Transition Work: Biology A level

Meadowhead School and Sixth Form

We make a difference

The aim of this booklet is to prepare you for the first few topics of A level biology by revisiting some GCSE content and researching some new A level content.

Please make sure that you have completed this booklet and hand it in to your biology teacher in your **first lesson** in September.

For your first lesson in September **you will need**:

- An A4 ring binder
- Ring binder dividers
- Lined paper
- Pen
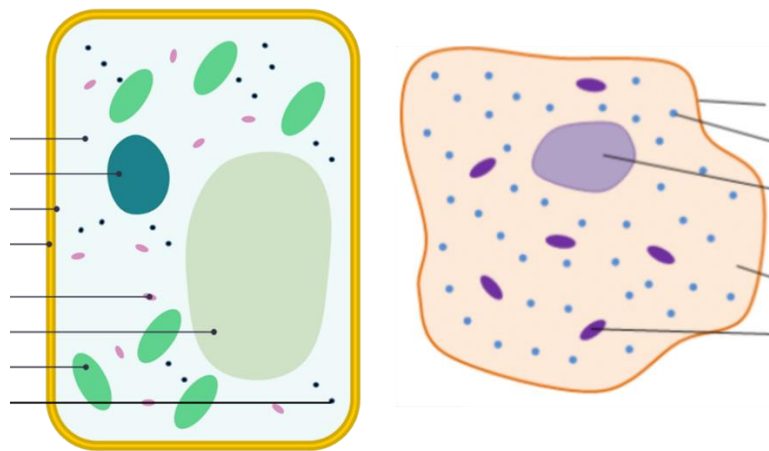- Scientific calculator

Name: _____

Cell structure

Task 1:

Label the animal and plant cells

Task 2:

Describe the functions of these organelles

Organelle	Function
Mitochondria	
Nucleus	
Ribosome	
Chloroplast	
Cell membrane	
Cell wall	
Cytoplasm	
Vacuole	

Task 3:
Research the job of these organelles:

Smooth endoplasmic reticulum:

Rough endoplasmic reticulum:

Golgi:

Vesicles:

Microscopy

Task 4:
Label the light microscope

Task 5:
Research the advantages of using electron microscopes instead of light microscopes

What type of electron microscope can provide 3D images?

What type of electron microscope has the highest resolution?

Task 6:

What is the equation to calculate the total magnification of a microscope?

What is the equation to calculate the real size of an organelle?

How do you convert mm to µm?

The real size of an organelle is 0.2 µm but it is magnified to produce an image where it is 14 mm long. What is the magnification of the microscope?

The image of a cell shows that it is 104mm wide. It is magnified 12,500x. What is the real size of the organelle in µm?

The image shows an onion cell. Calculate the real size of cell Z.
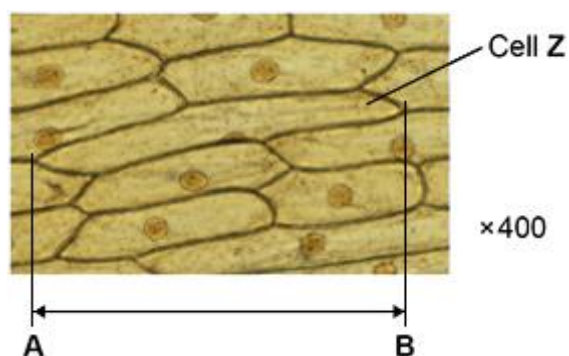
Biological molecules

Task 7:

Complete the table

	What are they made out of?	What chemical would be used to test for them?	What colour change would be seen?
Protein			
Carbohydrates			
Lipids			

Research and draw the structure of an amino acid:

There are two isomers of glucose – alpha glucose and beta glucose.
Research what type of glucose these carbohydrates are made out of and their structures:

- Starch:

- Glycogen:

- Cellulose:

Genetic material

Task 8:

DNA is made out of nucleotides. Draw and label the structure of a nucleotide

RNA is another molecules that carries genetic information. Research the differences between DNA and RNA.

Research what these three types of RNA are used for in a cell:

- mRNA

- tRNA

- rRNA

Maths and working scientifically skills

Task 9: Converting data

Re-write the following.

