

Week 21

IGCSE Biology

Homework bundle for this week

本周作业合集

exercises.lol

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16. Reproduction

Starter Quiz · 课前小测

IGCSE Biology

Name: _____ Score: _____

- Asexual reproduction needs how many parents?
 - ☐ one
 - ☐ two
 - ☐ three
 - ☐ none
- Gametes are:
 - ☐ sex cells with half the chromosome number
 - ☐ identical to body cells
 - ☐ made by one parent only
 - ☐ the same as zygotes
- Pollen is produced by the:
 - ☐ anther
 - ☐ stigma
 - ☐ ovary
 - ☐ style
- After landing on the stigma, a pollen grain grows a:
 - ☐ pollen tube down to the ovule
 - ☐ root
 - ☐ leaf
 - ☐ new flower
- Sperm are produced in the:
 - ☐ testes
 - ☐ ovaries
 - ☐ uterus
 - ☐ oviduct
- Which reproduce asexually? (Select all that apply.)
 - ☐ bacteria dividing in two
 - ☐ a plant growing runners

- ☐ a plant grown from a cutting
- ☐ a baby from two parents

Tick every correct option.

7. Which conditions does a seed need to germinate? (Select all that apply.)

- ☐ water
- ☐ oxygen
- ☐ a suitable temperature
- ☐ light

Tick every correct option.

8. In the placenta, the mother's and baby's blood flow close but do not mix.

- ☐ True
- ☐ False

9. A disadvantage of asexual reproduction is a lack of variation.

- ☐ True
- ☐ False

10. The cell formed when two gametes fuse is called a zygote.

- ☐ True
- ☐ False

16. Reproduction

Answers · 答案

IGCSE Biology

1. **one**

Only one parent is needed.

2. **sex cells with half the chromosome number**

Gametes carry half the chromosomes.

3. **anther**

The anther (part of the stamen) makes pollen.

4. **pollen tube down to the ovule**

The pollen tube carries the male nucleus to the ovule.

5. **testes**

The testes make sperm and testosterone.

6. **bacteria dividing in two; a plant growing runners; a plant grown from a cutting**

A baby from two parents is sexual reproduction.

7. **water; oxygen; a suitable temperature**

Seeds need water, oxygen and warmth — not light at first.

8. **True**

Substances pass by diffusion across a barrier.

9. **True**

Identical offspring are all equally vulnerable to the same threat.

10. **True**

The zygote grows into a new organism.

16.1 Asexual reproduction

Name: _____ Class: _____ Date: _____

Total: 6 marks

KEY WORDS reproduction 生殖 • sexual reproduction 有性生殖 • asexual reproduction 无性生殖
• offspring 后代 • parent 亲本

Objective

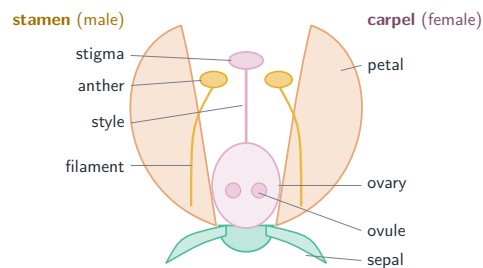
Build the skills to answer exam questions on **asexual reproduction** 无性生殖 — what it is, and its advantages and disadvantages.

You must be able to:

- define asexual reproduction (one parent, identical offspring)
- give the advantages and disadvantages
- compare it with sexual reproduction

1 Worked examples

■ Asexual reproduction



Asexual reproduction: one parent, offspring genetically identical (clones)

- **advantage:** fast; only one parent needed; good in stable conditions.
- **disadvantage:** no variation — a change (e.g. a new disease) could kill them all.

2 Practice

2.1 State how many parents are needed in asexual reproduction. [1]

2.2 State how the offspring of asexual reproduction compare with the parent. [1]

3 Exam-style questions

3.1 A disadvantage of asexual reproduction is that the offspring: [1]

- **A** are all different
- **B** are genetically identical, so a change could kill them all
- **C** need two parents
- **D** grow slowly

3.2 A farmer grows a field of genetically identical crop plants.

(a) State one advantage of this. [1]

(b) Explain one risk of growing identical plants. [2]

Solutions

2.1 one.

2.2 they are genetically identical to the parent (clones).

3.1 B. Identical offspring could all be killed by a single change.

3.2 (a) the plants are uniform / give an even harvest.

(b) the plants are genetically identical, so one disease could wipe out the whole crop.

Name: _____

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23 A gardener has a strawberry plant that produces large, sweet fruits.

How does the gardener grow more strawberry plants that **all** produce large, sweet fruits?

- A Use asexual reproduction to produce offspring with no genetic variation.
- B Use asexual reproduction to produce seeds that will grow into new plants.
- C Use sexual reproduction and self-pollination as they only have one plant.
- D Use sexual reproduction to reduce variation in the offspring.

