

TEACHERS WITHOUT BORDERS PROGRAMME

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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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In Bill Gates words, at the Mandela Day 'Living Together' address: "Maintaining the quality of this country's higher education system while expanding access to more students will not be easy. But it's critical to South Africa's future" – working together, we can help achieve this."

Contributing schools to date:

Clifton School	Milnerton High	Rustenburg Girls' High	St Peter's
Durban Girls'	Northwood High	St Anne's DC	St Stithians
Fairmont High	Roedean	St John's DSG	Wynberg Boys' High
Herzlia High	Rondebosch Boys'	St Mary's DSG Kloof	Wynberg Secondary

LIFE SCIENCES PAPER

TIME: 1 HOUR

MARKS ____/60

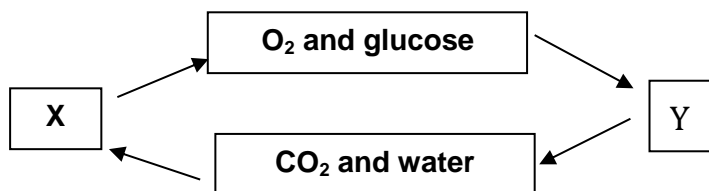
NAME: _____

QUESTION 1 ANSWER QUESTION 1 ON THE QUESTION PAPER

1.1. Various possible answers are provided for each question. Choose the best answer and write only the LETTER in the box provided.

1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.1.8	1.1.9
B✓	D✓	D✓	C✓	C✓	C✓	A✓	D✓	A✓

QUESTIONS 1.1.1 and 1.1.2 refer to the flow chart below.



1.1.1 Which process is represented by X and Y respectively? (1)

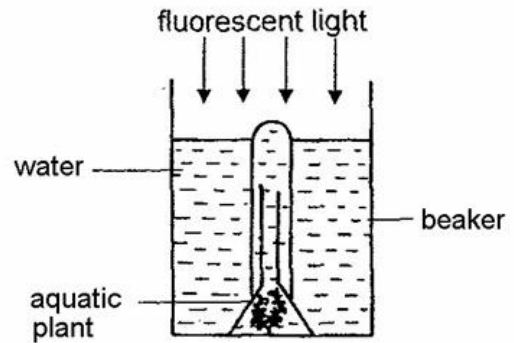
	X	Y
A	Respiration	Photosynthesis
B	Photosynthesis	Respiration
C	Transpiration	Photosynthesis
D	Photosynthesis	Transpiration

1.1.2 Radiant energy is...

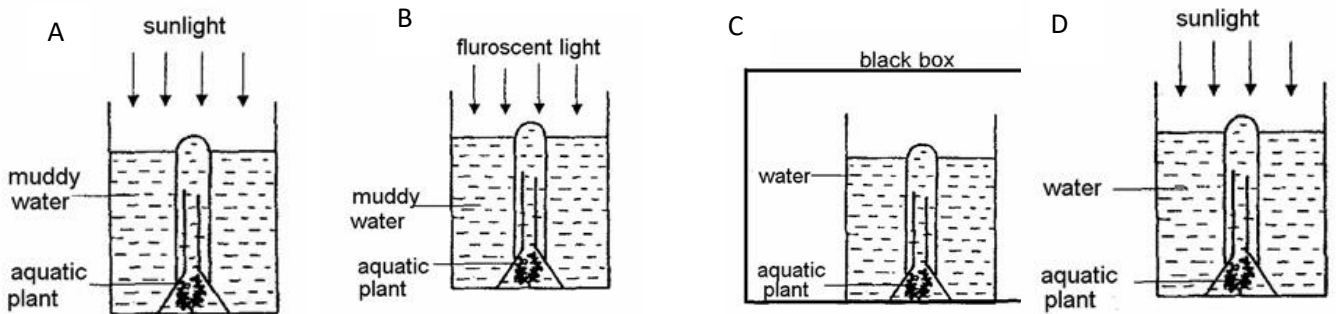
- A not involved in these processes.
- B needed by both X and Y.
- C needed by Y and released by X.
- D needed by X only.

(1)

Courtney wanted to find out if an aquatic plant can undergo photosynthesis faster under fluorescent light or sunlight. She prepared the following set-up for her experiment.



