# HUMAN REPRODUCTION I 24 JULY 2013

## Lesson Description

In this lesson, we:

- Look at human reproduction in terms of:
  - Male reproductive organs
  - Spermatogenesis
  - Female reproductive organs
  - Oogenesis

# Key Concepts

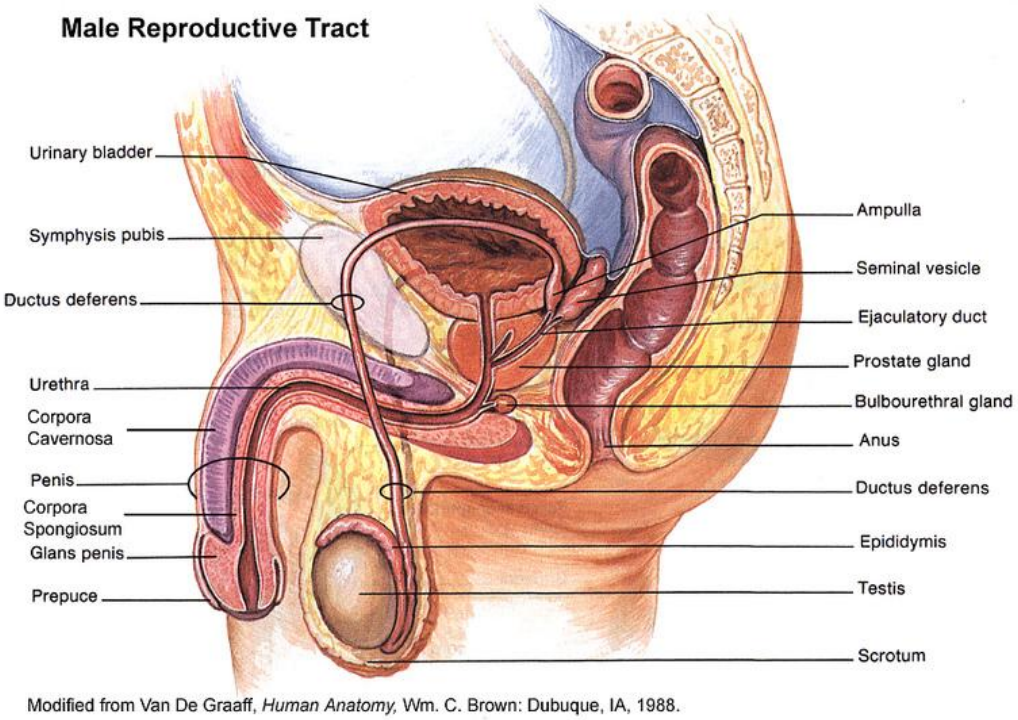
## Human Reproduction

- Reproduction is the process whereby 2 parent organisms of the same species reproduce sexually, to create a new living organism of that species. Thus preventing extinction.

### Male Reproductive Organs

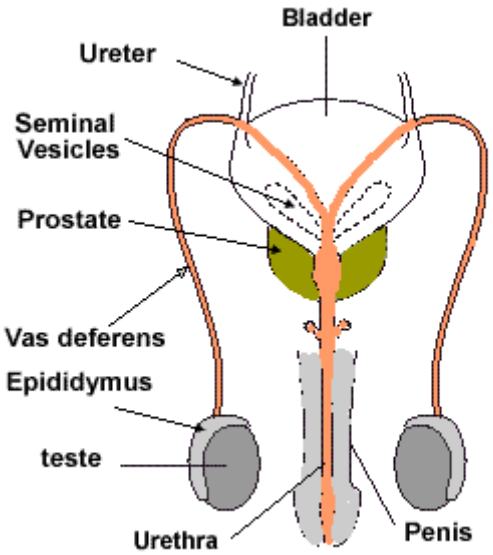
The role of the male reproductive system is to:

- Make sperm cells, and
- Deliver them into the body of the female so that fertilization can take place.
- A man's reproductive system, consists of the testes, sperm ducts, glands and the penis




Modified from Van De Graaff, *Human Anatomy,* Wm. C. Brown: Dubuque, IA, 1988.

