

Pre-course materials

A Level Biology

TASK GUIDANCE: The following definitions, unit conversions and concepts are fundamental to Biology.

COMPLETION OF WORK:

- ✓ Please title the work Biology pre-course materials. Add a date and the label "Independent research"
- ✓ Answer the questions included on lined paper.
- ✓ Highlight any words that you do not fully understand.
- ✓ Submission is compulsory for students.

IN YOUR FIRST LESSON:

This piece of work will be used to assess your prior knowledge of key biological principles that will form the basis of the first taught module.

DEADLINE FOR SUBMISSION:

This booklet will be collected in your FIRST LESSON of the week beginning

Task 1: Key definitions

Define the following terms.

Tissue

Diffusion

Nucleus

Photosynthesis

Respiration

Enzyme

Activation energy

Cell

Chromosome

Gene

Mitosis

Homeostasis

Bacteria

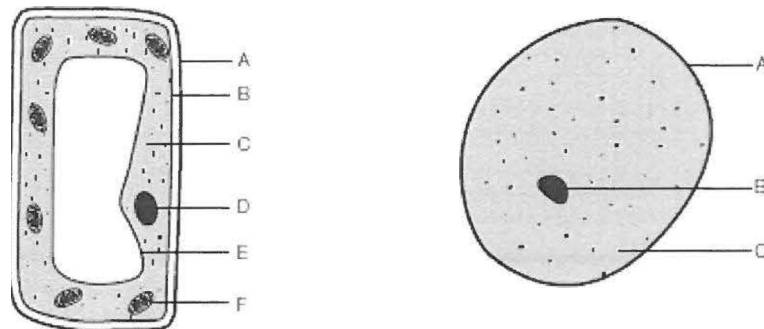
Active site

DNA

Protein

Task 2: Key biological principles - Cell structure

A. Label the structures in the plant and animal cell



B. Complete the table comparing cell structure

Complete the table below, stating the function of each feature. Tick which cell type the feature is present in and place a cross where it does not exist.

Feature	Function	Present in animal cell	Present in plant cell
Cellulose cell wall			
Cell membrane			
Permanent vacuole			
Nucleus			
Cytoplasm			

C. Answer the following questions about cells

- 1 What structures are usually present in all cells, whether plant or animal?
- 2 Which cell structure is responsible for controlling the entry and exit of substances into and out of the cell?
- 3 What structures are only present in palisade cells?
- 4 Which process occurs in the chloroplast?
- 5 State the function of the nucleus.
- 6 Where in the plant cell would you find cell sap?
- 7 What is the function of the cellulose cell wall?
- 8 Where in the cell do most of the chemical reactions take place?

Task 3: Key biological principles - Biological molecules

Different types of food are needed in correct amounts to maintain a healthy body. The main food groups are **carbohydrates**, **lipids** and **proteins**. Complete the following task and questions.

A. Complete the table below by placing a tick if the statement is correct for each food group or a cross if incorrect.

<i>Statement</i>	<i>Carbohydrates</i>	<i>Lipids</i>	<i>Proteins</i>
Major component found in the plant cell wall - cellulose			
Provides thermal insulation			
Can be either found as fats (animals) or oils (plants)			
Needed to build up muscles in animals			
Main compound used in respiration			
Amino acids are the building blocks			
Made up of fatty acids and glycerol			
Examples include enzymes, hormones and haemoglobin			
Include glucose, sucrose and starch Denature/break down at high temperatures			

B. Answer the following questions:

- 1 Name the compound that is the source of energy in respiration.
- 2 What are built up from amino acids?
- 3 Which compound serves as a reserve source of energy in plants and animals?
- 4 What has a structural role in the plant cell wall?
- 5 List two functions of lipids.
- 6 What compound is made up of glycerol and fatty acids?
- 7 This forms compounds that carry oxygen in the blood.
- 8 Name the storage molecule found in plant cells.

Task 4: Biological unit notations and conversions

In Biology you will be making many observations and measurements that need appropriate units; it is therefore important that a universal system is followed.

- To convert mm to μm , you need to multiply by 1,000.
- To convert μm to nm, you need to multiply by 1,000.
- To convert μm to m, you need to divide by 1,000.
- To convert nm to μm , you need to divide by 1,000.

