

17.1

In class 6th you have learnt about 'Growth in living organisms'. Growing up is a natural process. In human beings, growth begins from the day one. But upon crossing the age of 10 or 11 there is a sudden sprout in growth which becomes noticeable. The changes taking place in the body are part of growing up. They indicate that you are no longer a child but are on the way of becoming an adult.



Activity 1

Put a tick mark (✓) in the table 17.1 showing the changes that have taken place in your childhood friends of your neighbourhood or class/school, who have played and studied with you since their childhood.



TABLE 17.1

S.No.	Changes from Childhood to till now	Peer - 1 (Boy/ Girl)	Peer - 2 (Boy/ Girl)
1.	Increase in height.		
2.	Change in voice.		
3.	Changes in body shape.		
4.	Get acne and pimples on the face.		
5.	Muscles become stronger.		
6.	Larynx is prominently visible.		
7.			

You have seen that the human body undergoes several changes during its life time. The period of life, when the body undergoes changes, leading to reproduction maturity, is called adolescence. These changes mark the onset of puberty. The most important change which

marks puberty is that boys and girls become capable of reproduction. Puberty ends when an adolescent reaches reproductive maturity.

Adolescence begins around the age of 11 and lasts up to 18 or 19 years of age. Since this period covers the teens (13 to 18 or 19 years of age), adolescents are also called 'teenagers'. In girls, adolescence may begin a year or two earlier than in boys.

Adolescence is a period of change in a person's way of thinking. Intellectual development also takes place and they tend to spend considerable time in thinking.

However, an adolescent may feel insecure while trying to adjust to the changes in the body and mind. But as adolescent learners you should know that there is no reason to feel insecure. These changes are a natural part of growing up.

17.2 Changes during Adolescence

17.2.1 Increase in Height - The most conspicuous change during adolescence is the sudden increase in height. At this time the long bones, that is the bones of the arms and the legs elongate and make a person tall. Table 17.2 gives the average rate of growth in height of boys and girls with age. For example, by the age 12, a boy has reached 84% of his probable full height, while a girl has reached 91% of her full height. These figures are only representative and there may be individual differences. Use the table and calculate with the help of formula given below how tall you are likely to be.



TABLE 17.2

Age in years	% of full height	
	Boys	Girls
08	72%	77%
09	75%	81%
10	78%	84%
11	81%	88%
12	84%	91%
13	88%	95%
14	92%	98%
15	95%	99%
16	98%	99.5%
17	99%	100%
18	100%	100%

$$\text{Calculation fo full height (cm)} = \frac{\text{Present height(cm)}}{\% \text{ of full height at this age}} \times 100$$

Example - (as given in the chart)

Ramesh is 9 years old and 120 cm tall. At the end of the growth period he is likely to be -

According to the table 17.2

$$\frac{120}{75} \times 100 \text{ cm} = 160 \text{ cm tall}$$

Initially, girls grow faster than boys but by about 18 years of age both reach their maximum height. The rate of growth in height varies in different individuals. Some may grow suddenly at puberty and then slow down while others may grow gradually.

You must have noticed that height of an individual is more or less similar to that of some family member. This is because height depends on the genes inherited from parents. It is however very important to eat the right kind of food during these growing years. This helps the bones, muscles and other parts of the body get adequate nourishment for growth.

17.2.2 Change in Body Shape - Have you noticed that boys in your class have broader shoulder and wider chests than boys in junior classes? In boys the muscles of the body grow more prominently than in the girls. Thus changes occurring in adolescent boys and girls are different.

17.2.3 Voice change - Did you notice that sometimes the voice of some of the boys in your class cracks? At puberty, the voice box or the larynx begins to grow. Boys develop larger voice boxes. The growing voice box in boys can be seen as a protruding part of the throat called Adam's apple. In girls the larynx is hardly visible from the outside because of its small size.

