X-Sheet 13

Male and Female structures

Terminology & definitions

Asexual reproduction: reproduction without the fusion of sex cells e.g. budding, binary fission.
Circumcision: religious rite or surgical procedure where the foreskin of the penis is removed.
Cowper's glands: located just below the prostrate gland in male mammals and secretes a sticky fluid to assist with movement of the sperm cells.
Epididymis: a long convoluted tube that stores sperm cells while they mature and reabsorbs them after four weeks if they are not ejaculated.
Fallopian tube (also called the oviduct): a muscular tube, lined with a mucus secreting ciliated epithelium joining each ovary to the uterus. Fertilization takes place in this tube.
Ovaries: female reproductive organs which release egg cells.
Prostate gland: gland of the male reproductive system situated just below the urinary bladder. It secretes most of the seminal fluid.
Seminal vesicle: located in the male reproductive system and stores sperm until ejaculation.
Sertoli cell: an elongated nurse cell in the tubules of the testes that supports and provides nutrition to maturing sperm cells.
Vas deferens: the tube that carries sperm cells and seminal fluid into the penis during ejaculation
Urogenital system: the male reproductive system and the urinary system link so that both semen and urine pass out of the body through the urethra.

Key Concepts

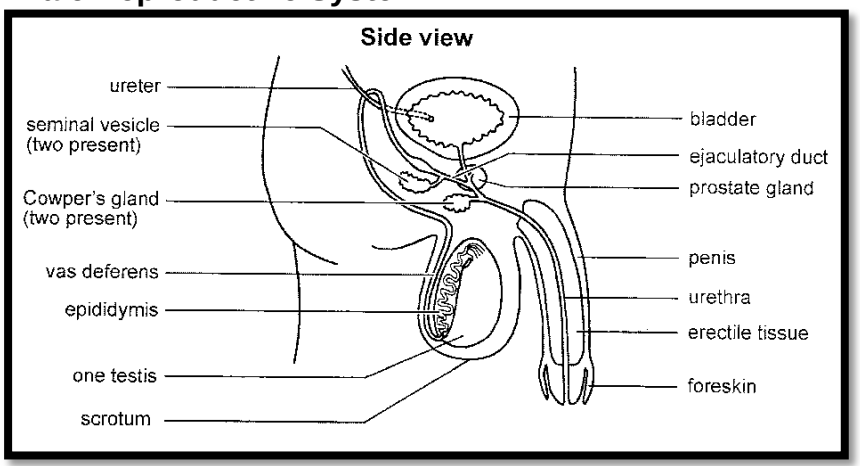
Living organisms reproduce sexually or asexually to ensure there is a next generation. In **asexual reproduction**, there is **no fusion** of male and female gamets. For sexual reproduction, sexually mature diploid adults produce haploid sex cells during Meiosis. This process occurs in specialized reproductive structures. The **haploid gametes fuse** during the process of **fertilization** to produce a diploid zygote. Genetic material from the male and female gametes combine to form a new unique organism. In mammals, the male and female reproductive systems are responsible for:

- the production of hormones to regulate the production of gametes
- the production of gametes (gametogenesis)
- the fertilization process (internal fertilization)
- the development and protection of the foetus until it is ready for birth
- the production of milk to sustain the offspring once it is born

Diagrams

Please ensure that you know each label and the function of the structure. We suggest that you write the function next to each label, to assist you when you study this section.

