



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

LIFE SCIENCES P1

EXEMPLAR 2007

MARKS: 150

TIME: 2½ hours

This question paper consists of 20 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.

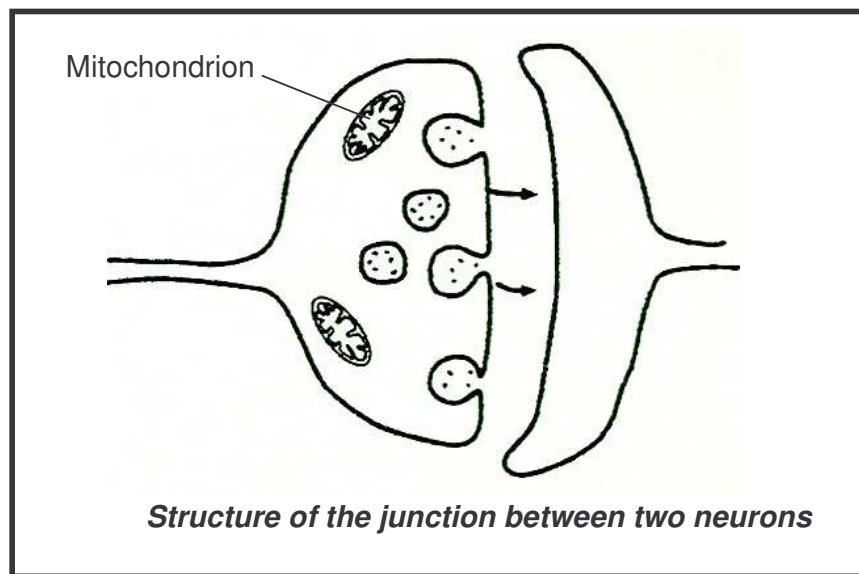
SECTION A**QUESTION 1**

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 Which ONE of the following is the correct sequence/order for the flow of urine?

- A Renal pelvis → ureter → bladder → urethra
- B Bladder → renal pelvis → urethra → ureter
- C Ureter → bladder → renal pelvis → urethra
- D Urethra → renal pelvis → ureter → bladder

QUESTIONS 1.1.2 and 1.1.3 are based on the following diagram which represents the junction between two neurons. Study the diagram and answer the questions that follow.



1.1.2 The junction between the neurons is called a/an ...

- A synapse.
- B axon.
- C myelin sheath.
- D ganglion.

1.1.3 The mitochondrion shown in the diagram ...

- A transports impulses.
- B increases the rate of respiration in neurons.
- C stores neurotransmitters until they are required.
- D provides ATP for the production of neurotransmitters.

1.1.4 Bacteria are ...

- A unicellular and parasitic in plants and animals.
- B unicellular and without a nucleus.
- C microscopic plants with a saprophytic mode of nutrition.
- D unicellular with a nucleus and parasitic in plants and animals.

1.1.5 Viruses have a ...

- A DNA-containing nucleus and a lipid envelope.
- B nucleic acid core and a plasma membrane.
- C DNA core and a protein coat.
- D nucleic acid core and a protein coat. (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 Places at which two or more bones meet

