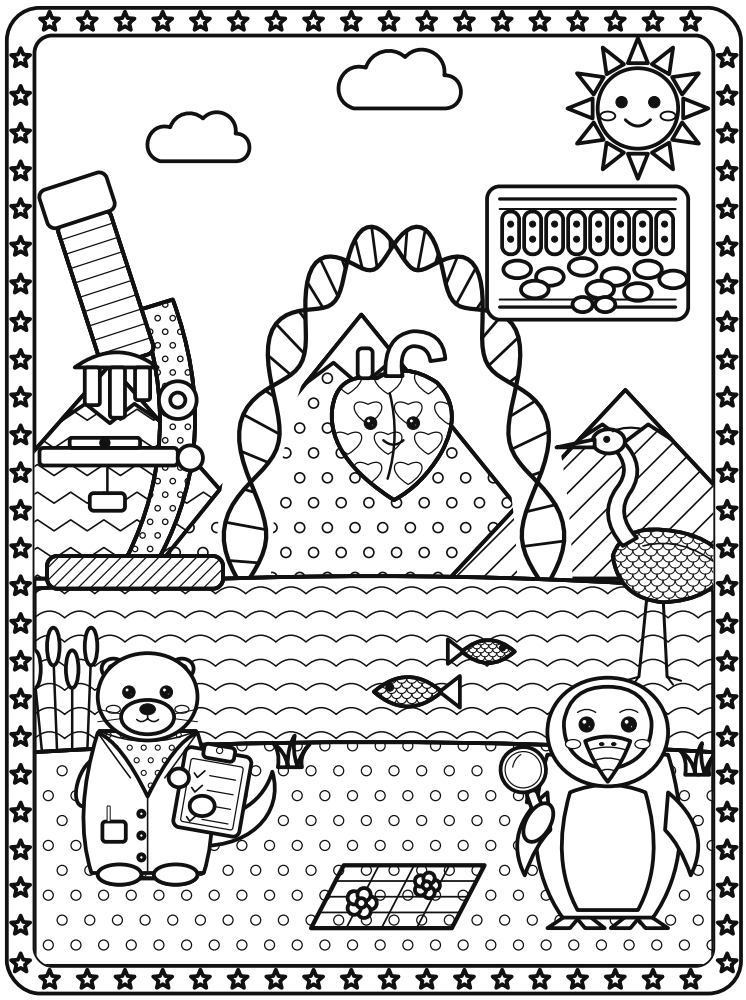
REAL-LIFE BIOLOGY

National 5 Biology

Revision Guide

Notes, worked examples, exam-style questions and two practice exams, with full answers



C. Blewis

Blewis LEARNING

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How to use this guide

This guide covers the whole National 5 Biology course in three areas. Each key area follows the same pattern, so you always know what comes next.

EACH KEY AREA HAS

Notes	the ideas you need, in short sections with diagrams
Methods	data skills such as percentages, ratios, averages and graphs, each with a worked example set out step by step
Exam tips	common mistakes and how to pick up every mark
Quick check	short questions to test yourself straight away
Exam-style questions	longer questions with marks, like the real exam

A GOOD WAY TO REVISE

1. Read the notes and cover the worked example. Can you do it yourself?
2. Try the quick check without looking back. Mark it using the answers at the back.
3. Do the exam-style questions in your jotter, with full working. Then mark them carefully against the marking guidance.
4. Tick the key area off on the tracker at the start of each area: **1** need more work, **2** getting there, **3** confident.
5. When you have revised everything, sit the practice exams under exam conditions.

ANSWERS

All answers are at the back. For exam-style questions the marking guidance shows where each mark comes from, so you can see exactly what examiners look for.

CHECK THE COURSE

Exam arrangements and course content can change. Your teacher and the latest course documents always come first.

The exam

National 5 Biology is assessed by a question paper and an assignment. This is the current format. **Arrangements can change, so check the latest arrangements with your teacher.** Older past papers have a different number of marks and a different time, so allow for this if you use them for practice.

	What it is	Marks
Question paper	One paper, 2 hours, covering the whole course.	80
Section 1	Multiple choice: choose one answer from A, B, C or D for each question.	20
Section 2	Structured and extended-response questions: knowledge, data and graphs, experiments, and longer describe or explain answers.	60
Assignment	A report on an investigation you carry out, with data from other sources, written up under supervision.	20

ON THE DAY

- You have **about 1.5 minutes per mark** (80 marks in 120 minutes), so there is time to read carefully and check.
- Read the whole question, including the introduction, tables and graphs. The information you need is often in the stem.
- Look at the marks: a 2-mark explain question usually needs two separate points.
- Never leave a multiple choice answer blank: there is no penalty for a wrong answer.

The assignment

You plan and carry out an investigation, collect your own data, find data from another source to compare with it, then write a report under supervision. It is marked out of 20. Your report needs a title, an aim, the underlying biology, your method and results (tables with headings and units, averages), a graph, a comparison with the other source, a conclusion that matches your aim and an evaluation. Your teacher will give you the current details.

