



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**LIFE SCIENCES P1**

**NOVEMBER 2007**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 17 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 the answer to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Write neatly and legibly.
6. If answers are NOT presented according to the instructions of each question, candidates will lose marks.
7. ALL drawings should be done in pencil and labelled in blue or black ink.
8. Draw diagrams or flow charts only when requested to do so.
9. The diagrams in this question paper may NOT necessarily be drawn to scale.
10. The use of graph paper is NOT permitted.
11. Non-programmable calculators, protractors and compasses may be used.

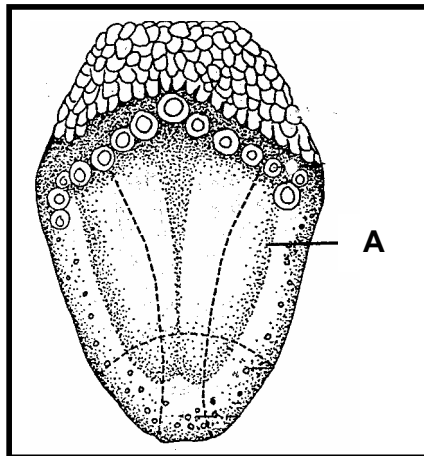
**SECTION A****QUESTION 1**

1.1 Various possible options are provided as 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 book, for example 1.1.6 D.

1.1.1 A man experiences slight problems with his vision and speech after a serious head injury. Which section of his brain was possibly damaged?

- A Hypothalamus
- B Medulla oblongata
- C Cerebrum
- D Cerebellum

1.1.2 The diagram below illustrates the surface view of the tongue.



Which of the following tastes is the region labelled A sensitive to?

- A Sweet
- B Sour
- C Bitter
- D Salty

- 1.1.3 In comparison with the renal artery, the renal vein carries ...
- A a higher oxygen concentration and more nitrogenous waste.
  - B the same oxygen concentration and the same amount of nitrogenous waste.
  - C a lower oxygen concentration and less nitrogenous waste.
  - D a lower oxygen concentration and more nitrogenous waste.
- 1.1.4 All viruses are ...
- A unicellular and disease-causing.
  - B acellular and non-living.
  - C eukaryotes.
  - D cellular in structure.
- 1.1.5 A biologist discovered a new living cell with a distinct cell wall but with no definite nucleus. The cell is likely to be that of a/an ...
- A animal.
  - B plant.
  - C virus.
  - D bacterium. (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 The strong outer membrane protecting the kidney
- 1.2.2 A membrane separating the outer ear and middle ear
- 1.2.3 Chemical messengers transported by blood to target organs
- 1.2.4 Organisms that cause diseases
- 1.2.5 Cells that do not have a clearly defined nucleus
- 1.2.6 The proteins produced by lymphocytes that attack and destroy foreign bodies and foreign chemical substances (6)

- 1.3 Choose a/an item/word from COLUMN B that matches a description in COLUMN A. Write only the letter (A – J) next to the question number (1.3.1 – 1.3.6), in the answer book, for example 1.3.7 L.

COLUMN A		COLUMN B	
1.3.1	Insulating layer of a neuron	A	lens
1.3.2	The hormone preparing the body for emergencies	B	retina
1.3.3	Can change its shape and size to allow the eye to see objects that are far or near	C	phloem
1.3.4	Rod-shaped bacteria	D	immunity
1.3.5	Tissue responsible for the transport of water and mineral salts	E	bacilli
1.3.6	The body's response to the presence of disease-causing organisms before it has a chance to cause an illness	F	myelin sheath
		G	ADH
		H	adrenalin
		I	cocci
		J	xylem

(6)

- 1.4 Read the following passage on the story of penicillin and answer the questions that follow:

