



Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

Grade 11

PAPER 3 - PRACTICAL TEST - 2018

GREENBURY SECONDARY SCHOOL



DEPARTMENT OF MATHS & SCIENCES
H.O.D. MR L. PILLAY

L. Pillay
10/09/2018

MARKS: 60

TIME: 60 minutes

INSTRUCTIONS:

1. This paper consists of 6 pages.
2. Answer ALL questions in the spaces provided.
3. Write neatly.
4. Drawings must be done in pencil and labelled in ink.

Question 1: HANDLING EQUIPMENT, FOLLOWING INSTRUCTIONS, OBSERVING, DRAWING

1.1 PLANT STUDY

Observe the FOUR plants (A, B, C and D) in front of you, and answer the questions below.

1.1.1 Write ONLY the LETTER representing the plant in the appropriate space.

- a) The plant that bears naked seeds _____
- b) The plant with a rhizome _____
- c) A gametophyte plant _____
- d) A plant that bears fruit _____

(4)

1.2 You are provided with the following equipment/apparatus:

A flower specimen	Forceps
Microscope	Dissecting needles
Scalpel	A slide
Petri dish	Cellotape

You are required to: i) view the specimen under the microscope
ii) dissect and remove the male and female reproductive structures

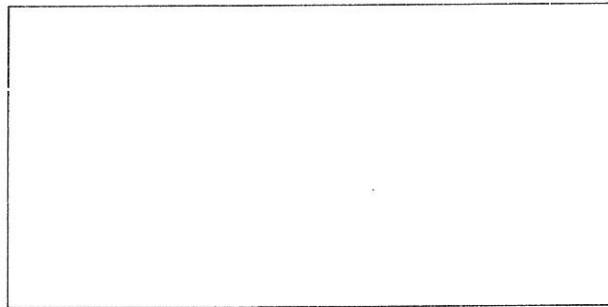
1.2.1 Handling of equipment: 1.2.2 Clarity of specimen (2)

1.2.3 Separate the male and female reproductive structures and paste them in the appropriate spaces below, using the cellotape provided.

<u>Male Reproductive Structure</u>	<u>Female Reproductive Structure</u>

(2)

1.2.4 Draw a neat labelled diagram of the male reproductive structure in the space below:



(4)

1.2.5 Name the pollinating agent for this flower. _____

(1)

1.2.6 Give TWO reasons for your answer. _____

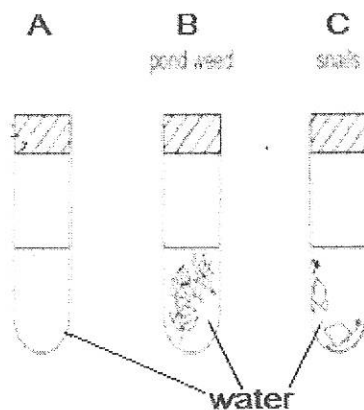
(2)

(15)

2. **Question Two: RECORD OBSERVATIONS, SELECTING APPARATUS, HYPOTHESISING**

2.1 The diagram below represents an investigation, and is exactly like the apparatus set up in front of you. After a period of 24 hours red hydrogen carbonate indicator was added to each to each test tube. Hint: Hydrogen carbonate indicator is used to show changes in carbon dioxide concentration as follows:

- It turns from red to purple when the carbon dioxide level decreases.
- It turns from red to yellow when the carbon dioxide levels increases.



Test tubes A, B and C
in darkness

2.1.1 State the AIM for the investigation. _____

(2)

2.1.2 Tabulate the results that will be observed in test tubes A, B and C.

2.1.3 Explain the purpose of test tube A. _____

(5)

2.1.4 List TWO ways in which the process taking place in test tube C is of biological importance. _____

(2)

(2)

2.2 You are given the following equipment and apparatus.

- 2 test tubes of the same size
- 2 water plants of the same species and the same size
- Water for the test tubes
- A beaker to use as a water bath, with some warm water
- A thermometer
- A lamp
- Some foil
- Hydrogen carbonate indicator