1.2.2 Muscles which work in opposition to each other

1.2.3 Removal of metabolic wastes from the body

1.2.4 An organism that causes diseases

1.2.5 The vegetative part of a fungus

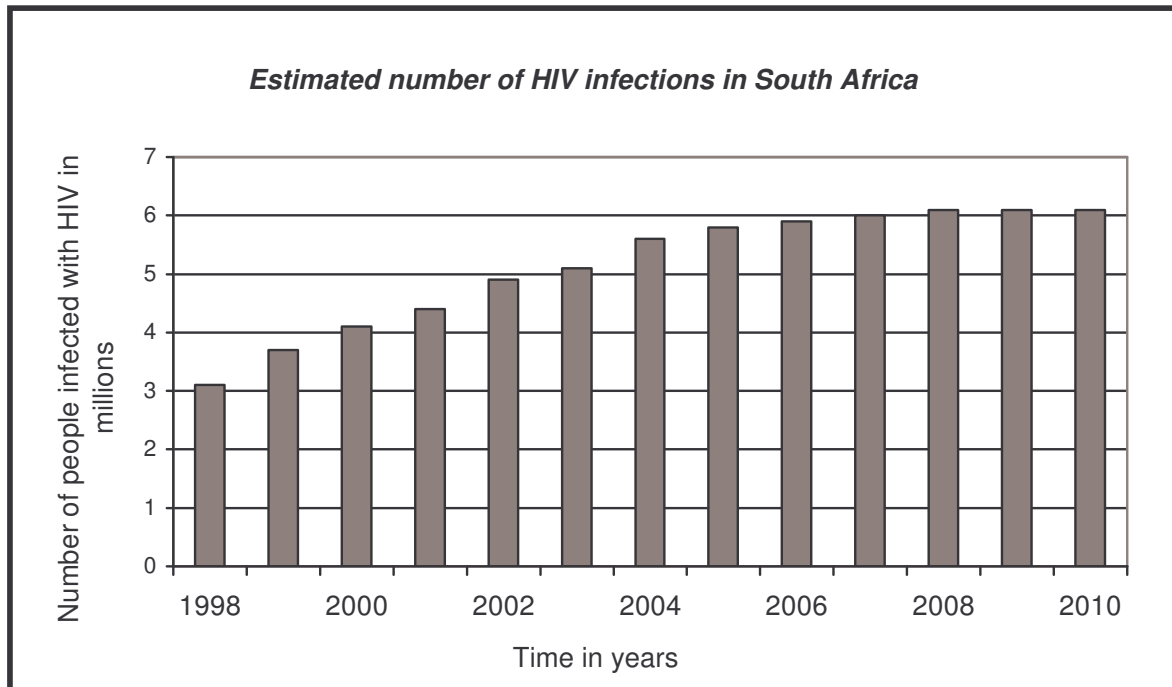
1.2.6 An animal, usually an insect, that transmits disease-causing micro-organisms from one host to another (6)

- 1.3 Choose an item from COLUMN B that matches a statement in COLUMN A. Write only the letter (A - K) 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	Neurons which carry impulses to the central nervous system	A	phloem
		B	motor
1.3.2	The main artery which transports oxygenated blood away from the heart to other parts of the body	C	lymphocytes
		D	erythrocytes
1.3.3	Tissue that transports water in plants	E	tuberculosis
		F	sensory
1.3.4	Cells that identify the presence of foreign organisms and destroy them	G	aorta
		H	pulmonary artery
1.3.5	A disease caused by a virus	I	measles
1.3.6	Small pieces of DNA in bacteria	J	plasmid
		K	xylem

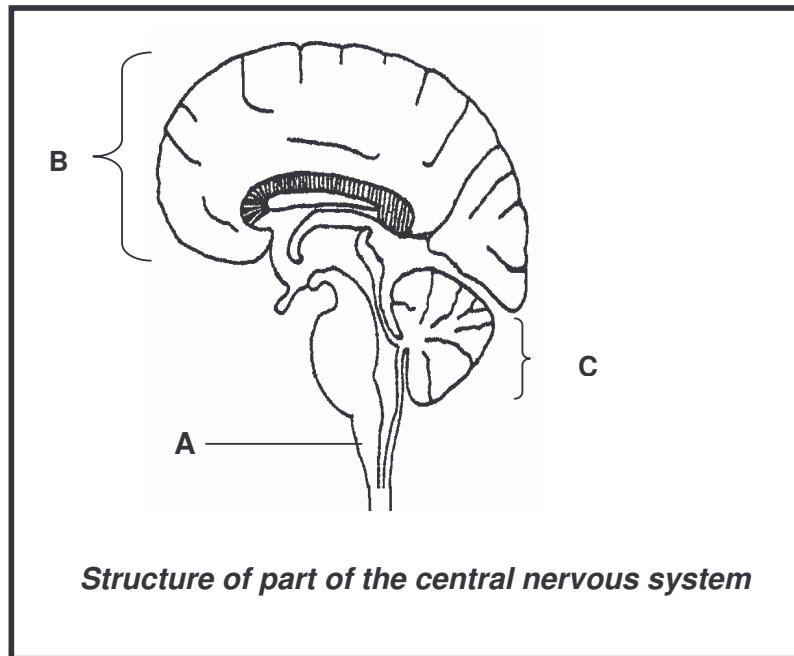
(6)

- 1.4 The graph below shows an estimated number of HIV infections in South Africa projected up to the year 2010. Study the graph and answer the questions that follow:



