



# ChapterNotes

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CHAPTER NOTES

## Human Reproduction Class 12 Notes — CBSE Biology Chapter 3

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# Human Reproduction Class 12 Notes — CBSE Biology

## Chapter 3

Chapter 3 — **Human Reproduction** — covers the male and female reproductive systems, gametogenesis, menstrual cycle, fertilisation, pregnancy, and embryonic development. This is a **high-weightage chapter (8-10 marks)** with important diagrams of reproductive organs and the menstrual cycle.

### Key Concepts

#### Male Reproductive System

| Organ                           | Function                                                            |
|---------------------------------|---------------------------------------------------------------------|
| Testes (pair)                   | Produce sperms (seminiferous tubules) + testosterone (Leydig cells) |
| Epididymis                      | Storage and maturation of sperms                                    |
| Vas deferens                    | Transport sperms from epididymis to urethra                         |
| Seminal vesicles                | Secrete fructose-rich fluid (60-70% of semen)                       |
| Prostate gland                  | Secretes alkaline fluid to neutralise vaginal acidity               |
| Bulbourethral (Cowper's) glands | Lubrication                                                         |
| Penis                           | Copulatory organ; delivers semen into female tract                  |

**Why testes are outside the body (in scrotum)?** Spermatogenesis requires 2-2.5°C lower than body temperature. The scrotum maintains this lower temperature.

#### Spermatogenesis

Spermatogonia (2n) → (mitosis) Primary spermatocyte (2n) → (meiosis I) Secondary spermatocytes (n) → (meiosis II) Spermatids (n) → (spermiogenesis) Spermatozoa

**One primary spermatocyte → 4 functional sperms**

Supported by Sertoli cells (nutrition, nourishment)

Regulated by FSH (Sertoli cells) + LH (Leydig cells → testosterone)

## Female Reproductive System

| Organ                      | Function                                                 |
|----------------------------|----------------------------------------------------------|
| Ovaries (pair)             | Produce ova + estrogen/progesterone                      |
| Fallopian tubes (oviducts) | Site of fertilisation (ampulla); transport egg to uterus |
| Uterus                     | Implantation and development of embryo                   |
| Cervix                     | Narrow opening connecting uterus to vagina               |
| Vagina                     | Copulatory canal; birth canal                            |

## Oogenesis

Oogonia (2n) → (mitosis, in foetal life) Primary oocyte (2n, arrested in prophase I) → (at puberty, meiosis I) Secondary oocyte (n) + first polar body → (meiosis II, after sperm entry) Ovum (n) + second polar body

**One primary oocyte → 1 functional ovum + 3 polar bodies**

## Menstrual Cycle (28 days)

| Phase                    | Days   | Events                                    | Hormones                           |
|--------------------------|--------|-------------------------------------------|------------------------------------|
| Menstrual                | 1-5    | Endometrium sheds, bleeding               | Low estrogen, progesterone         |
| Follicular/Proliferative | 6-13   | Follicle develops, endometrium rebuilds   | FSH↑, estrogen↑                    |
| Ovulation                | Day 14 | Release of secondary oocyte from ovary    | LH surge (+ FSH peak)              |
| Luteal/Secretory         | 15-28  | Corpus luteum forms, endometrium thickens | Progesterone↑ (from corpus luteum) |

**If fertilisation occurs:** Corpus luteum persists → progesterone maintains pregnancy. **If not:** Corpus luteum degenerates → progesterone drops → endometrium sheds → menstruation.

## Fertilisation & Pregnancy

- Fertilisation occurs in **ampulla of fallopian tube**
- Sperm must undergo **capacitation** in female tract before it can fertilise
- Zygote → morula → blastocyst → implantation in uterus (Day 7)
- Blastocyst: inner cell mass (embryo) + trophoblast (placenta)
- **Placenta:** connects mother to foetus; exchange of nutrients,  $O_2$ ,  $CO_2$ , waste; produces hCG, hPL, estrogen, progesterone
- Pregnancy duration: ~9 months (266 days / 40 weeks)
- **Parturition:** Oxytocin from posterior pituitary → uterine contractions → delivery
- **Lactation:** Prolactin stimulates milk production; colostrum (first milk) rich in antibodies (IgA)

## Important Definitions

| Term            | Definition                                                     |
|-----------------|----------------------------------------------------------------|
| Spermatogenesis | Formation of sperms from spermatogonia in seminiferous tubules |
| Oogenesis       | Formation of ovum from oogonia in the ovary                    |
| Ovulation       | Release of secondary oocyte from Graafian follicle             |
| Implantation    | Embedding of blastocyst in endometrium of uterus               |
| Placenta        | Structural and functional connection between mother and foetus |
| Parturition     | Process of giving birth (delivery of baby)                     |
| Colostrum       | First milk rich in antibodies (IgA) for passive immunity       |

## Solved Examples — NCERT Based

### Example 1

**Q:** Why does menstruation occur?

**Solution:** If the released ovum is not fertilised, the corpus luteum degenerates. This causes a sharp drop in progesterone and estrogen levels. Without hormonal support, the endometrium (uterine lining) breaks down and is shed along with blood — this is menstruation. It indicates that pregnancy has not occurred.

## Example 2

**Q:** What is the difference between spermatogenesis and oogenesis in terms of the number of functional gametes produced?

**Solution:** In spermatogenesis, one primary spermatocyte produces **4 functional sperms**. In oogenesis, one primary oocyte produces only **1 functional ovum + 3 polar bodies** (which degenerate). This difference exists because the ovum needs to be large (store nutrients for embryo development).

## Important Questions for Board Exams

### 1 Mark

1. What is the function of Leydig cells?
2. Where does fertilisation occur in humans?
3. What triggers ovulation?

### 2-3 Mark

1. Describe the menstrual cycle with hormonal regulation.
2. Draw a labelled diagram of a sperm.
3. What is the role of the placenta during pregnancy?

### 5 Mark

1. Describe spermatogenesis with a diagram.
2. Explain the events from fertilisation to implantation in humans.

## Quick Revision Points

- Testes in scrotum (2°C cooler); seminiferous tubules → sperms; Leydig cells → testosterone
- Spermatogenesis: 1 PMC → 4 sperms; Oogenesis: 1 PMC → 1 ovum + 3 polar bodies
- Menstrual cycle: 28 days; ovulation on day 14 (LH surge)

- Fertilisation in ampulla; implantation day 7; pregnancy ~9 months
- Placenta: hCG (pregnancy test hormone), progesterone, estrogen
- Parturition: oxytocin; Lactation: prolactin; Colostrum: IgA antibodies

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