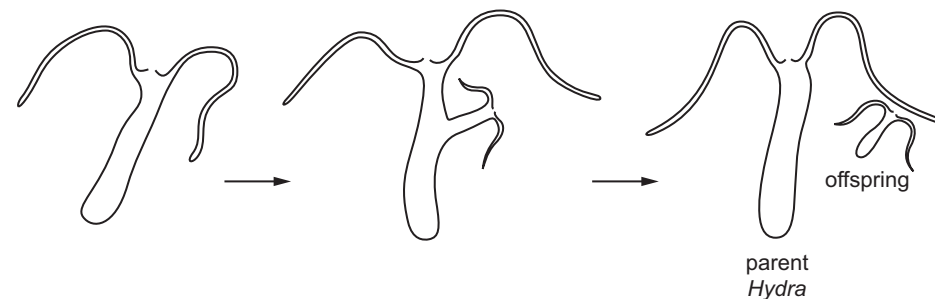
IGCSE Biology: w25 22

23 What is an example of asexual reproduction?

- A a single bacterium dividing to produce two genetically identical bacteria
- B a mammal giving birth to four offspring
- C a female bird laying six eggs which will hatch into the same species
- D a tomato plant producing fruits which contain many seeds

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27 The diagram shows one parent *Hydra* growing and releasing an offspring from the side of its body.



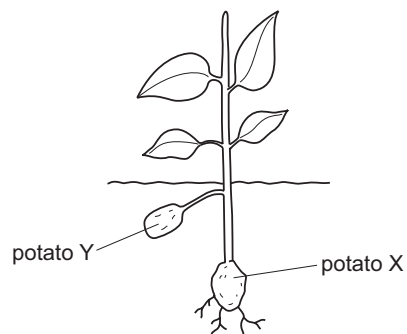
Which row is correct?

	parent and offspring are genetically identical	involves asexual reproduction
A	yes	yes
B	yes	no
C	no	yes
D	no	no

28 What are the characteristics of asexual reproduction?

	fusion of gamete nuclei	genetic variety in the offspring
A	yes	yes
B	yes	no
C	no	yes
D	no	no

27 The diagram shows reproduction in a potato plant. Potato X was planted into the ground and a plant grew from it. The plant then produced potato Y.



Which statement is correct?

- A X and Y are genetically different.
- B Y was produced by asexual reproduction.
- C Y was produced by sexual reproduction.
- D Y was produced by the fusion of gametes.

16.2 Sexual reproduction

Name: _____ Class: _____ Date: _____ Total: 6 marks

KEY WORDS sexual reproduction 有性生殖 • reproduction 生殖 • fertilisation 受精
• offspring 后代 • variation 变异

Objective

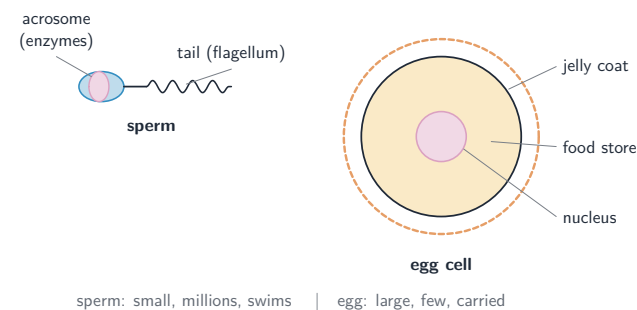
Build the skills to answer exam questions on **sexual reproduction** 有性生殖 — the fusion of **gametes** 配子, **fertilisation** 受精, and **variation** 变异.

You must be able to:

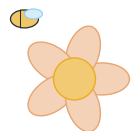
- define sexual reproduction and fertilisation
- explain why it produces variation
- use the terms haploid and diploid

1 Worked examples

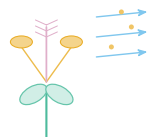
■ Gametes and fertilisation



Sexual reproduction: two parents; gamete nuclei fuse at fertilisation to make a zygote



insect-pollinated
bright petals, scent + nectar;
sticky, spiky pollen



wind-pollinated
small dull petals; anthers &
stigma hang out; light pollen

Pollination begins plant sexual reproduction

- gametes are **haploid** (one set of chromosomes); the zygote is **diploid** (two sets).
- offspring get a mix of genes from both parents → variation.

2 Practice

2.1 Define fertilisation. [1]

2.2 State how many parents sexual reproduction needs. [1]

3 Exam-style questions

3.1 A gamete nucleus is described as: [1]

- **A** diploid (two sets of chromosomes)
- **B** haploid (one set of chromosomes)
- **C** having no chromosomes
- **D** identical to the zygote

3.2 Sexual reproduction produces variation.

(a) Explain why the offspring show variation. [2]

(b) State one advantage of this variation. [1]

Solutions

2.1 the fusion of the nuclei of a male and a female gamete.