*(http://www.flickr.com/photos/79474535@N02/6968445060/)*




*(http://click4biology.info/c4b/6/hum6.6.htm)*

## Spermatogenesis

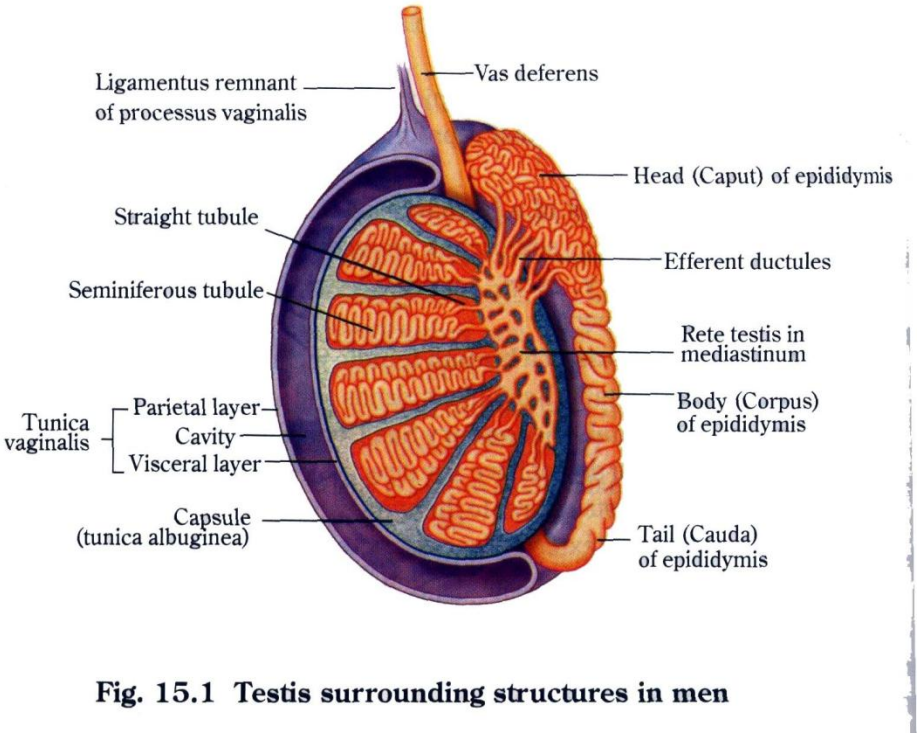



**Fig. 15.1 Testis surrounding structures in men**

*(https://sites.google.com/site/biologyinstitute/reproduction&developments)*

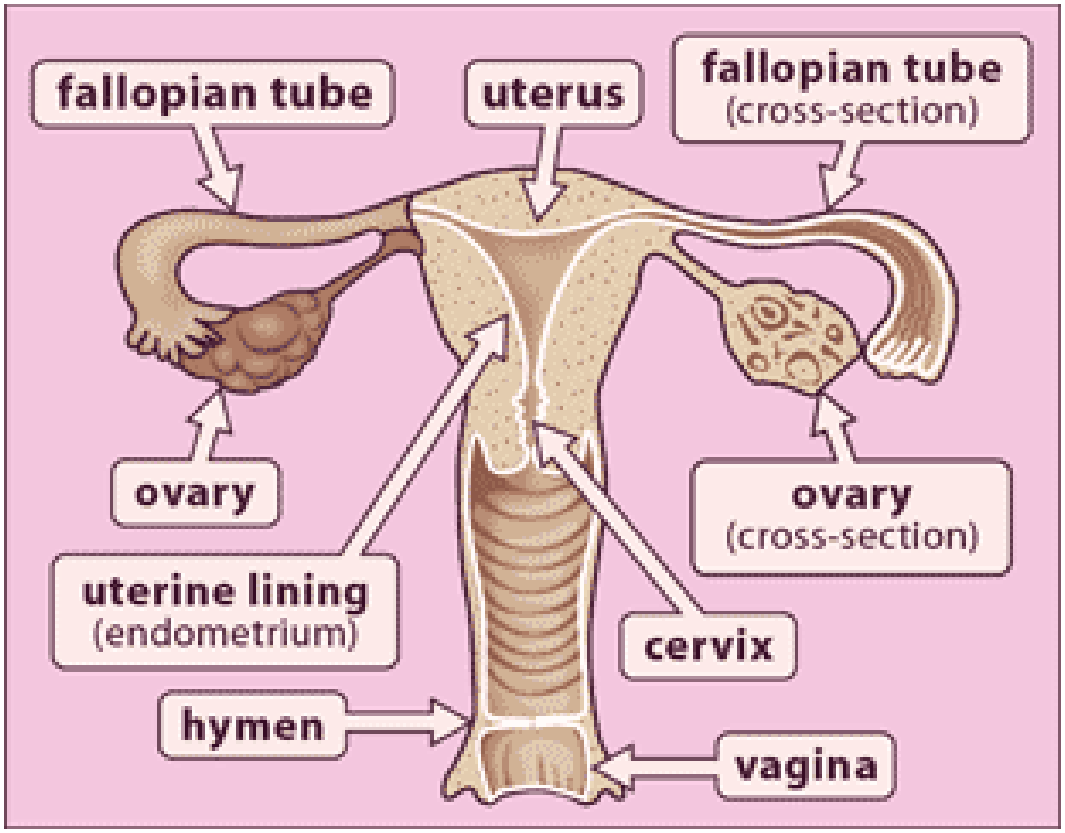
**How spermatozoa are produced:**

- Germinal epithelium divides by mitosis to produce spermatogonia (2n)
- Spermatogonia are pushed towards the centre of tubule where they mature into primary spermatocytes (2n) which divide by meiosis
- Secondary spermatocytes (2n) result from the first meiotic division
