ST MARY'S SCIENCE DEPARTMENT:

BIOLOGY

F

GCSE BIOLOGY **HOMEWORK BOOK**
TOPIC 1: ADVANCED CELLS
STUDENT BOOK

YOU MUST ANSWER ALL THREE SECTIONS IN EACH PART OF THE HOMEWORK TASKS

NAME	
CLASS	
TEACHER	
FORM	

TASK	MARK	GRADE
1		
2		
3		
4		
5		
OVERALL		

GCSE BIOLOGY

YEAR 9

TOPIC 1

HOMEWORK SCHEDULE

Please use the following table to ensure each homework task is completed and submitted on time.

Carrying out these homework tasks can only increase your ability to gain a high grade in the GCSE examinations.

Failure to hand in work on time will lead to sanctions to complete this work.

Task	Submission Date	Completed?	On Time?
Task 1 Microscopy 1			
Task 2 Microscopy 2			
Task 3 Mitosis			
Task 4 Stem Cells			
Task 5 Cell Transport			

SCIENCE DEPARTMENT MARKING CODE

ID = Insufficient detail in answer
W = Wrong understanding of science
IR = Irrelevant information given.
V = This is too vague to get a mark.
AQ = Answer the question asked
R = Read the question/information
M = Maths mistake
BOD = Benefit of the doubt given.
E = Explain the answer further please.
U = Wrong units used.
SF = Wrong significant figures used.
SP = Wrong spelling of a technical term
SR = Same reason given more than once.
A circle means this lost you marks
An underline means this gained you marks

PLEASE READ

This homework booklet has made with custom selected examination questions and activities to assess your understanding in the concepts covered in class. This will increase your familiarity with the style of examination questions.

Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

Thank you for your hard work in completing this book, and good luck.

Mr. Turnbull

TASK 1: MICROSCOPY 1

SPEC CHECK

Content	Achieved?
Students should be able to: • Understand how microscopy techniques have developed over time • Explain how electron microscopy has increased understanding of sub-cellular structures. Limited to the differences in magnification and resolution. An electron microscope has much higher magnification and resolving power than a light microscope. This means that it can be used to study cells in much finer detail. This has enabled biologists to see and understand many more sub-cellular structures.	
Students should be able to carry out calculations involving magnification, real size and image size using the formula: $\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$	
Students should be able to express answers in standard form if appropriate.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1.1 Fill in the table below to complete the information about units used in biology.

[7 Marks]

Prefix	Power of 10	Example using length
_____	10^3	1 kilometre (km) = 1000 m
		metre (m)
centi	10^{-2}	1 centimetre (cm) = 0.01 m
milli	_____	1 _____ (mm) =0.001 m
_____	10^{-6}	1 micrometre (μm) = _____ m
nano	_____	1 nanometre (_____) = 0.000 000 001 m

1.2 A 15-year-old girl is 1.55 m tall. She was 47.6 cm long at birth.

Calculate how much she has grown since birth in metres.

[1 Mark]

.....

.....

1.3 A fertilised egg (zygote) has a diameter of 0.01 cm.

At birth the average baby measures 50 cm in length.

Calculate the change in order of magnitude of length from fertilisation to birth.

[2 Marks]

.....

.....

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. A scientist clones a cauliflower plant.

He uses small pieces of the cauliflower plant called explants.

This is the method the scientist uses to get the explants:

- Place the equipment in a beaker of bleach and swab the bench with 70% alcohol.
- Collect a small piece of cauliflower and place on a white tile.
- Using a scalpel cut the piece of cauliflower lengthways into small 3–5 mm pieces called explants.
- Measure the mass of the explants.

1.1 What equipment should be used to measure the mass of the explants to 1 hundredth of a gram?

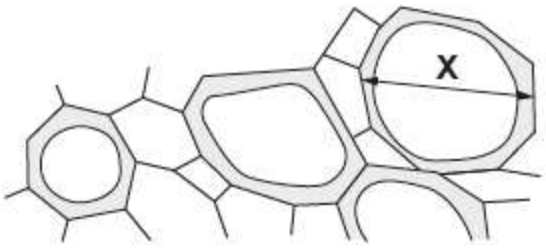
[1 Mark]

.....

