Human reproduction

Teacher review edition. Ask your teacher if anything is unclear.

What happens between the production of sex cells and development in the uterus?

What you will learn

- Identify the main reproductive organs and their roles.
- Distinguish fertilisation from implantation.
- Describe the menstrual cycle without assuming fixed timing.
- Explain the placenta's role in exchange.

Sexual reproduction in humans

> **Gamete**
> A sex cell, such as a sperm or an egg.

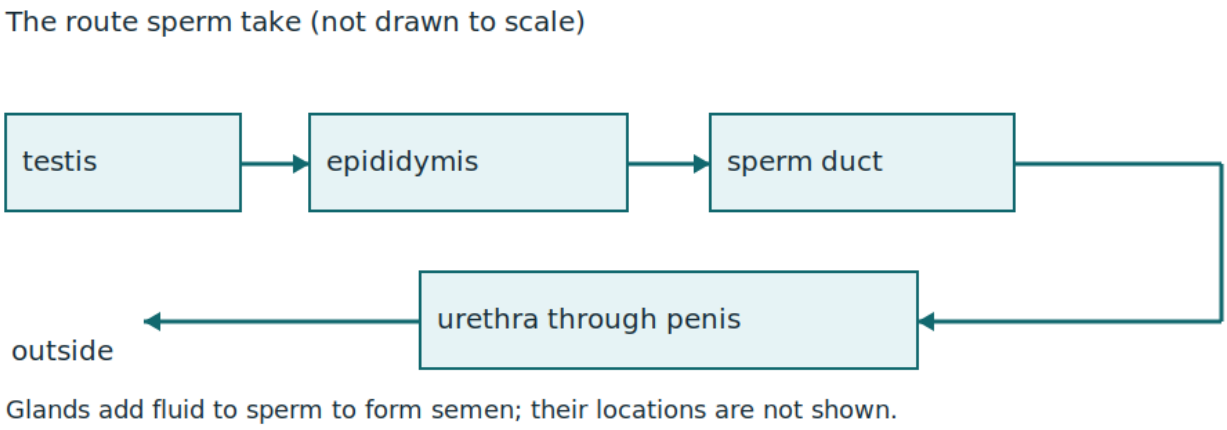
Human sexual reproduction involves two gametes, or sex cells: a sperm and an egg. When their nuclei join, genetic information from both parents is combined. This event is called fertilisation.

The fertilised egg, called a zygote, divides to form an embryo. The reproductive organs produce the gametes and provide the route and conditions for development.

The male reproductive system

The male reproductive organs produce sperm and carry them out of the body.

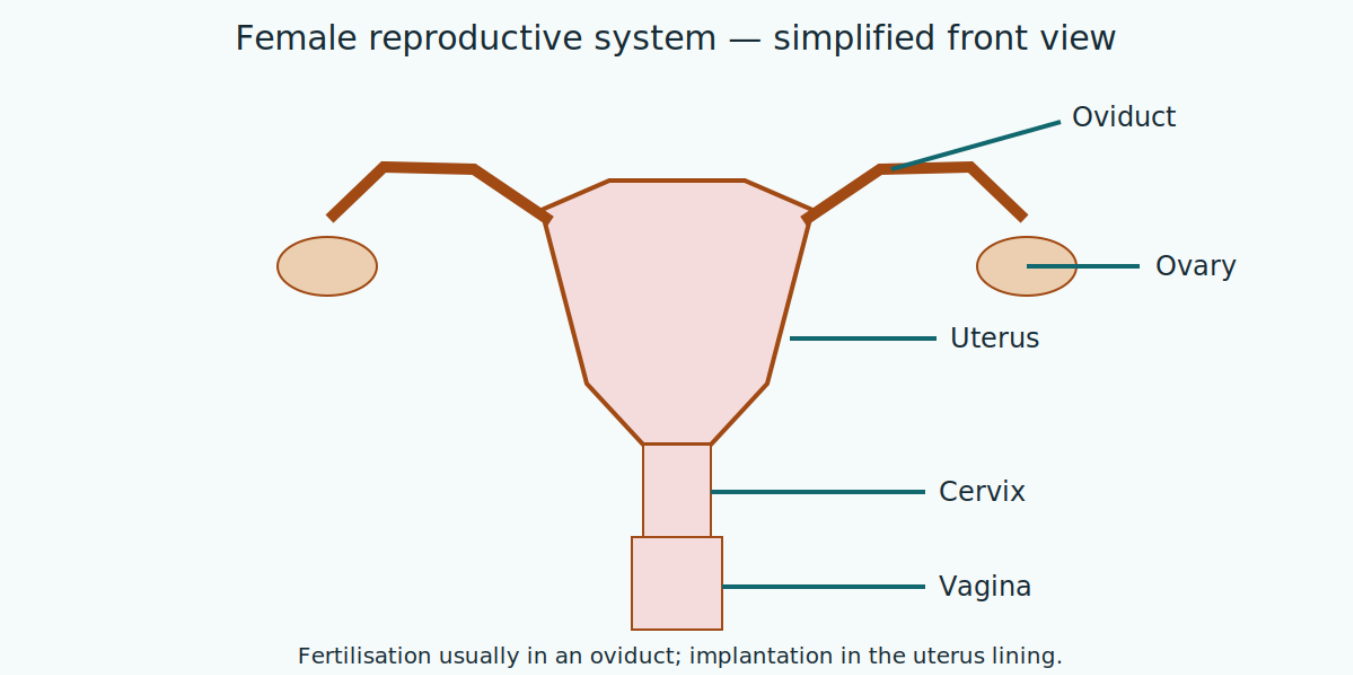
- Testes: produce sperm and testosterone. The scrotum holds them outside the main body cavity.
- Epididymis: sperm mature and are stored here.
- Sperm ducts: carry sperm away from the testes.
- Glands add fluid to sperm, forming semen.
- The urethra carries semen out through the penis. It also carries urine, but not normally at the same time.