2.2 two.

3.1 B. A gamete nucleus is haploid (one set of chromosomes).

3.2 (a) the offspring receive a mix of genes from two parents; so they are genetically different.

(b) some offspring may survive if the environment changes.

16.3 Sexual reproduction in plants

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS pollination 传粉 • seed 种子 • anther 花药 • germinate 萌发 • stigma 柱头

Objective

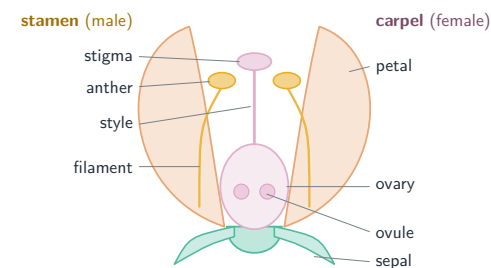
Build the skills to answer exam questions on **sexual reproduction in plants** 植物有性生殖 — flower parts, **pollination** 传粉, and fertilisation/germination.

You must be able to:

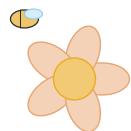
- name the flower parts and their functions
- compare insect- and wind-pollinated flowers
- describe pollination, fertilisation and the needs for germination

1 Worked examples

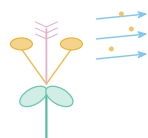
■ Flower and pollination



Male: stamen (anther + filament). Female: carpel (stigma, style, ovary with ovules)



insect-pollinated
bright petals, scent + nectar;
sticky, spiky pollen



wind-pollinated
small dull petals; anthers &
stigma hang out; light pollen

Insect-pollinated: bright petals, scent, nectar. Wind-pollinated: small dull petals, parts hanging out

- **germination** needs water, oxygen and a suitable temperature.

2 Practice

2.1 Name the male part of a flower. [1]

2.2 Define pollination. [1]

3 Exam-style questions

3.1 A wind-pollinated flower is likely to have: [1]

- **A** large bright petals and nectar
- **B** small dull petals and anthers hanging out
- **C** sticky pollen
- **D** strong scent

3.2 A flower is pollinated by insects.

(a) State two features that help attract insects. [2]

(b) State the three conditions a seed needs to germinate. [3]

Solutions

2.1 the stamen (anther and filament).

2.2 the transfer of pollen from an anther to a stigma.

3.1 B. Wind-pollinated flowers have small dull petals and exposed anthers.

3.2 (a) any two of: bright/large petals; scent; nectar.

(b) water; oxygen; a suitable temperature.

Name:

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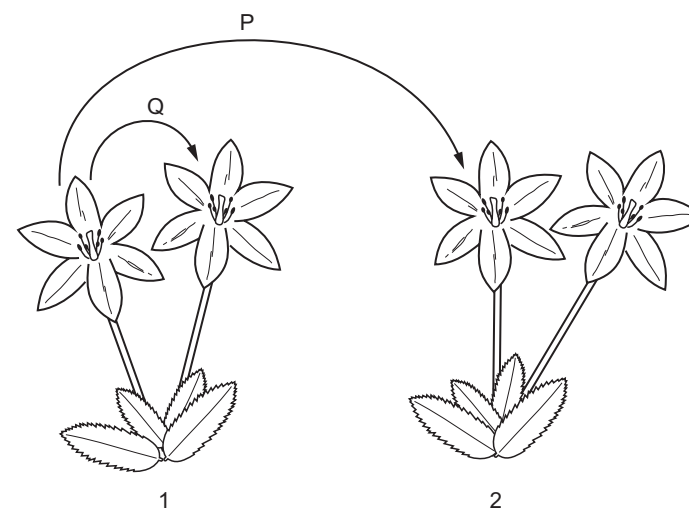
24 Where does fertilisation occur in a plant?

- A ovule
- B pollen grain
- C pollen tube
- D stigma

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24 The diagram shows parts of two different plants, 1 and 2, of the same species.

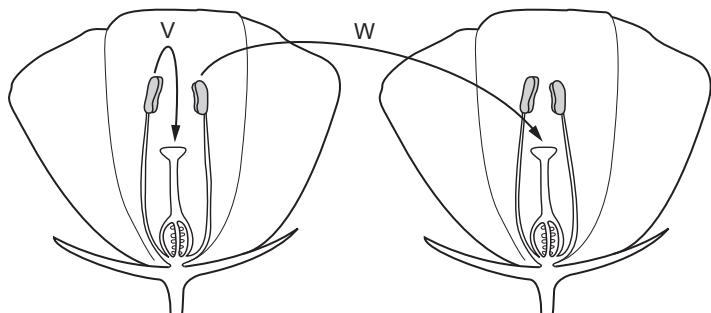
The transfer of pollen between the flowers of these two plants is shown by the arrows labelled P and Q.



