4.1 Cells

https://www.youtube.com/watch?v=Lk1Mb1U11EY&list=PLoeKqZ0YqLkvhOIFFHGAUawzoeR12-1ti

Cell Structure

☐ I can describe the differences between **eukaryotic and prokaryotic cells**

☐ I can label and explain the function of:

- nucleus
- cytoplasm
- cell membrane
- mitochondria
- ribosomes

☐ I can explain the function of **cell wall, vacuole, chloroplasts (plant cells)**

☐ I can describe the structure of **bacterial cells**

Microscopy

☐ I can calculate **magnification** using the equation: magnification = image size ÷ real size

☐ I can convert between **mm, µm, nm**

☐ I can compare **light microscopes vs electron microscopes**

Cell Division

☐ I can describe the stages of the **cell cycle**

☐ I can explain what happens during **mitosis**

☐ I can explain why mitosis is important (growth, repair, asexual reproduction)

☐ I can compare **mitosis and meiosis**

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Stem Cells

☐ I can define a stem cell

☐ I can explain that stem cells are undifferentiated cells

☐ I can explain that stem cells can differentiate into different types of cells

☐ I can describe the difference between embryonic stem cells and adult stem cells

☐ I can explain how stem cells can be used in medicine

☐ I can describe how stem cells are used in plants

☐ I can explain the advantages of using stem cells

☐ I can explain the risks and ethical issues linked to stem cell use

Transport in Cells

☐ I can explain **diffusion**

☐ I can explain **osmosis**

☐ I can explain **active transport**

☐ I can compare the three processes

☐ I can explain factors affecting diffusion (surface area, concentration gradient, distance)

🧠 Retrieval + Exam Questions

🔹 Quick Recall

1. What is the function of the nucleus?
2. Name two structures found in plant cells but not animal cells
3. What is a prokaryotic cell?
4. What does a mitochondrion do?

🔹 Understanding

5. Explain why cells need mitochondria
6. Describe two differences between plant and animal cells
7. Why are electron microscopes better than light microscopes?

🔹 Application

8. A cell has many mitochondria. What can you conclude about this cell? Explain why.
9. A root hair cell has a large surface area. Explain why this is useful.

🔹 Maths Skills

10. An image of a cell is 5 mm. The real size is 50 μm.
    Calculate the magnification.

🔹 6-Mark Exam Question

11. Explain how substances move into and out of cells.
    Include diffusion, osmosis and active transport in your answer.

4.2 Organisation

https://www.youtube.com/watch?v=VU2Wm2DHpY4&list=PLoeKqZ0YqLkuL_och6IGP0IBcrvi1ntkq

Organisation in Animals

☐ I can describe the levels of organisation: **cells** → **tissues** → **organs** → **organ systems**

☐ I can explain the functions of organs in the **digestive system**

☐ I can describe the role of:

- stomach
- liver
- pancreas
- small intestine

☐ I can explain how the **digestive system breaks down food**

Enzymes

☐ I can explain what enzymes are (biological catalysts)

☐ I know where amylase, protease and lipase are made, what they break down (the substrate) and what the substrates are turned into

☐ I can describe the **lock and key model**

☐ I can explain the effect of each of the following on enzyme activity

- temperature
- pH
- substrate concentration

☐ I can explain why enzymes denature

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The Heart

☐ I can describe the heart as an **organ that pumps blood around the body**

☐ I can identify the **four chambers** of the heart:

- right atrium
- right ventricle
- left atrium
- left ventricle

☐ I can explain the role of the **valves**

☐ I can describe the difference between the **right side** and **left side** of the heart

☐ I can explain **double circulation**

Blood Vessels

☐ I can compare the structure and function of:

- **arteries**
- **veins**
- **capillaries**

☐ I can explain why arteries have **thick muscular walls**

☐ I can explain why veins have **valves**

☐ I can explain why capillaries have **thin walls**

Blood

☐ I can identify the main components of blood from a picture & thier function:

- red blood cells
- white blood cells
- platelets
- plasma

Coronary Heart Disease (CHD)