- 1.4.1 How many millions of people were estimated to be infected with HIV in 2003? (1)
- 1.4.2 Describe the trends shown in the graph above. (3)
- 1.4.3 Give a possible explanation for the estimated number of HIV infections observed from 2008 to 2010. (2)

1.5 Study the following diagram and answer the questions that follow:



- 1.5.1 Identify the organ illustrated in the diagram. (1)
- 1.5.2 Name the parts labelled A and C respectively. (2)
- 1.5.3 State TWO functions of part B. (2)
- 1.5.4 Name the bony structure that encloses the organ shown in the diagram. (1)
- 1.5.5 Explain how the consumption of a large amount of alcohol can affect the functioning of the part labelled C. (2)
- 1.5.6 The legal limit of blood alcohol concentration in South Africa is 0,05 g/100 mL. Ronel's blood alcohol concentration is 1,00 g/100 mL. She insists, however, that she can drive home safely after a party. Should Ronel be allowed to drive home? (1)
- 1.5.7 Explain your answer to QUESTION 1.5.6. (2)

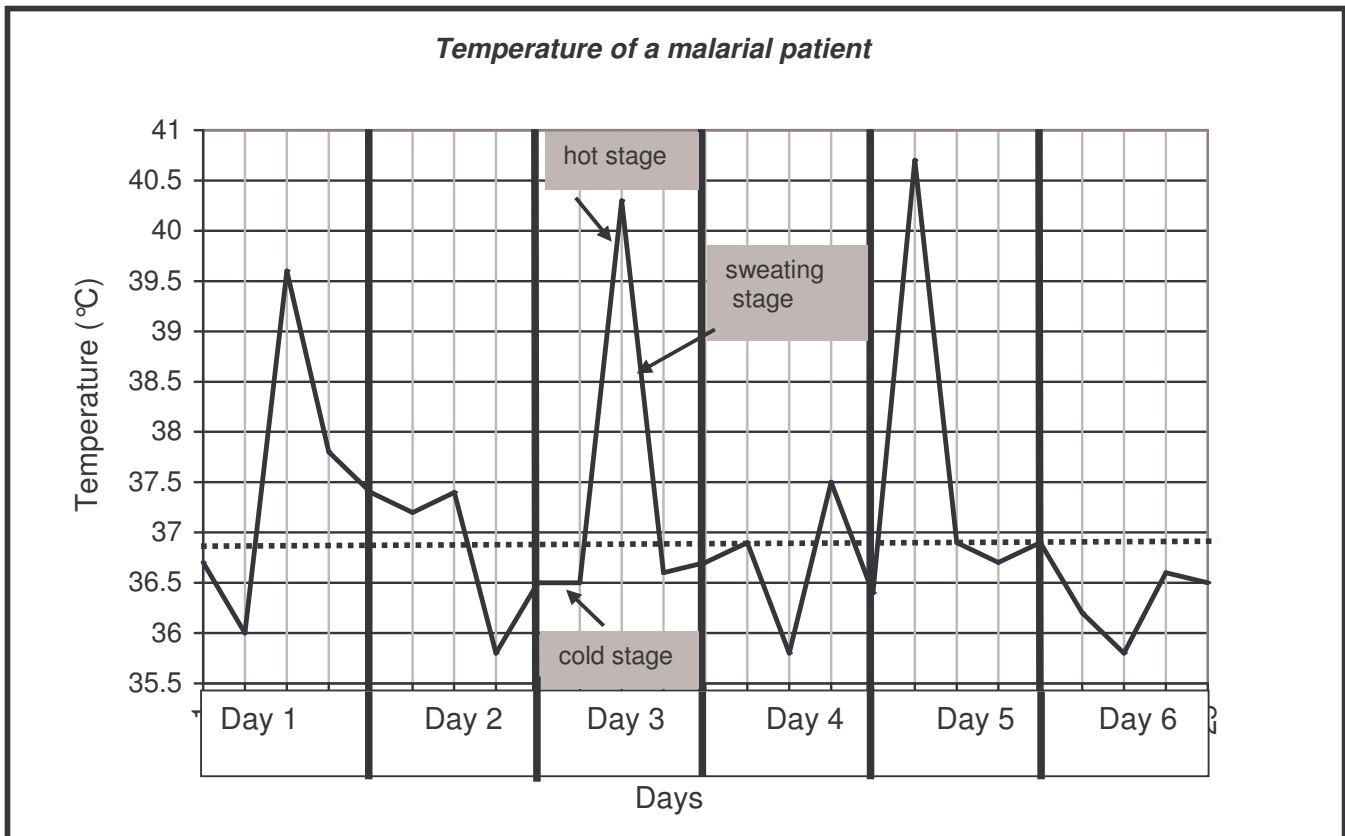
1.6 Read the following passage on malaria and study the temperature chart of a patient suffering from malaria:

Malaria is endemic (always present) in Africa and Asia. Each year 200 million to 300 million people are infected with malaria, mostly in the hot tropical and sub-tropical regions, and each year more than one million people die from it.