.....

The scientist observes some of the tissues of the growing explants using a light microscope.

The diagram shows some of the plant cells.



The diameter of **X** has been magnified 500×.

1.2 What is the actual diameter of **X**?

Give your answer in standard form.

[2 Marks]

.....

.....

Diameter = ... mm

1.3 Transmission electron microscopes (TEM) work by passing a beam of electrons through a very thin slice of an object.

Suggest **one** advantage and **one** disadvantage of using TEM rather than a light microscope to look at cells.

[2 Marks]

Advantage

.....

.....

Disadvantage

.....

.....

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1.1 Scientists often want to look at things very closely. To help see things larger than they actually are scientists use a microscope.

When you look at something under a microscope, the thing that you are looking at is called the object. It may also be called a specimen.

The first thing you must do is to place the object onto a small sheet of glass called a slide. This process is called mounting.

You may need to cut a very thin slice of the object in order to see through it.

You may have to use a stain to make the features of it stand out.

After you have mounted it and stained it (if needed), cover it with a small square of thin glass called a cover slip to protect the sample.

Once this is done you can secure the slide to the microscope by attaching it to a flat plate called a stage with a pair of clips.

Turn the larger wheel on the side of the microscope, called the coarse focus, until the slide is well away from the objective lenses. There are several of these on a disc which can be rotated.

To view the object as big as possible turn the turret until the shortest objective lens is over the slide. This is the least magnification – how many times bigger the object looks.

Look down the eyepiece lens. This is usually a ×10 magnification. This is on the top of the tube. Slowly turn the coarse focus wheel clockwise until you can see the object clearly. This raises the stage nearer to the objective lens.

Now turn the turret until a larger objective lens is over the slide. Turn the smaller wheel (the fine focus) until you can see the object in greater detail.

1.1 Give two words for the name of the sample you look at through a microscope.

[2 Marks]

.....

.....

1.2 What is the piece of glass that you place your sample on called?

[1 Mark]

.....

.....

1.3 What is the thin square of glass that protects your sample called?

[1 Mark]

.....

.....

1.4 Explain why you might add a stain to the object you are looking at.

[1 Mark]

.....

.....

1.5 What word do you use to describe placing the object on the slide?

[1 Mark]

.....

.....

1.6 What is the name of the flat plate to which you attach the slide?

[1 Mark]

.....

.....

1.7 Which objective lens do you use first?

[1 Mark]

.....

.....

1.8 What magnification is usual for the eyepiece lens?

[1 Mark]

.....

.....

1.9 Give a reason why you might look at the slide from the side.

[1 Mark]

.....

.....

FEEDBACK SHEET

Overall Mark:	**/25**
Section A: Mark	/10
Section B: Mark	/5
Section C: Mark	/10

GRADE ACHIEVED:

5	☐	**1**	☐
4	☐	**U**	☐
3	☐		
2	☐		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision. ☐ Complete outstanding work. ☐ Make corrections as indicated by the teacher. ☐ Attend intervention for this topic ☐ Include more information in responses. ☐ Include more key words in responses. ☐ Attend departmental revision sessions. ☐ Read the questions carefully. ☐ Explain your answers in more detail. ☐ Carry out revision on Seneca Learning.	☐ Revise the equations. ☐ Check the units on answers. ☐ Check the correct amount of sig figs on answers. ☐ Check to convert values correctly. ☐ Show your full working out. ☐ Check your calculations. ☐ Revise the science investigative skills. ☐ Revise the key concepts of the topics. ☐ Thoroughly check your work for mistakes. Other:

Student response

TASK 2: MICROSCOPY 2

SPEC CHECK

Content	Achieved?
Students should be able to: • Understand how microscopy techniques have developed over time • Explain how electron microscopy has increased understanding of sub-cellular structures. Limited to the differences in magnification and resolution. An electron microscope has much higher magnification and resolving power than a light microscope. This means that it can be used to study cells in much finer detail. This has enabled biologists to see and understand many more sub-cellular structures.	
Students should be able to carry out calculations involving magnification, real size and image size using the formula: $\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$	
Students should be able to express answers in standard form if appropriate.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Work out the real size of these objects.