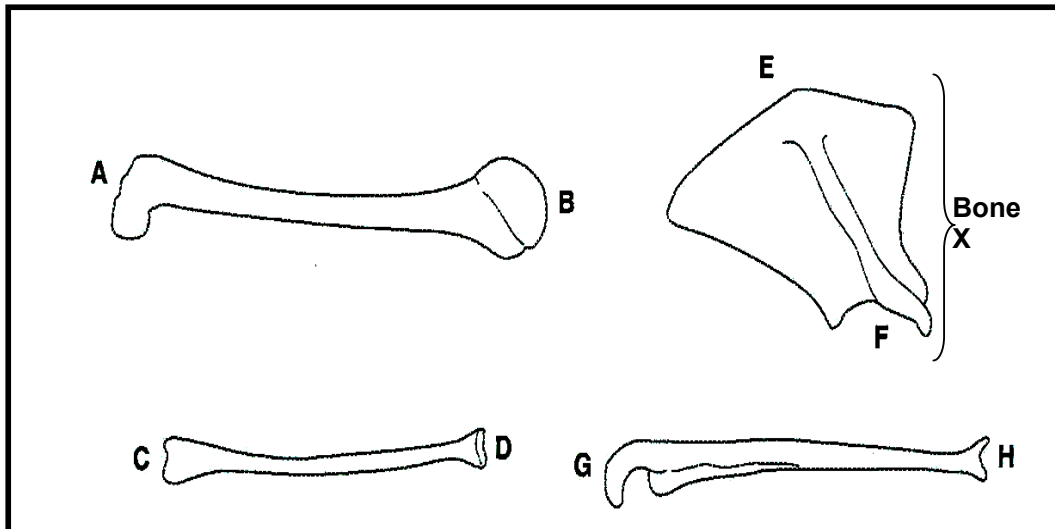
***The story of penicillin***

*In 1928 a Scottish bacteriologist called Alexander Fleming was growing bacteria on dishes of agar. Normally Fleming covered his bacterial colonies with a lid to prevent them getting contaminated. But on this occasion, he accidentally left a dish uncovered. When he examined the dish later, he found that a mould fungus was growing on the agar. But the really interesting thing was that close to the mould, no bacterial colonies were present. He went on to discover that the substance produced by the mould fungus had the power of destroying all kinds of bacteria that cause human disease. He identified the mould as Penicillium notatum.*

*It took scientists about 10 to 12 years to obtain the substance in a usable form. This was achieved by two biochemists, Howard Florey and Ernst Chain. The substance was called penicillin. Most of their tests were completed by 1940, and because it was then during the Second World War, there was an urgent need for penicillin. Today vast amounts of penicillin are commercially produced.*

- 1.4.1 Why, do you think, the name 'penicillin' is appropriate? (1)
- 1.4.2 What name is given to all substances/drugs that are produced by microbes and have the power to kill bacteria? (1)
- 1.4.3 It is often said that Fleming discovered penicillin by luck. But it wasn't luck only. State TWO scientific skills that were involved. (2)
- 1.4.4 Why, do you think, it took so long for penicillin to become available in a form that could be used? (2)
- 1.4.5 Why was there an urgent need in wartime for a drug that had the power to kill bacteria? (2)
- 1.4.6 Name TWO diseases that would probably have caused death about 70 years ago, but can now easily be cured by these drugs. (2)

- 1.5 Study the following diagrams showing the main bones of the pectoral girdle and the human arm (fore limb) and answer the questions that follow:



- 1.5.1 Identify bone X. (1)
- 1.5.2 Parts of some of these bones meet at certain joints.  
By using the **letters** (A – H) only, state which parts of the bones form the shoulder joint. (2)
- 1.5.3 Name the type of synovial joint that is located at the following parts of the body:
- (a) At the elbow (1)
- (b) Where the lower limb joins the pelvis (1)
- (c) In the wrist (1)

- 1.6 Read the following passage on dwarfism and answer the questions that follow:

***Dwarfism***

*Dwarfism is a condition where an adult is less than 1,40 m in height. There are many causes and forms of dwarfism. One is due to a deficiency of growth hormone as a result of an underactive pituitary gland (hypophysis).*

*A pituitary dwarf is usually only about 1,10 m tall, well proportioned, sometimes with a head which is larger than usual, but normal in all other aspects.*

*In the past, in certain parts of the world, dwarfs were separated from their communities and treated as disabled. Presently, although they are seen as part of the community, they sometimes still have to deal with the negative attitudes of taller people, who either stare at them or call them names.*