Which arrows show cross-pollination, and which transfer of pollen would produce the most variation in the offspring?

	cross-pollination	transfer of pollen that produces the most variation in the offspring
A	P only	P
B	P only	Q
C	P and Q	P
D	P and Q	Q

- 27 The diagram shows two methods of pollination, V and W. The two flowers are on different plants of the same species.



A student made three conclusions about these two methods of pollination.

- 1 Method V will produce genetically identical offspring.
- 2 Method W will produce genetically different offspring.
- 3 Method W increases the ability of the species to adapt to its surroundings.

Which conclusions are correct?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

- 4 Fig. 4.1 is a photograph of a bee on a flower. One of the bee's legs is covered with pollen.



Fig. 4.1

- (a) (i) State **three** features of flowers that attract pollinating insects such as bees.

- 1
- 2
- 3 [3]

- (ii) State **one** way that pollen grains are adapted for pollination by bees.

- [1]

- (b) Describe **two** ways the structure of a monocotyledonous plant differs from the structure of a dicotyledonous plant.

- 1
- 2 [2]

(c) Fig. 4.2 is a diagram of a cross-section of an insect-pollinated flower.

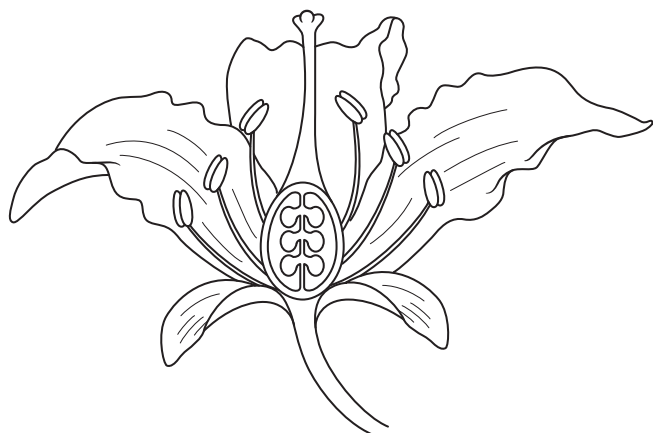


Fig. 4.2

On Fig. 4.2, name and draw label lines to:

- the structure that supports an anther
- a structure that protects the flower bud
- an ovule.

[3]

(d) Describe sexual reproduction in a flower, from the release of pollen to the formation of a zygote.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(e) Sexual reproduction also occurs in humans.

(i) State the name of the male gamete in a human.

..... [1]

(ii) State where gametes are formed in the human male reproductive system.

..... [1]

(iii) Human male gametes are haploid.

State the name of the process that produces haploid male gametes.

..... [1]

(iv) Describe the function of the prostate gland in the male reproductive system.

.....

.....

..... [1]

[Total: 18]

29 Which description of cross-pollination is correct?

- A the transfer of pollen grains from the anther of one plant to the stigma on a different plant
- B the transfer of pollen grains from the anther to the stigma on the same plant
- C the transfer of pollen grains from the stigma of one plant to the anther on a different plant
- D the transfer of pollen grains from the stigma to the anther on the same plant

28 Which statement about pollination is correct?

- A Self-pollination increases the ability of the population to respond to changes in the environment by increasing variation.
- B Self-pollination increases the ability of the population to respond to changes in the environment by reducing variation.
- C Self-pollination reduces the ability of the population to respond to changes in the environment by increasing variation.
- D Self-pollination reduces the ability of the population to respond to changes in the environment by reducing variation.

3 (a) Fig. 3.1 shows one stage involved in plant reproduction after pollination.

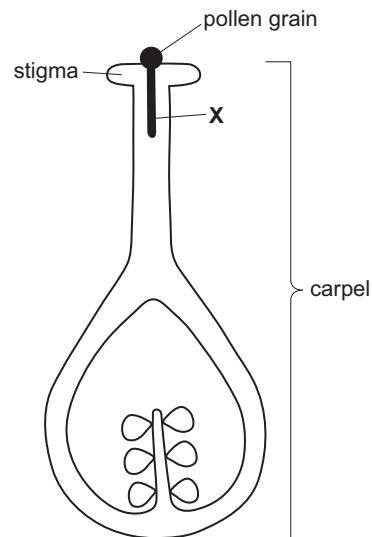


Fig. 3.1

(i) State the name of the part labelled X in Fig. 3.1.
 [1]

(ii) Describe the events that occur after the stage shown in Fig. 3.1 that result in fertilisation.

 [3]

(b) A species of plant can use self-pollination and cross-pollination.