[10 Marks]

Question	Size of image (mm)	Magnification	Size of real object (mm)
1.1	5	40	
1.2	10	1000	
1.3	12	60	
1.4	8	200	
1.5	15	500	

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Figure 2 shows a sperm cell.

Figure 2

The function of a sperm cell is to swim to an egg and fertilise it.

It has a tail to swim.

1.1 Describe **one** other adaptation of the sperm cell.

[2 Marks]

.....

.....

1.2 A student observed a sperm cell using a microscope at a magnification of ×400.

The sperm cell image measured 22 mm long.

Use the equation to calculate the real size of the cell.

Give your answer in micrometres (μm).

$$\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$$

[3 Marks]

.....

.....

.....

.....

.....

.....

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. Use the equations given to complete the table.

[10 Marks]

$$\text{size of image} = \text{magnification} \times \text{size of real object}$$

$$\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$$

Question	Size of image (mm)	Magnification	Size of real object (mm)
1.1	10		0.002
1.2		400	0.05
1.3	6		0.006
1.4		50	0.05
1.5	15		0.15

FEEDBACK SHEET

Overall Mark:	**/25**	**GRADE ACHIEVED:**	
		5 ☐	**1** ☐
		4 ☐	**U** ☐
		3 ☐	
		2 ☐	
Section A: Mark	/10		
Section B: Mark	/5		
Section C: Mark	/10		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
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Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
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Student response

TASK 3: MITOSIS

SPEC CHECK

Content	Achieved?
The nucleus of a cell contains chromosomes made of DNA molecules. Each chromosome carries a large number of genes. In body cells the chromosomes are normally found in pairs.	
Cells divide in a series of stages called the cell cycle. Students should be able to describe the stages of the cell cycle, including mitosis. During the cell cycle the genetic material is doubled and then divided into two identical cells. Before a cell can divide it needs to grow and increase the number of sub-cellular structures such as ribosomes and mitochondria. The DNA replicates to form two copies of each chromosome. In mitosis one set of chromosomes is pulled to each end of the cell and the nucleus divides. Finally, the cytoplasm and cell membranes divide to form two identical cells. Students need to understand the three overall stages of the cell cycle but do not need to know the different phases of the mitosis stage. Cell division by mitosis is important in the growth and development of multicellular organisms. Students should be able to recognise and describe situations in given contexts where mitosis is occurring.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Table 3 gives the names of some parts of a plant.

1.1 Tick **one** box in each row to show whether each part is a cell, a tissue or an organ.

The first row has been done for you.

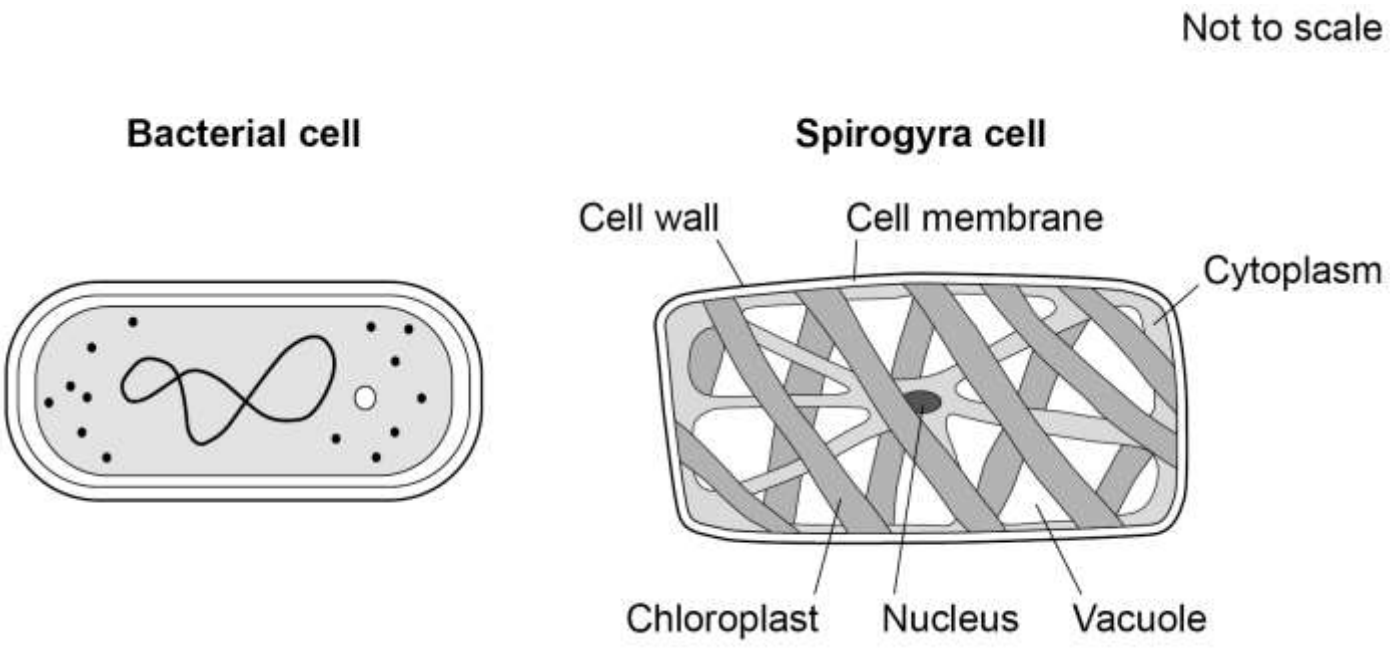
[3 marks]