- 1.6.1 Do you consider dwarfism to be a 'disability'? (1)
- 1.6.2 Give an explanation for your answer to QUESTION 1.6.1. (2)
- 1.6.3 Why do you think people with dwarfism were separated in the past? (1)
- 1.6.4 Comment on the changes in attitudes of most people to people with dwarfism. (2)
- 1.7 Differentiate between the following terms:
- 1.7.1 Unicellular and acellular (2)
- 1.7.2 Protists and fungi (2)
- 1.7.3 Infectious and non-infectious diseases (2)

**TOTAL SECTION A: 50**

**SECTION B****QUESTION 2**

- 2.1 The following table shows the percentage of HIV infected women who attended antenatal (before birth) clinics in South Africa from 1999 to 2004. The attendance at the clinics could be used as an indicator of the number of HIV infected people in each province. Study the data and answer the questions that follow:

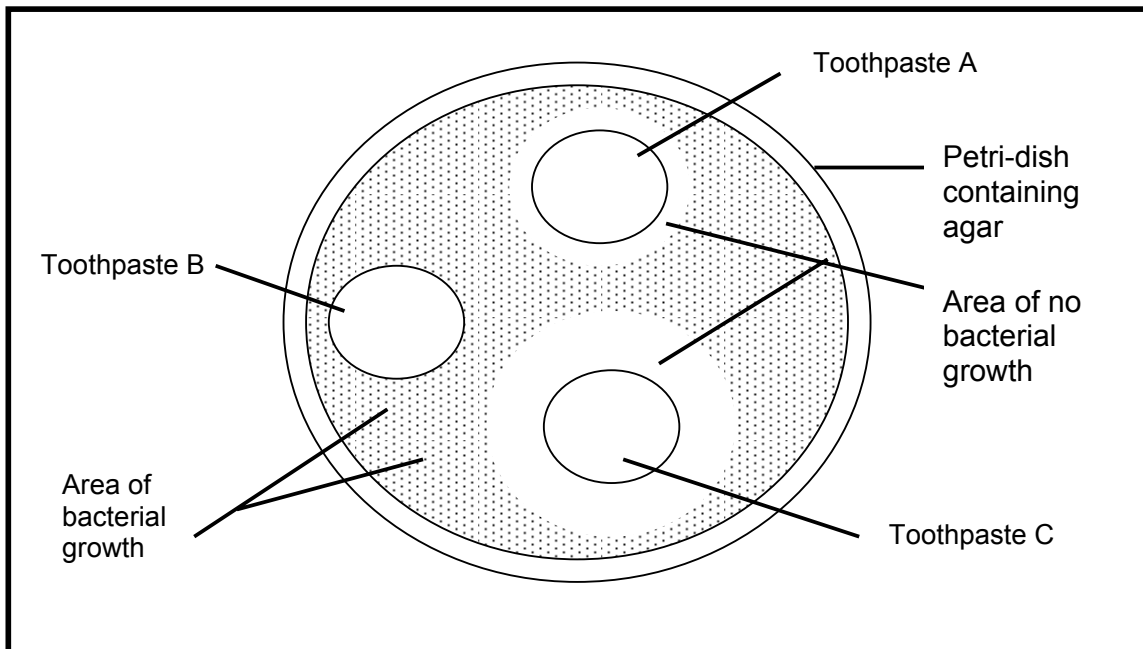
<b>Percentage of HIV infected women who attended antenatal clinics in South Africa</b>									
	<b>KwaZulu-Natal</b>	<b>Gauteng</b>	<b>Mpumalanga</b>	<b>Free State</b>	<b>Eastern Cape</b>	<b>North West</b>	<b>Limpopo</b>	<b>Northern Cape</b>	<b>Western Cape</b>
<b>1999</b>	32,5	23,8	27,3	27,9	18,0	23,0	11,4	10,1	7,1
<b>2000</b>	36,2	29,4	29,7	27,9	20,2	22,9	13,2	11,2	8,7
<b>2001</b>	33,5	29,8	29,2	30,1	21,7	25,2	14,5	15,9	8,6
<b>2002</b>	36,5	31,6	28,6	28,8	23,6	26,2	15,6	15,1	12,4
<b>2003</b>	37,5	29,6	32,6	30,1	27,1	29,9	17,5	16,7	13,1
<b>2004</b>	40,7	33,1	30,8	29,5	28,0	26,7	19,3	17,6	15,4