- Spermatids are haploid and result from second meiotic division of secondary spermatocytes
- Mature sperm cells (spermatozoa) develop from spermatids

## Testosterone

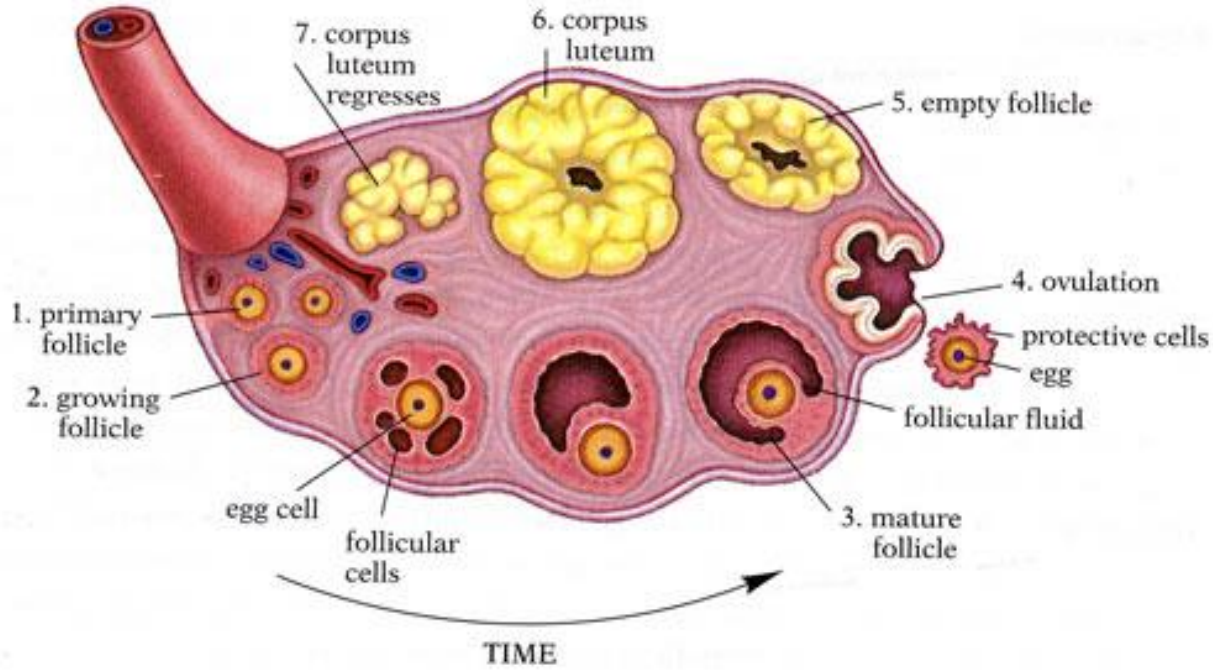
- Testosterone is the male sex hormone.
- It is produced by specialized cells in the testes
- It is responsible for:
  - The development of secondary sex characteristics of males at puberty such as muscle development, facial hair and deepening of the voice
  - A rapid increase in physical growth at puberty
  - The maturation and maintenance of the reproductive organs
  - The production of sperm