The malarial parasite is a unicellular spore-forming organism called Plasmodium. Plasmodium in humans produces spores called merozoites which infect and re-infect red blood corpuscles causing them to burst. This results in the fever characteristic of malaria patients.

The female mosquito, Anopheles, spreads a common type of malaria caused by Plasmodium vivax. Plasmodium is introduced in the human when a mosquito sucks up blood.

The graph below shows a temperature chart of a person suffering from malaria. The first fever attack usually takes place 10 days after infection. Such an attack is characterised by three stages: cold, hot and sweating stages. Assume that day 1 on the chart was 22 March 2006.



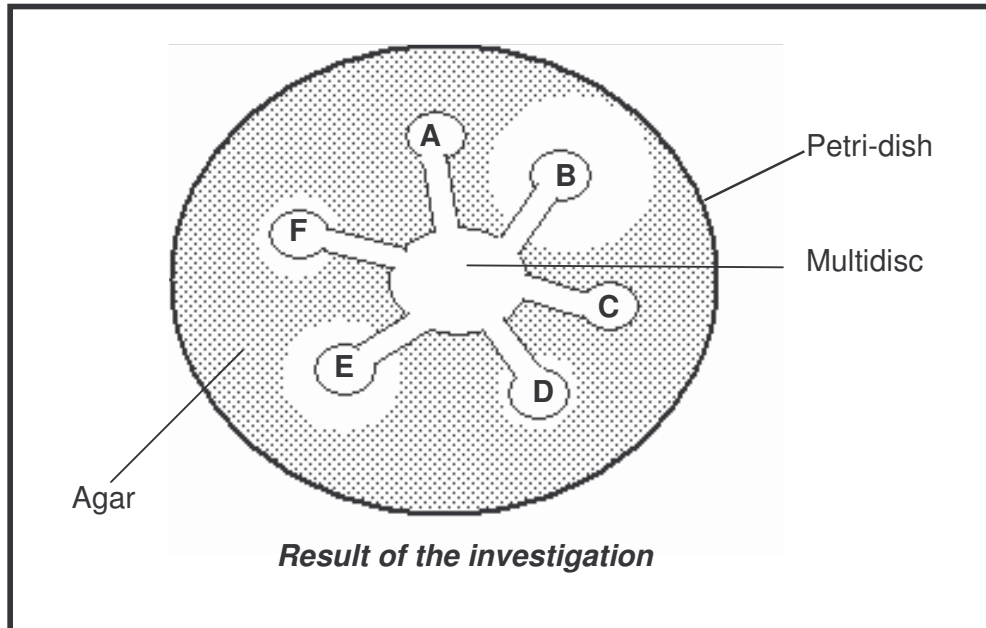
- 1.6.1 From the chart, determine:
- (a) The normal body temperature (in °C) of a healthy person (1)
 - (b) The number of fever attacks recorded (1)
- 1.6.2 Calculate the following:
- (a) The date on which the patient was initially infected by the mosquito (1)
 - (b) The day you would expect the start of the next fever attack (1)
- 1.6.3 Determine from the chart, the patient's:
- (a) Lowest temperature (in °C) on Day 2 (1)
 - (b) Highest temperature (in °C) on Day 2 (1)
- 1.6.4 Refer to Day 5 to answer the following:
- (a) Suggest a reason for the sharp increase in temperature during the hot stage. (1)
 - (b) Suggest ONE symptom that the patient might experience during the cold stage. (1)
- 1.6.5 State THREE ways in which you can protect yourself from being infected with malaria. (3)

