



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2011

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours



This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Present your answers according to the instructions of each question.
5. Do ALL drawings in pencil and label them in blue or black ink.
6. Draw diagrams or flow charts only when asked to do so.
7. The diagrams in this question paper are NOT necessarily drawn to scale.
8. Do NOT use graph paper.
9. You may use a non-programmable calculator, protractor and compass.
10. Write neatly and legibly.

SECTION A**QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.5) in the ANSWER SHEET, for example 1.1.6 D.

1.1.1 South Africa is one of the signatories of Kyoto Protocol and therefore, obliged to ...

- A export rhino horns to the Far East.
- B import indigenous orchids from Singapore.
- C stop the spread of HIV/AIDS on the African continent.
- D reduce the emission of carbon dioxide and other greenhouse gases.

1.1.2 The photograph below shows uncollected household refuse pile-up for three weeks in Birdle Path Road, Nahoon Valley, East London. Which one of the following is not a possible environmental effect due to the pile-up?



[Source: *Daily Dispatch* newspaper, 8 June 2011. Photo: Mlondolози Mbolo]

- A The site becomes a breeding ground for rodents and pathogens.
- B Promotes ecotourism.
- C Possible contamination of nearby water sources.
- D Possible land pollution when garbage bags are ripped open by animals and vagrants.

1.1.3 Which of the following tissues in the root of a dicotyledonous plant is responsible for the development of the lateral root?

- A Cambium.
- B Xylem.
- C Endodermis.
- D Pericycle.

1.1.4 The Casparian strips are found in the ...

- A stele of the stem.
- B endodermis of the root.
- C pericycle of the root.
- D epidermis of the root.

1.1.5 Which of the following is not associated with phloem?

- A Fibres
- B Parenchyma
- C Sieve tubes
- D Vessels

(5 x 2) (10)

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 – 1.2.6) in the ANSWER BOOK.

1.2.1 A disorder during which the skeletal bones become porous, brittle and subject to fracture, due to the loss of calcium and other mineral components.

1.2.2 Organic matter that is used as fuel to generate energy.

1.2.3 Blood vessels of which the walls are made up of a single layer of endothelial cells.

1.2.4 The ability of a substance to be broken down into simpler components by the natural process of decay.

1.2.5 The wise and cautious use of our resources so that they are available to current, as well as future generations. (5 x 1) (5)

- 1.3 Indicate whether each of the statements in COLUMN I applies to A only, B only, both A and B or none of the items in COLUMN II. Write A only, B only, both A and B or none next to the question number (1.3.1 – 1.3.5) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Rooibos tea	A Contains no caffeine B Contains substantial amounts of anti-oxidants
1.3.2 Eutrophication	A A process that releases nitrogen from the soil. B A process that fix nitrogen in the soil
1.3.3 Effects of air pollution	A Asthma B Osteoporosis
1.3.4 Greenhouse gases	A Oxygen B Methane
1.3.5 Osmoregulation	A Maintenance of constant level of water B Maintenance of constant level of glucose

(5 x 2) (10)

- 1.4 Read the following the newspaper articles and answer the questions that follow.

Breathing new life into EC

Govt plan to restore 'carbon friendly *spekboom*'

At the Eastern Cape Climate Change conference in East London, Mcebisi Jonas, MEC of Economic Development, Environmental affairs and Tourism, signed a Memorandum of Understanding with Rejoice Mabudafhasi, the Deputy Minister of Environmental Affairs, to forge a partnership that will see the restoration of succulent thicket through planting *Portulacaria afra* (*spekboom*). A favourite with elephant, the succulent is common in Addo National Park and is said to cover approximately 80 percent of the park's area.

Normally found in rocky, dry areas, *spekboom* is an Afrikaans word for the succulent tree, which can sequester – the process of capturing and storing – carbon dioxide at the astonishing rate of four tons per hectare per annum. This is said to be more than that of a tropical rainforest.

Liebenberg said that the stored carbon dioxide could be sold in the form of carbon credits. Therefore, "You can forward sell it, but you have to store the carbon for a period of about 30 years and this could net in the region of R200 million."

[Adapted from the *Daily Dispatch*, 11 June 2011]

"The vision is to tap into the international carbon market and thereby restore hundreds of thousands of hectares of degraded thicket, provide tens of thousands of jobs in the process and create a source of income for rural communities for many decades", Mr. Richard Cowling of the NMMU said.