Table 3

	Cell	Tissue	Organ
Gamete	✓		
Leaf			
Phloem			
Root			

1.2 Figure 7 shows a bacterial cell and a cell from an organism called Spirogyra.

Figure 7



Give **one** similarity and **one** difference between the bacterial cell and the Spirogyra cell.

[2 marks]

Similarity

.....

.....

Difference

.....

.....

1.3 Name the process Spirogyra uses to produce its food.

Give **one** reason for your answer using information from **Figure 7**.

[2 marks]

Process .....

Reason

.....

.....

1.4 Write the names of the parts of the cell in order of size.

Use the answers from the box.

chromosome	gene	nucleus

[2 marks]

..... Largest

.....

.....

..... Smallest

The cells in living organisms are different sizes.

Table 4 gives the lengths of four cells.

Table 4

Cell	Length in mm
A	4.8×10^{2}
B	7.2×10^{-3}
C	3.1×10^{-3}
D	1.2×10^{2}

1.5 Which cell in **Table 4** has the shortest length?

[1 mark]

Cell .....

1.6 Which two cells in **Table 4** can be seen without using a microscope?

[1 mark]

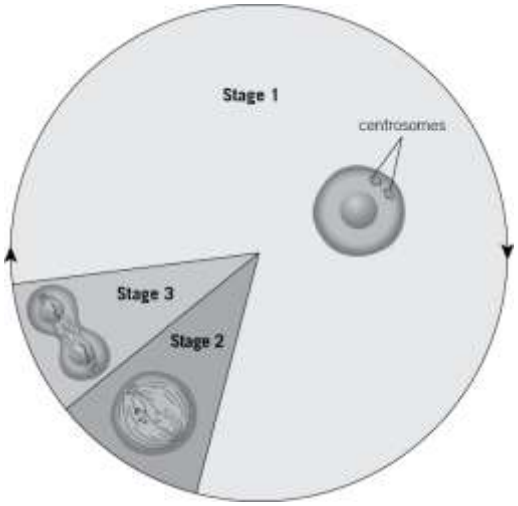
Cell ..... and Cell .....

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

Below is a diagram of the cell cycle for human skin cells at the site of a wound.



The stages in the cell cycle of a human skin cell

1.1 Describe the main events which occur in:

Stage **1**

[1 Mark]

.....

Stage **2**

[1 Mark]

.....

Stage **3**

[1 Mark]

.....

1.2 Explain why the interphase stage is the longest stage in the cell cycle.

[2 Marks]

.....

.....

.....

1.3 Suggest why mitosis is important in living organisms.

[2 Marks]

.....

.....

.....

.....

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

This question is about the cell cycle.

1.1 Chromosomes are copied during the cell cycle.

Where are chromosomes found?

Tick **one** box.