17.2.4 Increased Activity of Sweat and Sebaceous Glands - During puberty the secretion of sweat glands and sebaceous glands (oil glands) increases. Many young people get acne and pimples on the face at this time because of the increased activity of these glands in the skin.

17.2.5 Development of Sex Organs - Its considered to be the most important change at puberty, where in the sex organs of human develop completely and become reproductive. You have read about the human reproductive system in class 7, now let's know something more about it.

(a) Male reproductive organs - The male reproductive organs include a pair of testes (singular testis), two sperm ducts and a penis (fig17.1a). On maturity the testes produce millions of tiny male gametes called sperms. Sperm is a single cell with a small head, a middle piece and a tail (fig17.1b) .

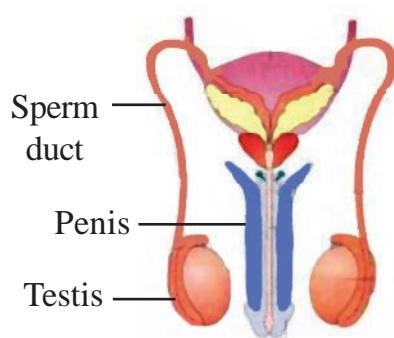


fig17.1a

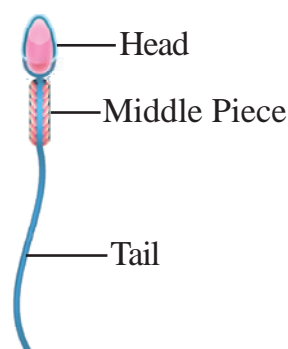


fig17.1b

Fig. -17.1 Male reproductive organs

(b) Female reproductive organs - The female reproductive organs are a pair of ovaries, oviducts (fallopian tubes) and the uterus (fig.17.2a). The ovary produces female gametes called ova (eggs) (fig.17.2b). At puberty in girls, the uterus increases in size and a single matured egg (ovum) is released in to the oviduct by one of the ovaries every month. Uterus is the part where development of the baby takes place. Like the sperm, an egg is also a single cell.

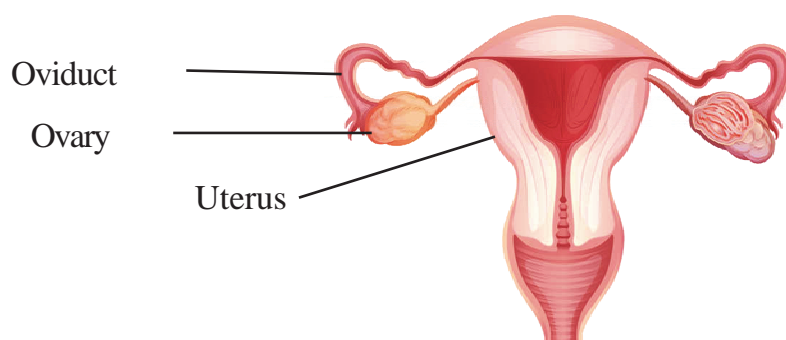


Fig. -17. 2 a Female reproductive organs

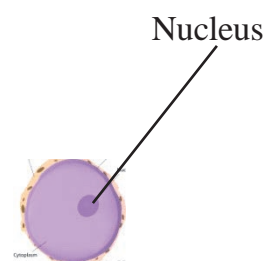


Fig. -17. 2 b Ovum

(C) Fertilization - As you know the first step in the process of reproduction is the fusion of a sperm with an ovum. Such fusion of egg and sperm is called fertilization (fig.17.3 a). When this fertilization occurs inside the female body it is known as internal fertilization like in human, cat, cow etc and the type of fertilization in which the fusion of a male and a female gamete takes place outside the body of the female is called external fertilization, like in frog, fish and in most aquatic animals.