Follow the sperm route: testis → epididymis → sperm duct → urethra. Glands add fluid to form semen.

The female reproductive system

Structure	Role
Ovary	Contains egg cells and produces hormones. An egg is released at ovulation.
Oviduct	Carries an egg towards the uterus. Fertilisation usually occurs here.
Uterus	A muscular organ where an embryo can implant and develop.
Cervix	The narrow lower part of the uterus, opening into the vagina.
Vagina	The passage leading from the cervix to the outside of the body.



Egg cells are released from ovaries; fertilisation normally occurs in an oviduct. A developing embryo implants in the uterus lining.

Puberty and the menstrual cycle

Ovulation
The release of an egg from an ovary.

Menstrual cycle
The repeating changes in the ovaries and uterus, including ovulation and menstruation.

Puberty is the stage when hormones cause the body to mature towards reproductive adulthood. Changes can include body-hair growth, breast development, voice changes, sperm production and the start of periods. Timing varies between people.

During the menstrual cycle:

- The lining of the uterus builds up.
- An egg may be released from an ovary: ovulation.
- If pregnancy does not occur, the lining breaks down and leaves through the vagina as a period.
- Cycle length and ovulation timing vary. A fixed day on a classroom diagram cannot predict someone's fertility.

Fertilisation and implantation

> **Fertilisation**
> The joining of sperm and egg nuclei to form a zygote.
>
> **Implantation**
> The embedding of an early embryo in the lining of the uterus.

Fertilisation usually happens in an oviduct when a sperm nucleus joins with an egg nucleus. The resulting cell divides as it travels towards the uterus.

The early embryo then attaches to and becomes embedded in the uterus lining. This is implantation. Fertilisation and implantation are different events in different places.

The placenta and development

> **Placenta**
> The organ through which a developing baby receives oxygen and nutrients and loses wastes.

The placenta allows exchange between the mother and developing baby. The umbilical cord connects the baby to the placenta.

- Oxygen and nutrients pass towards the baby.
- Carbon dioxide and other wastes pass towards the mother for removal.
- The two blood supplies do not normally mix directly.
- Some harmful substances and infections can cross the placenta; it is not a complete protective barrier.

Reproductive health and questions for society

Contraception aims to prevent pregnancy. Preventing pregnancy and reducing the spread of sexually transmitted infections are different tasks. Use the school's current health resources when comparing particular methods.

Fertility treatment can help some people have a baby, but it does not always succeed. Questions about cost and access involve both scientific evidence and people's values. In discussing them, distinguish what the treatment does from what people think should be available.

These topics can be discussed using fictional examples. Respect privacy and use the class's confidential question route if you prefer.

Worked examples

Follow the sequence from an egg being released to an embryo developing in the uterus.

Work through it

1. An ovary releases an egg: ovulation.
2. If a sperm joins with the egg in an oviduct, fertilisation occurs.
3. The fertilised cell divides as it moves towards the uterus.
4. The embryo embeds in the uterus lining: implantation.

Another example

1. Sperm route: testis → epididymis → sperm duct → urethra → outside through the penis.
2. Egg route: ovary → oviduct. Fertilisation may occur in the oviduct.
3. An early embryo can then travel to the uterus and implant in its lining.

Common mistakes

Common mistake: Fertilisation and implantation happen in the same place.

Remember: Fertilisation usually occurs in an oviduct. Implantation occurs later in the uterus lining.

Common mistake: Everyone has the same menstrual-cycle timetable.

Remember: Cycle length and ovulation timing vary, so a fixed day on a classroom diagram is not an individual prediction.

Answering questions

- For a reproduction sequence, name the event and its usual location, then put the events in order.
- When describing the placenta, give the direction of exchange: oxygen and nutrients towards the baby; carbon dioxide and other wastes towards the mother.

Try an investigation

Use labelled models to identify the organs and trace the routes of sperm and egg cells. Discuss supplied fictional examples using current school-approved reproductive-health resources.

Plan, record and review

- Question and prediction: What are you testing, and what do you think will happen? Give a reason.
- Change, measure, keep the same: What will you deliberately change? What will you measure, and in what units? What stays the same to make it a fair test? For an observation, say what you will record consistently instead.
- Record and look for a pattern: Use a table with headings and units. Look for a pattern or a result that does not fit.
- Conclude from evidence: Answer your question using a result or observation. Say if the evidence is unclear.
- Improve the investigation: What would you repeat or change, and how would that make the evidence better?

Do practical work with your teacher and follow the laboratory safety instructions.