TOTAL SECTION A: 50

SECTION B**QUESTION 2**


- 2.1 A scientist designed an investigation to determine whether microbes were present on human hair. A sterile petri-dish (round, flat container) containing sterile nutrient agar (substance on which microbes feed and grow) was used. The lid of the petri-dish was removed carefully and a strand of human hair was laid on the surface of the agar. The lid was then replaced and the petri-dish was placed in an incubator (apparatus in which temperature can be controlled) for 48 hours. The dish was then examined.
- 2.1.1 What is meant by a *sterile* petri-dish? (1)
- 2.1.2 State a hypothesis for testing in the above investigation. (2)
- 2.1.3 At which ONE of the following temperatures (0 °C, 30 °C, 80 °C, 100 °C) should the incubator have been set? (1)
- 2.1.4 Explain your answer to QUESTION 2.1.3. (2)
- 2.1.5 Describe a suitable control for this investigation. (2)
- 2.1.6 Explain why a control is needed for this investigation. (2)

- 2.2 A sample was taken from a patient suffering from a throat infection. The bacteria on the swab were cultured on a nutrient agar in a petri-dish. A multidisc with a different type of antibiotic at the end of each of its six arms was then placed on top of the bacteria. The two halves of the petri-dish were then sealed together and placed in an incubator at 30 °C. The following diagram shows the result of the investigation after 48 hours:

**Key:**

A - F — Six different types of antibiotic

 — Zone of bacterial growth

 — Zone of no bacterial growth

- 2.2.1 State ONE difference in activity between antibiotics B and F. (2)
- 2.2.2 The patient was known to be allergic to antibiotic B.
- (a) Which antibiotic should the patient be given? (1)
- (b) Explain your answer to QUESTION 2.2.2 (a). (2)

- 2.2.3 The organism causing this infection seems to be resistant to two of these antibiotics.
- (a) Which TWO antibiotics are referred to in the statement above? (2)
- (b) Explain your answer to QUESTION 2.2.3 (a). (2)
- 2.2.4 The patient was given a 5-day course of the appropriate antibiotic. Explain why it is important to finish the course of antibiotics, even if you feel better. (3)
- 2.2.5 In the early part of the twentieth century, spiders' webs (in which many fungal spores were trapped) were placed on small cuts and wounds. Suggest ONE reason for the following:
- (a) Why this might have been a useful procedure (2)
- (b) Why it could have been dangerous (2)
- 2.2.6 Antibiotics are ineffective against viral diseases. Why then, are antibiotics sometimes given to people suffering from viral infections, such as influenza (flu)? (2)
- 2.2.7 State TWO ways in which an antiseptic is different from an antibiotic. (2)
- [30]**

QUESTION 3

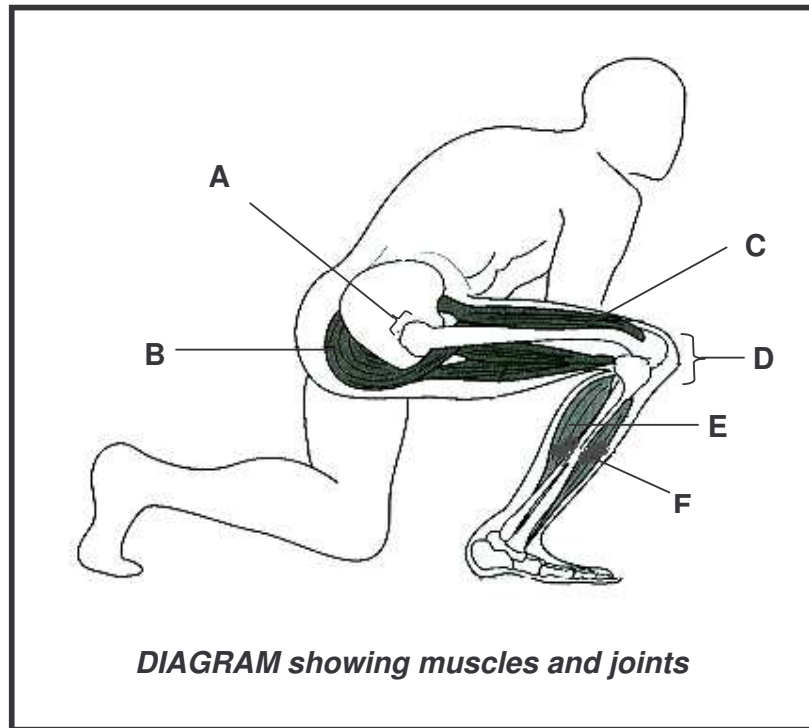
- 3.1 Too much, or too little water can damage the cells. To keep healthy, the total amount of water taken into the body must be the same as that which passed out of the body. Our bodies take great care to keep the water in the body constant.