Common units in Biology:

Name of unit	Multiple or fraction of a metre
kilometre (km)	$10^3 = 1000\text{m}$
metre (m)	1m
centimetre (cm)	$10^{-2} = 0.01\text{m}$
millimetre (mm)	$10^{-3} = 0.001\text{m}$
micrometre (μm)	$10^{-6} = 0.000001\text{m}$
nanometre (nm)	$10^{-9} = 0.000000001\text{m}$

A. Convert the following measurements into the correct units:

Unit	m	cm	mm	μm	nm
Rosebush height		145			
Length of a fingernail			16		
Diameter of a liver cell				25	
Diameter of cell membrane					10

B. Convert the following measurements:

- 1 Convert $75\mu\text{m}$ into mm.
- 2 How many nm are there in 450mm?
- 3 Write $84\mu\text{m}$ in mm.
- 4 Susan uses an optical microscope to look at a liver cell that is 4mm in diameter.
 - a) How would she write this figure in cm?
 - b) How would she write this figure in μm ?
- 5 Write 180_m as mm.
- 6 Write 0.2mm in μm .
- 7 Convert 2.Sm into μm .
- 8 George measures the size of the nucleus in a plant cell as 30mm. What is this value in nm?
- 9 The length of a salmon was measured as 0.5m. Convert this into μm .
- 10 A holly leaf was measured and had a diameter of 6.5cm.
 - a) What is its diameter in mm?
 - b) What is its diameter in m?
 - c) What is its diameter in nm?

Important biological reactions

Photosynthesis and respiration

Two of the most important reactions that take place in living things are photosynthesis and respiration. They both involve transfer of energy.

Activity 6

Complete the table.

	Photosynthesis	Aerobic respiration
Which organisms carry out this process?		
Where in the organisms does the process take place?		
Energy store at the beginning of the process	Sun	
Energy store at the end of the process		In cells
Reactants needed for the process		
Products of the process		
Overall word equation		
Balanced symbol equation for the overall process		

Which of the answers for aerobic respiration would be different for anaerobic respiration? Add these answers to the table in a different colour.

Investigation skills

Important vocabulary for practical work

You will have come across most of the words used in practical work in your GCSE studies. It is important that you use the right definition for each word.

Join the boxes to link the word to its definition.

Accurate	A statement suggesting what may happen in the future.
Data	An experiment that gives the same results when a different person carries it out, or a different set of equipment or technique is used.
Precise	A measurement that is close to the true value.
Prediction	An experiment that gives the same results when the same experimenter uses the same method and equipment.
Range	Physical, chemical or biological quantities or characteristics.
Repeatable	A variable that is kept constant during an experiment.
Reproducible	A variable that is measured as the outcome of an experiment.
Resolution	This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading.
Uncertainty	The interval within the true value can be expected to lie.
Variable	The spread of data, showing the maximum and minimum values of the data.
Control variable	Measurements where repeated measurements show very little spread.
Dependent variable	Information, in any form, that has been collected.

Analysing data

Biological investigations often result in large amounts of data being collected. It is important to be able to analyse this data carefully in order to pick out trends.

Activity 9: Mean, media, mode and scatter graphs

A student investigated an area of moorland where succession was occurring. She used quadrats to measure the area covered by different plant species, bare ground and surface water every 10 metres along a transect. She also recorded the depth of soil at each quadrat. Her results are shown in the table.

	Area covered in each quadrat A to E in cm ²				
	A	B	C	D	E
Bog moss	55	40	10	–	–
Bell heather	–	–	–	15	10
Sundew	10	5	–	–	–
Ling	–	–	–	15	20
Bilberry	–	–	–	15	25
Heath grass	–	–	30	10	5
Soft rush	–	30	20	5	5
Sheep's fescue	–	–	25	3	30
Bare ground	20	15	10	5	5
Surface water	15	10	5	–	–
Soil depth / cm	3.2	4.7	8.2	11.5	14.8

