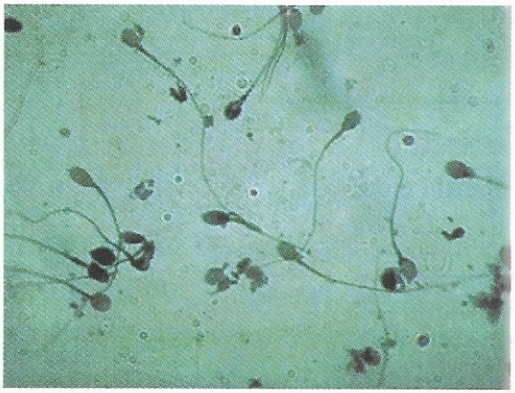
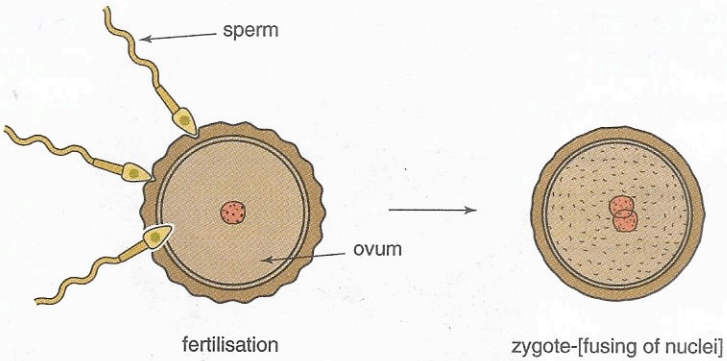
Sexual Reproduction in Animals

Two individuals, one male and the other a female, are involved in sexual reproduction. The male of the species produces the male gametes called **sperms**. The female produces the female gametes called **ova** (singular: **ovum**) or eggs. **The fusion of the sperm and the ovum is called fertilisation**. The fusion results in the formation of the **zygote**, which then grows into a new individual.



▲ human sperm (highly magnified)



▲ fertilisation resulting in formation of zygote

In frogs and fish, fertilisation takes place in water. During mating, the male frog climbs onto the back of the female and they shed the sperms and ova together into the water. They release the gametes close together at the same time, to help the sperms reach the eggs. Fertilisation takes place in the water, outside the body of the female frog. This type of fertilisation is called **external fertilisation**.

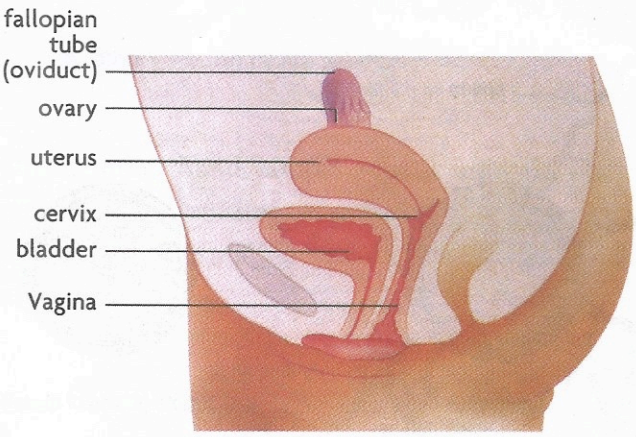
In land animals like insects, birds, dogs, cats, cattle and human beings, the fusion of the gametes takes place inside the body of the female. The male discharges the sperms inside the body of the female through a special organ. Such fertilisation is called **internal fertilisation**.

Reproduction in Human Beings

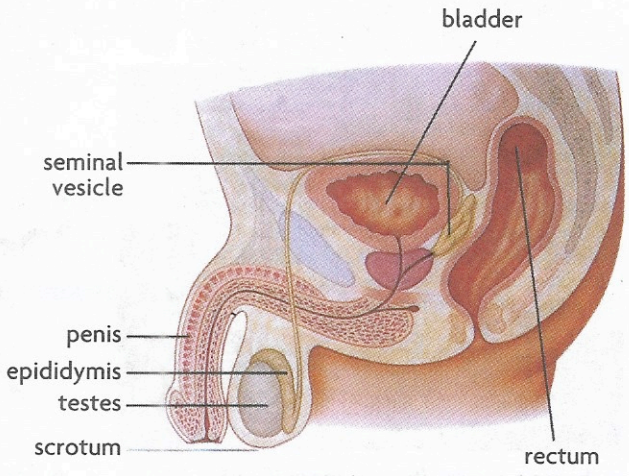
The reproductive systems in males and females are different. They are designed to fulfil different roles. After fertilisation is over, the fertilised egg has to remain and grow inside the female body, till the baby is ready to be born.