Exam skills

Command words

Command word	What you need to do
State, name, give	a short answer: a word, a phrase or a value, no explanation needed
Identify	pick out the right thing from a diagram, table, graph or list
Describe	say what happens or what something is like; for a graph, give the trend and quote values
Explain	say **why** or **how**, using biology; link the cause to the effect
Predict	say what is likely to happen, using a pattern, a graph or what you know
Suggest	give a sensible answer using biology; there may be more than one acceptable answer
Calculate	work out a value: show your working and give a unit if there is one
Compare	give a similarity or difference that mentions **both** things, e.g. "A is faster than B"
Evaluate	weigh up good and bad points, or how well something works, and come to a judgement

Answering explain questions

An explain answer gives a **reason**. Use biology words and link each step with "so", "because" or "which means". Count the marks: each mark needs a separate, correct point.

EXAMPLE

Explain why the rate of an enzyme reaction falls above 40 °C. (2)

The enzyme is **denatured**: the shape of its **active site** changes (1), so the substrate no longer fits / is no longer complementary (1).

WORDS THAT COST MARKS

- Enzymes are denatured, never "killed".
- Molecules move, cells do not "want" or "need" to.
- Water moves by osmosis; other molecules diffuse.

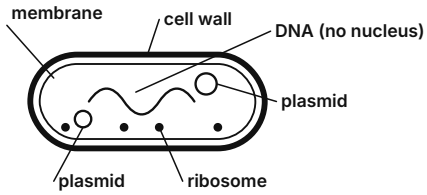
Multiple choice technique

- Cover the options, work out the answer, then look for it.
- Cross out options you know are wrong. Two are often easy to rule out.
- For a calculation, work it out on paper: the wrong options are usually common mistakes.
- Read every word of the stem: "**not**", "**only**" and "**first**" change the answer.

1.1 Cell structure

Comparing cell types

Structure	Animal	Plant	Fungal (yeast)	Bacterial
Nucleus	✓	✓	✓	×
Cell membrane	✓	✓	✓	✓
Cytoplasm, ribosomes	✓	✓	✓	✓
Mitochondria	✓	✓	✓	×
Chloroplasts	×	✓	×	×
Large vacuole	×	✓	✓	×
Cell wall	×	✓ cellulose	✓ not cellulose	✓ not cellulose
Plasmids	×	×	✓ (yeast)	✓

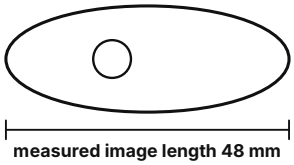


Bacterial cell

Yeast is a single-celled **fungus**. It has a nucleus, mitochondria, a vacuole, a cell wall that is not made of cellulose, and it can contain plasmids. Bacteria are much smaller than plant, animal and fungal cells.

Magnification and scale

Cells are measured in micrometres (µm): 1 mm = 1000 µm. Magnification = image size ÷ actual size, with both in the same unit.



WORKED EXAMPLE

A drawing of a cheek cell is 48 mm long. The drawing is magnified × 800. Find the actual length of the cell in µm.

Convert 48 mm = 48 000 µm

Rearrange actual size = image size ÷ magnification

Answer 48 000 ÷ 800 = **60 µm**

Quick check

1 Name the structure where aerobic respiration takes place.

2 State the function of ribosomes.

3 Give two structures found in a plant cell but not in an animal cell.

4 What is the plant cell wall made of?

5 State one way a bacterial cell differs from a yeast cell.

6 What is a plasmid?

1.1 Cell structure

Exam-style questions (15 marks)

1 Which structure is found in plant, fungal and bacterial cells but not in animal cells?

A nucleus
B cell wall
C chloroplast
D cell membrane

2 Which row is correct for a bacterial cell?

A has a nucleus and a cellulose cell wall
B has plasmids and no nucleus
C has mitochondria and plasmids
D has chloroplasts and no cell wall

3 Cells from a moss leaf and from the lining of Isla's cheek were viewed under a microscope.

(a) Name **two** structures seen in the moss cells that would not be present in the cheek cells. **(2)**

(b) State the function of the cell membrane. **(1)**

(c) The cheek cells were stained before viewing. Suggest why. **(1)**

4 The table shows some features of four cells, P, Q, R and S. ✓ = present, × = absent.

Cell	Nucleus	Cell wall	Chloroplast	Plasmid
P	✓	✓ not cellulose	×	✓
Q	×	✓ not cellulose	×	✓
R	✓	✓ cellulose	✓	×
S	✓	×	×	×

(a) Identify which cell is a bacterial cell and which is a yeast cell. Give a reason for each. **(2)**

(b) Identify cell R and explain your choice. **(1)**

(c) Name the structure in bacteria that contains extra genes and is used in genetic engineering. **(1)**

5 A student drew a red blood cell from a photograph taken through a microscope. The drawing is 56 mm wide and the magnification is × 7000.