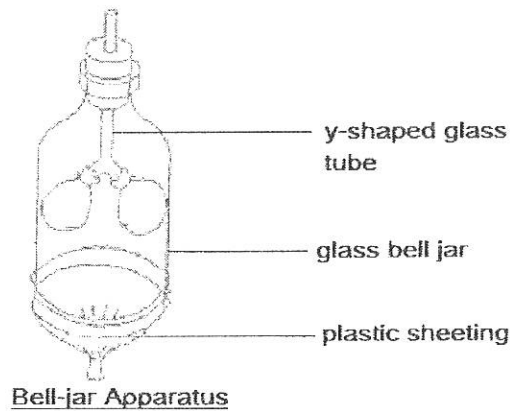
Describe the **METHOD** (in steps) how you will use these to set up an investigation to demonstrate that light is a factor that affects the rate of photosynthesis.

(4)

(15)

3. **Question Three: DRAWING GRAPH, MEASURING, CALCULATING**

3.1 The MODEL set up in front of you is similar to the one in the diagram below.



3.1.1 Name the process that this model demonstrate. _____ (1)

3.1.2 What do each of the following parts in the model represent in the human:

- a) the Y-shaped tube/straw _____ (2)
- b) the plastic sheeting _____ (2)

3.1.3 a) Your teacher will pull downwards on the plastic sheeting.

State the result _____

b) Name this process. _____ (2)

3.1.4 Explain how the glass bell jar of the model is limited in demonstrating the actual human system. _____

_____ (2)

3.2 The TABLE below shows the percentage of carbon dioxide (CO₂) emitted by different sectors in a certain city in South Africa.

SECTOR	CO ₂ EMISSION (%)
Transport	25
Residential	27
Industrial	15
Commercial	28
other	5

3.2.1 Draw a **pie chart**, on the next page, to represent the data in the table. Show ALL calculations.

(5)

3.2.2 Describe how an increase in the CO₂ concentration can lead to global warming.

(3)
(15)

4. **Question Four: MAKE OBSERVATIONS/ ANALYSE/ INTERPRET DATA**

4.1 Observe the dissected specimen of an organ.
Provide the label (A, B, C or D) for each of the following descriptions.

- a) Region where Malpighian bodies are situated _____
- b) Collects the urine from pyramids _____
- c) A wide portion leading to the ureters _____
- d) A collection of collecting tubes, forming ducts of Bellini _____

(4)

4.2 The TABLE below shows the following:

- ❖ The amount of each substance filtered daily from the blood into the Bowman’s capsule.
- ❖ The amount of each substance which is present in a day’s urine output.

Substrate	Filtrate	Urine
Water	180 litres	1,5 litres
Salts	500 g	15 g
Glucose	200 g	0 g
urea	40 g	42 g

4.2.1 Give ONE reason for 200g glucose in the filtrate and none in the urine.

(1)

4.2.2 Calculate the percentage of filtered salt which are reabsorbed. Show calculations. _____

(2)