The female reproductive organs consist of two almond-shaped **ovaries**. They lie at the back of the abdomen just below the kidneys. Ovaries produce the eggs or ova. Close to the ovary is the funnel-shaped opening of the **oviduct** or **fallopian tube**. The ovum released from the ovary passes down this tube which is connected to the pear-shaped **uterus** or **womb**. The uterus is a muscular organ which is capable of stretching enormously as the baby grows inside it. The uterus is connected to the outside through a muscular tube called the **vagina**. The **cervix** is the ring of muscles at the lower end of the uterus where it joins the vagina. It stretches during birth to allow the baby to come out.

The male reproductive system has of a pair of **testes** (singular: **testis**). These lie outside the body in a sac called the **scrotum**. The sperms produced in the testes are stored in a highly coiled tube, the **epididymis**. Sperms are mixed with a fluid to form **semen**. This takes place in narrow tubes called the **sperm ducts**. The semen is carried to the **urethra** by the sperm ducts. The urethra passes through the **penis**, a muscular external organ used for passing both urine and semen. The semen is deposited with the help of the penis in the vagina.



▲ female reproductive system



▲ male reproductive system

The age when girls and boys become sexually mature is called **puberty**. Puberty usually starts at the age of 11–13 years in girls and 12–14 years in boys. The time may vary with different children. There is nothing wrong if puberty starts early or a little later in life. When boys and girls become sexually mature, the ovaries start producing ova and the testes start producing sperms. Besides this, both ovaries and testes also produce **sex hormones**. These hormones bring about changes in the bodies of both boys and girls. While the internal changes are not visible, some external changes can be seen. These are the development of **secondary sexual characteristics**. In boys, hair starts to grow on the arms, armpits, legs, chest, and in the pubic area. As time passes, young men develop hair on the face as well. Their voices deepen and their bodies become more muscular.

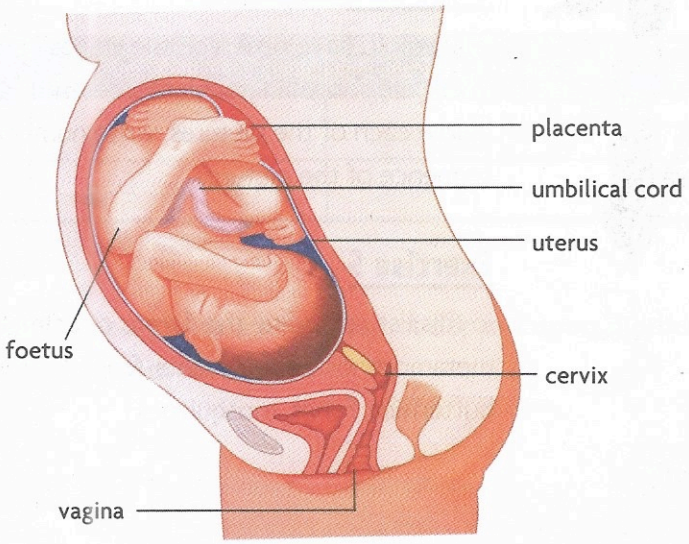
In girls, at puberty, the breasts start to develop and the body becomes more rounded. Hair starts to grow under the arms and in the pubic area. At puberty, girls also start to **menstruate**. Each month, an ovum is produced by the ovaries and the uterus prepares to receive a fertilised ovum. If fertilisation does not take place, the inner layer of the womb is shed and removed from the body. This, together with some blood, flows out of the body through the vagina. This process, called **menstruation**, is usually completed in three or four days. The start of the menstrual cycle in a girl is called **menarche**. This is a monthly cycle that continues till the female is no longer capable of having babies. The stopping of the menstrual cycle usually takes place between the ages of 45 and 50 years. It is called **menopause.**

The human body produces chemical substances called **hormones**. These are made in the **endocrine glands**. The **ovaries** produce **female hormones** which cause the cyclic changes and menstruation in the female body. In the male body, the testes produce **male hormones** along with the sperms. You will read more about the endocrine system of the human body at the end of this chapter.

