Province of the
EASTERN CAPE
EDUCATION

[redacted]

GRADE 11

NOVEMBER 2010

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours

This question paper consists of 14 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start EACH question on a NEW PAGE.
4. Number the answers correctly according to the numbering system used in this question paper.
5. If answers are NOT presented according to the instructions of each question, candidates will lose marks.
6. All drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams and flow charts ONLY when requested to do so.
8. The diagrams in this question paper may NOT necessarily be drawn to scale.
9. The use of graph paper is NOT permitted.
10. Non-programmable calculators, protractors and compasses may be used.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1. Various options are provided as possible answers to the following questions.
1 Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.6) in the ANSWER BOOK, for example 1.1.7 D.

1.1.1 The parts of the root hair which act as selectively permeable membrane are the ...

A cell wall and tonoplast.
B cell membrane and tonoplast.
C cell wall and cell membrane.
D cell wall and cytoplasm.

1.1.2 The absorption of water by a cell causes an increase in volume of the cell sap, which in turn exerts pressure on the cell wall. This phenomenon is called …

A plasmolysis.
B wall pressure.
C turgor pressure.
D root pressure.

1.1.3 Podocytes in the human body are found in the …

A nose.
B ear.
C kidney.
D spinal cord.

1.1.4 Which element destroys the ozone layer?

A Carbon
B Chlorine
C Hydrogen
D Helium

1.1.5 Which of the following is a major compound causing acid rain?

A Chlorofluoro-carbon
B Carbon dioxide
C Methane
D Sulphur dioxide

1.1.6 Which of the following is not an effect of global warming?

A Increase in droughts
B Rise of sea levels
C Ozone depletion
D Leaching of coral reefs (6x2) (12)

1. Give the correct biological term for each of the following descriptions.
2 Write only one term next to the question number (1.2.1 – 1.2.8) in the ANSWER BOOK.

1.2.1 The range of species and the number of organisms making up each species within communities

1.2.2 Control of the water and solute content in the body

1.2.3 An auto-immune disorder in which joints swell and are gradually immobilized and may totally be destroyed

1.2.4 Conducting tissue that transports manufactured food in a plant

1.2.5 Chemical compound making up the secondary wall of thick- walled cells such as xylem and sclerenchyma

1.2.6 Supporting tissue found within the epidermis of some young stems with thickened corners and no intercellular spaces

1.2.7 The pores through which water vapour moves out of the leaves during transpiration

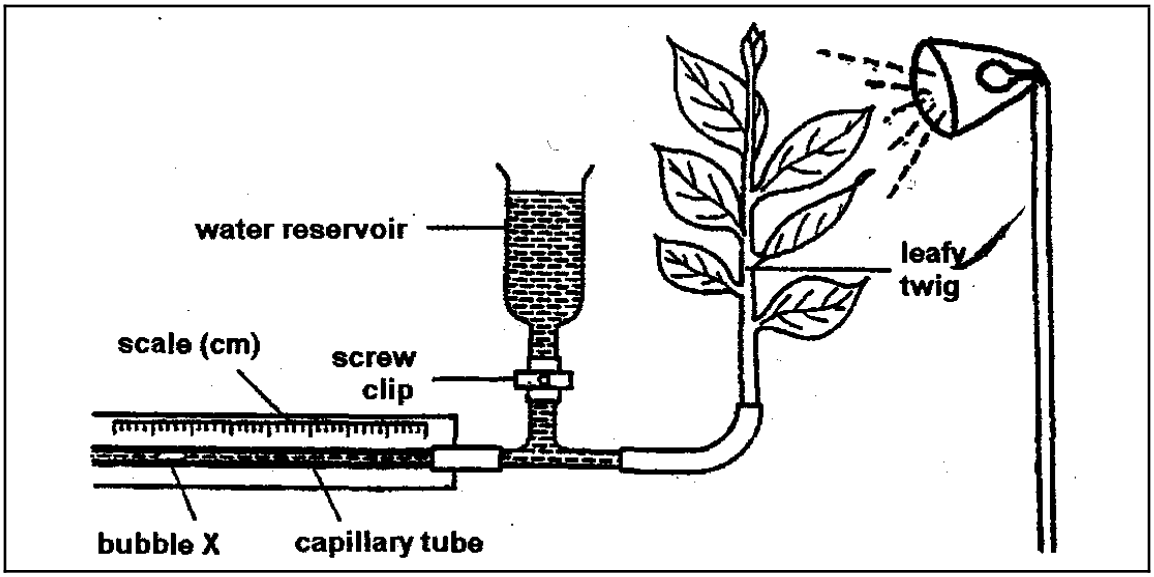
1.2.8 An industry that attracts a large number of visitors due to the ecology of the country (8x1) (8)