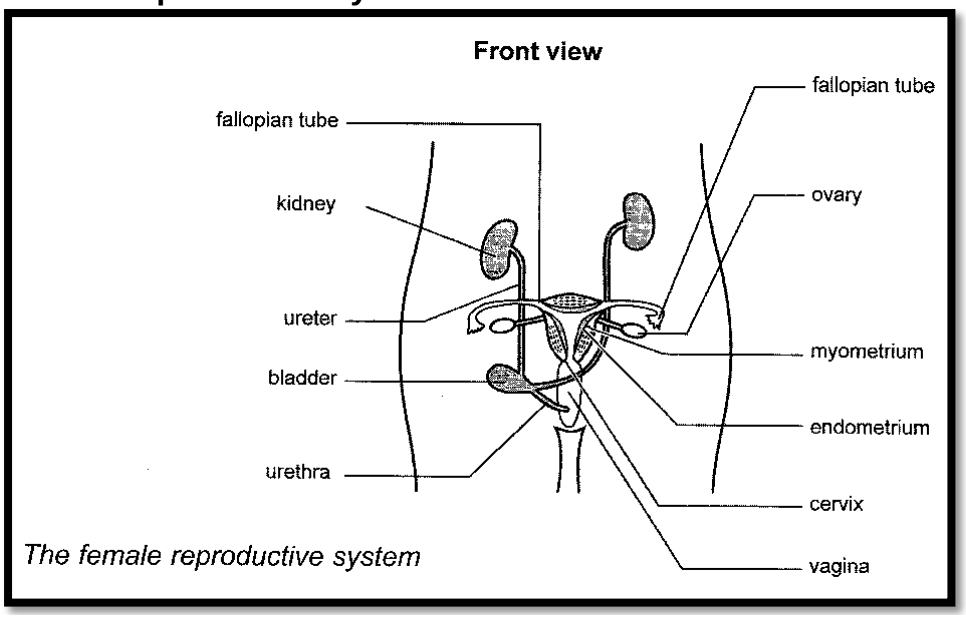
Male Reproductive System



Structure	Function
Two glandular testes	Responsible for the production of the sperm and the male sex hormone called testosterone Testosterone is responsible for: • the secondary sexual characteristics when the males mature like a deeper voice, pubic hair and facial hair. • rapid physical growth at puberty • the maturation of reproductive organs and production of sperm
Scrotal Sac (bag of skin)	Holds the testis and hangs outside of the abdominal cavity to regulate the temperature of the testes at 35 °C. The scrotal sac can contract into the body when it is cold or relax and hang away from the body if the temperature is high.
Seminiferous tubules	Each testis consists of about a thousand coiled seminiferous tubules lined with germinal epithelium. Contains the **Leydig cells,** the **spermatogonia** and cells of **Sertoli**
Leydig cells	Produce testosterone
Diploid spermatogonia	Undergoes Spermatogenesis - produces haploid spermatozoa/sperm cells
Cells of Sertoli	Nutrition for the developing sperm cell
Vas efferentia	Transfers collected sperm to epididymis
Epididymis (6m long coiled tube)	Tube stores about 5000 million sperm per cm^3 until the sperm mature and are able to swim
Vas deferens	Tube that connects each testis from the epididymis to the urethra, just after the urethra leaves the bladder
Seminal vesicle (a short glandular tube)	Tube secretes mucus and a watery alkaline fluid containing fructose, an energy source for the spermduring ejaculation
Prostate gland	Secretes mucus mixed with a slightly alkaline fluid during ejaculation to increase motility of the sperm cells and neutralizes the possible acidity of the vagina

Cowper's gland	Secretes an alkaline fluid directly into the male's urethra to neutralize acidity caused by urine residue
Penis (consists of masses of erectile tissue that surrounds the urethra)	During sexual stimulation, blood flows into the erectile tissue causing the penis to become erect for insertion into the vagina during sexual intercourse. Semen (sperm and fluid) is ejaculated directly into the vagina (internal fertilization)