The accompanying table shows the total volume of water gained and the water lost in a day by a Grade 11 learner. Study the table and answer the questions that follow:

Daily activities	Volume of water taken in or lost during one day (cm ³)								
	WATER GAINED				WATER LOST				
	Drinking	Food	Respiration	Total	Urine	Sweat	Breathing out	Faeces	Total
Normal day (indoors at a comfortable temperature and humidity)	1 400	800	200	2 400	950	950	400	100	2 400
Day out in cold weather	1 100	800	400	2 400	1 800	200	300	100	2 400
Day out in very hot weather	X	800	200	3 000	700	1 400	750	150	3 000

- 3.1.1 Calculate the amount of water the learner gained by drinking, on the day out in very hot weather, represented as **X** on the table. (Show ALL calculations.) (3)
- 3.1.2 Draw a bar graph to compare the different ways in which the learner loses water on a normal day and on a day out in cold weather. Use the same axes to draw both sets of bars. (11)
- 3.1.3 What do you think the learner should have done on the day out in very hot weather to ensure that the amount of water gained and lost from the body is equal? (1)
- 3.1.4 Describe the role of anti-diuretic hormone (ADH) in conserving water in the body on the day out in hot weather. (5)

- 3.2 The diagram below shows the legs of an athlete while he is waiting for a race to start. The letters A to F show some of the muscles as well as joints that will be used during the race.



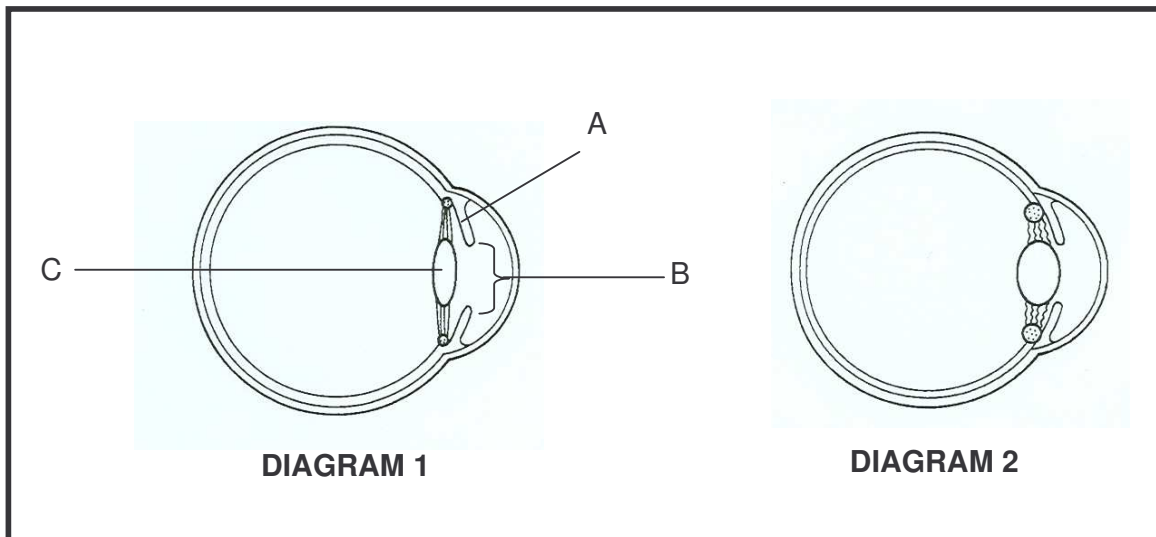
- 3.2.1 When the Starter's gun is fired, the athlete's right leg will straighten, pushing the athlete upwards and forwards. Which of the letters (A to F) indicate muscles that will:
- (a) Relax (1)
- (b) Contract (3)
- 3.2.2 The leg shown in the diagram has different types of joints. Which of the following letters (A to F) indicates:
- (a) A hinge joint (1)
- (b) A ball and socket joint (1)