1.1.3. Which one of the following sets of apparatus A, B, C or D, should Courtney prepare in order to conduct a fair test? (1)



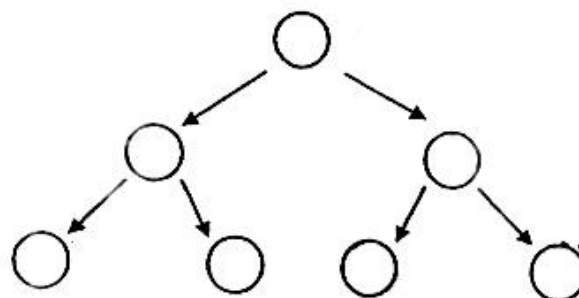
1.1.4. The main reason why meat feels softer than wood is that the cells in meat have

- A. smaller vacuoles
 - B. more cytoplasm
 - C. no cell wall
 - D. no mitochondria
- (1)

1.1.5. The diagram below shows the process of cell division.

How many cells will be produced if the original cell undergoes 5 cell divisions?

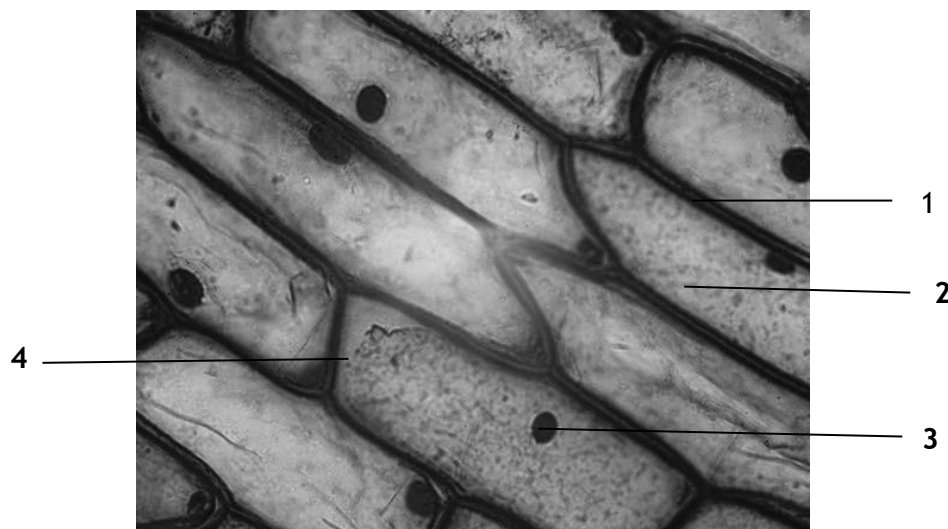
- A. 8
- B. 16
- C. 32
- D. 64



(1)

Questions 1.1.6.to 1.1.8. are based on the micrograph below:

Micrograph showing onion epidermal cells



1.1.6. Which numbered part in the micrograph above represents the part of the cell which contains information about all the processes that take place in that cell?

- A. 1
- B. 2
- C. 3
- D. 4

(1)

1.1.7. The part labelled 1 is made of cellulose. Part 1 is

- A. permeable
- B. partially permeable
- C. impermeable
- D. non-permeable

(1)

1.1.8. The cell structure which controls the entry and exit of substances in the cell is:

- A. 1
- B. 2
- C. 3
- D. 4

(1)

1.1.9. The cells have been cut in

- A. Longitudinal section
- B. Cross section
- C. Transverse section
- D. Vertical section

(1)

[9]

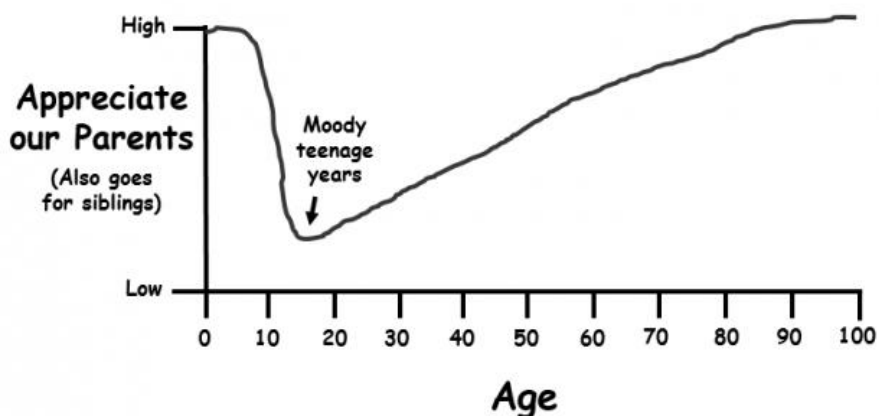
1.2. Choose a term from COLUMN Y that matches a statement in COLUMN X.