Female Reproductive System



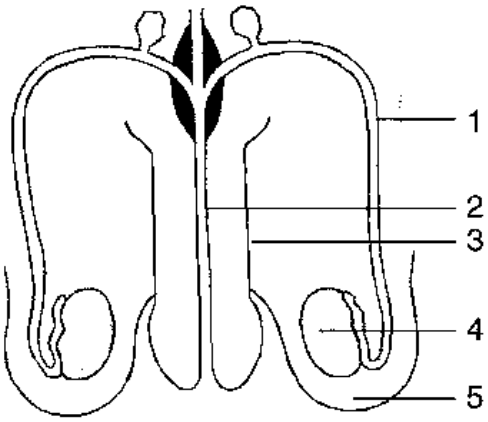
The female reproductive system

Structure	Function
Ovaries (two almond-shaped ovaries are located inside the abdominal cavity)	The germinal epithelium produces the egg cells. Produce the sex hormones **oestrogen and progesterone**. Once female matures sexually, an egg cell is produced each month and released during ovulation.
Fallopian tubes (a tube that connects the ovaries to the uterus)	Egg cell moves along the fallopian tube to the uterus. Fertilization and the first stages of mitosis take place in the fallopian tube.
Uterus (a hollow, muscular, pear-shaped structure about 7,5 cm long and 5 cm wide, located inside the pelvic cavity behind the bladder)	**Perimetrium:** outer layer - protection **Myometrium:** middle layer - smooth muscle that contracts during childbirth **Endometrium:** inner layer consists of glands and a very good blood supply to provide nutrition and protection for developing foetus in pregnancy. Layer breaks away during menstruation.
Cervix	Opening between the Vagina and uterus. A mucus plug develops in the cervix during pregnancy.
Vagina (a muscular tube 8 to 10 cm long, with elastic tissue and a folded lining, connecting the external area with the uterus)	Links from the outside to the uterus. Able to stretch when penis is inserted during copulation and childbirth process because it forms the birth canal.

(Diagrams with thanks and acknowledgement: Vivlia Publishers: Viva Life Science – Grade 12)

X-ample Questions

1. Study the diagram below and answer the questions that follow:



1.1. Provide labels 1 to 5. (5)
1.2. Where are the testes located at the time of birth? (1)
1.3. Describe the seminiferous tubules. (3)
1.4. Why is it necessary for a male to produce such a large quantity of sperm cells? (2)
1.5. Name one function of the epididymis. (1)
1.6. Why is it important that the testes are located outside of the abdominal cavity? (1)
1.7. Name the three glands of the male reproductive system and provide one function of each. (6)
1.8. What does the term semen refer to? (4)

2. Match column A with the statements in column B.

Column A	**Column B**
1. uterus 2. Fallopian tube 3. testis 4. cervix 5. ovary 6. corpus luteum 7. primary follicle 8. cells of Sertoli 9. epididymus 10. penis	A. the external opening of the vagina
	B. releases the egg cell during ovulation
	C. produces the hormone testosterone
	D. development of the foetus takes place here
	E. develops into the Graafian follicle
	F. organ enclosed by a scrotum
	G. secretes progesterone
	H. provides nutrition of the sperm cells
	I. deposits sperm cells into the female
	J. transports egg cells from the ovary to the uterus
	K. region in the female that separates the vagina and the uterus
	L. produced by the Cowper's gland
	M. region where the sperm cells mature before release

(10)

X-ercise

1. In mammals, fertilization usually occurs in the...

   A Fallopian tubes
   B vagina
   C uterus
   D ovary

2. The part of male reproductive system in which sperm cells undergo maturation, is the:

   A testis
   B prostate gland
   C gland of Cowper
   D epididymis

3. The cells playing a role in the nutrition of the spermatozoa, are the:

   A germinal cells
   B cells of Leydig
   C cells of Sertoli
   D spermatogonia

4. The cells in the testes that are responsible for the production of the male hormone testosterone, are the:

   A germinal cells
   B cells of Leydig
   C cells of Sertoli
   D spermatogonia

5. The correct sequence of the developmental stages during oogenesis is:

   A primary follicle – corpus luteum – Graafian follicle
   B primary follicle – primary oocyte – corpus luteum
   C oogonium – primary oocyte – egg cell
   D corpus luteum – Graafian follicle – primary follicle

6. The fusion of an egg cell and a sperm is known as:

   A copulation
   B cleavage
   C fertilization
   D ovulation

7. Which of the following represents the correct order of the parts through which spermatozoa pass?

   A Testis → vas deferens → epididymis → ureter
   B Vas deferens → seminal vesicles → ureter
   C Testis → epididymis → vas deferens → urethra
   D Vas deferens → prostate gland → urethra

8. Which of the following male and female structures are LEAST alike in function?

   A Seminiferous tubules – Vagina
   B Spermatogonia – Oogonia
   C Testes – Ovaries
   D Vas deferens – Fallopian tube (oviduct)

Answers for X-ercise questions:

1. A
2. D
3. C
4. B
5. C
6. C
7. C
8. A