- 3.2.3 During the race the athlete suffered injury to his right knee resulting in torn ligaments. As a result, he was not allowed to participate in competitions for six weeks. During this time he was only paid one third of his monthly income.
- (a) What are *ligaments*? (1)
- (b) Do you think that athletes who are unable to take part in competitions due to injury should be entitled to their full income? (1)
- (c) Give a reason for your answer to QUESTION 3.2.3 (b). (1)
- (d) After six weeks the athlete found out that the knee injury was permanent. He had surgery to fit in an artificial knee, which could perform better than his original knee. Suggest why he should NOT be allowed to participate in the competitions he took part in previously. (1)

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

SECTION C**QUESTION 4**

- 4.1 The diagrams below show two stages in the changing of the shape of the lens when a human eye is focused on an object:



- 4.1.1 Which lens (DIAGRAM 1 or DIAGRAM 2) is more suited to distant vision? (1)
- 4.1.2 Explain how the change from DIAGRAM 1 to DIAGRAM 2 was brought about. (6)
- 4.1.3 Which part (labelled A, B or C) regulates the amount of light entering the eye? (1)
- 4.1.4 Explain what would happen if the lens could not change its shape. (2)

4.2 Read the passage below and then answer the questions based on it:

When the ventricles of the heart pump blood into the arteries, the pressure of the blood in the arteries is high. This is called systolic pressure (average 120 mm Hg). When the heart muscle relaxes, the pressure in the arteries is much less. This is called diastolic pressure (average 80 mm Hg). The average blood pressure of a healthy person is 120 over 80.

It is normal for a person's blood pressure to differ slightly from the average. If blood pressure is too high or too low there are medication that can be used to control this. High blood pressure is called 'hypertension' and low blood pressure is called 'hypotension'.

There are several contributing factors to heart disease, namely hypertension, strokes, lack of exercise, smoking, rich fatty diets, obesity and diabetes. Research has shown that 25% of the South African population suffer from hypertension and that this is on the increase.

The treatment for hypertension is expensive and has a great impact on the health system and on the economy.

- 4.2.1 Explain what causes the pressure in the arteries to rise and fall. (4)
- 4.2.2 Why is it essential that blood pressure in the capillary vessels be much lower than that in the artery? (4)
- 4.2.3 List THREE reasons why heart disease is on the increase in South Africa. (3)
- 4.2.4 Suggest ONE way in which the government could reduce the number of people with heart disease. (2)

4.2.5 A group of Grade 11 learners decided to carry out a survey to see how many people in their community suffered from hypertension. Below are the steps (not in order) which they followed during their survey:

- 1 They went to the clinic to get information on the number of people treated for hypertension on a monthly basis.
- 2 They made some conclusions based on their results.
- 3 They drew up sheets to record their results.
- 4 They analysed their results and represented the information in graphs.
- 5 They planned how they were going to carry out the survey.

Write only the letter that indicates the correct sequence/order of steps involved in conducting the survey:

- A 1→2→3→4→5
- B 4→5→2→3→1
- C 5→3→1→4→2
- D 5→3→1→2→4

(2)

4.3 Read the following article on organ transplants:

ORGAN TRANSPLANTS AND ETHICS

Transplanting human organs has given a new lease on life to many thousands of people in South Africa. But there are many ethical issues and different opinions which could negatively influence the practice of transplanting organs.

At the centre of most of the ethical debates are two very important questions:

- *How do we get organs? (procurement)*
- *How do we decide who will receive the organs? (distribution)*

There are always fewer donors than there are potential recipients. This is the reason why many thousands die every year while waiting for transplant organs.

Then there is the issue of consent. Someone has to agree to transplantation for organs to be removed.

Distribution of organs also raises many questions. Should organs be given to patients who can afford the expensive operation or should everyone have a fair chance of getting the organs?

Write an essay that describes the strategies that the Health Department could use to increase procurement of transplant organs and also the strategies to ensure a fair distribution of these. Include your own views on organ transplant, as well, and state whether you will consent to donate your organs or not, giving reasons for your answer.

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

The following rubric will be used to assess the essay:

CRITERIA	Marks		
	1	2	3
Strategies for procurement	One appropriate strategy given	Two appropriate strategies given	Three or more appropriate strategies given
Strategies to ensure fair distribution	One appropriate strategy given	Two appropriate strategies given	Three or more appropriate strategies given
Own view on organ transplant	Support/No support, without appropriate reasons	Support/No support, with one appropriate reason	Support/No support, with two appropriate reasons
Donor/Non-donor with reasons	Yes/No, with no appropriate reason	Yes/No, with one appropriate reason	Yes/No, with two/more 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**