[1 Mark]

- Cytoplasm ☐
- Nucleus ☐
- Ribosomes ☐
- Vacuole ☐

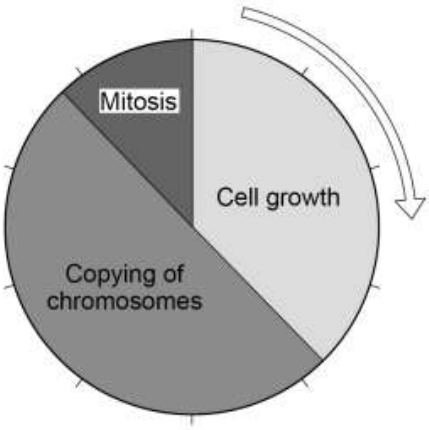
1.2 What is the name of a section of a chromosome that controls a characteristic?

[1 Mark]

.....

Figure 1 shows information about the cell cycle.

Figure 1



1.3 Which stage of the cell cycle in **Figure 1** takes the most time?

Tick **one** box.

[1 Mark]

- Cell growth ☐
- Copying of chromosomes ☐
- Mitosis ☐

1.4 During mitosis cells need extra energy.

Which cell structures provide most of this energy?

Tick **one** box.

[1 Mark]

- Chromosomes ☐
- Cytoplasm ☐
- Mitochondria ☐
- Ribosomes ☐

1.5 The cell cycle in **Figure 1** takes two hours in total.

The cell growth stage takes 45 minutes.

Calculate the time taken for mitosis.

[2 Marks]

.....

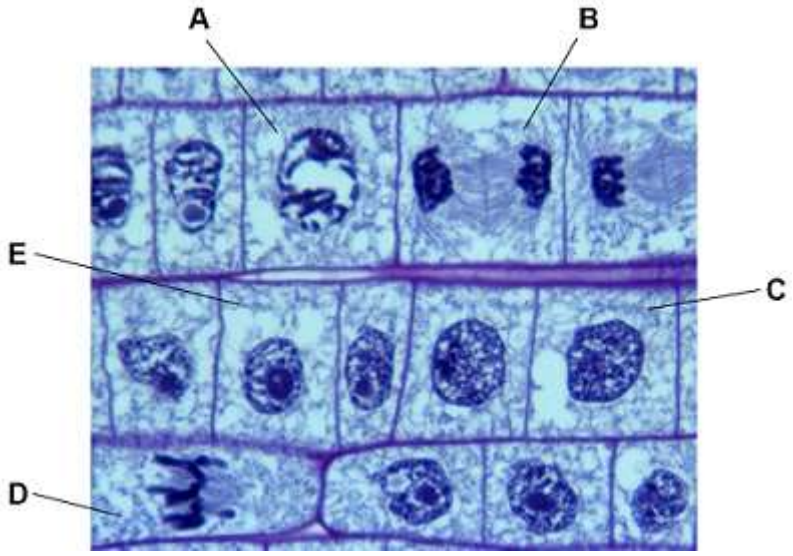
.....

.....

.....

Time = _____ minutes

Figure 2 shows some cells in different stages of the cell cycle.



1.6 Which cell is **not** dividing by mitosis

Tick **one** box.

[1 Mark]

A		B		C		D	

1.7 Cell **E** in **Figure 2** contains 8 chromosomes.

Cell **E** divides by mitosis.

How many chromosomes will each new cell contain?

Tick **one** box.

[1 Mark]

- 2 ☐
- 4 ☐
- 8 ☐
- 16 ☐

1.8 Why is mitosis important in living organisms?

Tick **one** box.

[1 Mark]

- To produce gametes ☐
- To produce variation ☐
- To release energy ☐
- To repair tissues ☐

FEEDBACK SHEET

Overall Mark:	**/27**	**GRADE ACHIEVED:**	
		5 ☐	**1** ☐
		4 ☐	**U** ☐
		3 ☐	
		2 ☐	
Section A: Mark	/11		
Section B: Mark	/7		
Section C: Mark	/9		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
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Student response

