of estrogen by the growing follicles. In the middle of the cycle, both LH and FSH reach the peak level. This speedy secretion of LH at the maximum level during the mid-cycle causes rupture of Graafian follicle and hence ovulation.

**Q.8. Mention the names of the hormones responsible for ovarian changes during the menstrual cycle in the boxes provided.**



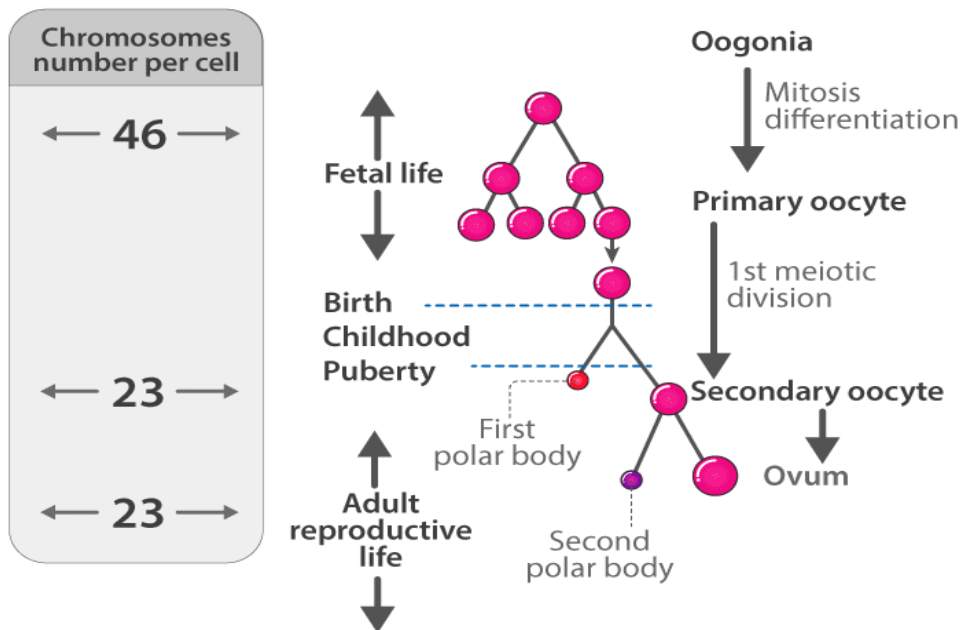
**A.8. Hormones responsible for the various stages of the menstrual cycle are:**



**Q.9. Draw a schematic diagram depicting oogenesis. (Label without description)**

A.9.

### SCHEMATIC REPRESENTATION OF OOGENESIS



**Q.10. Mention the changes taking place during the transition of a primary follicle to Graafian follicle in the oogenesis.**

**A.10.** Oogonia or the gamete mother cells are formed within each fetal ovary. No more oogonia are formed after birth. They enter into the prophase-I stage of meiotic division when they start cell division to approach the primary oocyte stage. These primary oocytes are girdled by a layer of granulosa cells to form the primary follicle which degenerates during the stages of birth to puberty. The primary follicles are encircled by more layers of granulosa cells and a new theca known as secondary follicles. The theca is subdivided into outer *theca externa* and an inner *theca interna* which secretes estrogen. The secondary follicle is then transformed into a tertiary follicle characterized by antrum, which is a fluid-filled cavity. At this phase, the primary oocyte grows in size inside the tertiary follicle to complete the first meiotic division. The tertiary follicle finally transitions to form the Graafian follicle.

**Q.10. Define Parturition.**

**A.10.** Parturition refers to a process of delivering a baby from the uterus to the vagina to the outside world. There are three stages of Parturition:

1. Dilation.

2. Expulsion.
3. Placental.

**Q.11. Define Fertilization.**

**A.11.** Fertilization refers to the biological process of fusion of male and female gametes resulting in the formation of a zygote. In humans, the fertilization process takes place in the fallopian tube.

**Q.12. Write the main functions each of testis and ovary?**

**A.12.** Testis also called the Testicles. It is a pair of oval-shaped organs masked in a pouch called the scrotum. They are responsible for the production of sperms and the male hormone testosterone.

The ovary is a ductless reproductive gland, which functions by producing a female sex hormone called estrogen and also involved in producing and storing the ovum or the egg cell.