Write only the letter (A – J) in the space provided in front of column X.

COLUMN X	COLUMN Y
E The jelly-like substance between the nuclear membrane and cell membrane	A multicellular
D Similar cells which work together to perform a specific, common function	B organ
A The human body consists of trillions of cells	C nucleoplasm
G A group of different systems that function together	D specialised
	E cytoplasm
	F unicellular
	G organism

[4]

1.3. Explain the general trend of the following graph.

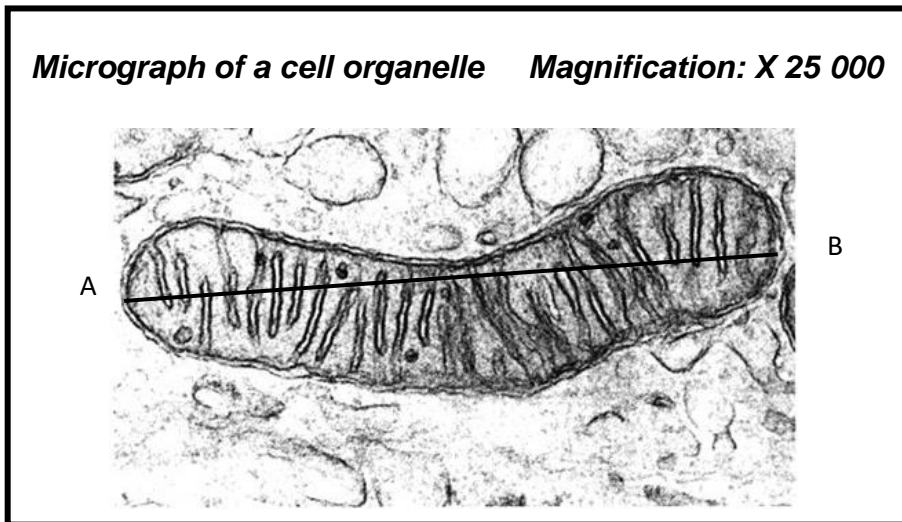


During the first 10 years, there is a high appreciation for parents. ✓

During the early teenage years, the level of appreciation drops dramatically. ✓

In the late teens, appreciation levels start to rise ✓ and they continue to rise over the rest of the life. ✓ _____ [3]

1.4. Owethu observed the following micrograph of a cell organelle.



1.4.1. Identify the cell organelle shown in the above micrograph. (1)

mitochondrion ✓ _____

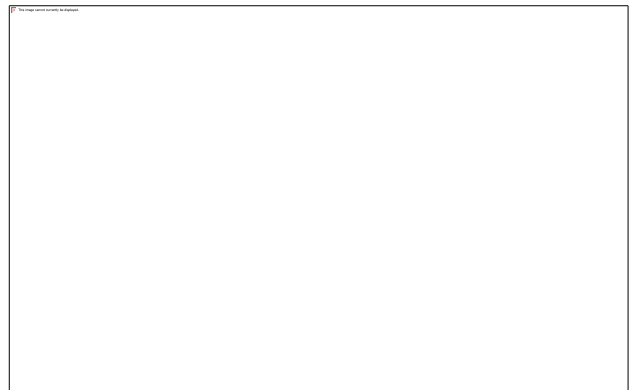
1.4.2. What type of microscope was used to photograph this image? (2)

Transmission ✓ **electron** ✓ **microscope** _____

1.4.3. Calculate the true length of the organelle in micrometres. Measure the organelle along the line AB. Show all working. (3)

$$R = D/M = 87 / 88 \text{ mm} \checkmark / 25\ 000 \checkmark \times 1\ 000 = 3.48 / 3.52 \checkmark \mu\text{m}$$

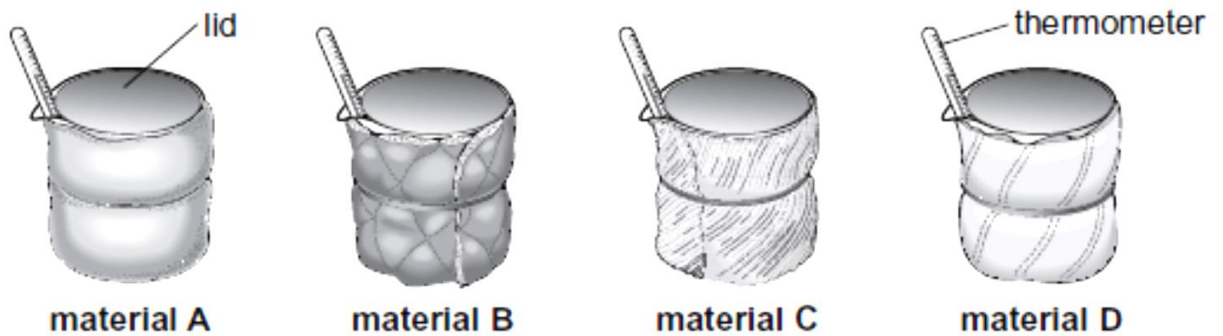
[6]



ANSWER THE FOLLOWING QUESTIONS ON THE LINED PAPER PROVIDED.