(i) Suggest reasons for this species of plant to use self-pollination rather than cross-pollination.

.....

 [3]

(ii) Discuss the potential effects of only using self-pollination in a population of plants.

 [3]

(c) Meiosis produces gametes and is a source of genetic variation.

State **two other** sources of genetic variation in populations.

1
 2 [2]

(d) Describe mitosis and its roles in organisms.

..... [4]

[4]

(e) State the name of the unspecialised cells that divide by mitosis.

..... [1]

[1]

[Total: 17]

25 Which row describes self-pollination?

	pollen transferred from an anther to the stigma of a different flower on the same plant	pollen transferred from an anther to the stigma of a flower on a different plant of the same species	pollen transferred from an anther to the stigma of the same flower
A	✓	✓	✗
B	✓	✗	✓
C	✗	✗	✓
D	✗	✓	✓

key
✓ = yes
✗ = no

16.4 Sexual reproduction in humans

Name: _____ Class: _____ Date: _____ **Total: 30 marks**

Total: 30 marks

KEY WORDS placenta 胎盘 • sperm 精子 • fertilisation 受精 • fetus 胎儿 • egg 卵子

Objective

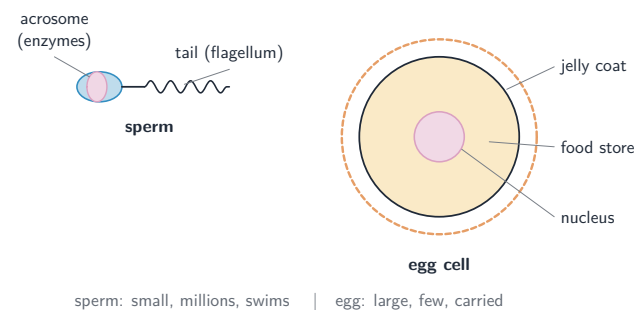
Build the skills to answer exam questions on **sexual reproduction in humans** 人类有性生殖 — the gametes, fertilisation, and the **placenta** 胎盘.

You must be able to:

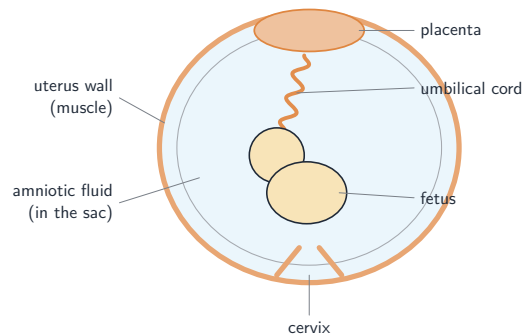
- compare the sperm and egg cell and their adaptations
- state where fertilisation happens
- describe the roles of the placenta, umbilical cord and amniotic sac

1 Worked examples

- Gametes and pregnancy



Sperm: small, many, swims (flagellum). Egg: large, few, food store



Placenta: exchanges nutrients/gases/wastes (bloods never mix); cord joins fetus; amniotic fluid cushions

■ The gametes, the journey, and what the placenta is for

The two gametes are adapted in opposite directions. The **sperm** 精子 is small and mobile: a flagellum to swim, many mitochondria in the mid-piece to release the energy for swimming, and an acrosome carrying enzymes to digest a path through the egg's membrane. The **egg** 卵子 is much larger and not mobile: it carries a store of food (yolk) for the early embryo, and its membrane changes the moment one sperm enters so no second sperm can get in.

The sequence the exam asks for, in order: an egg is released from an ovary at **ovulation** 排卵; it travels along the **oviduct** 输卵管; **fertilisation** 受精 — the fusion of the nuclei of a sperm and an egg — happens in the oviduct; the resulting **zygote** 受精卵 divides by mitosis as it travels on; the ball of cells reaches the uterus and **implants** in the thick uterus lining.

The placenta 胎盘. The mother's blood and the fetus's blood come very close but **never mix** — that is a marking point, and the reason matters: the two blood pressures differ, and the blood groups may differ. Exchange happens by **diffusion** across the placenta's large surface area of villi, down concentration gradients:

To the fetus	To the mother
oxygen, glucose, amino acids, water, mineral ions, antibodies	carbon dioxide, urea

The **umbilical cord** carries the blood between fetus and placenta. **Amniotic fluid** 羊水 in the amniotic sac cushions the fetus against bumps, supports its weight and keeps its temperature steady.

△ Harmful substances cross too. Nicotine and carbon monoxide from smoking reduce the oxygen the fetus receives, so birth mass is lower; alcohol and some viruses and drugs also cross.