As a result of fertilization a zygote is formed. Which later forms the embryo and finally develops in to a new off spring

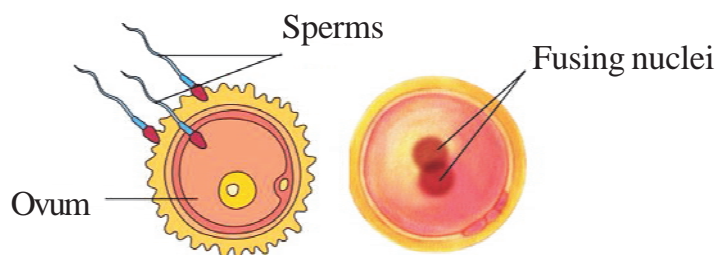


Fig. 17.3 Human (a) fertilization (b) Zygote

In human and other mammals the complete development of embryo into a new born individual takes place in the uterus of the female body. Such animals are known as viviparous. While those animals which lay eggs, which later hatches out into a new individual are known as oviparous. Can you name same oviparous animals?

In microorganisms asexual reproduction occurs like hydra reproduce through budding. A small knob like structure develops which later grows into a bud and finally separates out as a new individual. Unicellular amoeba reproduces by binary fission in which the nucleus and cell divides into two independent parts and each part grows into a new individual.



NOW ANSWER THESE

1. Mention the main characteristics of adolescence?
2. What are the reasons of acne and pimples on the face of adolescents?
3. Why do adolescents feel insecure?
4. What are the main differences between viviparous and oviparous animals?
5. What is fertilisation? Explain.

17.3 Secondary Sexual Characters

You know that the testes and ovaries are the reproductive organs. They produce the gametes that are, sperms and ova. In girls, breasts begin to develop at puberty and in boys facial hair like moustaches and beard begin to grow. As these features help to distinguish the male from the female they are called secondary sexual characters. Boys also develop hair on their chest. In both boys and girls hair grows under the arms and in the region above the thighs or the pubic region.

The changes which occur at adolescence are controlled by hormones. Hormones are chemical substances secreted by endocrine glands.

At the onset of puberty, the male hormones or testosterone begins to be released by the testis. This causes changes in boys, for example the growth of facial hair. Once puberty is reached in girls, ovaries begin to produce the female hormone or estrogen which makes the breasts to develop. Milk secreting glands or mammary glands develop inside the breasts. The production of this hormone is under the control of another hormone secreted from an endocrine gland called pituitary gland.

17.4 Role of Hormones in Initiating Reproductive Function -

Endocrine glands release hormones into blood stream so as to reach a particular body part called the target site. The target site responds to the hormone. There are many endocrine glands or ductless glands in the body. The testes and ovaries secrete sex hormones. Further the sex hormones are under the control of hormones from the pituitary gland -

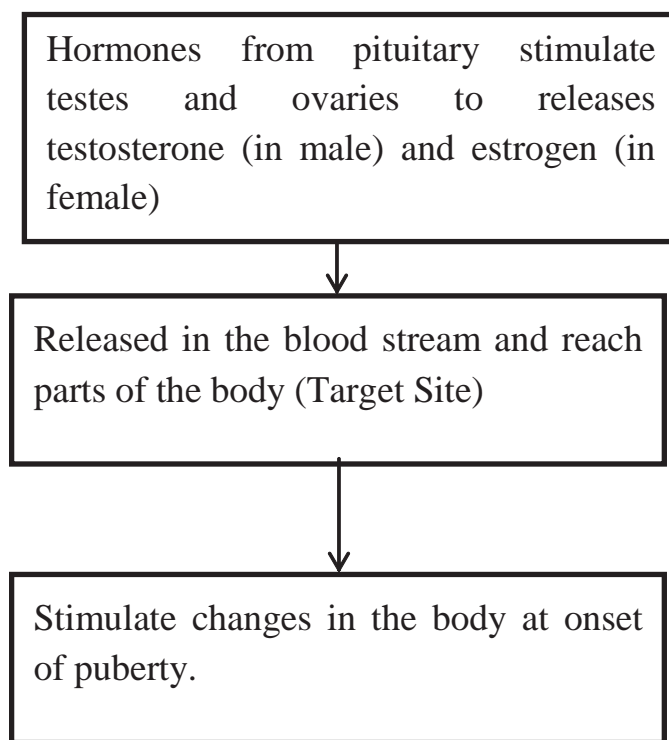


Fig. 17.4 The onset of puberty is controlled by hormones.