4.2.3 Explain why the urea concentration is higher in the urine than in the filtrate.

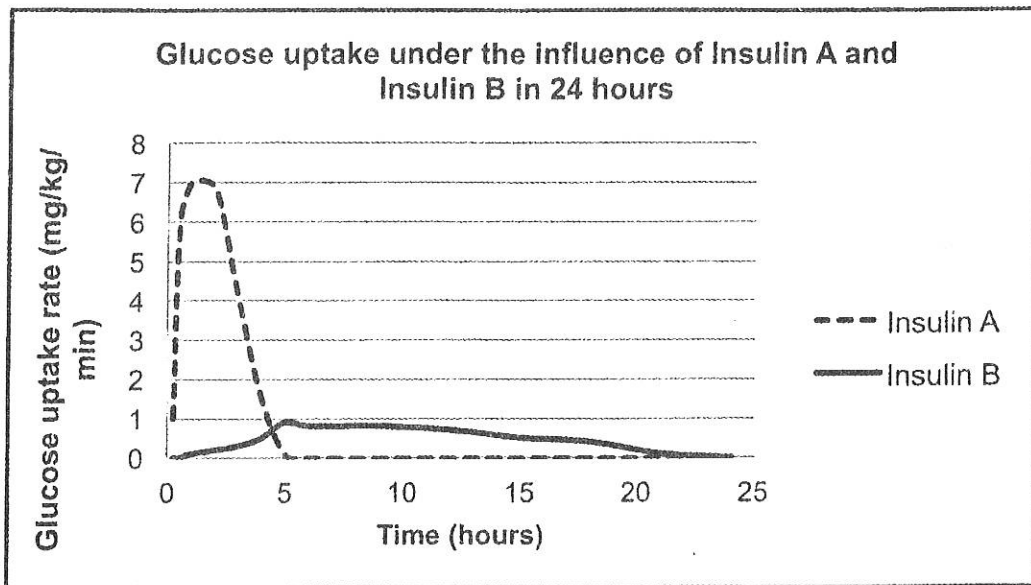
(2)

4.2.4 Give ONE reason why water is passively reabsorbed at the proximal convoluted tubule.

(1)

4.3 Some people with type I diabetes cannot produce insulin and therefore need to inject themselves regularly (insulin-dependent).

An investigation was done to determine the action of two types of insulin (**A** and **B**). The glucose uptake rate of cells, when using each type of insulin, was measured over time.



[Adapted from www.webmed.com]

4.3.1 Name the organ that produces insulin. _____

(1)

4.3.2 Using the information in the graph, state TWO differences in the functioning of insulin **A** and **B**.

(4)

(15)

MEMO



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Question 1: HANDLING EQUIPMENT, OBSERVING, DRAWING

1.1 PLANT STUDY

Observe the FOUR plants (A, B, C and D) in front of you, and answer the questions below.

1.1.1 Write ONLY the LETTER representing the plant in the appropriate space.

- | | |
|-------------------------------------|--------------------|
| a) The plant that bears naked seeds | <u> D </u> ✓ |
| b) The plant with a rhizome | <u> C </u> ✓ |
| c) A gametophyte plant | <u> B </u> ✓ |
| d) A plant that bears fruit | <u> A </u> ✓ |

(4)

1.2 You are provided with the following equipment/apparatus:

A flower specimen	Forceps
Microscope	Dissecting needles
Scalpel	A slide
Petri dish	Cellotape

You are required to: i) view the specimen under the microscope
ii) dissect and remove the male and female reproductive structures

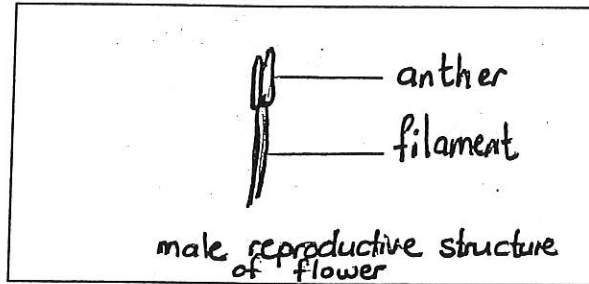
1.2.1 Handling of equipment: 1.2.2 Clarity of specimen (2)

1.2.3 Separate the male and female reproductive structures and paste them in the appropriate spaces below, using the cellotape provided.

<u>Male Reproductive Structure</u>	<u>Female Reproductive Structure</u>
✓	✓

(2)

1.2.4 Draw a neat labelled diagram of the male reproductive structure in the space below:



✓ labels
✓ caption
✓ neat, correct drawing

(4)

1.2.5 Name the pollinating agent for this flower. Wind ✓ (1)

1.2.6 Give TWO reasons for your answer. feathery stigma, not showy, large anthers, no scent, no nectar (2)

(15)

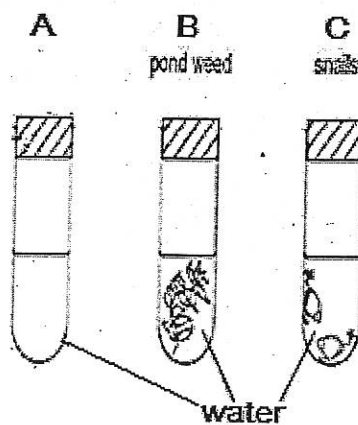
2.