**Long Answer Type Questions**

**Q.1. Explain the role of pituitary gonadotropins during the follicular and ovulatory phases of the menstrual cycle. Describe the shifts in steroidal secretions.**

**A.1.** The menstrual flow is due to the breakdown of the lining of the uterine endometrium and blood vessels which forms the liquid discharged from the vagina. The menstrual cycle is controlled through the pituitary gland by the hypothalamus. Changes in the ovary and uterus during the menstrual cycle is due to the fluctuation in the levels of ovarian and pituitary hormones. Towards the end of the menstrual phase, the pituitary FSH eventually increases which causes the development of the follicles inside the ovaries. Both the FSH and LH attain a peak level during the mid of the cycle. This speedy secretion of LH leads to LH surge which induces rupture of the Graafian follicle and hence the ovulation. During the maturation of follicles, more of estrogen is secreted causing a surge in FSH and LH from the anterior pituitary. The LH surge causes ovulation. The LH also induces luteinisation. The LH hormone causes the conversion of the empty follicle into the corpus luteum. The Corpus luteum produces steroidal hormones – progesterone and estrogen. These hormones govern the growth and maintenance of the uterine endometrium for probable implantation.

**Q.2. Explain in detail the difference between the meiotic division of oogenesis and spermatogenesis.**

**A.2.** Spermatogenesis is the production process of sperm from the male germ cell whereas oogenesis is the production process of the eggs from the oogonia in females. Meiosis is different in spermatogenesis and oogenesis in the quantity of the end product. This unequal division is necessary to maintain the essential part of the cytoplasm. One minor part is detached as the polar body where a single daughter cell called the ovum is formed which is functional. But in spermatogenesis, four spermatids are produced which are functional and that later develops into spermatozoa.

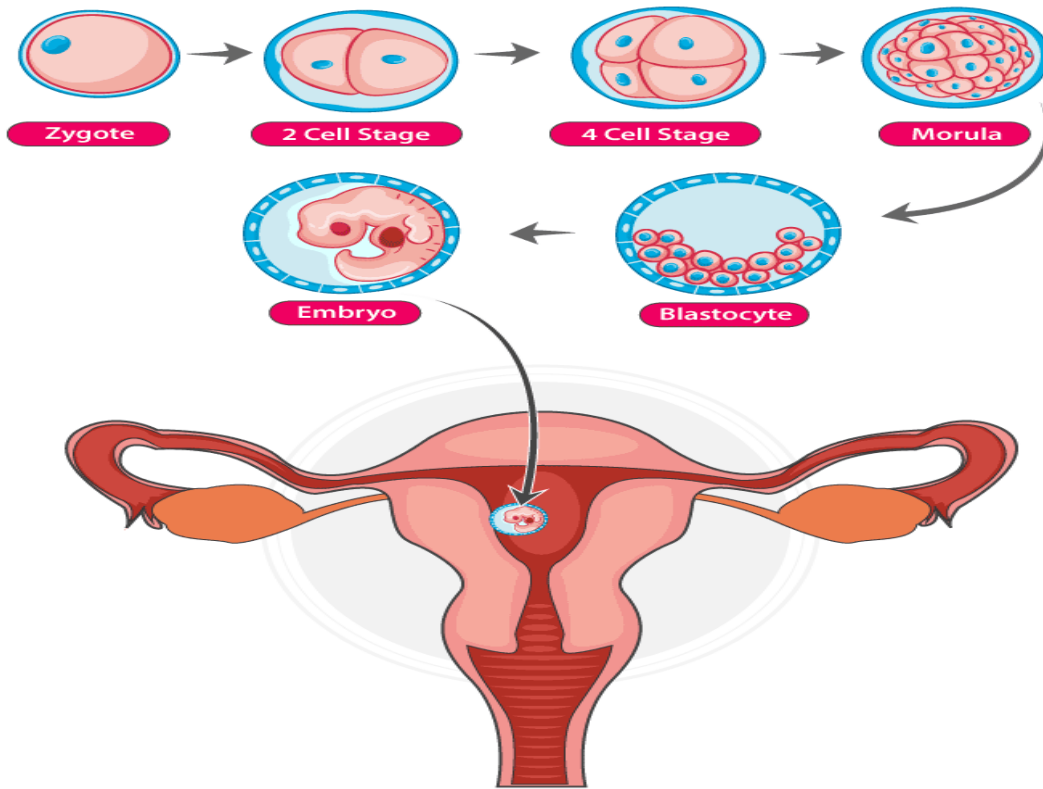
<b>Oogenesis</b>	<b>Spermatogenesis</b>
Production of eggs from oogonia	Production of sperm from spermatogonia
Takes place inside the ovary in females	Takes place inside the testes in males
All except the last phase takes place inside the ovary	All phases occur inside the testis
Early stages observed during the fetal period. Rest stages observed between puberty and menopause	A continuous process that is initiated from puberty and lasts until death
Matured from germinal epithelium overlying the ovary	Developed from the germinal epithelial lining of the seminiferous tubules

