The Human Reproductive System and the Perinatal Period

BLG–5062-2
Learning Guide
THE HUMAN REPRODUCTIVE SYSTEM AND THE PERINATAL PERIOD

BLG-5062-2 LEARNING GUIDE
The Secondary V biology learning guides are published by SOFAD

*The Human Respiratory System*

*The Human Reproductive System and the Perinatal Period*

*The Transmission of Hereditary Characteristics*

The learning guides in this collection are adapted from the online courses of the same name which were produced first. The decision to produce both an online and a printed version of the same course was made to meet the requirements of those who do not have access to the Internet or who prefer to work with “paper,” in accordance with the need to diversify the tools and venues for distance learning.
Introduction

The Human Reproductive System and the Perinatal Period

This learning guide was produced by the Société de formation à distance des commissions scolaires du Québec (SOFAD).

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Introduction

General Introduction

◆ The Biology Program

The Société de formation à distance des commissions scolaires du Québec (SOFAD) welcomes you to the course entitled *The Human Reproductive System and the Perinatal Period*. This course is part of the Secondary V Biology Program for basic adult general education, which is comprised of the following nine courses:

BLG-5061-1  *The Human Respiratory System*
BLG-5062-2  *The Human Reproductive System and the Perinatal Period*
BLG-5063-2  *The Human Digestive System*
BLG-5064-2  *The Anatomy and Physiology of Cells*
BLG-5065-2  *The Transmission of Hereditary Characteristics*
BLG-5066-1  *The Human Skeletal and Muscular System*
BLG-5067-1  *The Human Endocrine System*
BLG-5068-2  *The Human Nervous System*
BLG-5069-1  *Ecology*

Students who complete this 50-hour course can earn two Secondary V credits provided they pass a supervised examination administered by a Québec school board. There are no prerequisites for the courses in this program, and there is no equivalent program in the youth sector. The course’s general objective is as follows: “By learning concepts of anatomy and physiology, adults will gain a better understanding of the human reproductive system and the perinatal period, and the health problems associated with them.”

◆ Using The Learning Guide

This learning guide is the main work tool for this course and has been designed to meet the specific needs of adult students enrolled in an individualized learning or a distance learning program.

The contents of this guide are divided into three main sections, which in turn are subdivided into modules, which are again subdivided into units. In each unit, the subject matter is presented in a number of ways (e.g. text, tables, illustrations, exercises) in order to facilitate mastery of the program objectives. In addition, at the end of each unit, just before the conclusion, you will be required to do a review activity in which all the main illustrations are shown in colour. By doing these exercises, you will be building an excellent summary of the entire course. Lastly, at the end of this guide you will find a conclusion, a self-evaluation activity and the corresponding answer key as well as an answer key for the exercises in the modules and appendices.
Learning Activities

This guide includes theoretical sections as well as practical activities in the form of exercises. These exercises come with an answer key. Start by skimming through each part of this guide to familiarize yourself with the content and the main headings. Then read the theory carefully:

◆ Highlight the important points.
◆ Make notes in the margins.
◆ Look up new words in the dictionary.
◆ Study the diagrams carefully.
◆ Write down questions relating to ideas you don’t understand. You can submit these questions to your instructor.

Exercises

The exercises come with an answer key found at the end of this guide.

◆ Do all the exercises and, at the end of each modules, quizzes.
◆ Read the instructions and questions carefully before writing your answer.
◆ Do all the exercises to the best of your ability without looking at the answer key.
◆ Reread the questions and your answers and revise your answers, if necessary. Then, check your answers against the answer key and try to understand any mistakes you made.
◆ Complete a module before doing the corresponding review exercises. Doing these exercises without referring to the lesson you have just completed is a better way to prepare for the final examination.

Self-evaluation Activity

The purpose of the self-evaluation activity is to help you prepare for the final examination. Before you tackle the self-evaluation activity, reread your notes to ensure you have covered all the material pertaining to the learning objectives cited at the beginning of each module. Make sure you understand the learning objectives. Then do the self-evaluation activity without referring to the main body of the guide or the review exercises. Compare your answers with those in the answer key and review any areas you had difficulty with.

Work Environment

Have all the materials you need close at hand.