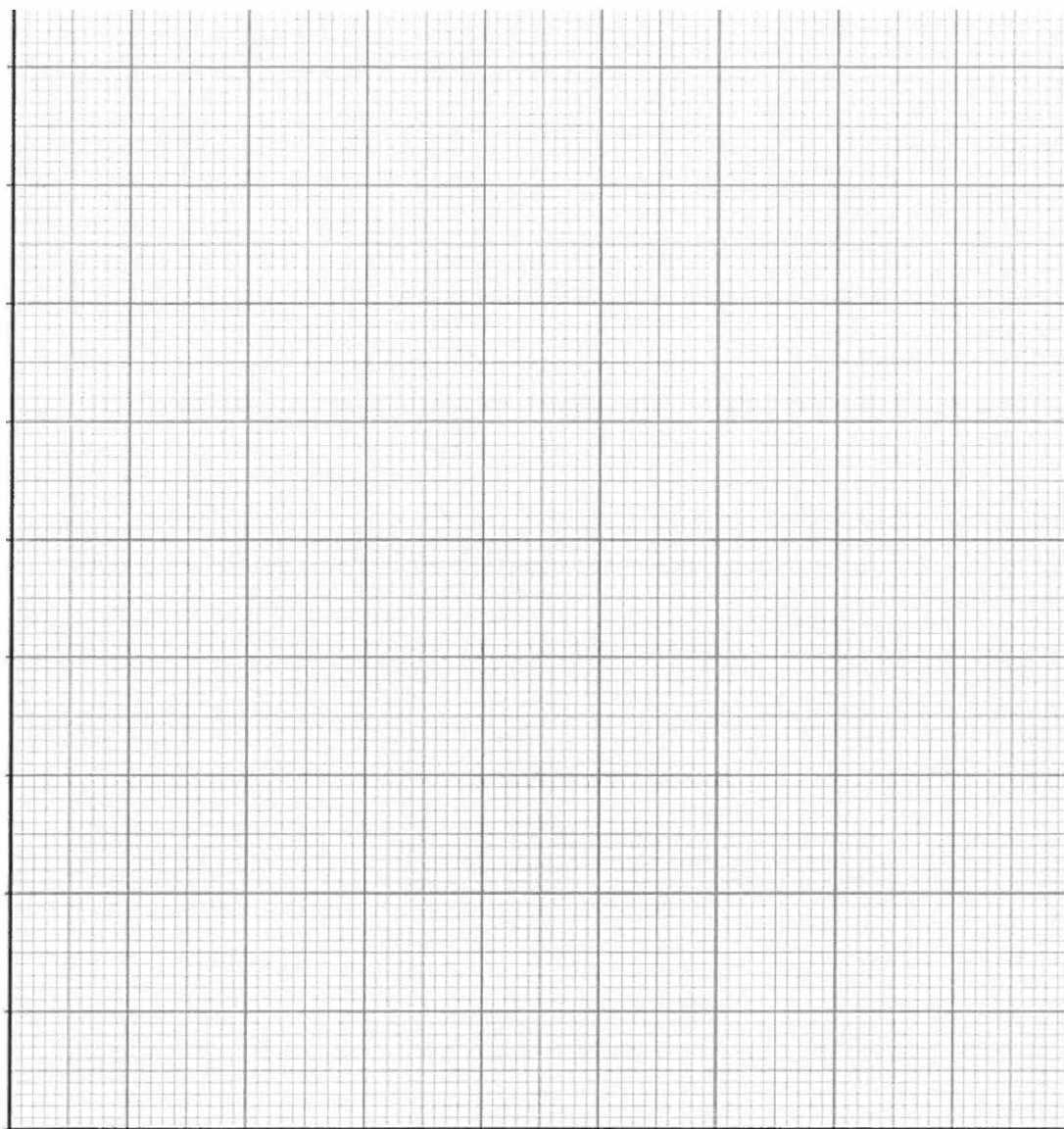
– indicates zero cover.

Calculate:

1. the mode area of soft rush in the sample
2. the mean soil depth
3. the median amount of bare ground in the sample.

Activity 9: Mean, media, mode and scatter graphs (continued)

Use the data from the table to plot a scatter graph of soil depth against the area covered by bare ground, soft rush and bog moss (use different colours or markers for each)



Activity 9: Mean, media, mode and scatter graphs (continued)

4. What conclusions does your graph suggest?

5. How confident are you in these conclusions?