## Female Reproductive Organs




*(http://endocrine101.wikispaces.com/Reproductive+System)*

- In mammals, females have a sexual cycle that can be divided into three cycles:
- The **ovarian** (oestrus) **cycle** that leads to the production of mature ova
- The **uterine cycle** that prepares the lining of the uterus to receive the fertilized egg
- The **menstrual cycle** that sheds the lining of the uterus lining if the ova is not fertilized
- The cycles are controlled by ovarian hormones, which are in turn controlled by hormones produced by the hypophysis (pituitary) gland




*(http://www.knowurflow.com/hormones-and-your-flow/)*

- Primary follicle – contains a primary oocyte (2n)
- Follicles ripen – due to Follicle Stimulating Hormone (FSH)
- Follicle continues to ripen – maturing follicles secrete oestrogen
- Primary oocyte (2n) surrounded by follicle cells
- Mature follicle (Graafian follicle) – secondary oocyte is formed by meiosis
- The follicle ruptures – secondary oocyte (n) is discharged → ovulation
- The follicle collapses – and becomes the corpus luteum which secretes progesterone
- The corpus luteum degenerates if fertilization does not occur

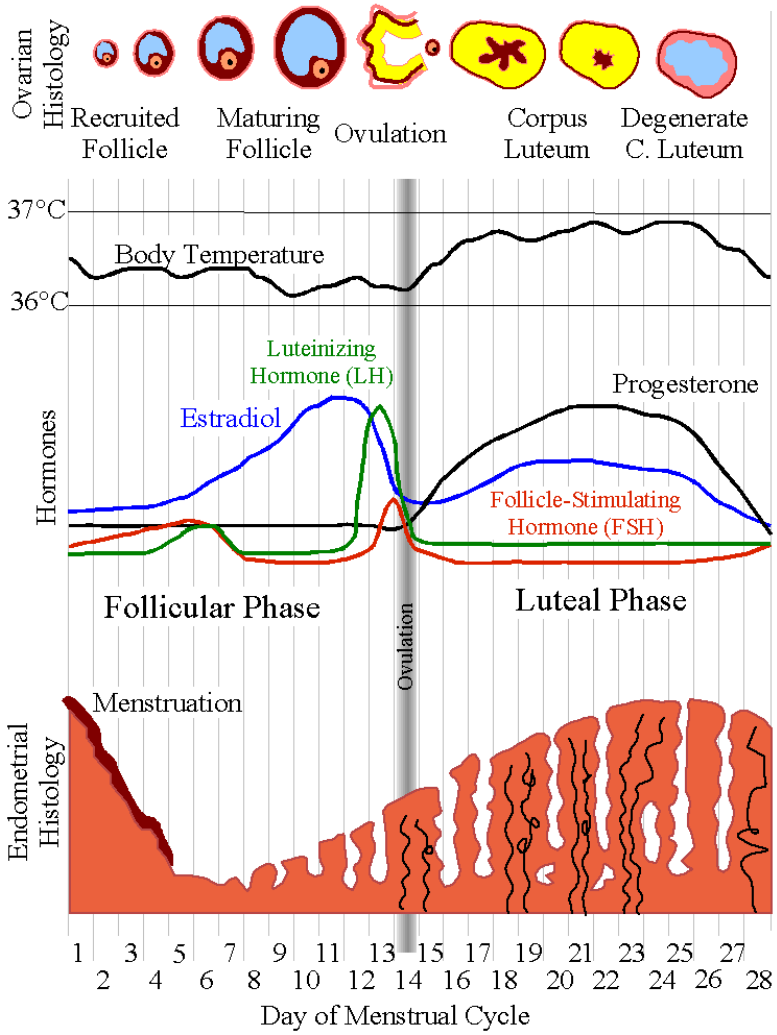
These changes take place in the endometrium in preparation for implantation of the fertilized egg