1. Choose an item from the COLUMN II that matches a description in COLUMN I. Write only the letter (A – K) next to the question number (1.3.1 – 1.3.8) in the ANSWER BOOK, for example 1.3.9 J

	COLUMN I		COLUMN II
1.3.1	The movement of water molecules from a high concentration to a low concentration through a selectively permeable membrane	A	semi-lunar valve
1.3.2	The movement of nutrients in the plants	B	radius
1.3.3	The tendency of liquid molecules to spontaneously rise in narrow, open tubes	C	fauna
1.3.4	Valves at the openings of the aorta and pulmonary artery which prevent blood from flowing back into the ventricles when they relax	D	litter
1.3.5	Waste that is thrown into the environment and not into waste containers	E	osmosis
1.3.6	All the animal populations present in a certain habitat	F	antagonistic muscles
1.3.7	Paired voluntary muscles found at joints which work in opposition to each other to bring about movement	G	capillarity
1.3.8	A bone of the upper arm which is in line with the thumb	H	translocation
		I	flora
		J	diffusion
		K	bicuspid valve
		L	sewage
		M	smooth muscles

(5x2) (10)

1. Study the diagram below and answer the questions that follow:
4



1.4.1 Give the aim of the above-mentioned investigation. (2)

1.4.2 What is the name of the instrument or apparatus used in this investigation? (1)

1.4.3 Mention any THREE ways in which leaves can be structurally adapted to reduce transpiration. (3)

1.4.4 Name TWO environmental conditions which must be kept constant during this investigation. (2)

1.4.5 How will the results be affected if the leafy twig is covered with a plastic bag? (1)

1. The table given below shows the volume of medical waste generated in two
5 provinces over a period of nine years. Study the information and answer the questions that follow:

	MEDICAL WASTE GENERATION (tons)								
	YEAR	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
	WESTERN CAPE	357	366	398	383	399	410	426	444	452
	EASTERN CAPE	252	256	261	267	270	276	278	289	291

1.5.1 Which province has shown the most rapid increase in medical waste generation? (1)

1.5.2 What was the total amount of waste generated by the two provinces between 1999 and 2002? (2)

1.5.3 State any THREE negative effects of dumping medical waste in water resources. (3)

1.5.4 How can plastic bags dumped in rivers as part of medical waste affect marine animals? (1)

1.5.5 What is meant by biodegradable waste? (2)

1.5.6 There are THREE principles of waste management. Mention any TWO. (2)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The following table is a summary of information about the sources and effects of greenhouse gases. Study the information and answer the questions that follow.

	GAS	SOURCES	CONTRIBUTION TO GREENHOUSE EFFECT %
	Carbon dioxide	Burning forests and fossil fuels, manufacture of cement	54
	Chlorofluoro-carbons (CFCs)	Coolants in air conditioners, refrigerators, aerosol cans	21
	Methane	Decaying vegetables, rice, crops, waste gases of domestic animals	14
	Nitrogen oxides	Exhaust fumes, breakdown of fertilizers	7
	Low-level ozone	Nitrogen oxides and sulphur dioxides combining with oxygen	2

2.1.1 Represent the data in the table in the form of a bar graph. (8)

2.1.2 The greenhouse gas omitted from the table is water vapour. Calculate the percentage contribution to the greenhouse effect of water vapour using the data in the table. (2)

2.1.3 Identify which gas, shown in the table, is produced by natural processes. (1)

2.1.4 Why are fossil fuels referred to as non-renewable resources? (2)

2.1.5 What are fossil fuels? (2)

2. A group of grade 11 learners at an Eastern Cape High School wanted to
2 investigate the oxygen level in a nearby river in order to determine its pollution level. A low oxygen level indicates that the water is polluted. They followed the following procedures:

- Using a rope, bucket and protective gloves, they collected some water from the river, before and after a sewage outflow pipe (which pumps out human waste including faeces into the river).
- They labelled the samples of water A and B.
- The learners then added a few drops of methylene blue to each sample, A and B.