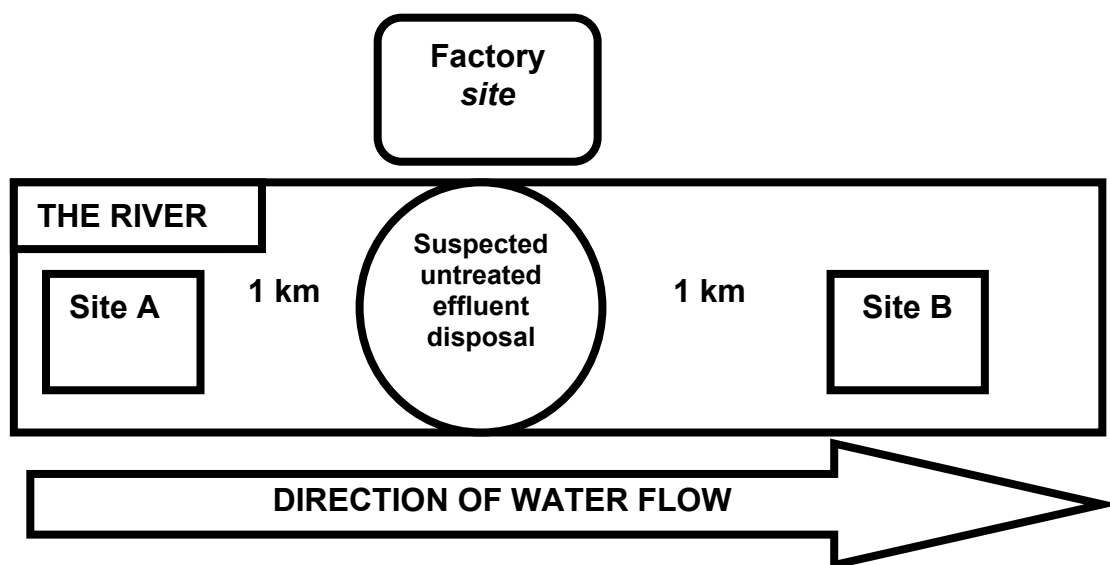
The scientists said that *spekboom* restoration offers huge social benefits in a province with an unemployment rate close to 50%. Replanting requires intensive labour and there are opportunities for skills development in the monitoring of carbon fixation.

"A project that restores 10 000 ha a year would employ about 2 000 labourers. In addition to the jobs there will be numerous long-term benefits to local communities, such as improved pasture and sustained access to fuel wood, timber, fruit and medicines."

[Adapted from the *Mail and Guardian*, 22 June 2008]

- 1.4.1 Give the scientific name for the succulent plant mentioned in the article. (1)
- 1.4.2 Describe a distinct ability of this plant which makes it most suitable for this project? (1)
- 1.4.3 Calculate, how many hectares of land should be replanted in order to remove 40 000 tons of carbon dioxide per annum, from the area? Show all your working. (2)

- 1.4.4 Mention any TWO short term financial benefits of this project. (2)
- 1.4.5 Mention any TWO ecological long term advantages of this project to the community. (2)
- 1.4.6 Write any TWO possible objections or criticisms that might be levelled against the project. (2)
- 1.5 A certain community living close to an industrial area has witnessed the unexplained death of many fish and other aquatic organisms in the nearby river. Many members of the community accused the local chemical factory of disposing untreated acid containing effluent in to the river. This incident has triggered an investigation by learners at the nearby school. The learners were instructed to monitor and record pH levels of two different sites A and B as indicated in the site diagram below, on a daily basis, for three weeks.