- The endometrium is the lining of the uterus.
- Day 1: Menstruation begins
- Day 6 – 14: Phase of proliferation of the cells of the endometrium. This grows to a thickness of 0.5mm
- Day 15 – 22: Phase of secretion - Secretions from the tubular glands contain glycogen and mucus. This maintains the endometrium in a receptive state in case of implantation of a young embryo. The endometrium grows to a maximum thickness of 5 – 6 mm
- Day 24: -Constriction of the arteries. This is the beginning of breakdown (necrosis) of extra layers

## The Menstrual Cycle

- If the ova is not fertilized and implanted, the thickened endometrium is shed as a bloody fluid during menstruation
- The menstrual cycle is therefore linked to changes in the endometrium in a non-pregnant female
- The cycle normally spans 28 days, but can vary in length from 25 – 35 days, with menstruation lasting 3 – 10 days.

- The following diagram shows the events occurring in the ovary and endometrium together with the different hormones involved if fertilization does not take place



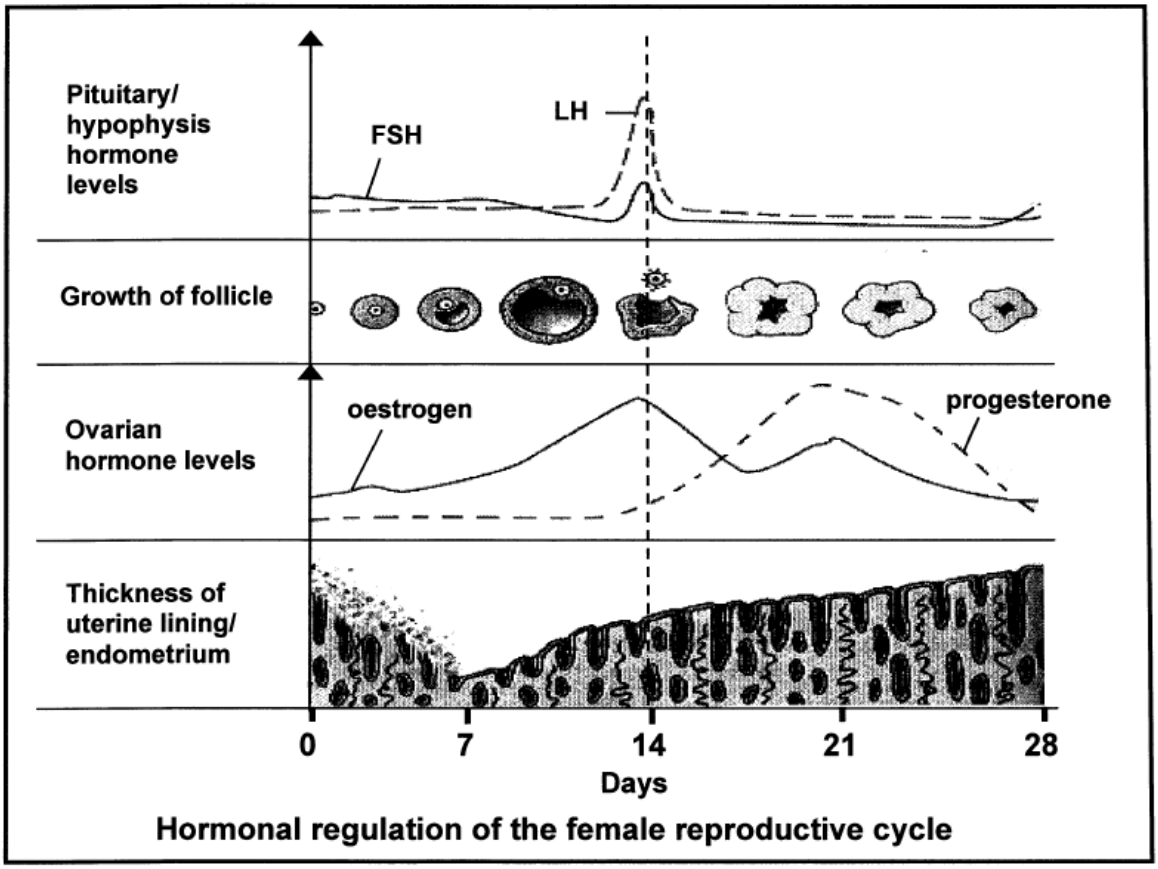

*(Average values. Durations and values may differ between different females or different cycles.)*