[Source: Whiteside A & Sunter C: *The Challenge for South Africa*, 2000]

- 2.1.1 (a) On the basis of attendance at antenatal clinics, name the province that has the highest proportion of HIV infected people. (2)
- (b) Suggest TWO probable reasons for this. (2)
- 2.1.2 Which province has the lowest proportion of HIV infected women who attended antenatal clinics over the 6-year period? (2)
- 2.1.3 State the general trend from 1999 to 2004 in terms of the proportion of HIV infected women that attended antenatal clinics in South Africa. (2)
- 2.1.4 Give THREE reasons why these figures cannot be a reliable estimate of the total number of people infected with HIV in South Africa. (3)
- 2.1.5 HIV/AIDS is a non-notifiable disease (the infected person is not forced to indicate whether he/she is HIV positive).
- (a) Should people be forced to indicate whether they are HIV positive or not? (1)
- (b) Give a reason for your answer to QUESTION 2.1.5 (a). (1)
- 2.1.6 State FOUR ways in which people can ensure that they do not become HIV positive. (4)

2.2 In an investigation, 1 cm<sup>3</sup> of a bacterial culture was placed in a sterile petri-dish containing sterile agar. A petri-dish is a clear plastic/glass container used to grow bacteria. Agar contains nutrients that are necessary for the growth of bacteria.

Three wells (holes) of equal size were cut into the agar with a sterile cork borer and were then filled with equal volumes of different kinds of toothpastes. The petri-dish was covered with a lid and sealed with sticky tape and then incubated at 20 °C for 72 hours. The results are shown in the diagram below:

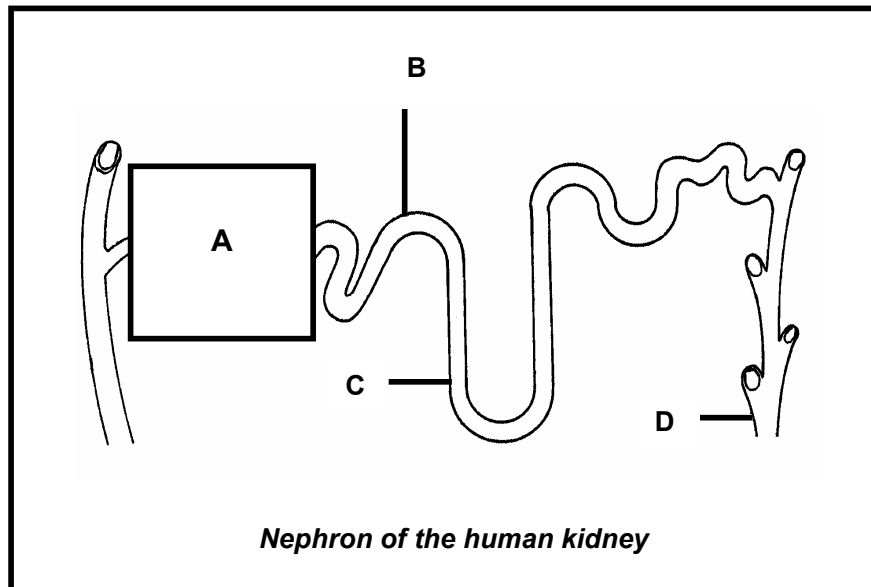


- 2.2.1 State a hypothesis for the above investigation. (2)
- 2.2.2 Why was sterile nutrient agar used? (2)
- 2.2.3 Describe the results shown in the diagram. (3)
- 2.2.4 (a) Which toothpaste would you buy, based on the results of the investigation only? (1)
- (b) Explain your answer to QUESTION 2.2.4 (a). (2)
- 2.2.5 State THREE ways in which variables have been controlled in the investigation. (3)

**[30]**

**QUESTION 3**

- 3.1 Study the diagram below of the nephron of the human kidney. The block labelled A represents a part of the nephron that has been left out of the diagram.