Question Two: SCIENTIFIC INVESTIGATION

2.1

The diagram below represents an investigation, and is exactly like the apparatus set up in front of you. After a period of 24 hours red hydrogen carbonate indicator was added to each to each test tube. Hint: Hydrogen carbonate indicator is used to show changes in carbon dioxide concentration as follows:

- It turns from red to purple when the carbon dioxide level decreases.
- It turns from red to yellow when the carbon dioxide levels increases.



Test tubes A, B and C
in darkness

- 2.1.1 State the AIM for the investigation. To determine whether living organisms release CO₂ during cellular respiration // (2)
- 2.1.2 Tabulate the results that will be observed in test tubes A, B and C.

Table showing the colour observed in each test tube at the end of expt

TEST TUBE	A	B	C
COLOUR OF INDICATOR	Red	Yellow	Yellow

Test T. Title ✓
Colour } Correct Headings ✓
Correct Results ✓
in each TT ✓

- 2.1.3 Explain the purpose of test tube A. It acts as a control to verify that the organisms present in B and C are responsible for producing the CO₂, and nothing else ✓ (5)
- 2.1.4 List TWO ways in which the process taking place in test tube C is of biological importance. * CO₂ released used as a raw material for photosynthesis ✓ (2)
- * Energy released during respiration is needed for all life processes. ✓ (2)

2.2 You are given the following equipment and apparatus.

- 2 test tubes of the same size
- 2 water plants of the same species and the same size
- Water for the test tubes
- A beaker to use as a water bath, with some warm water
- A thermometer
- A lamp
- Some foil
- Hydrogen carbonate indicator

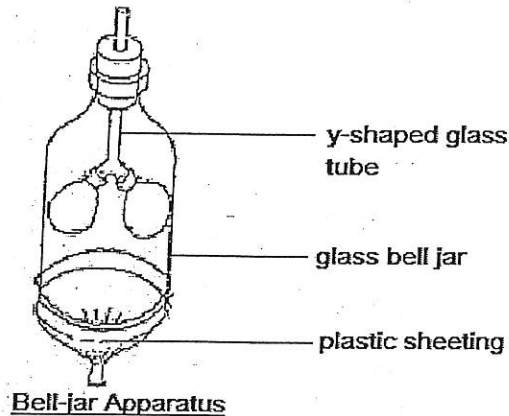
Describe the **METHOD** (in steps) how you will use these to set up an investigation to demonstrate that light is a factor that affects the rate of photosynthesis.

1. Place a leafy twig of the same species and the same size in each of test tube A and B. ✓
2. Add equal amount of water and same amount of hydrogen carbonate indicator to each TT. ✓
3. Treat each TT as follows:
 - TTA : wrapped in aluminium foil ✓
 - TTB : not screened (not wrapped) ✓
4. Both TT's are incubated in a water bath ✓
5. Both TT's are exposed to light from the lamp. ✓

any
(4)
(15)