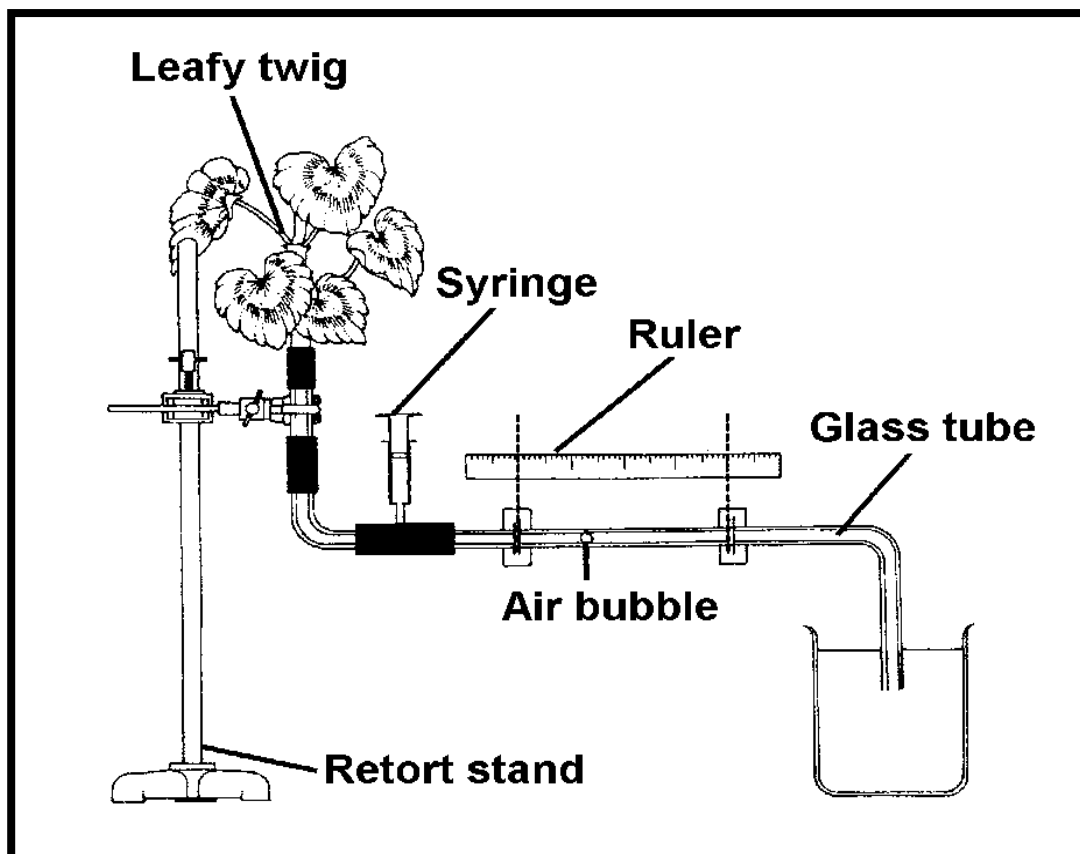


A summary of the recorded data is given below. Study the information below and answer the questions that follow.

	Site A	Site B
	Average pH levels per week	Average pH levels per week
Week 1	6,5	4,1
Week 2	6,8	3,5
Week 3	6,4	3,2

- 1.5.1 What observation prompted the above-mentioned investigation? (1)
- 1.5.2 Mention any TWO aspects to be considered when planning an investigation of this nature. (2)
- 1.5.3 Give a valid reason for testing the pH of water at Site A. (1)
- 1.5.4 Name any TWO variables that should be kept constant while conducting this investigation. (2)

- 1.5.5 What will your conclusion be if the pH levels of Site B do not vary much from those at Site A during the entire period of investigation? (2)
- 1.5.6 Mention any TWO other possible sources, other than industrial waste, of water pollution. (2)
- 1.6 Study the diagram below of apparatus used in an experiment in the class and answer the questions that follow.