- 3.1.1 Name the parts labelled B, C and D respectively. (3)
- 3.1.2 Write only the **letters** of the parts which are generally present in the medulla of the kidney. (2)
- 3.1.3 Make a labelled diagram of the structure that was left out at the part labelled A. (7)

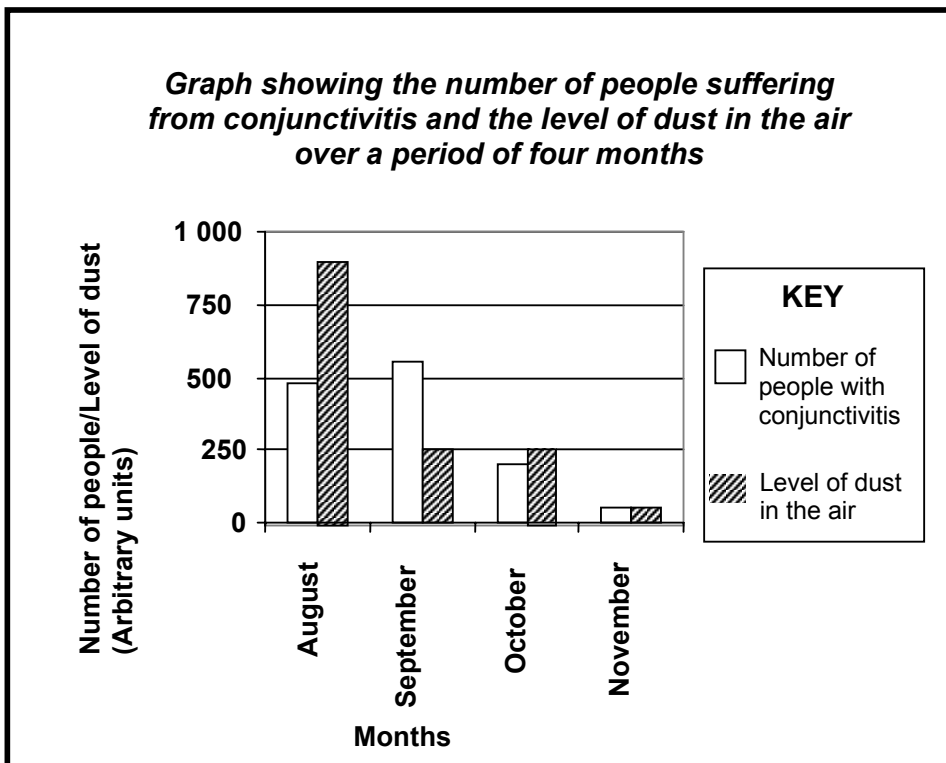
- 3.2 A group of learners investigated the occurrence of eye defects in a small town in Mpumalanga. They visited their local clinic and collected information on the number of people with eye defects who were attending the clinic, as well as the type of defects they had. They converted their results to percentages and recorded this in a table as shown below:

Type of eye defect	% of people suffering from the defect
Short-sightedness	10
Long-sightedness	25
Cataract	10
Night-blindness	5
Conjunctivitis (painful, red eyes)	50

- 3.2.1 What was the most common type of eye defect in the community surveyed? (1)
- 3.2.2 What percentage of the people have problems with adjusting the focus of their lens? (1)
- 3.2.3 Use the information in the table to draw a pie chart. (9)

3.3 A group of learners found out that there were sand storms in the area and that the level of dust in the air in the town was very high. They thought that this could have an effect on the occurrence of conjunctivitis in the town. They decided to plan another investigation to find out if this was true.