TASK 4: STEM CELLS

SPEC CHECK

Content	Achieved?
A stem cell is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type, and from which certain other cells can arise from differentiation. Students should be able to describe the function of stem cells in embryos, in adult animals and in the meristems in plants. Stem cells from human embryos can be cloned and made to differentiate into most different types of human cells. Stem cells from adult bone marrow can form many types of cells including blood cells. Meristem tissue in plants can differentiate into any type of plant cell, throughout the life of the plant. Knowledge and understanding of stem cell techniques are not required. Treatment with stem cells may be able to help conditions such as diabetes and paralysis.	
In therapeutic cloning an embryo is produced with the same genes as the patient. Stem cells from the embryo are not rejected by the patient's body so they may be used for medical treatment. The use of stem cells has potential risks such as transfer of viral infection, and some people have ethical or religious objections. Stem cells from meristems in plants can be used to produce clones of plants quickly and economically. • Rare species can be cloned to protect from extinction. • Crop plants with special features such as disease resistance can be cloned to produce large numbers of identical plants for farmers.	
Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

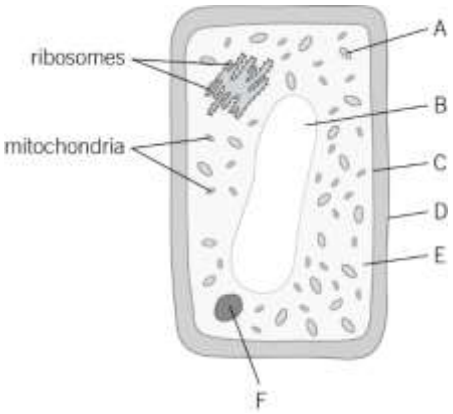
SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Figure 1 shows a plant cell.

Figure 1



1.1 Which part of the cell shown in **Figure 1** is the cell wall?

[1 Mark]

.....

1.2 Name the chemical that the cell wall is made of.

[1 Mark]

.....

1.3 Which part of the cell shown in **Figure 1** controls what enters and leaves the cell?

What is this structure called?

[2 Marks]

.....

In which part of the cell shown in **Figure 1** does photosynthesis take place?

1.4 What is the name of this structure?

[2 Marks]

.....

1.5 What is the function of ribosomes?

[1 Mark]

.....

.....

In which type of animal cell would you find a lot of mitochondria?

1.6 Give a reason for your answer.

[2 Marks]

.....

.....

1.7 Name **one** part of a plant cell that is also found in bacterial cells.

[1 Mark]

.....

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. After a baby is born, stem cells may be collected from the umbilical cord. These can be frozen and stored for possible use in the future.

1.1 What are stem cells?

[Marks]

.....

.....

.....

.....

.....

1.2 Suggest why it is ethically more acceptable to take stem cells from an umbilical cord instead of using stem cells from a 4-day-old embryo produced by In Vitro Fertilisation (IVF).

[1 Mark]

.....

.....

1.3 Stem cells taken from a child's umbilical cord could be used to treat a condition later in that child's life.

Give **one** advantage of using the child's own umbilical cord stem cells instead of using stem cells donated from another person.

[1 Mark]

.....

.....

1.4 Why would it **not** be possible to treat a genetic disorder in a child using his own umbilical cord stem cells?

[1 Mark]

.....

.....

SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. Stem cells can be collected from human embryos and from adult bone marrow. Stem cells can develop into different types of cell.

The table gives information about using these two types of stem cell to treat patients.

Stem cells from human embryos	Stem cells from adult bone marrow
It costs £5000 to collect a few cells.	It costs £1000 to collect many cells.
There are ethical issues in using embryo stem cells.	Adults give permission for their own bone marrow to be collected.
The stem cells can develop into most other types of cell.	The stem cells can develop into only a few types of cell.
Each stem cell divides every 30 minutes.	Each stem cell divides every four hours.
There is a low chance of a patient's immune system rejecting the cells.	There is a high chance of a patient's immune system rejecting the cells.
More research is needed into the use of these stem cells.	Use of these stem cells is considered to be a safe procedure.

Scientists are planning a new way of treating a disease, using stem cells.

Use **only** the information above to answer these questions.

1.1 Give **three** advantages of using stem cells from embryos instead of from adult bone marrow.

[3 Marks]

Advantage 1

.....

.....

Advantage 2

.....

.....

Advantage 3

.....