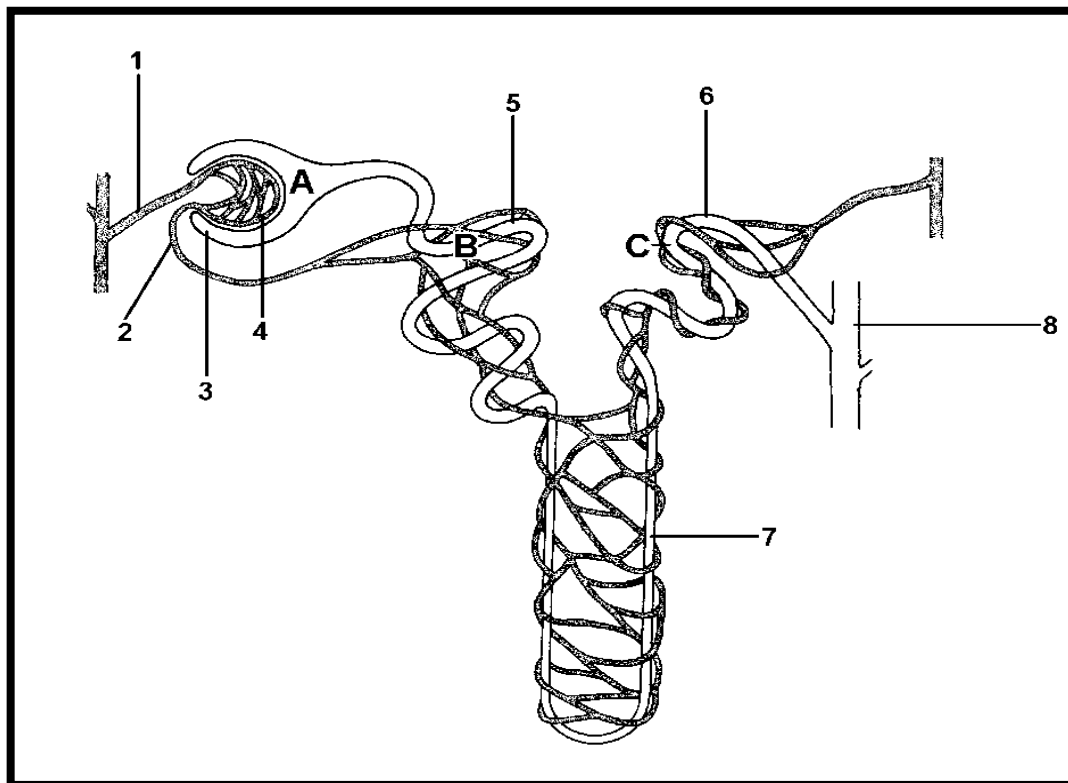
- 1.6.1 Which physiological process is investigated in the above experiment? (1)
- 1.6.2 Name the above apparatus. (1)
- 1.6.3 Why is the base of the leafy twig cut off underwater before inserting it into one end of rubber tubing? (1)