◆ Learning materials: this guide and a notebook in which you will summarize important concepts relating to the learning objectives for each module.
◆ Reference materials: a dictionary.
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◆ Miscellaneous materials: a calculator, a pencil for writing your answers and your notes on this guide, a coloured pencil for correcting your answers, a highlighter (or a pale-coloured felt marker) to highlight important ideas, a ruler, an eraser, etc.

◆ Evaluation

In order to earn the two credits for this course and towards your Secondary School Diploma, you must score at least 60% on a supervised examination dealing with the learning objectives outlined in this guide and administered in an adult education centre. The two-hour written examination counts for 100% of the final course mark.

◆ Succeeding at Distance Learning

Work Pace

A few tips for organizing your time are given below:

◆ Set up a study schedule that takes into account your availability, your needs and your family and work obligations.

◆ Try to devote a few hours a week to the course, preferably in blocks of two hours.

◆ As much as possible, stick to the schedule you have established.

Your Tutor

Your instructor is the person who will give you any help you need throughout this course. He or she is available to answer your questions and correct and comment on your assignments. Don’t hesitate to contact your instructor if you are having difficulty with the theory or the exercises, or if you need some words of encouragement to help you get through this course. Information about how to contact your instructor that is not already contained in this guide will be made available to you. Write out your questions and get in touch with your instructor during his or her available hours. If necessary, write to him or her. Your instructor will guide you in your work and provide you with the advice, constructive criticism and support that will help you succeed in this course.

Homework Assignments

This guide is sold with three homework assignments designed solely for distance learning students. The homework assignments are to be completed at the end of each of the three sections that make up this guide. These assignments will show your tutor whether you understand the subject matter and are ready to go on to the next part of the course. If your tutor feels you are not ready to move on, he or she will indicate this on your homework assignments, providing comments and suggestions to help you get back on track. It is important that you read these corrections and comments carefully. Do your homework assignments without referring to the learning guide and take note of your tutor’s corrections so that you can make any necessary adjustments. This is also an excellent way to prepare for the final examination.

Remember not to send in the next assignment until you have received the corrections for the previous one.
◆ The human reproductive system and the perinatal period

We can only fully understand that which we already know. For instance, when you watch a sports match, you will enjoy it more if you know the rules of the game.

The Greek philosopher Socrates (470-399 B.C.E.) said, “Know yourself; know your own self.”

Knowing your own body means improving your ability to observe its reactions, understand the messages it sends and act accordingly.

The science of human biology is constantly evolving, and topics such as cloning, the health effects of GMOs, the human genome project, and so on, frequently generate headlines.

Biology course 5062-2, *The Human Reproductive System and the Perinatal Period*, will give you an opportunity to deepen your knowledge of human reproduction and to learn more about the different facets of reproduction, sexual intercourse, pregnancy and lactation. The following diagram illustrates the three sections of the course and shows the order in which the learning modules and related homework assignments are to be completed.

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Introduction

_reader's Comments

The Human Reproductive System and the perinatal period (juin 2005)

You are about to read the second learning guide in SOFAD’s Secondary V Biology program series. SOFAD is committed to providing course materials adapted to your needs, and we value your opinion. Please write your comments, questions or suggestions on this sheet, or contact us by phone, fax or email. If you find any errors, ambiguities, typographical errors, etc., we would appreciate hearing from you.

Thank you for giving us your feedback.

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Comments:

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Individuals Pass Away, Life Continues

Living organisms have a life span that ranges from a few minutes to more than 100 years, depending on the species.

Canadian men and women born in 2003 have a life expectancy of 77 years and 82 years respectively. Life expectancy has doubled in just a few decades and you could conceivably live more than 100 years.

There was life before you were born and there will be life after you pass on. Through your very existence, you help to perpetuate the human species, especially if you have children.

Reproduction ensures that life continues and that species do not die out. Indeed, the ability to reproduce is one of the characteristics of living organisms.

The cell is the basic unit of life. It is as if individual cells had a “desire” to replicate themselves. This typifies both unicellular organisms and more complex organisms. We cannot speak of life at a level lower than that of the cell.

Sex: Yes or No?

Reproduction occurs in different ways in different species and it is not necessarily sexual.

Asexual Reproduction

Asexual reproduction is the formation of new individuals from a single parent. This process does not require the presence of specialized cells from parents that are sexually differentiated.