17.5 Reproductive Phase of life in Human

Adolescents become capable of reproduction when their testes and ovaries begin to produce gametes. The capacity for maturation and production of gametes lasts for a much longer time in males than in females.

In females the reproductive phase of life begins at puberty (10 to 12 years of age) and

generally lasts till the age of approximately 45 to 50 years. The ova begin to mature with the onset of puberty. One ovum matures and is released by one of the ovaries once in about 28 to 30 days. During this period the wall of the uterus becomes thick so as to receive the egg, in case it is fertilized and begins to develop. This results in pregnancy. If fertilization does not occur the released egg and the thickened lining of the uterus along with its blood vessels are shed off. This causes bleeding in women which is called menstruation. Menstruation occurs once in about 28 to 30 days. The first menstrual flow begins at puberty and is termed as menarche. At 45 to 50 years of age the menstrual cycle stops. Stoppage of menstruation is termed as menopause. Initially menstrual cycle may be irregular. It takes some time to become regular.

Menstrual cycle is controlled by hormones. The cycle includes the maturation of the egg, its release, thickening of uterine wall and its break down if fertilization doesn't occur. In case the egg is fertilized it begins to divide and then gets embedded in the uterus for further development.



NOW ANSWER THESE

1. Name the hormones responsible for the changes occurring in adolescence at puberty.
2. What is the span of reproductive life in females?
3. What do you understand by secondary sexual characters?

17.6 How is the sex of the baby determined?

Inside the fertilized egg or zygote is the instruction for determining the sex of the baby. This instruction is present in the thread like structures, called chromosomes in the fertilized egg. You can recall that chromosome is present inside the nucleus of every cell. All human beings have 23 pairs of chromosome in the nuclei of their cells. Two chromosomes out of these are the sex chromosomes, named X and Y. A female has two X chromosomes, while a male has one X and one Y chromosome.

No. of chromosomes in human being -

In female - 22 pairs + XX (one pair)

In male - 22 pairs + XY (one pair)

When a sperm containing X chromosome fertilises the egg, the zygote would have two X chromosome and develop in to a female child. If the sperm contributes a Y chromosome to the egg (ovum) at fertilisation the zygote would develop into a male child.

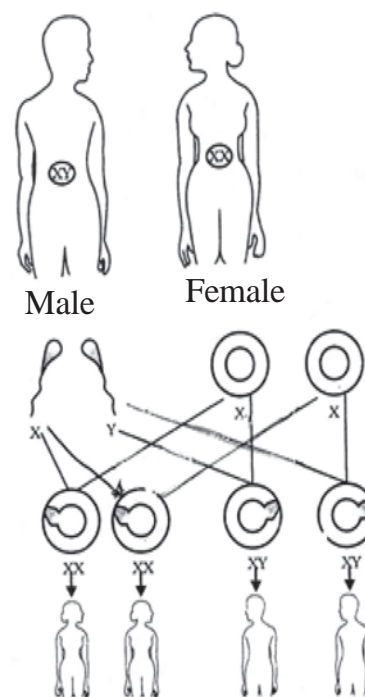


Fig. 17.5 Sex determination in humans

Now you know that the sex chromosomes of the father determine the sex of an unborn baby. The belief that the mother is responsible for the sex of her baby is completely wrong and to blame her for this is totally unjustified.

17.7 Reproductive Health

The physical and mental well being of an individual is regarded as an individual's health. To keep the body healthy every human being, at any age needs to have a balanced diet. The person must also observe personal hygiene and undertake adequate physical exercise.

During adolescence, however these become even more essential as the body is growing.