1. 0.00224 metres in millimetres

2. 104 micrograms in grams

3. 6.2 kilometres in metres

4. 10 micrograms in nanograms

5. 70 decilitres in litres

6. 10 cm^3 in litres

Task 10: Investigating how temperature and pH affect enzymes

Egg white is made of protein. The students were investigating how temperature and pH affect the digestion of protein

The students carried out the following procedure:
- Filled 3 narrow glass tubes with fresh egg white
- Boiled the tubes so the egg white became solid
- Placed each tube into a different beaker containing human protease enzyme in neutral pH but at different temperatures for 24 hours
- Measured the length of solid egg white in each tube after 24 hours

The diagram shows the investigation.
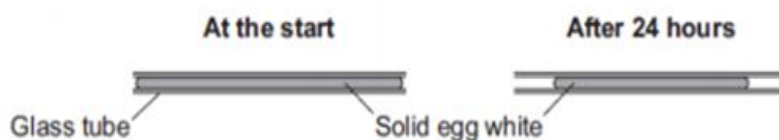
The results were recorded in the tables below:

Temperature (°C)	Original length of solid egg white (cm)	Final length of solid egg white (cm)	% change
15	6.0	5.7	
35	6.0	3.8	
55	6.0	5.3	

1. Identify the variables in this question:

    a. Independent variable:

    b. Dependent variable:

    c. Control variable

2. Calculate the % change for each result in this investigation. Show your answers to 2 significant figures.

Task 11: Mean and scatter graphs

A student investigated an area of moorland where succession was occurring. The student used quadrats to measure the area covered by; different plant species, bare ground and surface water.

They did this every 10 metres along a line transect. The student also recorded the depth of soil at each quadrat. Their results are shown in the table.

	Area covered in each quadrat A to E in cm²				
	A	**B**	**C**	**D**	**E**
Bog moss	55	40	10	–	–
Bell heather	–	–	–	15	10
Heath grass	–	–	30	10	5
Soft rush	15	30	20	5	5
Sheep's fescue	–	–	25	35	30
Surface water	15	10	5	–	–
Soil depth / cm	3.2	4.7	8.2	11.5	14.8

Calculate:

1. Calculate the mean soil depth of the area of moorland sampled.

2. Calculate the mean area of heath grass in the sampled moorland.

3. Using the data in the table plot a **scatter graph** of the soil depth against the area covered soft rush.
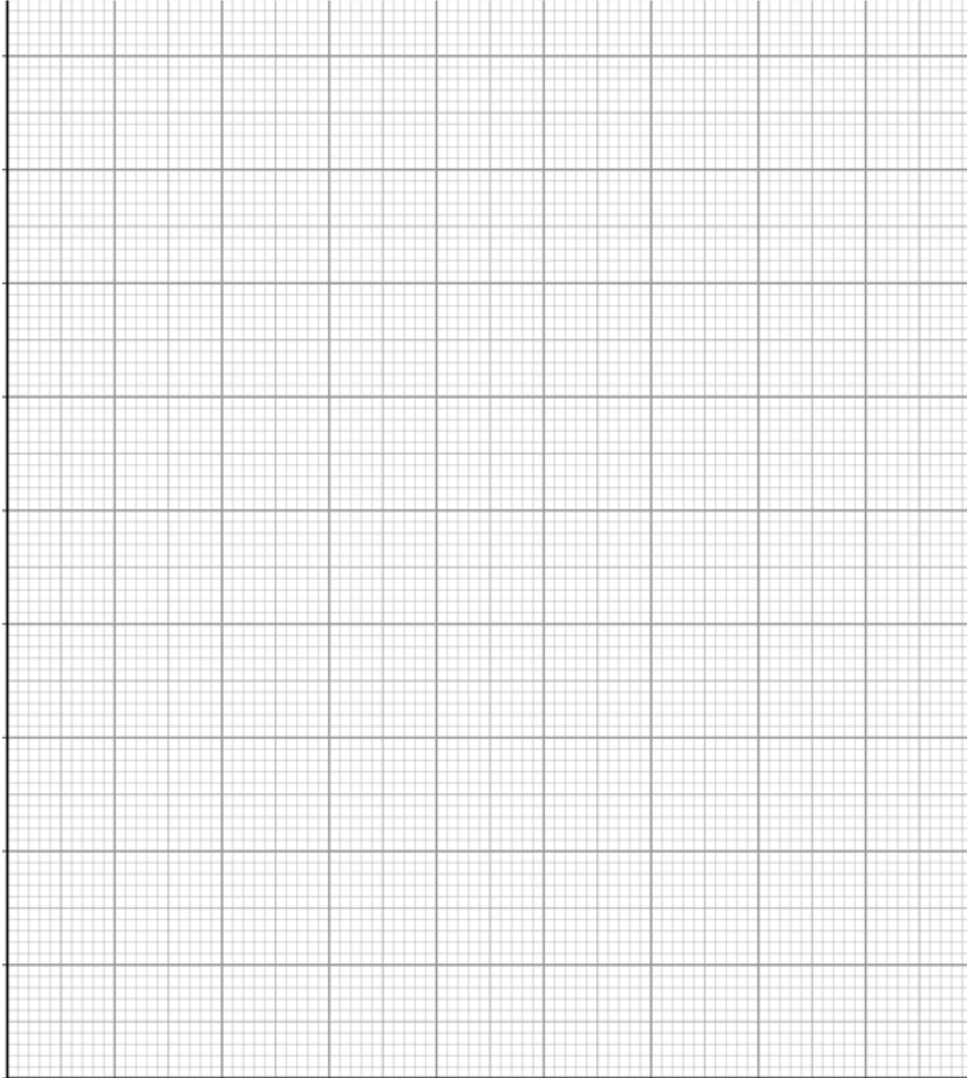
Task 12 Analysing complex graphs