Bacteria, yeasts, algae and ferns reproduce asexually.
In the simplest type of asexual reproduction, a mother cell divides into two daughter cells.

**Sexual Reproduction**

Sexual reproduction requires the fusion of two sex cells, or gametes, produced by two sexually differentiated parents: the male and the female. In the case of a flowering plant, the pollen grains constitute the male gametes and the ovules constitute the female gametes. In humans, the spermatozoon (male gamete) fertilizes the oocyte (female gamete). More colloquially, male sex cells are known as sperm.

The cell that results from fertilization is called a zygote. The zygote has the characteristics of both parents.

As soon as it is formed, the zygote undergoes a series of divisions leading to the birth of a new individual that has the characteristics of both parents.

The advantage of sexual reproduction is that it gives rise to individuals with greater genetic diversity, who are therefore more likely to ensure the species’ survival.

At the end of this section, you will be able to describe the male and female reproductive systems. You will be able to explain what happens during puberty and how gametes are formed in adolescent boys and girls. You will also be able to explain the ovarian cycle and the menstrual cycle as well as related physiological processes.

This section is divided into four modules:

**Module 1**, *The Reproductive System*, describes the male and female reproductive systems.

**Module 2**, *Puberty and Human Sexual Characteristics*, deals with the onset of puberty and the changes that characterize this life stage.

**Module 3**, *Spermatogenesis and Oogenesis*, describes the formation of spermatozoa and oocytes.

**Module 4**, *The Menstrual and Ovarian Cycles*, deals with the causes and effects of the ovarian and menstrual cycles.
Module 1

The Reproductive System

Food for Thought

Humans reproduce sexually. The existence of two different sexes is essentially justified by the reproductive function. Biologically speaking, the ultimate purpose of "sex" is reproduction of the species and therefore the continuation of life.

In your opinion, is a good knowledge of the male and female reproductive systems necessary to enjoy healthy sexuality?
Module 1 – The Reproductive System

◆ What I Already Know

The external genital organs of the male reproductive system are support structures. They consist of the scrotum, which houses the testicles, and the penis, which delivers sperm into the vagina during copulation. In women, the external genital organs—the vulva—have the primary function of receiving the penis.

However, most of the human reproductive organs are located inside the body and are not visible. Let’s test your knowledge of the internal parts of the male and female reproductive systems.

The purpose of this exercise is to help you determine what you already know, and identify topics with which you are less familiar. You will come back to it at the end of the module. This will allow you to assess your progress. Answer the following questions in your own words, using one or two sentences. Write what you know.

What do the seminal vesicles, the prostate and Cowper’s glands have in common?

Where in the female reproductive system

a) does fertilization take place?

b) does the embryo develop?
◆ **Learning Objectives**

After completing this module, you will be able to describe the male and female reproductive systems. More specifically, you will be able to:

- name the principal anatomical structures of the male and female reproductive systems;
- identify, on a diagram, the principal anatomical structures of the male and female reproductive systems;
- describe briefly the principal anatomical structures of the male and female reproductive systems;
- specify the role of the principal anatomical structures of the male and female reproductive systems.
The Male Reproductive System

**Introduction**

Besides the penis, the male reproductive system is composed of glands (sex glands and accessory glands) and a number of conducting tubes. Each component plays a specific role and contributes to the reproductive function. In this unit, we will study the various parts of the male reproductive system.

**The organs of the male reproductive system**

The male reproductive system is a complex set of external and internal organs. Are you familiar with all of these organs? Let's review them.

A- The **glans**, the bulbous head of the penis, is the expanded cap of the corpus spongiosum.

B- The **prepuce** is the loose fold of skin that covers the glans.

C- The **corpora cavernosa** are two dorsal masses of erectile tissue rich in blood vessels.

D- The **penis** is the best known urinary and copulatory organ of the male reproductive system. It delivers the male reproductive cells, or sperm, into the female reproductive tract.
The Male Reproductive System

E- The **urethra** is a single tube connecting the bladder to the outside of the body. It serves as a conduit for urine and sperm.

F- The paired **vasa deferentia** collect the sperm as they leave the two epididymides and channel them to the ejaculatory ducts. Connected to each testicle (left and right) are a vas deferens, an epididymis and an ejaculatory duct.

G- The **urinary bladder** holds urine. While the bladder is not part of the reproductive system, it is usually included in diagrams of this system because its contents are discharged into the urethra, which also serves as a conduit for sperm.