.....

1.2 Give **three** advantages of using stem cells from adult bone marrow instead of from embryos.

[3 Marks]

Advantage 1

.....

.....

Advantage 2

.....

.....

Advantage 3

.....

.....

FEEDBACK SHEET

Overall Mark:	**/21**	**GRADE ACHIEVED:**	
		5 ☐	**1** ☐
		4 ☐	**U** ☐
		3 ☐	
		2 ☐	
Section A: Mark	/10		
Section B: Mark	/5		
Section C: Mark	/6		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 5: CELL TRANSPORT

SPEC CHECK

Content	Achieved?
Substances may move into and out of cells across the cell membranes via diffusion. Diffusion is the spreading out of the particles of any substance in solution, or particles of a gas, resulting in a net movement from an area of higher concentration to an area of lower concentration. Some of the substances transported in and out of cells by diffusion are oxygen and carbon dioxide in gas exchange, and of the waste product urea from cells into the blood plasma for excretion in the kidney. Students should be able to explain how different factors affect the rate of diffusion. Factors which affect the rate of diffusion are: • The difference in concentrations (concentration gradient) • The temperature • The surface area of the membrane. A single-celled organism has a relatively large surface area to volume ratio. This allows sufficient transport of molecules into and out of the cell to meet the needs of the organism.	
Water may move across cell membranes via osmosis. Osmosis is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.	
Active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration. Active transport allows mineral ions to be absorbed into plant root hairs from very dilute solutions in the soil. Plants require ions for healthy growth. It also allows sugar molecules to be absorbed from lower concentrations in the gut into the blood which has a higher sugar concentration. Sugar molecules are used for cell respiration. Students should be able to: • Describe how substances are transported into and out of cells by diffusion, osmosis and active transport • Explain the differences between the three processes.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Substances can move into and out of cells.

1.1 How does oxygen move into and out of cells?

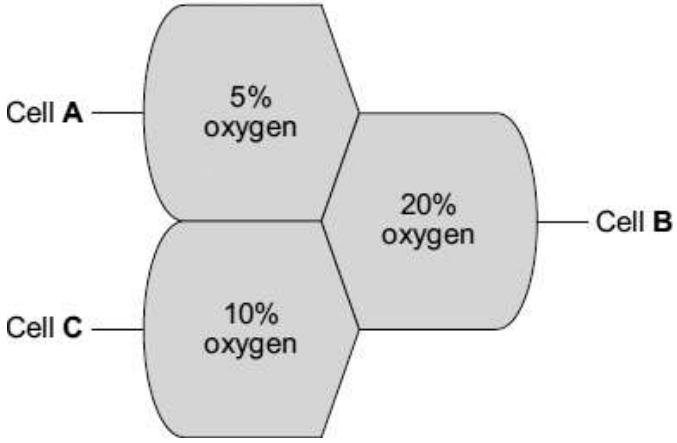
Draw a ring around **one** answer.

[1 Mark]

diffusion **digestion** **photosynthesis**

1.2 Diagram 1 shows the percentage concentration of oxygen in three cells, **A**, **B** and **C**.

Diagram 1



Oxygen can move from cell to cell.

Into which cell, **A**, **B** or **C**, will oxygen move the fastest? ☐

[1 Mark]

1.3 How does water move into and out of cells?

Draw a ring around **one** answer.

[1 Mark]