The bar graph below shows the results they obtained:



3.3.1 What question is the group of learners attempting to answer in this investigation? (2)

3.3.2 During which month was the incidence of conjunctivitis the highest? (1)

3.3.3 What was the level of dust in the air in October? (2)

3.3.4 What conclusion can be drawn from the graph about the relationship between the incidence of conjunctivitis and the level of dust in the air? (2)

**[30]**

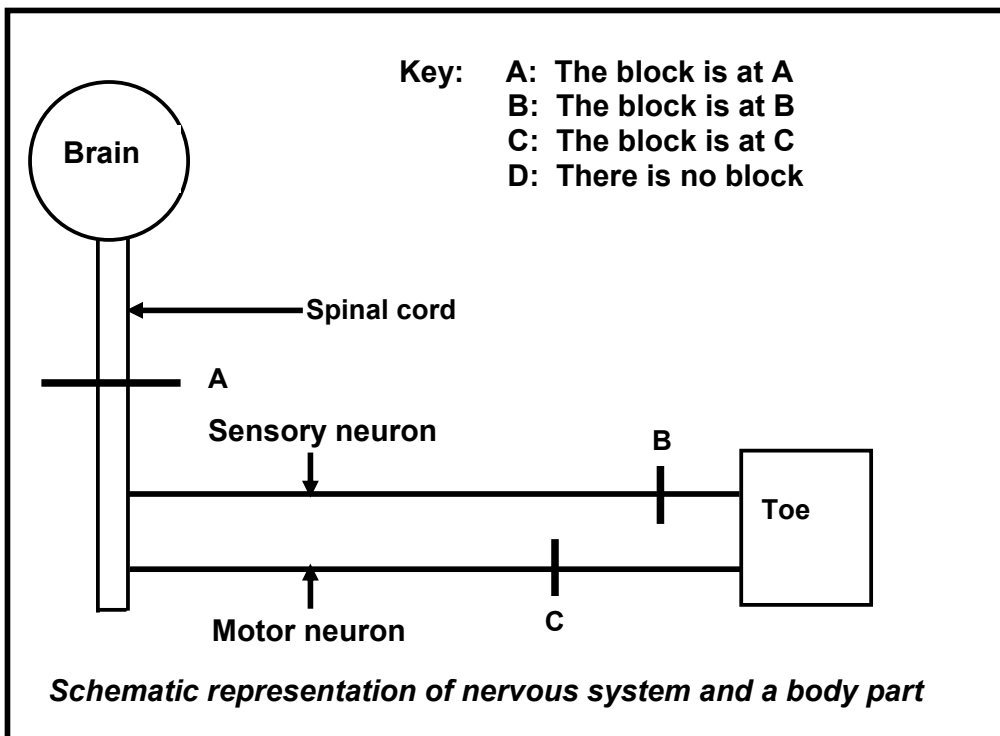
**TOTAL SECTION B: 60**

**SECTION C**

**QUESTION 4**

4.1 In the diagram below letters A, B and C represent regions of the human nervous system that can be blocked by chemicals for medical reasons.

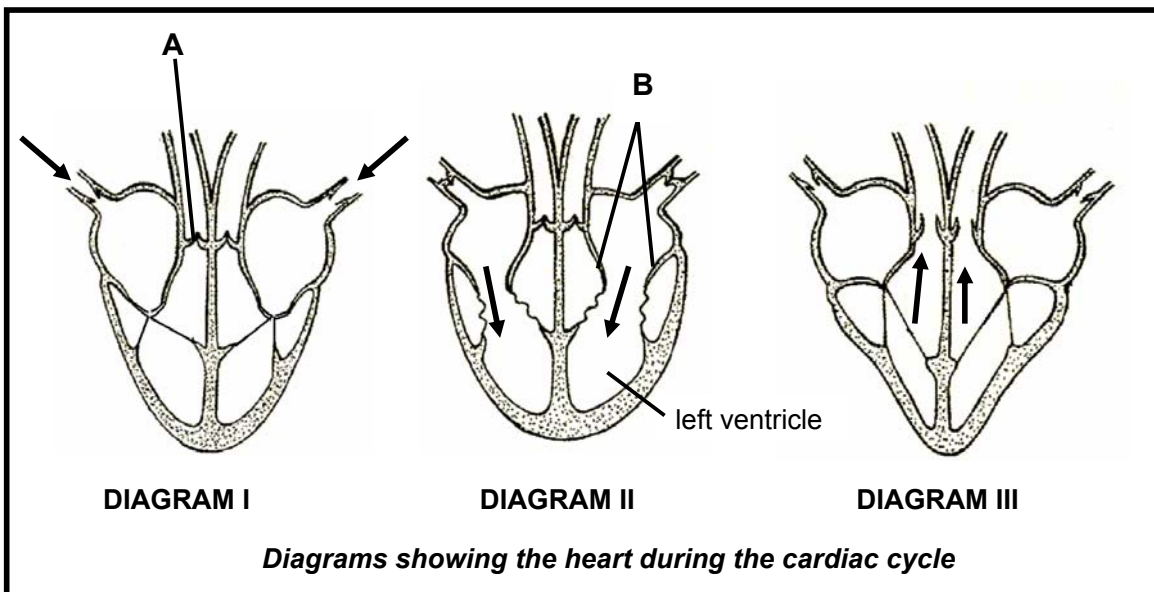
Study the diagram and answer the questions that follow:



Using the key above, write the letters (A, B, C or D) that matches each of the following effects:

- 4.1.1 When the skin of the toe is stimulated, the toe moves and the patient knows it is moving. (2)
- 4.1.2 The patient can feel the toe being touched or pinched, but cannot move the toe. (2)
- 4.1.3 When the skin of the toe is stimulated, the toe and foot move involuntarily, but the patient cannot move the toe voluntarily or feel it moving. (2)
- 4.1.4 The patient can move the toe, but cannot feel the stimulus. (2)

4.2 The following diagrams show the heart during the cardiac cycle. The arrows represent the flow of blood. Study the diagrams and answer the questions that follow:



4.2.1 Identify the structures labelled A and B respectively. (2)

4.2.2 Name and explain what happens in each of the phases of the cardiac cycle represented in:

- (a) Diagram I (3)
- (b) Diagram II (4)
- (c) Diagram III (4)

4.2.3 Loss of a lot of blood, vomiting and diarrhoea often causes a decrease in blood volume. As a result, blood cannot move normally around the body, as blood vessels are not completely full. The tissues do not get enough blood, leading to possible death of cells and hence damage to organs.

- (a) Explain why severe vomiting and diarrhoea would cause a decrease in the blood volume. (2)
- (b) What is the relationship between blood volume and blood pressure? (2)

- 4.3 Read the following article on heart disease and answer the following questions:

***At the heart of the matter***

*South Africa faces a looming crisis as statistics point to an 'epidemic' of heart disease. In the year 2000, 12% of the 500 000 deaths recorded in the country were from heart disease. Another 8% of deaths in the same year, were caused by strokes, closely aligned to heart disease.*

*There are increased rates of arteriosclerosis (fatty substances that cause narrowing of arteries) and coronary thrombosis (blood clots in arteries serving the heart muscles).*

*Generally heart disease starts in childhood but shows itself when the person is older. The best way to reduce heart disease is by preventing heart attacks and strokes rather than treating them. Most people who suffered from heart disease or had a stroke, did not die, but were disabled or required expensive medical treatment, which may involve a heart transplant. This has a massive impact on the health system and on the economy. Estimates state that this costs the country about R10 billion a year.*

Write an essay that describes the strategies that your school as well as the Department of Health or medical aid societies could use to prevent heart attacks and thus reduce costs for treatment. Also include your views on organ transplants giving reasons for your answer.

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams.

**Rubric to mark essay**

CRITERIA	MARKS		
	2	4	6
Strategies used by schools	One appropriate strategy discussed	Two appropriate strategies discussed	Three or more appropriate strategies discussed
	1	2	3
Strategies used by Health Department/medical aid societies	One appropriate strategy discussed	Two appropriate strategies discussed	Three or more appropriate strategies discussed
Views on organ transplants	Support/No support without appropriate reasons	Support/No support with one appropriate reason	Support/No support with two appropriate reasons
Synthesis	Significant gaps in the logic and flow of the answer	Minor gaps in the logic and flow of the answer	Well structured - demonstrates insight and understanding of the question

(15)

**TOTAL SECTION C: 40****GRAND TOTAL: 150**