3. **Question Three: SCIENTIFIC INVESTIGATION, DRAWING GRAPH**

3.1 The MODEL set up in front of you is similar to the one in the diagram below.

3.1.1 Name the process that this model demonstrate. Breathing Mechanism (1)

3.1.2 What do each of the following parts in the model represent in the human:

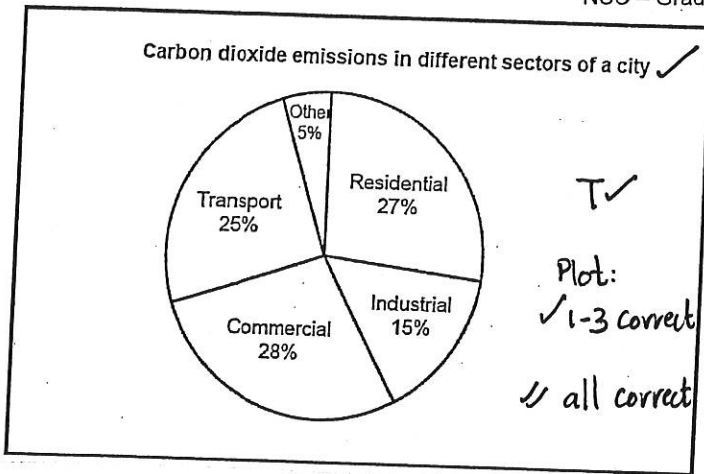
a) the Y-shaped tube/straw Trachea / bronchusb) the plastic sheeting diaphragm muscle (2)

3.1.3 a) Your teacher will pull downwards on the plastic sheeting.

State the result the balloons inflate ✓b) Name this process. inhalation ✓ (2)3.1.4 Explain how the glass bell jar of the model is limited in demonstrating the actual human system. The glass is NOT flexible, sothe effect of the external intercostal muscles cannot be demonstrated. (2)3.2 The TABLE below shows the percentage of carbon dioxide (CO₂) emitted by different sectors in a certain city in South Africa.

SECTOR	CO ₂ EMISSION (%)
Transport	25
Residential	27
Industrial	15
Commercial	28
other	5

3.2.1 Draw a pie chart, on the next page, to represent the data in the table. Show ALL calculations.



Transport = $25/100 \times 360^\circ = 90^\circ$
 Residential = $27/100 \times 360^\circ = 97,2^\circ$
 Industrial = $15/100 \times 360^\circ = 54^\circ$
 Commercial = $28/100 \times 360^\circ = 100,8^\circ$
 Other = $5/100 \times 360^\circ = 18^\circ$

all correct

(5)

3.2.2 Describe how an increase in the CO₂ concentration can lead to global warming.

- Increased CO₂ will absorb more heat ✓
- Leading to enhanced greenhouse effect ✓
- Therefore, preventing the escape of heat from the Earth's surface ✓
- raising the temperature on Earth's surface ✓

any (3)
(15)

4. **Question Four: MAKE OBSERVATIONS/ ANALYSE/ INTERPRET DATA**

4.1 Observe the dissected specimen of an organ.
Provide the label (A, B, C or D) for each of the following descriptions.

- a) Region where Malpighian bodies are situated A ✓
- b) Collects the urine from pyramids B ✓
- c) A wide portion leading to the ureters C ✓
- d) A collection of collecting tubes, forming ducts of Bellini D ✓

(4)

4.2 The TABLE below shows the following:

- ❖ The amount of each substance filtered daily from the blood into the Bowman's capsule.
- ❖ The amount of each substance which is present in a day's urine output.

Substrate	Filtrate	Urine
Water	180 litres	1,5 litres
Salts	500 g	15 g
Glucose	200 g	0 g
urea	40 g	42 g

4.2.1 Give ONE reason for 200g glucose in the filtrate and none in the urine.

all the glucose was re-absorbed into the blood at the proximal C. tubule ✓

(1)

4.2.2 Calculate the percentage of filtered salt which are reabsorbed. Show calculations.

$$\% \text{ salt re-absorbed} = \frac{485g \times 100}{500g} = 97\%$$

(2)

4.2.3 Explain why the urea concentration is higher in the urine than in the filtrate.

Urea is added to the filtrate from the blood in the second capillary network during tubular excretion

(2)

4.2.4 Give ONE reason why water is passively reabsorbed at the proximal convoluted tubule.

Passive re-absorption occurs since the concentration of water is higher in the glomerular filtrate than in the blood