H- The paired **seminal vesicles** are also **accessory glands**. They secrete much of the fluid that makes up semen. You will learn more about the accessory glands later in this unit.

I- The paired **ejaculatory ducts** connect the vasa deferentia to the urethra. Once they reach the urethra, sperm move along a single tube. The left and right conducting tubes join at the urethra, forming one central tube.

J- The **prostate**, the largest of the **accessory glands**, is located just below the urinary bladder. You will learn more about the accessory glands later in this unit.

K- The paired **Cowper's glands** are small **accessory glands** located on either side of the urethra.

L- The **corpus spongiosum**, also made of erectile tissue, surrounds the urethra and extends the length of the penis.

M- The **epididymis** is a long, tightly coiled tube that lies behind each testicle. Sperm produced in the testicles complete their maturation and are stored in the epididymides.

N- The paired **testicles** are the male sex glands. They secrete sex hormones and produce sperm.

O- The **scrotum** is a pouch of skin that houses, supports and protects the testicles. During sexual arousal or when it is cold, the muscles of the scrotum draw the testicles closer to the body. Conversely, when it is warm, the testicles move lower in the scrotum, away from the body.

**Quick Check**

1.1 The two external parts of the male reproductive system are the penis and

- [ ] the urethra.
- [ ] the testicles.
- [ ] the scrotum.
- [ ] the ejaculatory duct.

1.2 The tube that serves as a conduit for sperm and urine in males is

- [ ] the vas deferens.
- [ ] the epididymis.
- [ ] the ejaculatory duct.
- [ ] the urethra.

*Validate with the answer key.*
Recap

Most of the parts that make up the male reproductive system are located inside the body. The only two parts that are located outside the body, and therefore visible, are the penis and the scrotum. The penis has only one excretory tube, the urethra, which serves as a passage for both urine and sperm.

◆ A question of temperature

Why are the testicles, which produce sperm essential for human reproduction, found in such a vulnerable location outside the body? The answer has to do with temperature. While the normal temperature of the human body is 37°C, sperm production requires a temperature 2 or 3 degrees below this. The scrotum muscles contract when it is cold, bringing the testicles closer to the warmth of the body; when it is warm, they relax, and the testicles are suspended farther from the body.

◆ The structure and role of the testicles

Everyone knows that the testicles are the male sex organs. But what is their structure? What role do they play in the reproductive process? Let’s take a close look at the testicles, a veritable production factory!

A- Testicle
B- Seminiferous tubules
C- Straight tubules
D- Rete testis
E- Efferent ducts
F- Epididymis

A- The testicles are the male sex glands, or gonads. Each testicle is shaped like an olive and measures about 4 cm long and 2.5 cm in diameter. The testicles have a dual function: to produce sperm, which are the male sex cells, or gametes, and to secrete hormones, particularly testosterone.

B- Sperm are produced in the seminiferous tubules, small convoluted tubules grouped into some 300 to 400 lobules. Testosterone, the principal male hormone, is produced by the cells located in the interstices between the seminiferous tubules.
C, D and E- Upon leaving the seminiferous tubules, sperm travel through the straight tubules, the rete testis and the efferent ducts to reach the head of the epididymis.

F- While distinct from the testicle, the epididymis, a tightly coiled tube about 6 metres long, is nonetheless closely connected to it since it covers the upper half of the testicle. The epididymides function as a reservoir for sperm storage and maturation until they are expelled through the vasa deferentia.

Quick Check

1.3 Sperm are produced in

- the epididymides.
- the efferent ducts.
- the prostate.
- the seminiferous tubules.

1.4 The epididymides are two long, tightly coiled tubes where

- hormones are secreted.
- sperm mature.
- sperm are produced.
- hormones become active.

Recap

Sperm are produced in the seminiferous tubules of the testicles, travel through the straight tubules, the rete testis and the efferent ducts and undergo a period of maturation in the epididymides, which also function as a storage reservoir.

◆ A beneficial stay in the epididymides

Sperm produced in the testicles are immature and not very motile. As the sperm make their journey through the tightly coiled epididymides, they mature and become motile. They remain in the epididymides about 20 days.
The structure and role of the penis

The penis is the male copulatory organ. An erect penis can penetrate the female vagina in order to deliver sperm (male gametes).