NB: Methylene blue is an indicator which changes colour as follows:

- A low level of oxygen will be indicated by a loss of the blue colour.
- A high level of oxygen will be indicated by a darker blue colour.

Their results are shown in the table below:

SAMPLE	COLOUR CHANGE OF METHYLENE BLUE
A	Darker blue
B	Loss of blue colour

2.2.1 Suggest a caption for the table above. (1)

2.2.2 State a hypothesis for the above investigation. (2)

2.2.3 Which one of the samples (A and B) was taken after the sewage outflow pipe and why did the learners take two samples of water: A and B? (3)

2.2.4 Provide an explanation for choosing either sample A or B in QUESTION 2.2.3 above. (3)

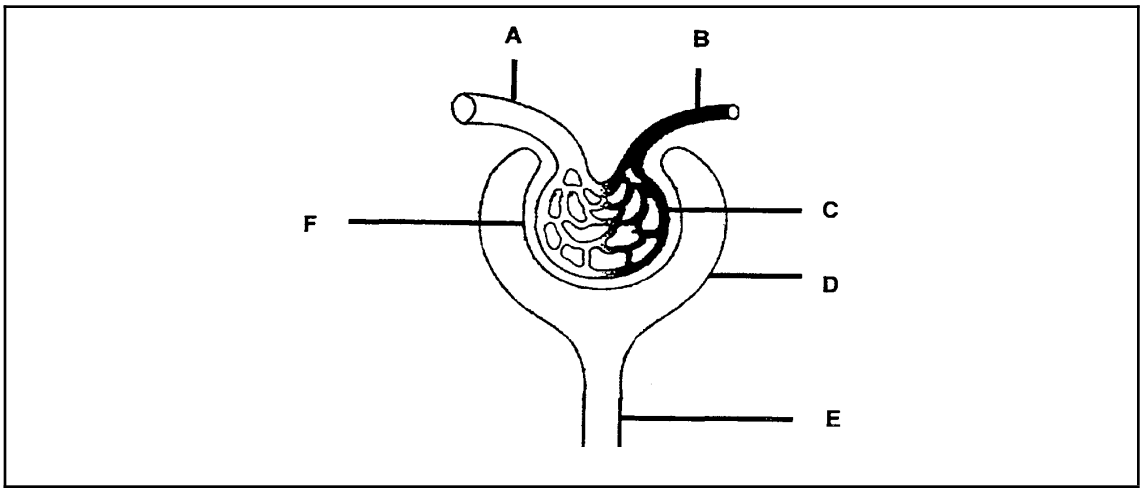
2.2.5 Suggest TWO ways in which learners could improve the investigation. (4)

2.2.6 Why did the learners wear protective gloves when collecting the water samples? (2)

[30]

QUESTION 3

3. Study the diagram below of a Malpighian body and answer the questions that follow:
1



3.1.1 Label the parts that are marked C and D. (2)

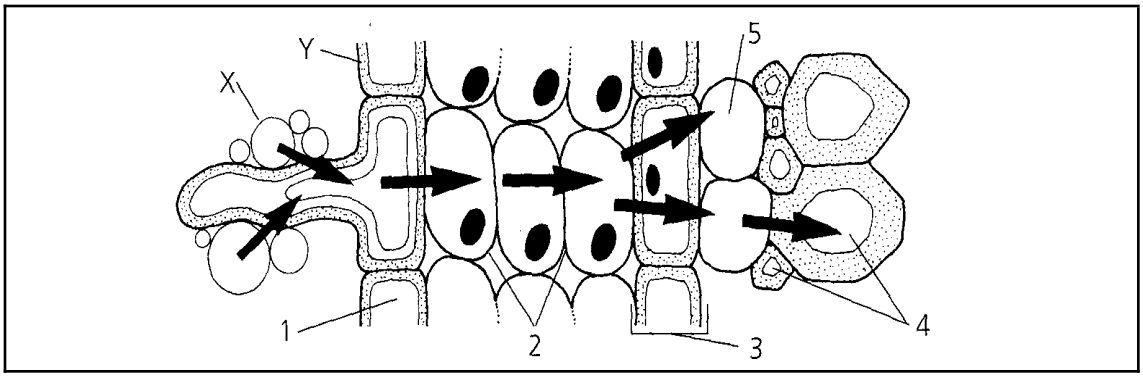
3.1.2 List THREE substances which will be filtered out from C. (3)

3.1.3 Name the type of cells found in part E. (1)

3.1.4 Give the name of specialised cells found in part F. (1)

3.1.5 In what way is part A different from part B and of what advantage is this for the process that occurs in the Malpighian body. (3)

3. The following diagram represents the pathway of water through the root.
2 Study the diagram and answer the questions that follow.