2 Practice

2.1 State where fertilisation occurs in a human. [1]

2.2 State the role of the amniotic fluid. [1]

2.3 Name two structures that adapt a sperm cell to its function, and give the use of each. [4]

2.4 State two substances that pass from the fetus's blood to the mother's. [2]

2.5 Explain why the mother's and the fetus's blood must not mix. [2]

3 Exam-style questions

3.1 The egg cell, compared with a sperm cell, is: [1]

- **A** smaller and able to swim
- **B** larger and stores food
- **C** present in millions
- **D** has a flagellum

3.2 The placenta supports the developing fetus.

(a) State two substances that pass from the mother's blood to the fetus. [2]

(b) State one feature of the sperm cell and how it helps. [2]

3.3 The diagram of a pregnant uterus shows the placenta, the umbilical cord and the amniotic sac.

(a) Complete the table by naming the structure that carries out each function. [3]

Function	Structure
exchanges substances between mother and fetus	
carries blood between the fetus and the placenta	
cushions the fetus and supports its weight	

(b) Describe how oxygen passes from the mother's blood to the fetus's blood. [3]

(c) Explain two ways in which the sperm cell is adapted for reaching and entering the egg. [4]

(d) State where fertilisation takes place, and describe what happens to the zygote in the days that follow. [3]

(e) A pregnant woman smokes. Explain one effect this has on the developing fetus. [2]

Solutions

2.1 in the oviduct.

2.2 it cushions/protects the fetus.

2.3 Any two structures, each with its use: a flagellum or tail, to swim to the egg; many mitochondria in the mid-piece, to release energy for swimming; an acrosome, containing enzymes to digest through the egg's membrane.

2.4 Carbon dioxide; urea.

2.5 The blood pressure in the mother's vessels is much higher and would damage the fetus's vessels; the blood groups may be different, so the bloods could react together.

3.1 B. The egg is larger and stores food.

3.2 (a) any two of: oxygen; glucose; (dissolved) nutrients.

(b) e.g. a flagellum/tail lets the sperm swim to the egg; or many mitochondria for energy.

3.3 (a) The placenta; the umbilical cord; the amniotic fluid, in the amniotic sac.

(b) The mother's blood in the placenta has a higher concentration of oxygen than the fetus's blood; oxygen therefore diffuses down the concentration gradient across the placenta; the placenta has a large surface area of villi, which makes the diffusion fast enough to supply the fetus.

(c) Any two, each for two marks: a flagellum lets it swim along the oviduct to the egg; many mitochondria release the energy needed for that swimming; the acrosome contains enzymes that digest a path through the egg's membrane so the nuclei can fuse.

(d) Fertilisation takes place in the oviduct; the zygote divides repeatedly by mitosis as it travels towards the uterus; the resulting ball of cells implants in the thick uterus lining.

(e) Carbon monoxide from the smoke binds to the fetus's haemoglobin (or nicotine narrows the blood vessels), so less oxygen reaches the fetus; the fetus grows more slowly and is likely to have a lower birth mass.

26 Which statement describes the net direction of movement of a substance across the placenta?

A Carbon dioxide moves from the mother's blood to the fetus's blood.

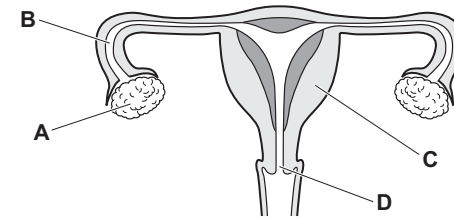
B Glucose moves from the fetus's blood to the mother's blood.

C Glycogen moves from the mother's blood to the fetus's blood.

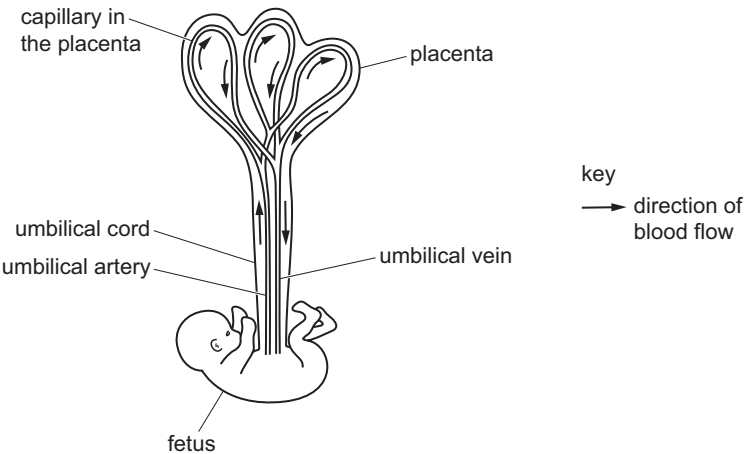
D Urea moves from the fetus's blood to the mother's blood.

27 The diagram shows the human female reproductive system.

Which label identifies the uterus?