The **glans** is the expanded cap of the corpus spongiosum which forms the head of the penis. Its opening, called the meatus, is the end of the urethra.

The **corpora cavernosa** are two longitudinal cylindrical masses made of spongy tissue rich in blood vessels. Sexual excitement causes blood to pour into these vessels, resulting in an erection.

The **prepuce**, or foreskin, is the loose fold of skin surrounding the glans. Its surgical removal is called circumcision.

The **corpus spongiosum**, likewise made of spongy tissue rich in blood vessels, surrounds the urethra and helps to make the penis erect. It extends to the tip of the penis, where it forms the glans.

The **urethra** is a tube that serves as a conduit for sperm and urine, but not at the same time. When sperm are expelled during ejaculation, a sphincter blocks the passage of urine.

**Recap**

The structure of the penis allows it to play the dual role of excreting urine and expelling sperm, depending on the order received from the brain.
◆ **Circumcision**

Circumcision is the surgical removal of the prepuce, or foreskin, for hygienic, medical or religious reasons. Most often, it is done as part of an initiation rite. Circumcision can be performed at birth or during adolescence. In certain tribes, circumcision is practised at puberty and marks the passage from childhood to adulthood.

◆ **The roles of the accessory glands: to nourish and transport sperm**

At the end of their maturation period in the epididymides, sperm are ready to travel through the conducting tubes but they need a vehicle, namely semen. Three accessory glands provide part of this semen. Identify these accessory glands in the following illustration.

The **prostate** is a single gland about 2.5 to 3 cm in diameter, located just below the urinary bladder. The whitish fluid it secretes directly into the urethra makes up more than 25% of the total semen volume and helps to make the sperm motile.

The paired **seminal vesicles** are approximately the size of a finger (from 5 to 7 cm long). Located on the posterior surface of the urinary bladder, they release a viscous alkaline secretion rich in sugar (fructose), which provides nourishment for the sperm. This secretion makes up 60% of the total semen volume. The seminal vesicles lead to the ejaculatory ducts.

The paired **Cowper’s glands**, also called bulbourethral glands, are two small, pea-sized glands that lie below the prostate. They secrete a fluid that neutralizes any traces of urine still present in the urethra. Sperm lose their motility in an acidic environment.

**Recap**

Sperm leaving the epididymides could not make their journey without the help of the accessory glands, which provide the fluid that nourishes the sperm and serves as a means of transport for them.
Prostate cancer strikes one in eight

The prostate can be a source of health problems and complications. Most older men suffer from an enlarged prostate which makes urination painful and difficult. Prostate cancer is the most common type of cancer affecting Canadian men. One in eight men will develop prostate cancer in his lifetime, often after age 70. One in 28 men will die of prostate cancer. There is no single cause for this type of cancer but some risk factors have been identified, including age, family history and high testosterone levels. Prostate cancer develops slowly and the symptoms (urination difficulties, bone pain, weight loss, constant fatigue) may take years to appear.

Treatment options include surgery (removal of the tumour), radiation therapy (X-rays or radioactive substance injected into the tumour) and hormone therapy (hormone injections to reduce or inhibit testosterone production.)

Conclusion

The male reproductive system is comprised of organs that produce male sex cells (gametes), or sperm, and deliver them into the female reproductive tract.

Sperm are produced by the testicles; the accessory glands provide them with nourishment and fluid that helps expel them during ejaculation. The erect penis delivers the sperm into the vagina, where they begin their journey toward the oocyte.

End of unit
Before you continue, go to the “Unit Summaries” section and complete the corresponding review activity.
The Female Reproductive System

◆ Introduction

Each component of the female reproductive system plays a specific role and contributes to the reproductive function. We will explore these components in this unit.

◆ The organs of the female reproductive system

The female reproductive system is comprised of external and internal organs. Each organ plays a specific role. Let’s study these organs.

A- The labia majora are folds of skin covered with pubic hair.

B- The labia minora are folds of skin with no pubic hair.

C- The clitoris is a small erectile structure located at the junction of the labia minora.

D- The paraurethral glands, or Skene’s glands, located on either side of the urethra, secrete a lubricating fluid.