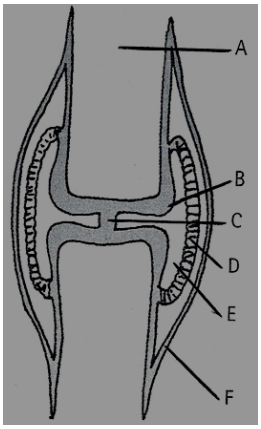
3.2.1 Supply labels for parts numbered 1 and 5. (2)

3.2.2 Name THREE ways in which the root hair is structurally suited for the absorption of water. (3)

3.2.3 Name THREE forces responsible for the movement of water through the tissue indicated by number 4. (3)

3.2.4 State the function of part numbered 3. (2)

3. Study the diagram shown below and answer the questions that follow:
3



3.3.1 Supply a suitable caption for the above diagram. (1)

3.3.2 Supply labels for parts marked A, C, D and F. (4)

3.3.3 What is the name of the fluid in the cavity that is marked E. (1)

3.3.4 What is the function of part marked B? (1)

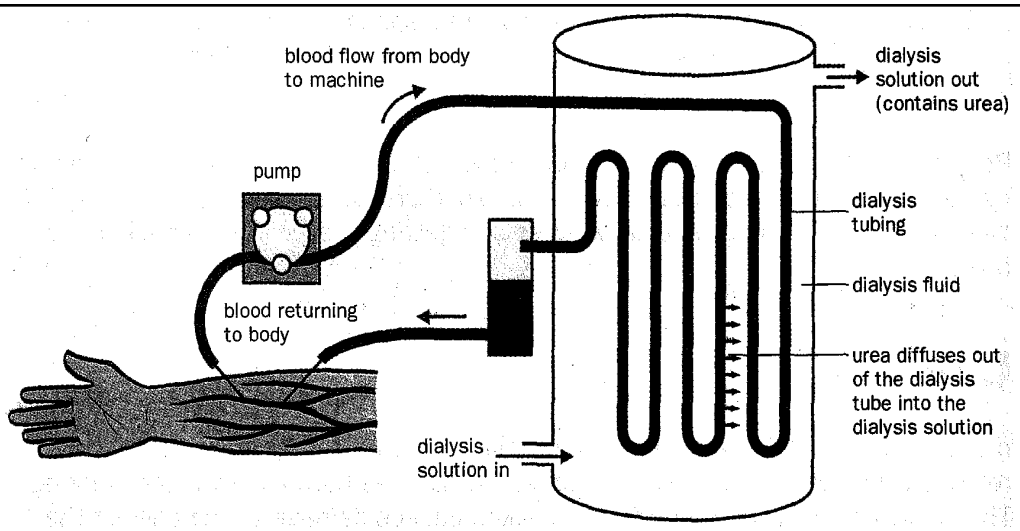
3.3.5 Name the disease/condition that could occur in the structure represented by the diagram shown above resulting in severe pain, stiffness and swelling. (1)

3.3.6 Explain how insufficient intake of calcium affects bones. (2)

SECTION C **TOTAL SECTION B: [30] 60**

QUESTION 4

4.1 The diagram below shows a simplified dialysis machine. Study it together with the extract given and then answer the questions that follow:



Blood from the patient is taken from a vein, pressurised, and transported to the dialysis machine. Once in the machine, the blood flows through small tubes made from a membrane called dialysis tubing. On the other side of the membrane is a liquid called dialysis fluid. The dialysis fluid has a similar composition to blood plasma but it does not contain any urea. Fresh dialysis fluid flows in through one end of the machine and out the other. It flows in the opposite direction to the blood.