- 1.6.4 The experiment is repeated under hot and windy conditions as well as conditions with a high relative humidity. How will these conditions respectively influence the experiment? (2)

TOTAL SECTION A: 50

SECTION B

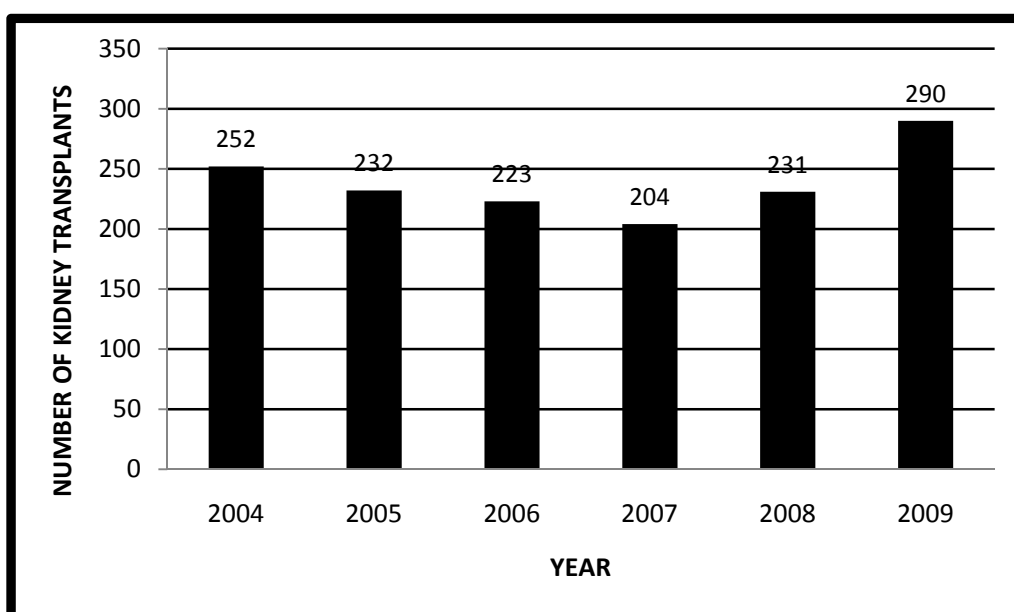
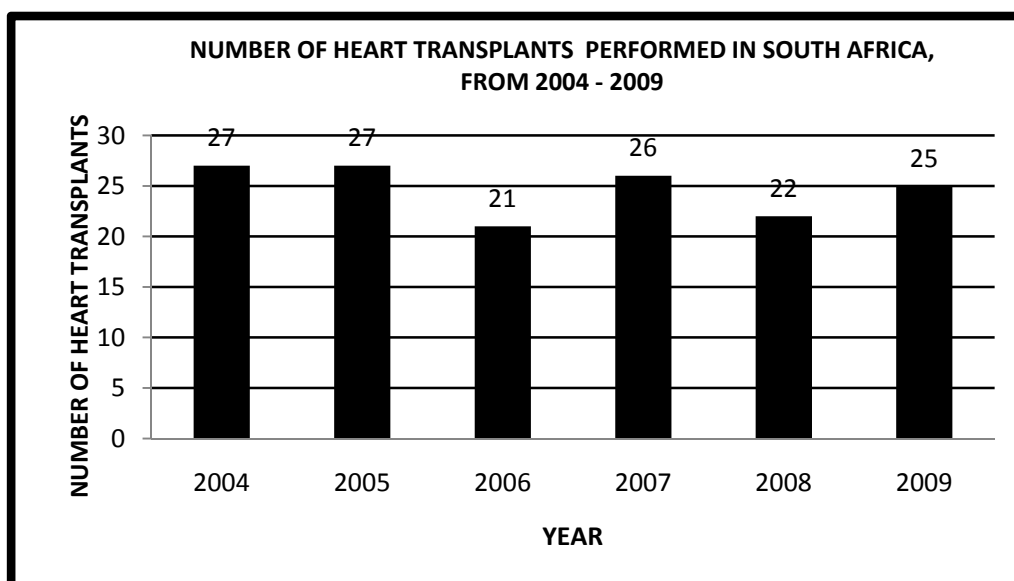
QUESTION 2