E- The urinary bladder is not part of the female reproductive system. It is mentioned here because of its location near the reproductive organs. Unlike the dual function (excretory and reproductive) the urethra plays in males, in females it serves solely as a canal through which urine is discharged.
F- The **uterus**, or womb, is a muscular, thick-walled cavity about 7.5 cm long and 5 cm wide. At the bottom of the uterus is an opening, the cervix, that leads into the vagina. The embryo develops inside the uterus. The uterus is very elastic and can expand to about 40 times its normal size.

G- The **fallopian tubes**, also called uterine tubes or oviducts, are paired tubes about 10 cm long attached to either side of the uterus. During ovulation, the fringed structures, or fimbriae, at the ends of the funnel-shaped fallopian tube opening move closer to the ovary to capture the oocyte.

H- The paired **ovaries** are the female sex glands. They lie close to the fallopian tubes and are attached to the uterus by a ligament.

I- The **vagina**, a muscular and membranous tract 6 to 8 cm long, connects the vulva to the cervix. It is the female copulatory organ, as it receives the penis during sexual intercourse.

J- The paired **Bartholin glands**, located on either side of the vaginal opening, secrete lubricating fluid during sexual intercourse.

K- The **hymen** is a thin membrane that completely or partially covers the vaginal opening.

**Quick Check**

1.5 The internal organ that will house the embryo is
   - the uterus.
   - the vagina.
   - the ovary.
   - a uterine tube.

1.6 The uterine tubes are also called
   - Cowper's tubes.
   - fallopian tubes.
   - Bartholin's tubes.
   - Eustache's tubes.

*Validate with the answer key.*

**Recap**

The female reproductive system consists of external and internal organs. The role of the external organs is to receive the penis, while that of the internal organs is to facilitate fertilization.

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**A dual role**

The male reproductive system has only one purpose: to produce sex cells (male gametes), or sperm, and deliver them into the female reproductive tract. The female sex organs carry out two distinct roles: they produce sex cells (female gametes), the oocytes, and bring to maturity the embryo resulting from the fertilization of an oocyte by a sperm.
For a long time, it was thought that the male’s role was to provide sex cells and the female’s role was to ensure fetal development. The role of oocytes in fertilization was not discovered until the early 19th century.

◆ **The structure and role of the ovaries**

Here is a frontal view of the female reproductive system. In the illustration, identify the ovary, the mature follicle, the fallopian tube and the uterus.

Whether or not it is fertilized, the oocyte travels from the ampulla to the **uterus**, the organ of gestation, aided by the **beating of the cilia** that line the fallopian tube. The uterus is an organ shaped like an upside-down pear. If the oocyte is fertilized, the tiny embryo is implanted in the lining of the uterus, where it grows and develops.

The **ovaries** are the female sex glands. They are almond-shaped and approximately 4 cm long and 2 cm wide. In addition to producing oocytes, the ovaries secrete the sex hormones estrogen and progesterone.

The hormones secreted by the ovaries cause the follicles to mature. Follicles are small sacs, each containing an oocyte. An ovary contains many follicles, and the mature follicles can be identified by the presence of bumps on the ovary’s surface. Each month, a **mature follicle** in one of the ovaries ruptures and releases an oocyte.

The role of the fringed structures (fimbriae) on the infundibulum of the **fallopian tube** is to capture the oocyte during ovulation. If the oocyte and sperm meet in the outer third of the tube, fertilization may occur and an embryo may form.

**Recap**

Each month, an oocyte is expelled from one of the ovaries and captured by the fallopian tube. Whether or not fertilization occurs, it then makes its way toward the uterus.
Five hundred and forty ovulations

At birth, women already have their full complement of oocytes, which number approximately 700,000. The period of fertility begins at puberty and ends with menopause, lasting about 45 years. At the rate of one ovulation per month, a woman will ovulate about $45 \times 12 = 540$ times. Each oocyte therefore has on average one chance out of 1300 of being selected for ovulation.

According to Statistics Canada, in 1999, these 540 ovulations produced an average of ... 1.5 children! This represents an average of one successful pregnancy for every 360 ovulations.

The structure and role of the external organs

The external organs of the female reproductive system are collectively known as the vulva.

Identify each organ on the diagram.

The vestibule is the space surrounded by the labia minora. It contains the external openings of the vagina and the urethra (meatus). The paraurethral and Bartholin glands also open into the vestibule.
The **labia majora** can be described as the female counterpart of the male scrotum due to their protective function. They are generally covered with pubic hair.