QUESTION 2

A company has made a new material called 'Wellwarm'. They want to use 'Wellwarm' to make coats. Hannah tested 'Wellwarm' to see how well it insulated a beaker of water at 60°C. She tested 'Wellwarm' and three other materials as shown below.



She wrapped each beaker in a different material.
She recorded the temperature at the start, and 20 minutes later.

- 2.1 Name the independent variable. **Type of material** ✓ (1)
- 2.2 Name the dependent variable. **Temperature of water** ✓ (°C) ✓ (2)

The results of the investigation are shown below.

time (minutes)	temperature of water (°C) wrapped in			
	material A	material B	material C	material D
0	60	60	60	60
20	34	40	38	36

Hannah said that the 'Wellwarm' material is the best insulator.

- 2.3. Based on the results, which material, A, B, C or D, was 'Wellwarm'? **B** ✓ (1)
- 2.4. Use the evidence in the results table to **explain** your choice in question 2.3. (2)
The temperature was 60 °C at the beginning and material B was 40 °C after 20 minutes – the highest of all the materials. ✓✓

The company made a coat from each of the four materials they tested. Mosa tested the different coats by wearing each one in a cold room. She measured the temperature inside each coat for 30 minutes.



2.5. State TWO variables (other than those mentioned above) that should be kept the same to make this a fair test. (2)

The same style/type of jacket✓, the same temperature of the room✓ [8]

QUESTION 3

3.1. Distinguish between a CONTROL and a CONTROLLED variable. [2]

The CONTROL is the apparatus set up without the independent variable as a comparison with the experiment apparatus. ✓

The CONTROLLED variables are those that are kept the same in all sets of apparatus. ✓

3.2. The purpose of yeast in the making of bread is to produce the gas that makes bread rise. Yeast does this by using the sugars in flour, and releasing carbon dioxide.

Reese designed an experiment to test the effect of temperature on the rising of bread.

METHOD:

I mixed flour, water, yeast and sugar to make a dough.

I used a koki to mark three measuring cylinders A, B and C.

I added 20 ml of dough to each of three measuring cylinders.

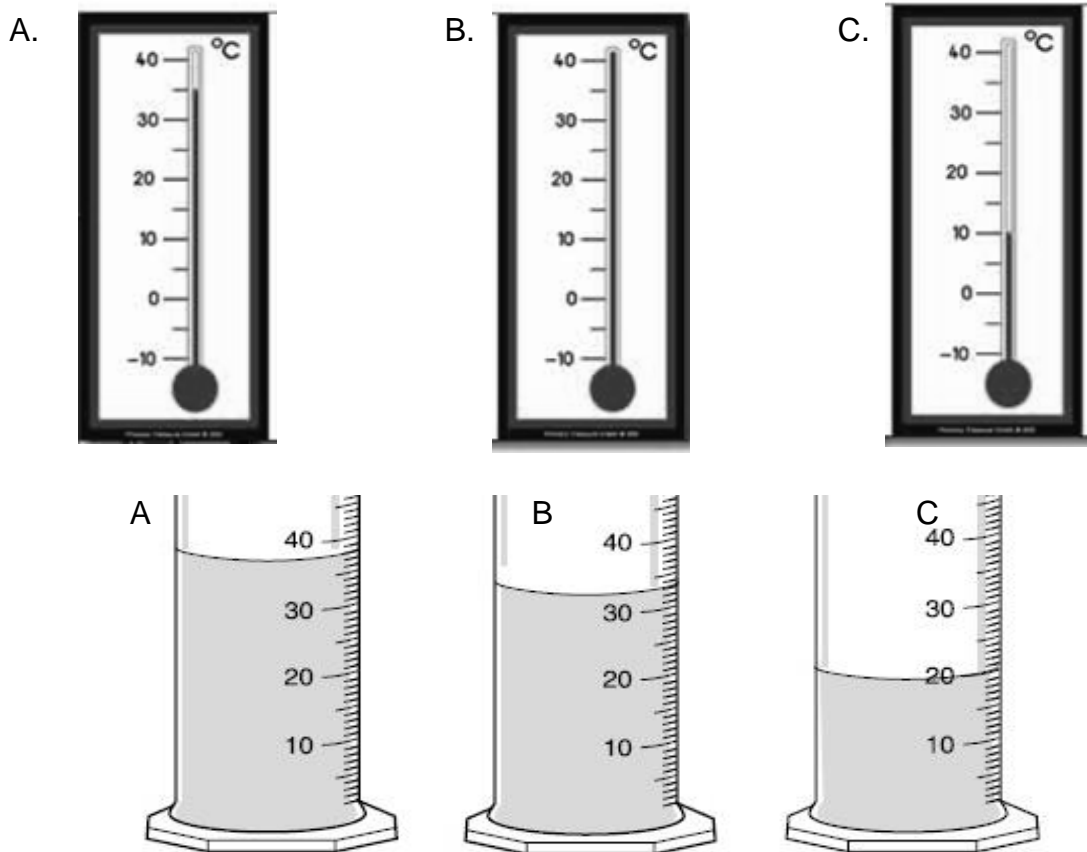
I kept the measuring cylinders at three different temperatures for one hour.