2.1 Study the diagram below and answer the questions that follow.



- 2.1.1 Name the above structure. (1)
- 2.1.2 Label parts numbered 1, 2 and 7. (3)
- 2.1.3 Mention the processes that take place at regions that are marked A, B and C. (3)
- 2.1.4 Supply the collective name for parts numbered 3 and 4. (1)
- 2.1.5 Which hormone is responsible for the re-absorption water at the part numbered 8? (1)
- 2.1.6 Describe the structural suitability of the region that is marked B, for its function. (4)

- 2.2 Mr Sivenathi conducted a survey to test his hypothesis regarding organ transplants. He presented his findings in the form of two separate graphs. Study the graphs given below and answer the questions that follow.

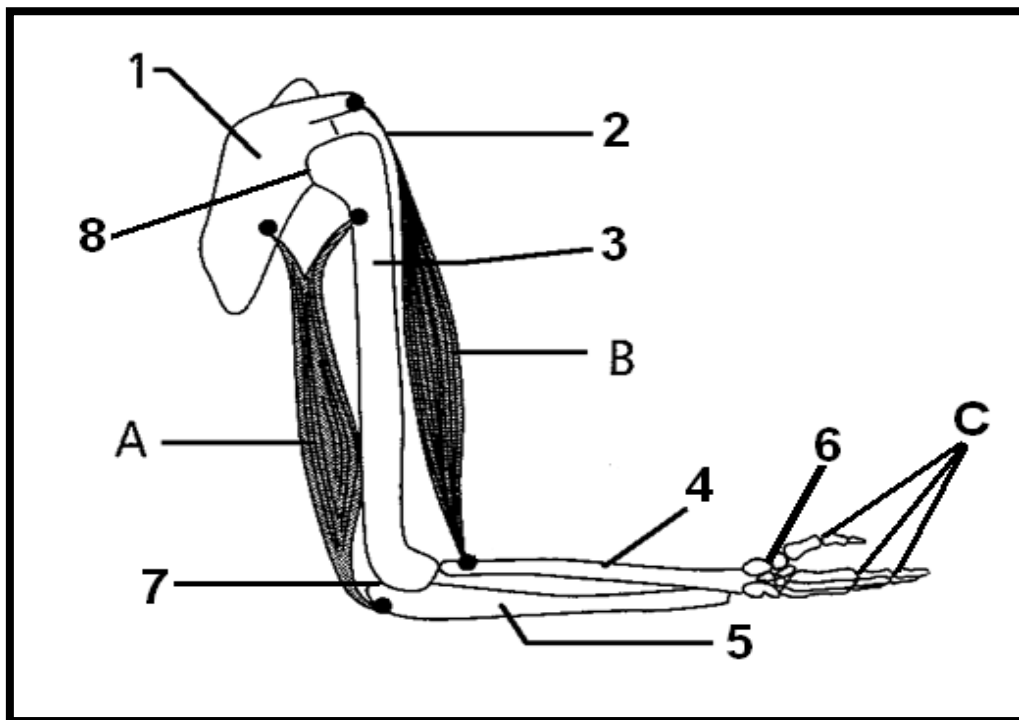


- 2.2.1 What is organ transplant? (2)
- 2.2.2 What was the total number of heart transplants performed in South Africa from 2007 until 2009? Show your working. (2)
- 2.2.3 Give a reason why more kidney transplants than heart transplants were performed between 2007 and 2009. (2)
- 2.2.4 Provide an appropriate caption for the second graph. (2)
- 2.2.5 Name a source from which above information can be accessed. (1)

- 2.2.6 Construct a table by using the information on the first graph from which the graph was drawn. (4)
- 2.2.7 What are the dependent variables in each of the above graphs respectively? (2)
- 2.2.8 What was Mr Sivenathi's possible hypothesis before the start of this investigation? (2)
- [30]**

QUESTION 3

3.1 Study the diagram below and answer the questions that follow.



- 3.1.1 Identify parts numbered 1, 3, 4 and 5. (4)
- 3.1.2 Name the type of joints at 6, 7 and 8. (3)
- 3.1.3 Label the muscles marked A and B. (2)
- 3.1.4 Muscles A and B function antagonistically. Explain how these muscles function when your lower arm is lifted and lowered. (2)
- 3.1.5 Name the medical condition caused by the disintegration of articular cartilage at the joints which are labelled as C. (1)

3.2 Read the following article and answer the questions that follow.

Three oil companies, Royal Dutch Shell, Falcon Oil & Gas, and Bundu Oil & Gas are eyeing the exploration of natural gas trapped in the underground shale formations in the Karoo. Shell recently applied for exploration licences for an area of 90,000 square kilometres – roughly three times the size of Lesotho.

Local communities in the Karoo are angry and concerned. Angry because they have no say about what happens to the minerals below their land. And seriously concerned because of the damaging environmental effects of shale gas exploitation.

Hydraulic fracturing, also called “fracking”, is part of the process to exploit shale gas reserves which are 'locked' in underground rock formations.

To access these reserves, fluid is pumped down a drilled channel (well) into the gas-bearing rock at very high pressures. This causes the rock to fracture, creating fissures and cracks through which the gas can ‘escape’. The fracturing liquid generally consists of mainly water, mixed with sand and chemicals. Numerous different chemical agents are used, many of which are flagged as dangerous to humans and the environment (carcinogens, acute toxins).

The fracturing of a single well requires a huge volume of water: around 9,000 – 29,000 m³ (9 – 29 million litres). Chemicals make up about 2% of the fracturing liquid, i.e. about 180,000 – 580,000 litres. Only 15 – 80% of the injected fluid is recovered, meaning that the rest remains underground, where it is a source of contamination to water aquifers.

Shale gas extraction poses a threat to ground and surface water. The fracking process brings a significant risk of contamination of these valuable water resources. This pollution can affect drinking water, as well as rivers and wetlands, threatening human health and the environment.

Secondly, fracking uses huge volumes of water. Given that many parts of South Africa already experienced water shortages, the prospect of further stressing water supplies could pose serious problems at a local and regional level. Can we really afford to waste vast amounts of water in a water scarce area such as the Karoo?