Sertoli cells not found in germinal cell epithelium	Sertoli cells found in germinal cell epithelium
Few oogonia divide to produce eggs, one at a time	Spermatogonia are divided by meiosis to produce sperms
Lengthy growth phase in oogonia	The growth phase of spermatogonia is short
Generates non-motile gametes	Produces motile gametes
Primary oocyte divides to form a secondary oocyte and polar body during meiosis-I	During meiosis-I, primary spermatocyte divides to form two secondary spermatocytes

**Q.3. Explain in detail the various developmental stages of the zygote until implantation with suitable diagrams.**

**A.3.** When the zygote moves through the isthmus of the oviduct, the mitotic division is initiated and is called the cleavage towards the uterus to form 2,4,8,16 daughter cells called blastomeres. It is an embryo containing 8 to 16 blastomeres from the morula. It continues to transform and divide into blastocysts as it further approaches the uterus. In the blastocyst, the blastomeres are organized into an outer layer referred to as the trophoblast and the inner cell mass, which is an inner collection of cells attached to the trophoblast. This layer gets attached to the endometrium and the inner cell mass transforms into the embryo. After attachment, the cells of the uterus rapidly divide and covers up the entire blastocyst. This causes the blastocyst to implant in the endometrium of the uterus which leads to conception.

## DEVELOPMENTAL STAGES OF ZYGOTE

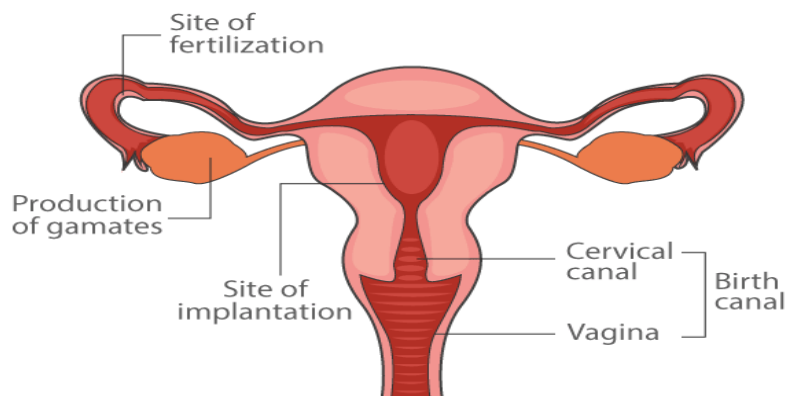


Q.4. With the help of a neat labelled diagram of the female reproductive system, depict the following sites:

- (a) production of gamete
- (b) site of fertilization
- (c) site of implantation
- (d) birth canal

A.4.