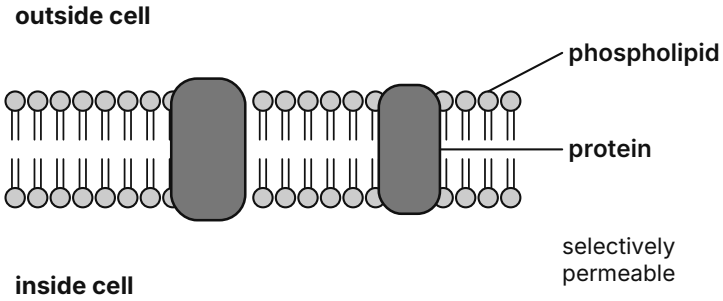
(a) Calculate the actual width of the red blood cell in micrometres. **(2)**

(b) Red blood cells have no nucleus or mitochondria. Suggest one advantage of having no nucleus for a cell that carries oxygen. **(1)**

(c) Muscle cells contain large numbers of mitochondria. Explain why. **(2)**

1.2 Transport across cell membranes

The cell membrane is made of a double layer of **phospholipids** with **proteins** in it. It is **selectively permeable**: small molecules such as oxygen, carbon dioxide, water and glucose can pass through, but large molecules such as starch and proteins cannot.



KEY POINTS

- **Diffusion**: net movement of molecules from a higher to a lower concentration. It is passive.
- **Osmosis**: net movement of **water** molecules from a higher water concentration to a lower water concentration through a selectively permeable membrane.
- **Active transport**: movement of molecules from a lower to a higher concentration. It needs energy and membrane proteins.

Why diffusion matters

Cells use diffusion to take in raw materials such as oxygen and glucose and to get rid of wastes such as carbon dioxide. For example, oxygen diffuses from the alveoli into the blood, and carbon dioxide diffuses out of respiring cells into the blood.

	Passive transport (diffusion and osmosis)	Active transport
Direction	**down** a concentration gradient (high to low)	**against** a concentration gradient (low to high)
Energy	no energy needed	needs energy (ATP from respiration)
Proteins	not needed for small molecules	membrane proteins act as carriers (pumps)

EXPERIMENT: OSMOSIS IN POTATO

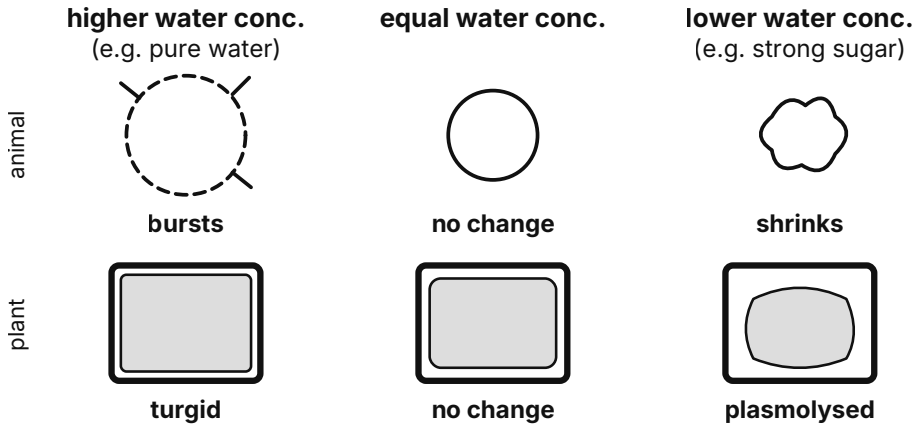
Cut equal-sized potato cylinders, blot and weigh each one. Put one in each of a range of sugar solutions, e.g. 0, 0.2, 0.4, 0.6 and 0.8 mol/l, for the same time at the same temperature. Blot dry and reweigh. Calculate the **percentage change in mass** so that cylinders with different starting masses can be compared. Use three cylinders per solution and find the average to improve reliability.

EXAM TIP

In osmosis always talk about **water concentration**, and say 'net movement', not just 'movement'.

1.2 Transport across cell membranes

Cells in different solutions



An animal cell has no cell wall, so in water it takes in water by osmosis until it **bursts**. A plant cell's wall stops it bursting: the vacuole swells and the cell becomes **turgid**. In a strong solution the plant cell loses water, the vacuole shrinks and the membrane pulls away from the wall: the cell is **plasmolysed**.

WORKED EXAMPLE

A potato cylinder had a mass of 2.50 g. After 1 hour in a sugar solution its mass was 2.20 g. Calculate the percentage change in mass.

Change	2.20 − 2.50 = −0.30 g
Divide	−0.30 ÷ 2.50 = −0.12
Percentage	× 100 = **−12%** (a 12% decrease)

EXAM TIP

Percentage change = (final − initial) ÷ initial × 100. Keep the minus sign or say 'decrease'. Where the line crosses 0% on a graph, the solution has the same water concentration as the cells.

Quick check

1. Name the two types of molecule that make up the cell membrane.
2. What does 'selectively permeable' mean?
3. Define osmosis.
4. State two differences between diffusion and active transport.
5. Describe what happens to a red blood cell placed in pure water.
6. What term describes a plant cell that has lost water and whose membrane has pulled away from the wall?
7. A cylinder changes from 4.0 g to 4.6 g. Calculate the percentage change in mass.

FREE SAMPLE

National 5 Biology Revision Guide

This sample shows a few pages. The full printed workbook is available from Amazon.

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