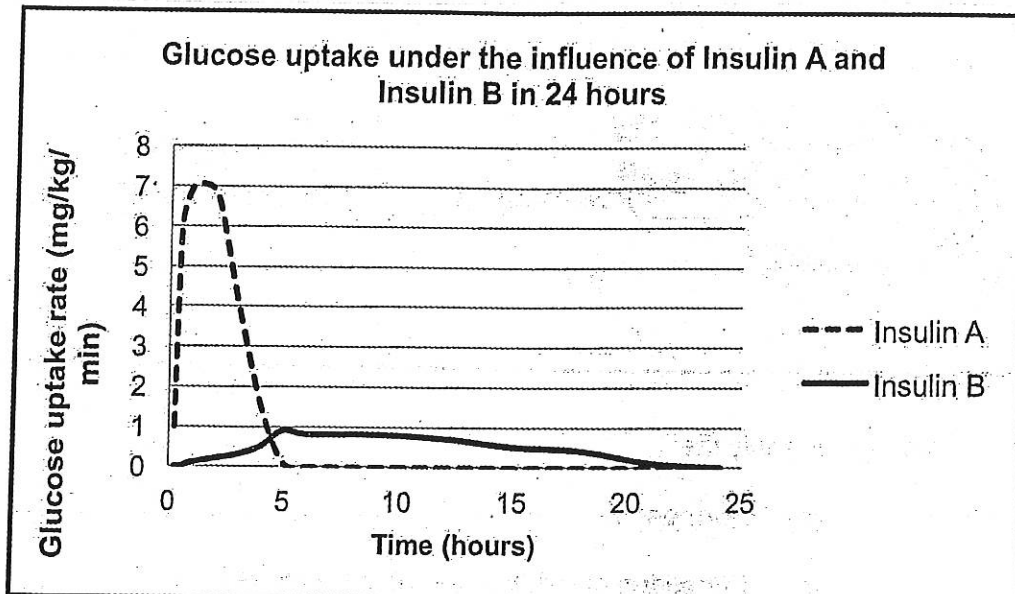
(1)

(mark FIRST ONE)

4.3

Some people with type I diabetes cannot produce insulin and therefore need to inject themselves regularly (insulin-dependent).

An investigation was done to determine the action of two types of insulin (A and B). The glucose uptake rate of cells, when using each type of insulin, was measured over time.



[Adapted from www.webmed.com]

4.3.1 Name the organ that produces insulin.

Pancreas

(1)

4.3.2 Using the information in the graph, state TWO differences in the functioning of insulin A and B.

Insulin A
 • Glucose uptake peaks at a higher level/ around 7 mg/kg/min
 • All glucose uptake occurs in a short period of time/ first 5 hours

Insulin B
 • Glucose uptake peaks at a lower level/ around 1 mg/kg/min
 • Glucose uptake is gradual/ sustained during a period of 24 hours

The initial uptake of glucose rises rapidly to a maximum within the first few hours

The initial uptake of glucose rises slowly to the maximum over 5 hours

(4)

(mark FIRST TWO)

(Any 2x2)

(15)

For the educator:**THIS PAGE MAY HELP YOU TO SET UP:**

- 1.1 Display PLANTS in a beaker/conical flasks in front of class, in the following order:
- | | |
|-----------------|---------------------------------------|
| A- Flower plant | } label the
beakers- A, B, C and D |
| B- Moss plant | |
| C- Fern plant | |
| D- Pine plant | |
- 1.2 Give learners **flowers of grass**, and equipment (as per test) to help them **dissect** the reproductive parts. Look for a grass that **you** can see parts and that **you** can dissect. Try out first.
- 2.1 **Set up the practical** in front on class as per the diagram in question as **demo**. Label the test tubes A, B and C.
- 2.2 Arrange the equipment mentioned in front of class, as per the list in question. Learners can **visualise**.
- 3.1 Set up the **bell jar**. You will need to **demonstrate the inhalation**.
- 3.2 Mention to learners as **pre-practical instructions**, to bring ALL necessary stationary, including **protractors, compasses**, even tweezers, if your school don't have, for the dissection, in question one.
- 4.1 **You will need to dissect all the kidneys**. Use tooth picks cut in half. Put a **label** on the broken end. Pierce the parts of the kidney using the pointed end, as follows:
- A- Cortex region
 - B- Calyx
 - C- Pelvis
 - D- Pyramid

Thank you. Kogie Govender (Greenbury)