3.2.1. Suggest TWO ways that Reese could improve the **format** of the method. (2)

Reese should not use 'I' but should write in passive voice. ✓

The method should be written with numbered points. ✓

Observe the thermometers and measuring cylinders AFTER ONE HOUR.



3.2.2. Draw a table of results showing the **CHANGE** in volume of the dough over the course of the experiment. (8)

[10]

TABLE TO SHOW THE CHANGE IN VOLUME OF THE DOUGH AT VARIOUS TEMPERATURES ✓✓

Measuring cylinder	A	B	C
Temperature(°C) ✓	40	35	10 ✓
Change in volume (ml) ✓	18	13	0 ✓

Units in headings ✓ grid ✓

OR **TABLE TO SHOW THE CHANGE IN VOLUME OF THE DOUGH AT VARIOUS TEMPERATURES** ✓✓

Measuring cylinder	A	B	C
Temperature(°C) ✓	40	35	10 ✓
Initial volume (ml) ✓	20	20	20 ✓
Final volume (ml)	38	33	20

Units in headings ✓ grid ✓

QUESTION 4

4.1. During a Natural Sciences lesson, girls observed specimens under the compound light microscope:

4.1.1. when **only** should Kiera use the coarse focus knob? (1)

On low power ✓

4.1.2. which parts should Katelyn use to work out the magnification? (2)

The objective ✓ and the eyepiece/ocular ✓

4.1.3. when would Kendall open the diaphragm wider? (1)

When the field of view/specimen is dark ✓

4.1.4. what should Kayleigh do if she cannot find the specimen when she changes to a higher power? (2)

go back to low power ✓ and ensure that the specimen is in the centre of the hole in the stage ✓

4.1.5. what should Calleigh do if the specimen is blurry when she changes to a higher power? (1)

turn the fine focus knob to focus the specimen ✓

4.1.6. why should Celeste not move the tube downwards whilst looking down the eyepiece? (1)

the objective may break the glass slide ✓

4.1.7. what should Kayla do if the field of view is half-light and half-dark? (1)

Turn the rotating nosepiece to click the objective into position ✓

4.1.8. If Chloe moves the glass slide towards the left, which way would the specimen move if she was looking at it through the ocular? (1)

To the right ✓

[10]

- 4.2. The following diagram shows the field of view of a microscope under LOW power. Mikayla placed a ruler measuring in **millimetres** on the stage to determine the size of the field of view.



- 4.2.1 What is the approximate width of the field of view in

- i. millimetres? **4mm**✓
ii. in micrometres? **4 000um** ✓ (2)

- 4.2.2. If 5 cells fit across the field of view on low power, what is the approximate size of each cell in micrometres? Show all working. (3)

$$4\ 000\text{um} \checkmark / 5\ \text{cells} \checkmark = 200\text{um} \checkmark$$

- 4.3. State TWO advantages and ONE disadvantage of using a compound light microscope to view specimens rather than an electron microscope. (3)

Advantages: specimens can be viewed in colour✓
Living organisms may be viewed ✓
(the microscope is inexpensive and portable – relevant?)

Disadvantages: magnification is low; only 40x - 1 000x ✓
compared with 20 000 000x with an electron microscope

[8]

TOTAL: 60