28 The diagram shows the blood supply between a fetus and a placenta.



Which row shows the concentration of substances in the umbilical artery and umbilical vein?

	umbilical artery	umbilical vein
A	high nutrient concentration	high urea concentration
B	high urea concentration	high carbon dioxide concentration
C	low carbon dioxide concentration	low nutrient concentration
D	low oxygen concentration	low urea concentration

6 (a) Fig. 6.1 is a diagram of the human male reproductive system.

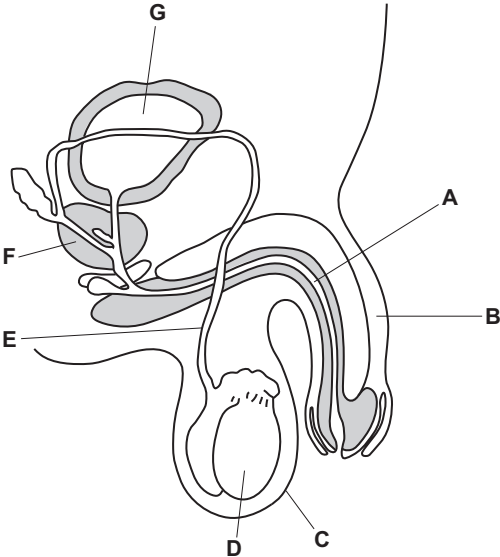


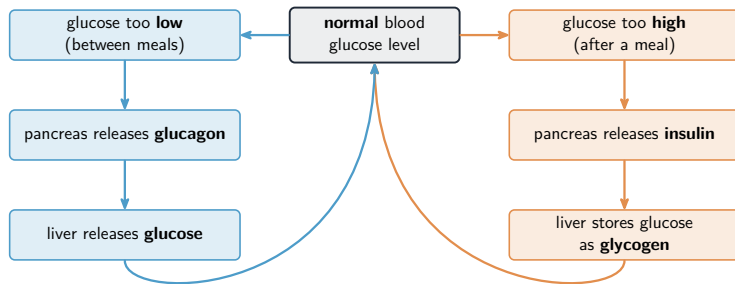
Fig. 6.1

Table 6.1 contains information about the male reproductive system shown in Fig. 6.1.

Complete Table 6.1.

Table 6.1

letter in Fig. 6.1	name of the structure	function
	scrotum	
		produces seminal fluid
		transports urine and sperm
E		



Sex hormones are controlled by negative feedback

- **testosterone** (boys) and **oestrogen** (girls) cause secondary sexual characteristics.
- hormones: FSH (egg matures), LH (ovulation), oestrogen (thickens lining), progesterone (maintains lining).

2 Practice

2.1 Name the hormone responsible for female secondary sexual characteristics. [1]

2.2 State on which day of a 28-day cycle ovulation usually occurs. [1]

3 Exam-style questions

3.1 Ovulation is the: [1]

- **A** thickening of the uterus lining
- **B** release of an egg from the ovary
- **C** breakdown of the lining
- **D** fusion of gametes

3.2 The menstrual cycle prepares the uterus for pregnancy.

(a) Describe what happens to the uterus lining if the egg is not fertilised. [2]

(b) Name the hormone that triggers ovulation. [1]

Solutions

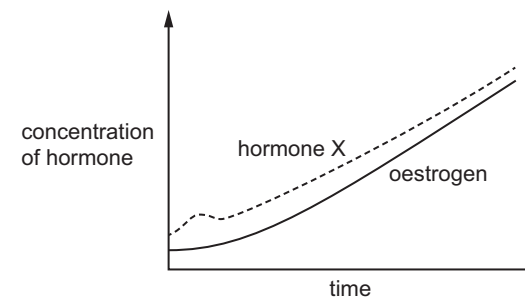
2.1 oestrogen.

2.2 about day 14.

3.1 B. Ovulation is the release of an egg from the ovary.

3.2 (a) the lining breaks down and leaves the body as a period.
(b) LH.

25 The graph shows the concentrations of two hormones during pregnancy.



Which organ secretes the most hormone X in the late stages of pregnancy?

- A ovary
- B placenta
- C uterus
- D vagina

26 A person has a 28-day menstrual cycle.

On which day is the lining of the uterus thickest?

- A 2
- B 4
- C 9
- D 21

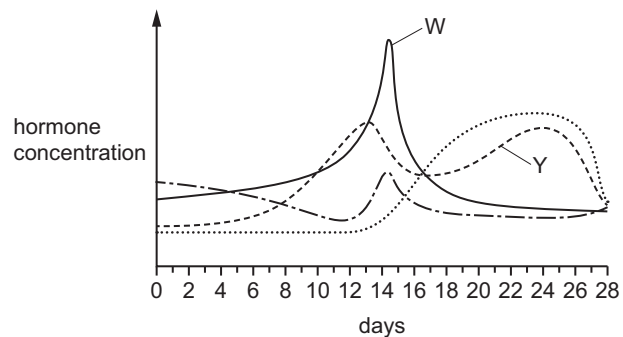
25 Which substance is a hormone that is involved in the development and regulation of male secondary sexual characteristics?