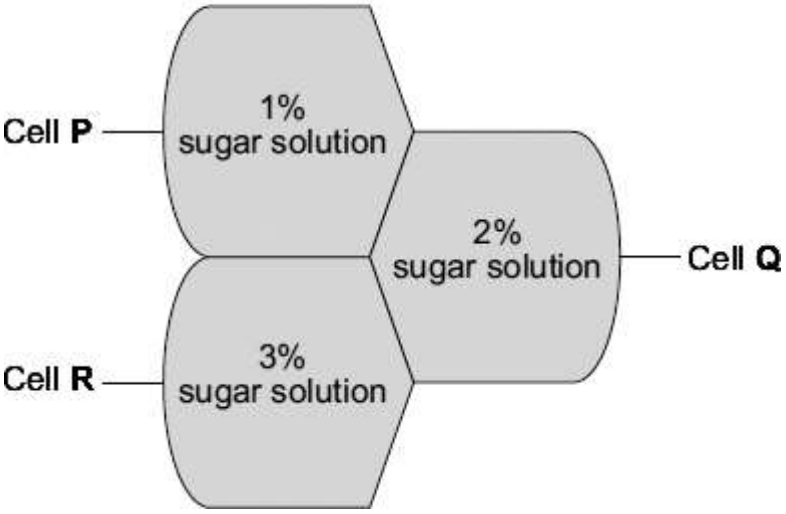
breathing **osmosis** **respiration**

1.4 Differences in the concentration of sugars in cells cause water to move into or out of cells at different rates.

Diagram 2 shows three different cells, **P**, **Q** and **R**.

The information shows the percentage concentration of sugar solution in cells **P**, **Q** and **R**.

Diagram 2



Water can move from cell to cell.

Into which cell, **P**, **Q** or **R**, will water move the fastest? ☐

[1 Mark]

SECTION B

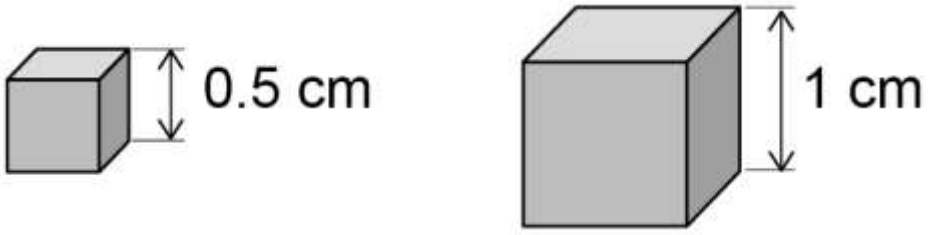
This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Figure 7 shows two model cells.

Both models are cubes.

Figure 7



1.1 Describe how the surface area to volume ratio changes as the length of the side of the model cell increases.

You should include calculations in your answer.

[3 marks]

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1.2 Explain why a bacterium can rely on diffusion for gas exchange, but animals need a transport system.

[3 marks]

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SECTION C

This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. A student investigated the effect of different concentrations of salt solution on the mass of chips.

The student:

Cut five chips from one potato

Weighed each chip

Placed each chip into a different concentration of salt solution

Left the chips for one hour

Then removed the chips from the salt solutions and reweighed them.

The student's results are shown **Table 1**.

Table 1

Concentration of salt solution in M	0.0	0.5	1.0	2.0	3.0
Mass of chip at start in grams	2.5	2.8	2.8	2.5	2.6
Mass of chip after one hour in grams	2.7	2.8	2.7	2.3	2.1

1.1 Draw **one** line from each variable to its description.

[2 Marks]

Variable	**Description**
Concentration of salt solution	Control variable
Length of time left in solution	Dependent variable
Change in mass	Independent variable

1.2 The 0 M salt solution did not contain any salt. It was just water.

Calculate the change in mass of the chip placed in the 0 M solution.

[1 Mark]

.....

.....

..... grams

1.3 What caused this change in the mass of the chip placed in the 0 M solution?

Tick (✓) **one** box.

[1 Mark]

A. The chip absorbed salt ☐

B. The chip absorbed water ☐

C. The chip lost water ☐

D. The chip lost salt ☐

1.4 In which concentration of salt solution was there no change in the mass of the chip?

[1 Mark]

.....

.....

..... M

1.5 What does your answer to **1.4** suggest about the concentration of salt solution inside the chip?

[1 Mark]

.....

.....

1.6 Suggest **one** way the student could have made his investigation more valid?

[1 Mark]

.....

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FEEDBACK SHEET

Overall Mark:	**/17**	**GRADE ACHIEVED:**	
		5 ☐	**1** ☐
		4 ☐	**U** ☐
		3 ☐	
		2 ☐	
Section A: Mark	/4		
Section B: Mark	/6		
Section C: Mark	/7		

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Student response

Acknowledgements

This document has been produced by Mr J Turnbull.

All relevant information has been credited in the document.

This document has been produced for educational purposes only.

This document has been produced for the AQA GCSE Science Specification.