## FEMALE REPRODUCTIVE TRACT

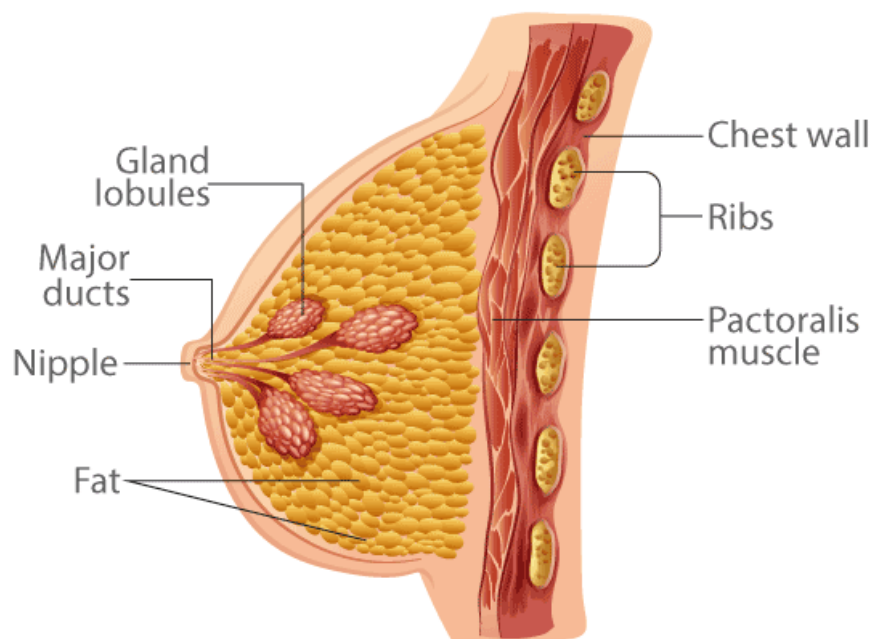




**Q.5. Explain the organization of the mammary gland with the help of a diagram.**

**A.5.** One of the characteristics of the female mammals is that they possess functional mammary glands. They have paired structures, containing glandular tissues and fat that varies in individuals. The glandular tissue is organized into 15-20 mammary lobes in each breast, which possess alveoli which are a cluster of cells. These alveolar cells secrete milk that is stored in the lumens or cavities of the alveoli. The alveoli open into the mammary tubules. These tubules in each of the lobes combine to form the mammary duct. Many such mammary ducts join to form a mammary ampulla that is connected to the lactiferous ducts. Through these structures, milk is sucked.

### ORGANIZATION OF MAMMARY GLAND



**Q.6. What is Reproduction? Explain how humans reproduce their young ones?**

**A.6.** Reproduction is a biological process of producing young ones or offspring, which are identical to their parents. There are two different modes of reproduction and are classified mainly based on the involvement of the parents.

The two different modes of reproduction are:

**Asexual Reproduction:** This mode of reproduction involves only one parent and the new offspring produced is genetically similar to the parent.

**Sexual Reproduction:** This mode of reproduction involves the formation and transfer of gametes, followed by fertilization, the formation of the zygote and embryogenesis. It is very complex.

Humans reproduce their young ones through the sexual mode of reproduction.

**Q.7. How many eggs does a woman have?**

**A.7.** As a fetus early in development, a female produces about 6 million to 7 million eggs.

At birth, there are approximately 1 million eggs. By the time of puberty, only about 300,000 remains. Out of these, only 200 to 300 will be ovulated during a woman's reproductive lifetime. Fertility can drop as a woman ages due to decreasing number and quality of the remaining eggs.

**Q.8. What is the female reproductive system?**

**A.8.** The female reproductive system includes both the internal and external organs. These organs are mainly involved with the reproduction process.

- **Internal Reproductive Organs**

The internal reproductive organs of females include the vagina, uterus (womb), cervix, fallopian tubes and ovaries.

- **External Reproductive Organs**

The vulva consists of all of the external parts of female's reproductive organs.

**Q.9. What is Menopause?**

**A.9.** Menopause is defined as the final stage or the end of a woman's menstrual cycle, fertility and the different types of changes a woman experiences. This is a natural process in all females and happens in all older women, between the age of 40 and 50, though it may also vary. The main cause for menopause is the female sex hormone levels, which naturally reduces along with age and eventually the ovaries stop releasing the eggs. Therefore, women in this phase no longer have periods and are not able to get pregnant.

**Q.10.What is the menstrual cycle? Name the Hormones which control the menstrual cycle.**

**A.10.**The menstrual cycle is defined as the natural process, which occurs in all females after reaching the age of their puberty. During this period, an ovary releases a mature egg, which travels to the uterus, if the egg is not fertilized, the uterine lining sheds and a new cycle begins. Overall, a menstrual cycle lasts for 28 days. These cycles may either last for 21 days or as long as 35 days in some individuals.

The entire process of the menstrual cycle is controlled by the endocrine system and the hormones involved are FSH, LH, estrogen, and progesterone. Both FSH and LH hormones are produced by the gonadotropic cells and progesterone hormones are produced by the ovaries.



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