[Source: www.greenpeace.org]

- 3.2.1 Name the proposed technique or process that can be used in the exploitation of shale gas in the Karoo. (1)
- 3.2.2 What is the area of land in Karoo which is affected by this project? (2)
- 3.2.3 Give a brief description of the process or technique mentioned in QUESTION 3.2.1. (4)

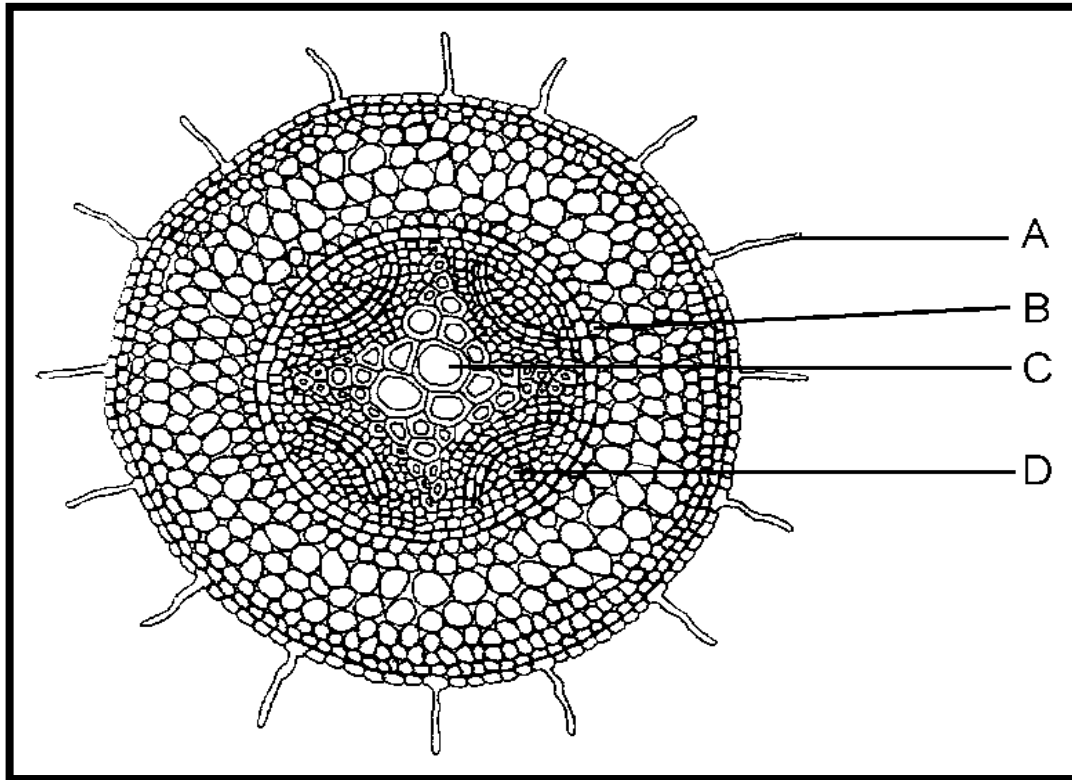
- 3.2.4 Thousands of inhabitants of Karoo region registered their disapproval and organised various forms of protests against the possible shale gas exploration. The newspaper cartoon shown below, sums up the frustration and anxiety of all inhabitants in the area. Study the cartoon and then motivate whether you agree or disagree with the possible shale gas exploration in the Karoo? Give any TWO valid reasons for your choice of response.



[Printed with permission from www.zapiro.com]

(3)

- 3.3 The diagram below shows the transverse section of a dicotyledonous root. Study the diagram and answer the questions that follow.