☐ I can explain what **coronary heart disease** is

☐ I can explain how **fatty deposits in the coronary arteries** reduce blood flow

☐ I can describe why reduced blood flow to the heart muscle is dangerous

☐ I can explain ways CHD can be treated:

- stents
- statins
- bypass surgery
- artificial pacemakers

Lifestyle, BMI and Health

☐ I can explain how **diet and exercise** affect health

☐ I can explain the meaning of **malnutrition**

☐ I can describe problems caused by having an **unbalanced diet**

☐ I can explain what **BMI** is used for

☐ I can calculate or interpret **Body Mass Index**

☐ I can explain limitations of BMI

☐ I can describe how too much body fat can increase the risk of:

- cardiovascular disease
- type 2 diabetes
- some cancers

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Organisation in Plants

☐ I can describe plant tissues:

xylem

phloem

meristem

☐ I can explain **transpiration**

☐ I can explain **translocation**

🧠 Retrieval + Exam Questions

- Recall

1. What is a tissue?
2. Name the enzyme that breaks down starch
3. What is the function of bile?
4. Which blood cells carry oxygen?
5. What is the function of platelets?

- Understanding

1. Explain how enzymes speed up reactions
2. Why does high temperature affect enzyme activity?
3. Explain how capillaries are adapted for exchange.

- Application

1. A person has had their pancreas removed. Explain how this affects digestion
2. Why do athletes need more enzymes working efficiently?
3. A patient is given a stent. Explain how this helps treat CHD.

- Maths / Data Skills

1. A person has a mass of 80 kg and a height of 1.7 m. Calculate their BMI.

- 6-Mark

1. Explain how the digestive system and enzymes work together to break down food.
2. Explain how lifestyle factors can affect the risk of coronary heart disease.

4.3 Infection & Response

https://www.youtube.com/watch?v=uCqt3L5ajsc&list=PLoeKqZ0YqLktGKp-uzkiSmuPRHzPMXiLY

Pathogens

☐ I can define **pathogens**

☐ I can describe disease caused by:

- Bacteria
- Viruses
- Fungi
- Protists

☐ I can describe how bacteria and virus' make us feel ill

The Immune System

☐ I can explain how white blood cells:

- engulf pathogens
- produce antibodies
- produce antitoxins

Treatment & Prevention

☐ I can explain how **vaccination** works

☐ I can explain **antibiotics vs viruses**

☐ I can explain the **difference** between: preclinical testing and clinical testing

☐ I can describe how drugs are first tested on: cells, tissues, live animals

☐ I can explain why drugs are tested on healthy volunteers first

☐ I can explain why drugs are later tested on patients

🧠Retrieval + Exam Questions

- Recall

  1. What is a pathogen?
  2. Name one viral disease
  3. What do antibiotics treat?

- Understanding

  1. Explain how vaccines protect us
  2. Why don’t antibiotics work on viruses?

- Application

  1. Why is it important to complete a course of antibiotics?

- 6-Mark

  1. Explain how the body defends itself against pathogens.

4.4 Bioenergetics

https://www.youtube.com/watch?v=q0v9PyQvR0A&list=PLoeKqZ0YqLksq_8wNhYMTuJcOPpod1CFK

Photosynthesis

☐ I can recall the **photosynthesis equation**

☐ I can explain limiting factors:

- light
- carbon dioxide
- temperature

☐ I can describe how plants use glucose

☐ I can calculate inverse square law (HT)

Respiration

☐ I can recall the **respiration equation**

☐ I can compare:

- aerobic respiration
- anaerobic respiration

☐ I can explain oxygen debt (HT)

☐ I can describe what metabolism is

🧠Retrieval + Exam Questions

- Recall

  1. What is the word equation for photosynthesis?
  2. Where does photosynthesis occur?

- Understanding

  1. Why does temperature affect photosynthesis?
  2. What is anaerobic respiration?

- Application

  1. Why do athletes breathe heavily after exercise?

- 6-Mark

  1. Explain how plants carry out photosynthesis and what affects the rate.