The dialysis tubing is partially permeable meaning that it only allows certain substances to pass through it. Blood cells and plasma proteins are too large to pass through, but smaller molecules pass through the membrane easily. Urea is at a higher concentration in the blood than in the dialysis fluid, so it diffuses across the dialysis tubing into the dialysis fluid.

4.1.1 Why must blood from the patient's vein be pressurised? (2)

4.1.2 What components of the blood cannot pass through the dialysis tubing? (2)

4.1.3 Why must the blood and the dialysis fluid flow in opposite directions in the dialysis machine? (2)

4.1.4 Why must dialysis fluid be sterile? (2)

4.2 The table below shows compatible blood groups, an issue which needs to be considered by doctors, when donors give blood for transfusion purposes:

COMPATIBLE BLOOD GROUPS		
Person receiving blood	**Donors' blood group COMPATIBLE**	**Donors' blood group NOT COMPATIBLE**
A	A or O	B or AB
B	B or O	A or AB
AB	ALL	None
O	O	A, B and AB

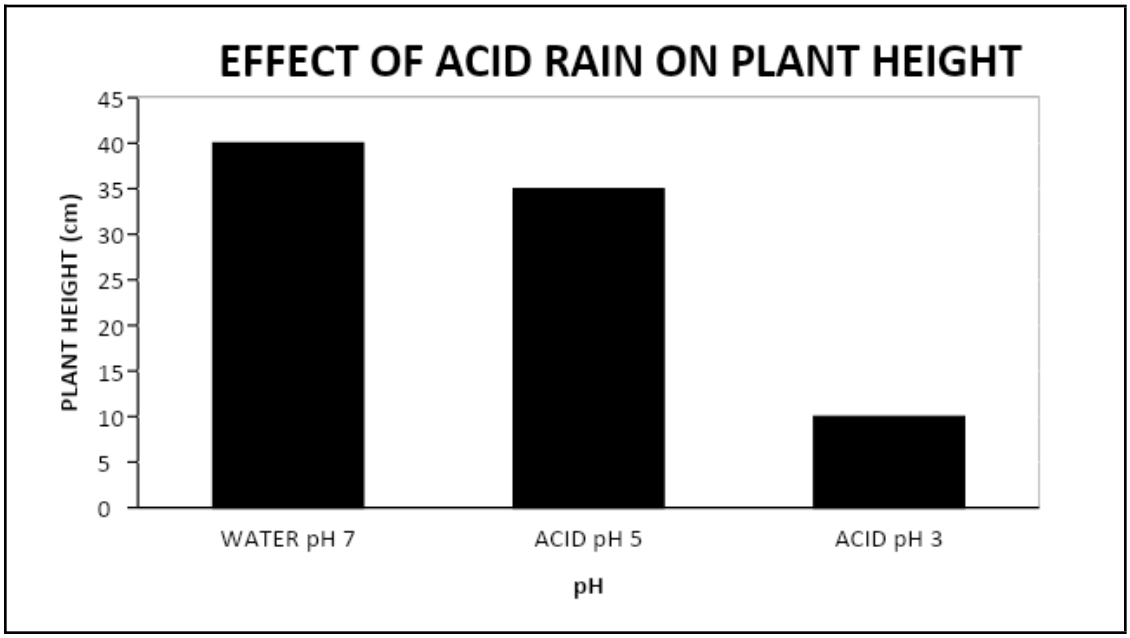
4.2.1 Which blood group would be most useful to the South African Blood Transfusion Service? Give a reason for your answer. (2)

4.2.2 What is meant by blood transfusion? (1)

4.2.3 A person with which blood group is known as a universal recipient? What does this mean? (2)

4.2.4 Explain why blood must be tested before it is transfused to a recipient? (4)

4.3 The graph below shows the results of an investigation of the effect of acid rain on plant height. Study the graph and answer the questions that follow:



4.3.1 At which pH of rainwater do the plants grow the most? (1)

4.3.2 At which pH of rainwater do the plants grow the least? (1)

4.3.3 As pH becomes more acidic, what happens to plant growth? (1)

4.3.4 What causes acid rain? (1)

4.3.5 How can we solve the problem of acid rain by using modern technology? (4)

4.4 The cardiac cycle includes all events taking place as the blood flows through the hart during one complete heart beat.

Write an essay in which you explain or describe the changes the heart undergoes during one heart beat. (12)

Synthesis (3)

TOTAL SECTION C: 40

GRAND TOTAL: 150