*(http://commons.wikimedia.org/wiki/File:MenstrualCycle2.pn)*

# Questions

## Question 1

Study the graph below of a menstrual cycle and the influence of the different hormones on it.




Hormonal regulation of the female reproductive cycle

a.) ON which day does ovulation take place? (1)

b.) Between which days does menstruation take place? (1)

c.) State one function of FSH during the menstrual cycle (1)

d.) Describe the functional relationship between FSH and progesterone. (2)

e.) Account for the change in the thickness of the endometrial lining between day 14 and 21. (2)

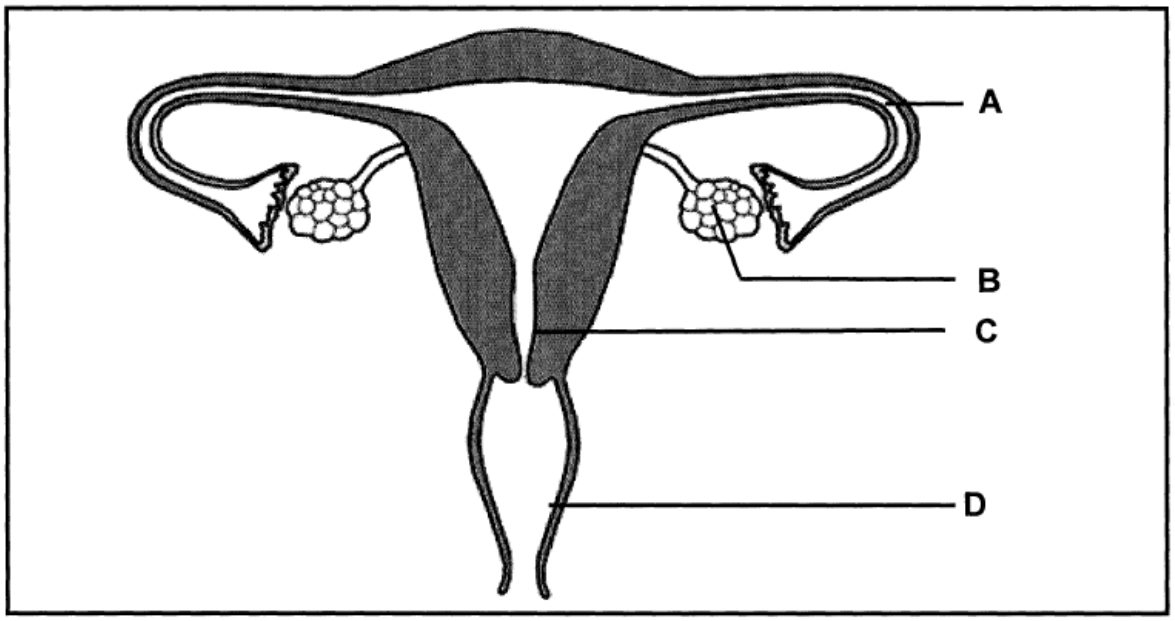
f.) Did fertilisation take place within the 28 day cycle illustrated in the graph? (1)

g.) Give TWO reasons for your answer to Question 1.6. (2)

**(10)**

## Question 2

The diagram below shows the structure of the female reproductive system.




Give the LETTER and NAME of:

a.) The part that breaks down when the levels of progesterone and oestrogen drop (2)

b.) The part that plays a role during copulation (2)

c.) The part where the zygote will be formed. (2)

d.) The part where the Graafian follicles develop. (2)

**(8)**