- A insulin
- B glucagon
- C lactase
- D testosterone

29 Which hormone is produced by cells in the placenta of a developing fetus?

- A FSH
- B LH
- C testosterone
- D progesterone

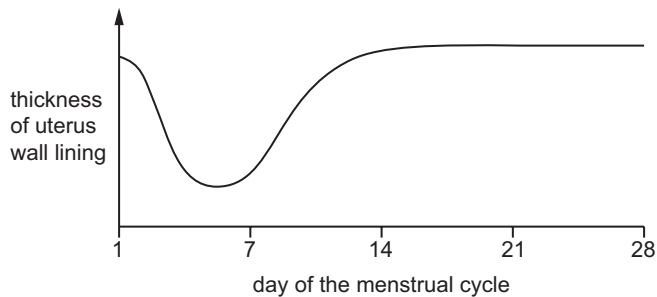
28 The diagram shows the changing concentrations of some hormones involved in the menstrual cycle.



Which letters identify two of the hormones?

- A** W is FSH and Y is oestrogen.
- B** W is LH and Y is oestrogen.
- C** W is progesterone and Y is FSH.
- D** W is progesterone and Y is LH.

29 The graph shows changes in the thickness of the lining of the uterus wall during a menstrual cycle.



Which day is the last day of menstruation?

- A** 4
- B** 8
- C** 16
- D** 20

27 Which statement correctly describes the effect of a hormone in a human menstrual cycle that lasts for 28 days?

- A** FSH causes maturation of an egg up to day 21.
- B** LH stimulates the release of an egg on day 14.
- C** Oestrogen maintains the uterus lining between days 14 and 28.
- D** Progesterone causes the repair and thickening of the uterus lining between days 4 to 14.

28 What is the main hormone responsible for the development of male secondary sexual characteristics?

- A** adrenaline
- B** insulin
- C** oestrogen
- D** testosterone

16.6 Sexually transmitted infections

Name: _____ Class: _____ Date: _____ Total: 6 marks

KEY WORDS infection 感染 • sexually transmitted infection 性传播感染 • virus 病毒
• style 花柱

Objective

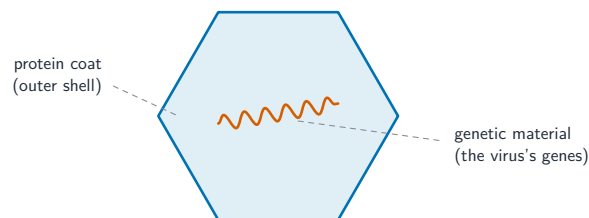
Build the skills to answer exam questions on **sexually transmitted infections** 性传播感染 — what an STI is, **HIV/AIDS**, and how the spread is controlled.

You must be able to:

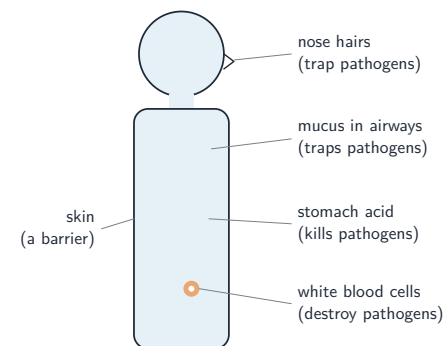
- define an STI
- describe HIV as a virus that can lead to AIDS, and how it spreads
- state methods to control the spread of STIs

1 Worked examples

■ HIV/AIDS



HIV is a virus that causes an STI and can lead to AIDS (the immune system fails)



The body defends against sexually transmitted infections

- **spread:** infected body fluids — unprotected sex, sharing needles, mother to baby.
- **control:** condoms, fewer partners, testing/treating, not sharing needles.

2 Practice

2.1 Define a sexually transmitted infection. [1]

2.2 State the type of pathogen that causes HIV. [1]

3 Exam-style questions

3.1 HIV is spread by: [1]

- **A** coughing and sneezing
- **B** infected body fluids
- **C** touching surfaces
- **D** insect bites only

3.2 HIV can lead to AIDS.

(a) State what happens to the immune system in AIDS. [1]

(b) State two ways to control the spread of HIV. [2]

Solutions

2.1 an infection spread through sexual contact.

2.2 a virus.

3.1 B. HIV is spread in infected body fluids.

3.2 (a) the immune system stops working properly.

(b) any two of: use condoms; have fewer partners; test and treat infected people; do not share needles.