The volume of air breathed in and out of the lungs during each breath is called the tidal volume. The breathing rate and tidal volume were measured for a cyclist pedaling at different speeds. The graph shows the results
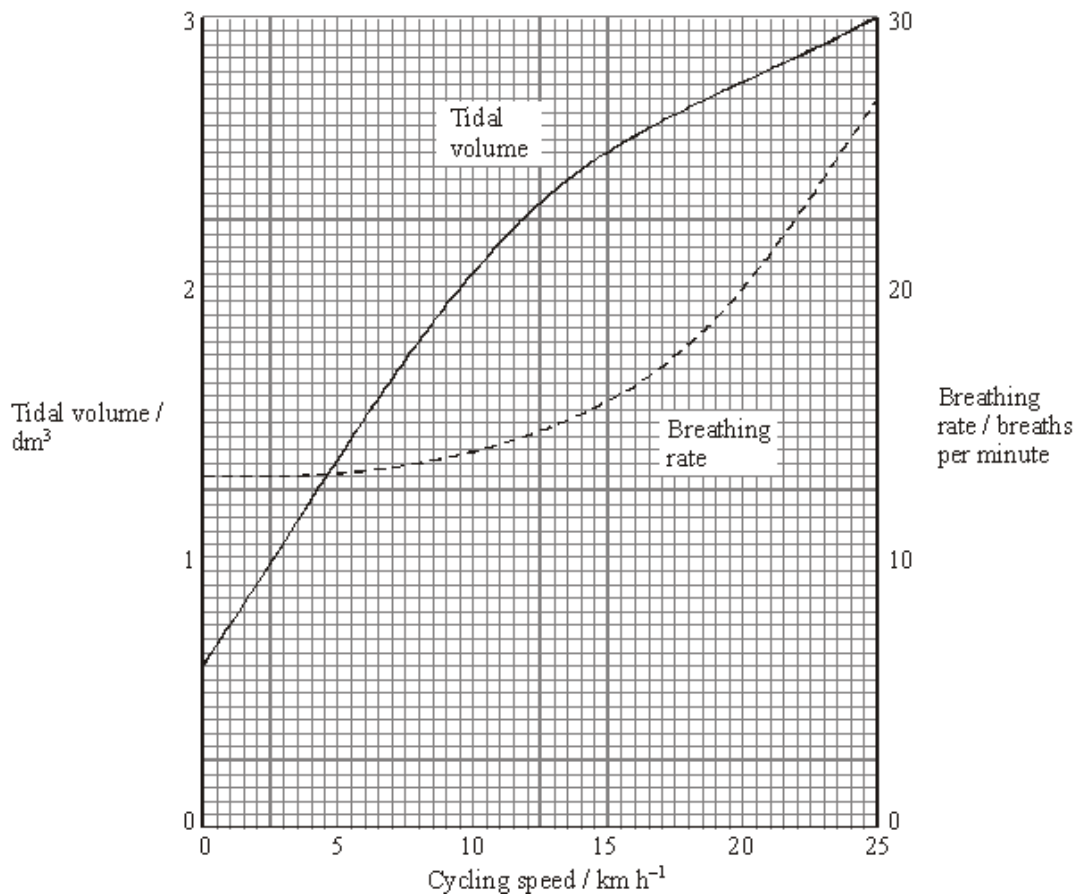
1. State the tidal volume when the cycling speed was 17 km h^{-1}.

2. State the breathing rate when the cycling speed was 8 km h^{-1}.

3. Calculate the change in breathing rate when the cyclist speed changed from 10 to 20 km h^{1}.
    Express this as a percentage.

4. State the speed at which the breathing rate starts to increase.

5. The tidal volume increased linearly with the cycling speed up to about 10 km h^{-1}. Calculate the increase in volume for each increase in speed of 1 km h^{-1}.