17.7.1 Nutritional Needs of the Adolescents - Adolescence is a stage of rapid growth and development. Hence the diet for an adolescent has to be carefully planned. You may have already learnt what a balanced diet is. Recall that a balanced diet means that the meal should include proteins, carbohydrates, fats and vitamins in requisite proportions. Our Indian meal of roti /rice, dal (pulses) and vegetables is a balanced meal. Milk is a balanced food in itself. Fruits also provide nourishment. Iron builds blood and iron-rich food such as leafy vegetables, jaggery, meat, citrus fruits, Indian gooseberry (amla) are good for adolescents.

17.7.2 Personal Hygiene - Everyone should have a bath at least once every day. It is more necessary for teenagers because the increased activity of sweat glands sometimes makes the body smelly. All parts of the body should be washed cleaned every day. If cleanliness is not maintained there are chances of catching bacterial infection. Girls should take special care of cleanliness during the time of menstrual flow. They should keep track of their menstrual cycle and be prepared for the onset of menstruation.

17.7.3 Physical Exercise -All young boys and girls should take walks, exercise, and play outdoor games. Walking and playing in fresh air keeps the body fit and healthy.

17.8 Myths and Taboos

There are many wrong notions which you should now be able to discard as sensible adolescents. For example; there are myths and taboos regarding bodily changes that adolescents experience. Some of these are given below and you can argue why these are myths and not facts.

1. A girl becomes pregnant if she looks at boys during menstruation.
2. The mother is responsible for the sex of her child.
3. A girl should not be allowed to work in the kitchen during menstruation.
4. A girl is considered unholy during menstruation.

You may come across many other myths & taboos, discard them.



Activity 2

Collect data on the number of children in your class who exercise regularly and who do not exercise regularly. Did you notice any difference in their fitness and health? Prepare a report on the benefits of regular exercises.

17.9 Say "No" to Drugs -

Adolescence is a period of much activity in the body and mind which is a normal part of growing up. So do not feel confused or insecure. If anybody suggests that you will get relief if you take some drugs, just say "No" unless prescribed by the doctor. Drugs are addictive, if you take them once you will feel like taking them again and again. They harm the body in the long run. They ruin health and happiness.

You must have heard about AIDS which is caused by a dangerous virus, HIV. This virus can pass on to a normal person from an infected person by sharing the syringes used for injecting drugs. It can also be transmitted to an infant from the infected mother through her milk. The virus can also be transmitted through sexual contact with a person infected with HIV.

17.10 Child Marriage is Harmful

You might know that in our country the legal age for marriage is 18 years for girls and 21 years for boys. This is because teenage mothers are not prepared mentally or physically for motherhood. Early marriage and motherhood cause health problems in the mother and the child.



NOW ANSWER THESE

1. Which chromosomes are responsible for the determination of sex in human?
2. Why the diet of an adolescent should be carefully planned?
3. Why it is important to maintain personal hygiene during adolescence?



WE HAVE LEARNT

- Children in the age group of 11 years to 19 years are called adolescents.
- Adolescence or the onset of puberty marks the beginning of reproductive life.
- The onset of puberty brings about maturing of the reproductive organs. Hair grows at various places on the body. Breasts develop in girls and facial hair (moustache and beard)

appear in boys. Voice of boys becomes hoarse as voice box enlarges during adolescence.



Children gain height during adolescence.



The onset of puberty and maturity of reproductive parts are controlled by hormones.



Hormones are secretions of endocrine glands which are powered directly into the blood stream.



Testosterone is the male hormone and estrogen is the female hormone. The uterine wall in female prepares itself to receive the developing fertilized egg. In case there is no fertilization the thickened lining of the uterine wall breaks down and goes out of the body along with blood. This is called menstruation.



Sex of the male child depends on whether the zygote has XX or XY chromosomes.



It is important to eat balanced food and maintain personal hygiene during adolescence.



