

Exercise walk-through

16.4.1

The reproductive systems, the gametes and the placenta

IGCSE Biology

Asexual vs sexual reproduction

asexual

one parent; identical **clones** ;
fast but **no** variation

sexual

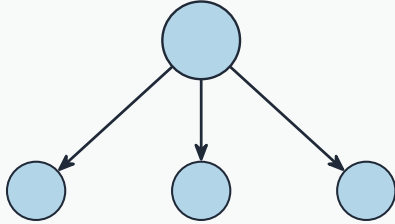
two parents; **gametes**
fuse at **fertilisation** ;
gives **variation**



Flowers are reproductive structures

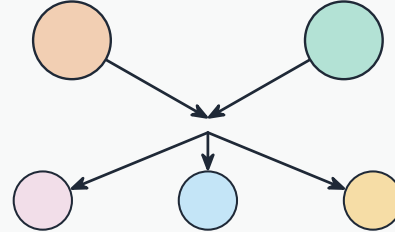
Two kinds of reproduction

asexual - one parent



offspring are **identical** clones

sexual - two parents



gametes join → **varied** offspring

Asexual reproduction needs one parent and gives identical clones; sexual reproduction needs two and gives varied offspring

Sexual reproduction, and what crosses the placenta

the advantage

variation means some offspring may survive if the environment changes

the cost

it needs two parents, and it is slower than asexual reproduction

the placenta

where dissolved **nutrients, gases and wastes** are exchanged between the mother's blood and the fetus's

the blood does not mix

the two circulations stay separate; only dissolved substances cross

amniotic fluid

surrounds the fetus, protecting it from shock and keeping the temperature steady

(Supplement)

some **pathogens** and **toxins** – alcohol, nicotine, rubella, HIV – can **cross the placenta and harm the fetus**

The placenta is a selective exchange surface, not a filter. Naming what it lets through *and* what harms the fetus is the marked pair.

Exercises 2.1·2.2

2.1 Name the part of the male reproductive system that makes sperm, and the part that adds fluid to them. [2]

2.2 Name the part of the female reproductive system where fertilisation happens, and the part where the embryo implants. [2]

Exercises 2.1·2.2

2.1 Name the part of the male reproductive system that makes sperm, and the part that adds fluid to them. [2]

2.1

- the **testis** makes sperm
- the **prostate gland** adds fluid to them

2.2 Name the part of the female reproductive system where fertilisation happens, and the part where the embryo implants. [2]

2.2

- fertilisation happens in the **oviduct**
- the embryo implants in the **uterus**, in its lining

Exercises 2.3-2.4

2.3 Describe what happens at fertilisation.

[2]

2.4 State the function of the jelly coat of an egg cell, and explain why it changes at fertilisation.

[3]

Exercises 2.3-2.4

2.3 Describe what happens at fertilisation.

[2]

2.3

- the **nucleus** of a sperm fuses with the **nucleus** of an egg cell
- the two haploid nuclei join, giving a **diploid zygote**

2.4 State the function of the jelly coat of an egg cell, and explain why it changes at fertilisation.

[3]

2.4

- the jelly coat surrounds and **protects** the egg cell
- as soon as one sperm has entered, the coat **changes**
- so that **no other sperm can get in**, which keeps the zygote diploid

Exercises 2.5-2.6

2.5 State **two** ways, other than size, in which an egg cell differs from a sperm cell. [2]

2.6 Describe what happens to the zygote between fertilisation and implantation. [3]

Exercises 2.5-2.6

2.5 State **two** ways, other than size, in which an egg cell differs from a sperm cell. [2]

2.5

- any **two** of: the sperm can **move itself** with its flagellum, while the egg cell cannot; **millions** of sperm are released at once, but usually only **one** egg a month; the egg cell has **energy stores** and a **jelly coat**, which the sperm does not

2.6 Describe what happens to the zygote between fertilisation and implantation. [3]

2.6

- the zygote divides by **mitosis**
- forming a **ball of cells**, the embryo, as it travels down the oviduct
- the embryo then **implants** into the lining of the uterus

Exercise 3.1

3.1 Which row correctly compares a human egg cell with a human sperm cell?

[1]

	size of egg	which gamete moves itself	number released
A	larger	the egg	more eggs than sperm
B	larger	the sperm	fewer eggs than sperm
C	smaller	the sperm	more eggs than sperm
D	larger	the sperm	more eggs than sperm

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3.1 B

- the egg cell is much larger, the sperm is the gamete that swims, and far more sperm are released than eggs
- A** has the egg swimming; **C** has the sizes the wrong way round; **D** has the numbers the wrong way round

Exercise 3.2 (a)

3.2 A sperm cell and an egg cell are both adapted to their functions.

(a) Explain how the **acrosome**, the **mitochondria** and the **flagellum** each adapt a sperm cell to its function. [3]

Exercise 3.2 (a)

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(a)

- the **acrosome** contains enzymes that **digest** a way through the jelly coat, so the sperm nucleus can enter
- the **mitochondria** release **energy** by respiration, for swimming
- the **flagellum** beats, so the sperm can **swim** to the egg cell

Exercise 3.2 (b)

3.2 A sperm cell and an egg cell are both adapted to their functions.

(b) Explain how the **energy stores** and the **jelly coat** each adapt an egg cell to its function. [3]

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(b)

- the **energy stores** in the cytoplasm feed the embryo until it implants and the placenta can supply it
- the **jelly coat** protects the egg cell, and **changes** once a sperm has entered
- so that no second sperm can enter, which keeps the chromosome number correct

Exercise 3.3 (a)

3.3 A fetus develops in its mother's uterus, joined to the placenta.

(a) Name the structure that joins the fetus to the placenta, and state the function of the amniotic fluid. [2]

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(a)

- the **umbilical cord**
- the amniotic fluid **protects the fetus from knocks** and supports its weight

Exercise 3.3 (b)

3.3 A fetus develops in its mother's uterus, joined to the placenta.

(b) Name **two** substances that pass from the mother's blood to the fetus's blood, and **one** that passes from the fetus's blood to the mother's. [3]

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(b)

- from mother to fetus, any two of: **glucose, amino acids, oxygen**
- from fetus to mother, either: **carbon dioxide** or **urea**

Exercise 3.3 (c)

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(c) The placenta has a large surface area and a very thin barrier between the two blood supplies. Explain why both of these features are needed. [2]

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(c)

- substances cross by **diffusion**, and a large surface area means **more can diffuse at once**
- a thin barrier gives a **short diffusion distance**, so diffusion is faster

Exercise 3.3 (d)

3.3 A fetus develops in its mother's uterus, joined to the placenta.

(d) A pregnant woman smokes. Explain how this can affect her fetus.

[3]

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(d) A pregnant woman smokes. Explain how this can affect her fetus. [3]

(d)

- some **toxins** in tobacco smoke can **cross the placenta** into the fetus's blood
- **carbon monoxide** binds to the fetus's haemoglobin, so its blood carries **less oxygen**
- so the fetus receives less oxygen for respiration and grows more slowly, giving a low birth mass