Transition Work: BTEC Medical Science

Meadowhead School and Sixth Form

We make a difference

The aim of this booklet is to prepare you for the start of your BTEC Medical Science by revisiting some GCSE content and researching some new content.

Please make sure that you have completed this booklet and hand it in to your medical science 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

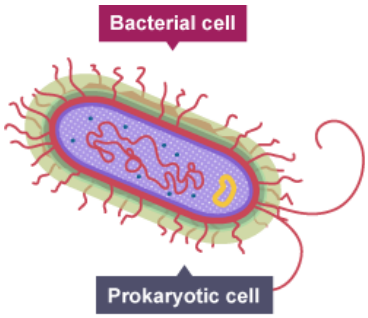
Name: _____

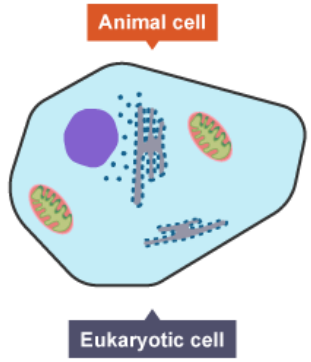
Contents:

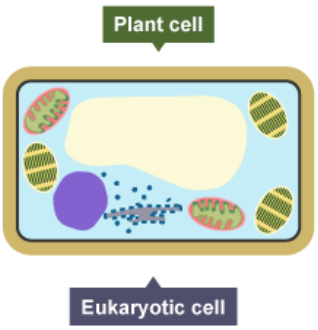
1. Cells
2. Microscopy
3. Pathogens and infectious disease
4. Maths skills
5. Practice assignment

Cells

Task 1: Label the animal, plant and prokaryotic cells using the word bank







nucleus	cytoplasm	ribosome	mitochondria	cell membrane
cell wall	vacuole	chloroplast	plasmid	free loop of DNA

Task 2: Complete the table with the functions of sub cellular structures

Name of sub cellular structure	**Function**
Nucleus	
Cytoplasm	
Ribosome	
Mitochondria	
Cell membrane	
Cell wall	
Vacuole	
Chloroplast	
Plasmid	

Microscopy

Task 3: Fill in the gaps

Microscopes are essential tools in biology for studying structures too small to be seen with just your _____. The two main types of microscopes used in science are _____ microscopes and electron microscopes. Although both are used to observe cells, they differ significantly in how they function and what they can reveal.

Light microscopes use _____ and glass lenses to magnify specimens. They are suitable for viewing whole cells and large organelles such as the _____, but they have a limited _____ and resolution. This means they cannot show fine details inside the cell.

Electron microscopes, on the other hand, use a beam of _____ and electromagnetic lenses. They have a much greater resolving power, allowing scientists to observe extremely small structures such as _____, membranes, and the internal details of _____.

Electron microscopes have improved our understanding of cell _____, but they are more _____, larger, and require the specimen to be non-living due to the preparation process.

light	**eyes**	**mitochondria**	**visible light**	**ribosomes**
electrons	**nucleus**	**magnification**	**ultrastructure**	**expensive**

Pathogens and infectious disease

Task 4: Complete the table for diseases that you have learnt about at GCSE

Disease	What type of pathogen causes it?	Main symptoms	How is it spread?	How can we prevent it spreading / treat it?
Salmonella				
AIDS				
TMV				
Rose black spot				
Gonorrhea				
Malaria				
Measles				

Task 5: Research one of the following diseases. Give a brief summary and name the type of pathogen that causes it

1. Ringworm
2. Mad cow disease
3. Cholera

Maths skills for science

Significant figures

Significant figures (or "sig figs") are the digits in a number that tell you how accurate it is. They show how sure you are about the number. Some digits are significant (important), and some are not. You only count the digits you're confident are correct.

The rule for significant figures in calculations is to give your final answer to the same number of significant figures as the data value with the **fewest** significant figures used in the calculation. It may say something like 'round to the appropriate number of significant figures'.