Every month, about 12 to 14 days after menstruation, the ovaries release an egg into the fallopian tube. **The process of releasing an egg from the ovary is called ovulation**. The egg remains in the tube for 2-3 days. During this time, if sperms are released into the vagina, they swim up the fallopian tube. Millions of sperms are released, but only one sperm fertilises the egg. The zygote that is formed divides a few times. It now travels to the uterus and attaches itself to the wall of the uterus. The wall of the uterus thickens and enhances the blood supply in preparation for the **foetus** or **embryo**.

The foetus now starts developing. With the passage of time, the cells multiply and differentiate into different body parts. The foetus is attached to the mother by an **umbilical cord**. One end of the umbilical cord is attached to the navel of the baby and the other end is attached to the **placenta** on the wall of the uterus. The placenta is rich in blood vessels. The growing foetus draws its oxygen and nourishment from the mother through the placenta through the umbilical cord. The umbilical cord is cut after the baby is born.

The period from fertilisation to birth is called **gestation** or **pregnancy.** The gestation period in human beings is about 280 days.



▲ foetus in the uterus

Exercise 2

Match the terms in the two columns.

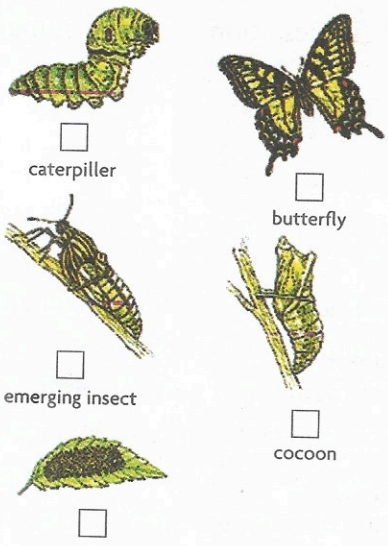
Column I	Column II
i. sexual maturity	**a.** endocrine glands
ii. period from fertilisation to birth	**b.** ovulation
iii. releasing eggs from the ovary	**c.** puberty
iv. hormones	**d.** menstruation
v. getting rid of the unfertilised egg	**e.** gestation

Exercise 3

How can harmful substances reach an unborn baby if his/her mother smokes, drinks alcohol, or takes drugs while pregnant?

Development in Other Animals

In human beings and most animals, the young ones grow directly into adults. However, in some animals, the young ones are very different from the adults. They undergo a series of changes before they change into an adult. This set of changes is called **metamorphosis**. Butterflies and moths undergo metamorphosis.



▲ life-cycle of a butterfly

Exercise 4

You would have observed the stages in the life-cycle of a butterfly. These are shown in jumbled order in the pictures here. In the boxes below each of the pictures, write numbers to indicate the correct sequence of the pictures.

Exercise 5

In this list, underline the names of animals that undergo metamorphosis. moths, ants, frogs, lizards, cockroaches, snakes, butterflies, fishes, mosquitoes

Parental Care

The young ones of fishes and frogs receive little or no protection or nourishment from the mother. They are usually left to fend for themselves as soon as they are born. Among the animals that reproduce by internal fertilisation, the young ones are fed and protected by the mother. Young birds are cared for and fed till they get their wings and are able to fly. Human babies are usually protected and looked after for a very long time, till they reach adulthood.

What determines the sex of the child?

You have learnt earlier that the nucleus of a cell has chromosomes which contain hereditary information. Chromosomes occur in pairs and hence are always found in even numbers. A human being has 23 pairs of chromosomes. All pairs are similar in males and females except the last pair. The last pair of chromosomes are called the **sex chromosomes. This pair determines the sex of the child.**

The last pair of chromosomes is termed **XX** in females and **XY** in males. The **Y** chromosome is found only in the male. The **X** chromosome is found in the cells of both males and females. During the formation of gametes in the sex organs, the chromosome number is halved. Each gamete therefore, receives only one set of chromosomes (23), comprising one chromosome from each pair.

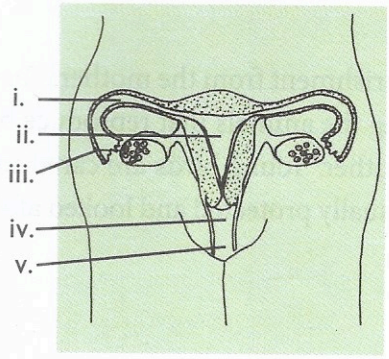
Since females have only XX chromosomes, the female gamete or ovum can only receive an X chromosome. Hence, **all eggs in females will have only X chromosomes.**

However, males produce two types of gametes or sperms—those with X chromosomes and those with Y chromosomes.