QUESTION FOR PRACTICE

1. Find out the correct and incorrect sentences. Make necessary corrections to the incorrect sentences-

- i. Mothers are responsible for the sex of the unborn child.
- ii. Children gain height during adolescence.
- iii. During menstruation girls should not be allowed to work in kitchen.
- iv. Children in the age group of 13-19 are called infants.
- v. The zygote with XY chromosome pair develops into a male child.
- vi. Body of girls becomes unholy during menstruation.

2. Choose the correct option -

- i. Adolescents should be careful about what they eat, because-
 - A. Proper diet develops their brains.
 - B. Proper diet is needed for the rapid growth taking place in their body.
 - C. Adolescents feel hungry all the time.
 - D. Taste buds are well developed in teenagers.
- ii. Reproductive age starts when -
 - A. Menstruation starts.
 - B. Breasts start developing.
 - C. Body weight increases.
 - D. Height increases.

iii. The right meal for adolescents consists of -

- A. Chips, noodles, chocolate
- B. Chapatti, dal, vegetables
- C. Rice, noodles and chips
- D. Vegetable, chips and cold drink.

iv. Following is male hormone -

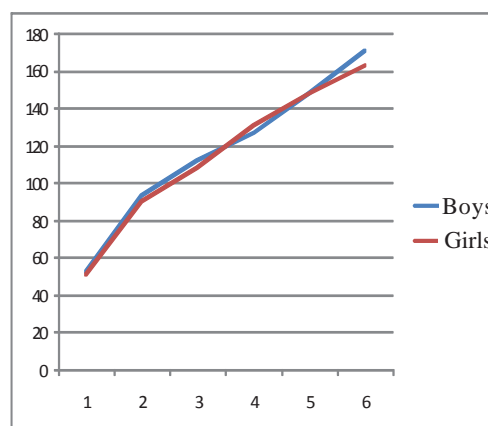
- A. Testosterone
- B. Estrogens
- C. Insulin
- D. Thyroxin

3. Explain the followings-

- (a) Secondary sexual characters
- (b) Sex determination in the unborn baby
- (c) Oviparous and viviparous animals

(d) The table and graph below shows the data of the likely heights of boys and girls, as they grow in age. Draw same graphs showing height and age for both boys and girls in your copy. What conclusions can be drawn from the graph?

Age (years)	Height (cm)	
	Boys	Girls
0	51	51
4	94	90
8	112	108
12	127	131
16	148	148
20	171	163



TRY TO DO THIS ALSO

- Find out from your elders, relatives about their awareness of the legal status of early marriage. You may get information on it from your teacher, parents, a doctor or the internet. Write a two minute speech explaining why early marriage is not good for the couple.

2. Collect newspaper cuttings and information from magazines about HIV/AIDS. Write a one page article of about 15 to 20 sentences on HIV/AIDS.
3. In our country, according to a census, the ratio of female and male adolescents is 882 : 1000. Find out the concerns of community regarding the challenge of having a boy or girl is equal.
4. Put your ideas together and write a short note on the importance of knowing facts about reproduction.





If there are Hearing Impaired students in your class:

- 1. To understand, these students need to see the blackboard, teacher's face, mouth and hands. They learn the pronunciation by looking at the movement of lips so make sure that they sit in the front rows.*
- 2. All new words introduced in the classroom should be written on to the blackboard. If possible make pictures also. Ensure that such students wear their hearing aid at all times.*
- 3. Hearing impaired students generally also have speech related difficulties. Listen to them with patience and give them the opportunity to express themselves.*
- 4. Keep your hands away from your mouth and avoid eating or drinking while talking so that the child is able to observe you.*



***If there are visually-impaired students
in your class, extend your help:***

1. *Always address visually-impaired students by their names and speak out whatever is written on the blackboard.*
2. *Familiarize these students with the way to the classroom, staircases, Principal's room, drinking water facility, toilet, playground and library. This will enable them to go about their tasks independently.*
3. *Visually-impaired students use the Braille script. If your school does not have sufficient resources, contact the nearest DIET office and agencies that provide Braille and audio books, cassettes and CDs.*