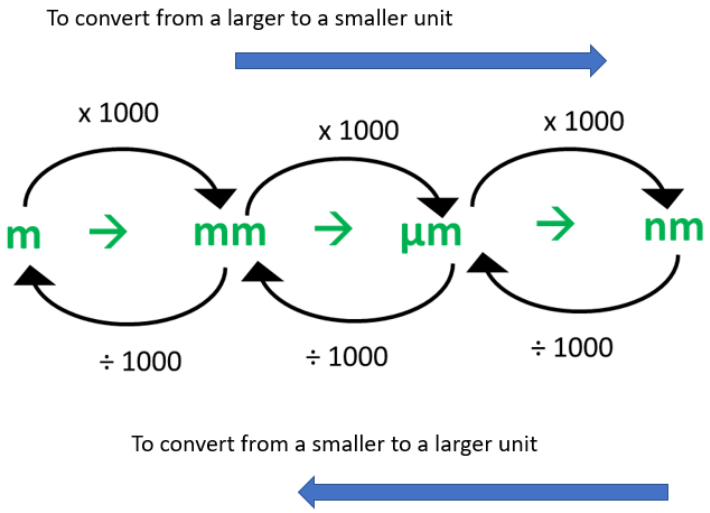
How to Count Significant Figures

1. Start counting from the first non-zero digit.
    - For example:
        - 0.038 has 2 significant figures (don't count the zeros at the start)
2. Zeros at the start don't count
    - They just show the size of the number, not accuracy.
3. Zeros in the middle or end (if there's a decimal) do count.
    - For example:
        - 104.2 → 4 sig figs
        - 5.200 → 4 sig figs (the zeros show the number was measured to that level)

Task: Complete the example questions

1. 52.6789 to **3 sig figs** → _____
2. 0.009876 to **2 sig figs** → _____
3. 482900 to **4 sig figs** → _____
4. 0.0054378 to **3 sig figs** → _____
5. 896.32 to **2 sig figs** → _____
6. 7.999 to **1 sig fig** → _____
7. 12034 to **3 sig figs** → _____
8. 0.07089 to **3 sig figs** → _____
9. 640000 to **2 sig figs** → _____
10. 93.7081 to **5 sig figs** → _____

Converting units:



Activity 5 Units

Choose the most appropriate unit and estimate the size of each of the following.

1. The mass of an earthworm
2. The time taken for a sunflower to grow
3. The diameter of a human hair
4. The length that your fingernails grow each day
5. The total length of DNA in one human body cell

Activity 6 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

Analysing data

Activity 9 Data in tables

A patient with a leaking heart valve may have the valve replaced. A study compared two different types of replacement heart valve:

- mechanical valves
- biological valves from pigs.

The data used in the study was collected from female patients aged 50–69. **Table 4** shows the data

Table 4

	Type of replacement heart valve	
	Mechanical	**Biological**
Number of patients given the valve	2852	1754
Number of patients who died from heart-related problems after valve replacement	180	178
Percentage of patients alive after 5 years	91	89
Percentage of patients needing a second valve replacement within 6 years	2.2	5.2
Percentage of patients who had a blood clot on the brain after surgery	5.8	0.1

1. Give **one** conclusion about the death of patients from heart-related problems after a valve replacement.
   Include calculations to support your answer.

2. Evaluate the use of mechanical replacement heart valves and biological replacement heart valves.
   Use information from **Table 4**.

Practice assignment:

- **Task: Research Find out the differences between eukaryotic and prokaryotic cells. List the key organelles cells contain and summarise their functions.**
- **Research some examples of diseases caused by eukaryotic and prokaryotic pathogens. Compare and contrast both types, giving examples.**

Grade criteria	Evidence	Achieved
Pass Describe the key structures and functions of a eukaryotic and prokaryotic cell	List the key **organelles** found in each type of cell (at least 8).	
	Summarise the **functions** of each organelle clearly. Organelles must include nucleus, mitochondria, cell membrane, cell wall, vacuole and ribosomes. This can be completed as a table.	
Merit Assess the differences between eukaryotic and prokaryotic cells	State clearly the **differences** between eukaryotic and prokaryotic cells. Refer to types of organelles present and cell size. Diagrams should be included to support analysis.	
Distinction Evaluate the similarities and differences between diseases caused by eukaryotic and prokaryotic pathogens	Describe clearly how **eukaryotic** and **prokaryotic** organisms can be **pathogens**. Compare and contrast both types of pathogen, giving examples of diseases caused by each This can be completed as a table	

Grade achieved _____

Assessor comments

_____

_____

_____

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