If the sperm with the X chromosome fuses with the egg, the zygote will have an XX combination. In other words, the child will be a **female**. If the sperm with the Y chromosome fuses with the egg, the zygote will have an XY combination. The child will be a **male**.

Sperm	Egg	Zygote	Male/Female
X	X	XX	female
Y	X	XY	male

Thus, whether a baby is going to be a girl or a boy does not depend upon mother. In fact, it depends upon the type of sperm that comes from the father.



▲ Practise this drawing.

Exercise 6

The diagram given here shows the female reproductive system. Fill in the names of the parts correctly using words from this list.
ovary, cervix, vagina, oviduct, sperm, uterus, testes

Exercise 7

Copy these sentences into your notebook and complete them.

i. The work of the sex organs is to produce _____ and _____.

ii. Male gametes are called _____.

iii. The _____ stores sperms.

iv. Fertilisation in human beings takes place in the _____.

v. The foetus draws its nutrition and oxygen from its mother through the _____ via the _____.

vi. A sac that holds the testes is called the _____.

vii. The foetus grows in the _____.

viii. External fertilisation usually takes place in _____.

ix. Animals which produce both eggs and sperms are called _____.

x. The product of the fusion of an egg and the sperm is a _____.

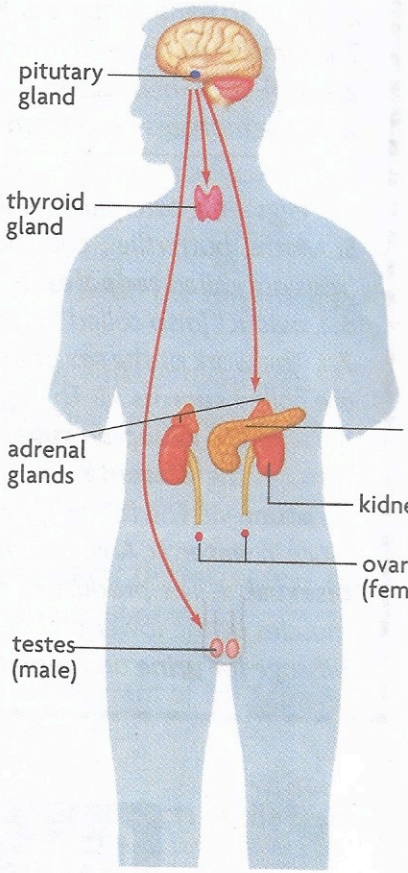
xi. The ring of muscles at the lower end of the uterus is called the _____.

xii. The urethra is the common passage for _____ and _____.

More About the Endocrine System

The endocrine system, made up of **endocrine glands,** is the control system of the body. These glands produce hormones. Hormones help in controlling many functions of the body along with the nervous system. Hormones are chemicals that control functions like growth and development. Hormones are released directly into the blood. For instance, the pancreas produces **insulin** which regulates the amount of sugar in the blood. A person suffering from **diabetes** has a shortage of insulin and is unable to process the sugar in their food. If sugar levels in the blood are too high or too low, a

diabetic person can become seriously ill. The hormone, **thyroxin,** produced by the **thyroid** gland controls the metabolism of the body. **Adrenalin** produced by the adrenal glands controls blood pressure and prepares the body to face stress. The testes produces the male sex hormone, **testosterone.** The ovaries produce the female sex hormones, **oestrogen** and **progesterone**. The female hormones are responsible for the menstrual cycle and play a role in pregnancy.



▲ some important endocrine glands

Population and Birth Control

A rapidly growing population is one of the major problems of our country. Although we have made progress in several fields, the benefits of progress do not reach everybody because the numbers are so large.

In earlier days, large families were quite common. Yet, many children used to fall ill and did not survive to become adults. Apart from this, frequent pregnancies made mothers less strong and unable to cope with the problems of bringing up their children. Today, with improved medical facilities, many more children survive the diseases of childhood. With proper education, they can earn well as adults and raise the living standards of the family. If the rate at which the population increases can be controlled, education, medical and other facilities can reach even distant parts of our country.

Many family welfare organisations are working to generate awareness about the benefits of a small family. Their volunteers educate people about methods of **birth control** and proper gap between children. The government has raised the minimum age of marriage to ensure that persons reach mental maturity before they start to raise a family. Reaching physical maturity does not automatically mean that a person is able to take on the responsibility of a family. Before that, a person needs to complete his or her education, start earning, and be capable of taking decisions and fulfilling his/her responsibilities.