3.3.1 Identify parts labelled B, C and D. (3)

3.3.2 Draw a microscopic view of the structure of part labelled A with relevant labels. (5)

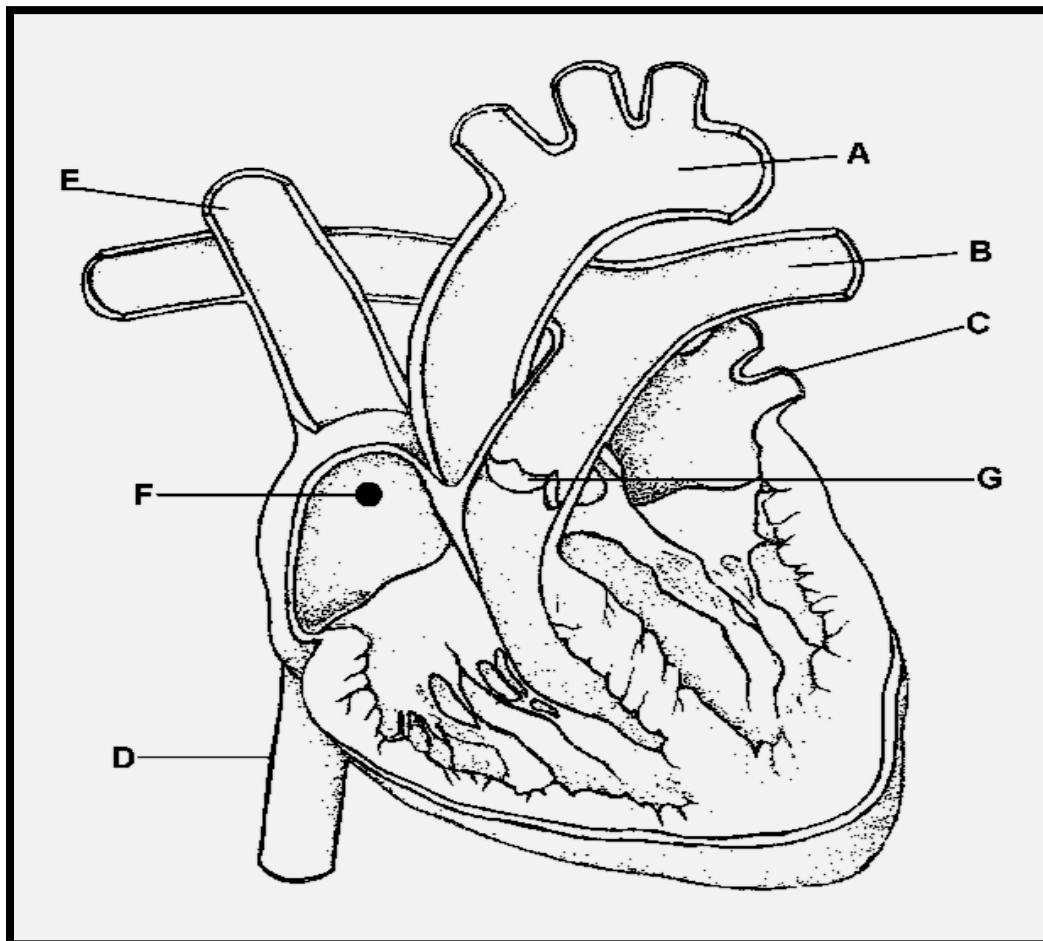
[30]

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 Study the diagram below and answer the questions that follow.



- 4.1.1 What type of blood is found in the parts labelled A and B respectively? (2)
- 4.1.2 Where does the blood in the parts respectively labelled A and B flow to? (2)
- 4.1.3 Write down the letters and names of veins that are labelled in this diagram. (4)
- 4.1.4 Identify the structures labelled G and F in the diagram AND provide their respective functions. (4)
- 4.1.5 Name the modern technique that can be used to unblock the coronary artery, if it is clogged up. (1)
- 4.1.6 Name the strong, double-walled protective covering of the heart. (1)

- 4.2 The table below shows the South African National Blood Service blood stock, available for three days, for different blood groups.

BLOOD GROUPS	UNITS OF BLOOD IN STOCK		
	DAY 1	DAY 2	DAY 3
O	31	51	34
A	19	26	26
B	16	10	16
AB	2	5	6

[Source: Rene Vice; SANBS, Berea, East London]

- 4.2.1 Plot a bar graph showing the available units of each blood group on each of the 3 days. Use an appropriate key to distinguish between the days. (9)

- 4.2.2 Humans carry an average of 5 litres of blood in their bodies. A blood donor donates 500 ml at the blood bank. What percentage of his blood is donated? Show your calculations. (2)

- 4.3 Invasive alien species are causing billions of rands of damage to South Africa's economy every year, and are the single biggest threat to the country's biological biodiversity. Of the estimated 9000 plants introduced to this country, 198 are currently classified as being invasive. It is estimated that these plants cover about 10% of the country and the problem is growing at an exponential rate.

[Source: www.dwaf.gov.za]

Write a short essay in which you discuss FOUR possible reasons why alien plants were imported to South Africa, FOUR unfavourable effects of alien plants in South Africa and FOUR strategies to eradicate alien plants. (12)

Synthesis (3)

TOTAL SECTION C: 40

GRAND TOTAL: 150