The **hymen**, a membrane that may partially cover the vaginal opening, can be ruptured during a woman’s first sexual intercourse or during strenuous exercise.

The **labia minora**, two liplike folds of skin surrounded by the labia majora, are not covered with pubic hair.

The **clitoris**, whose prepuce is located at the anterior junction of the labia minora, is a small protrusion that contains erectile tissue. Like the male penis, the clitoris becomes erect in response to tactile stimulation and contributes to sexual arousal in women.

**Recap**

Each external organ of the female reproductive system plays a specific role during copulation which, under favourable conditions, will result in the fertilization of an oocyte by a sperm.

**◆ The hymen**

The hymen can be of different shapes and thicknesses. Some women don’t have a hymen. In other cases, it is so thick that surgery is required. Very often, there is bleeding when it is ruptured.

A long time ago, it was believed that the hymen completely covered the vaginal opening. If the hymen was not intact, it was thought that the woman had already had sexual intercourse. Because the virginity of the future bride was highly prized, you can imagine the injustice that some women suffered!

**◆ Conclusion**

The female reproductive system plays a dual role: it produces sex cells (female gametes) and houses the embryo resulting from the fertilization of an oocyte by a sperm. The role of the external organs is to permit copulation, while the internal organs receive the sperm and permit fertilization and embryonic development.

**End of unit**

Before you continue, go to the “Unit Summaries” section and complete the corresponding review activity.
**What I Know Now**

At the beginning of this module, you answered two questions pertaining to the content of the two units, to the best of your knowledge. Here are the same questions. Answer them again, then compare your answers to your previous ones.

What do the seminal vesicles, the prostate and Cowper’s glands have in common?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Where in the female reproductive system

a) does fertilization take place?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

b) does the embryo develop?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

**Take a Stand**

The male and female reproductive systems are complementary and contribute to human sexual reproduction. You have described the main internal and external organs of the male and female reproductive systems.

In your opinion, does a better knowledge of the male and female reproductive systems promote healthy and responsible sexuality?

☐ Yes  ☐ No  ☐ I don’t know
Quiz

1. Which of the following statements about sperm production and maturation is correct?
   A. Spermatozoa are produced in the epididymides and stored in the testicles.
   B. Spermatozoa are produced in the seminiferous tubules and stored in the vasa deferentia.
   C. Spermatozoa are produced in the testicles and stored in the seminiferous tubules.
   D. Spermatozoa are produced in the seminiferous tubules and stored in the epididymides.

2. The inflow of blood in the corpora cavernosa causes
   A. miction.
   B. ejaculation.
   C. an erection.
   D. ovulation.

3. Which of the following organs is not part of the reproductive system?
   A. The prostate
   B. The urinary bladder
   C. The vas deferens
   D. The scrotum

4. Which of the following organs does not contribute to sperm production?
   A. The urinary bladder
   B. The prostate
   C. The seminal vesicle
   D. Cowper’s glands

5. Which conducting tube in the male reproductive system serves as a passage for both urine and sperm?
   A. The urethra
   B. The ejaculatory duct
   C. The vas deferens
   D. The efferent duct
6. What are the external organs of the female reproductive system called collectively?
   A. The vestibule
   B. The pubis
   C. The vulva
   D. The vagina

7. What distinguishes the female urethra from the male urethra?
   A. The female urethra is one of the internal organs of the reproductive system.
   B. The female urethra serves to excrete urine only.
   C. The female urethra serves to excrete urine and oocytes.
   D. The female urethra serves to excrete urine and follicles.

8. Which organ of the female reproductive system can be compared to the penis owing to its erectile properties?
   A. The vagina
   B. The uterus
   C. The clitoris
   D. The vulva

9. In which organ of the female reproductive system does the embryo develop?
   A. The uterus
   B. The vagina
   C. The fallopian tube
   D. The ovary

10. Which of the following sequences correctly represents the path of an unfertilized oocyte starting from ovulation?
    A. Uterus, vagina, ovary, fallopian tube
    B. Vagina, uterus, fallopian tube, ovary
    C. Ovary, uterus, fallopian tube, vagina
    D. Ovary, fallopian tube, uterus, vagina

   Validate with the answer key.