



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P2**

**VERSION 1 (NEW CONTENT) FOR FULL-TIME CANDIDATES**

**NOVEMBER 2011**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 19 pages.**

**INSTRUCTIONS AND INFORMATION**

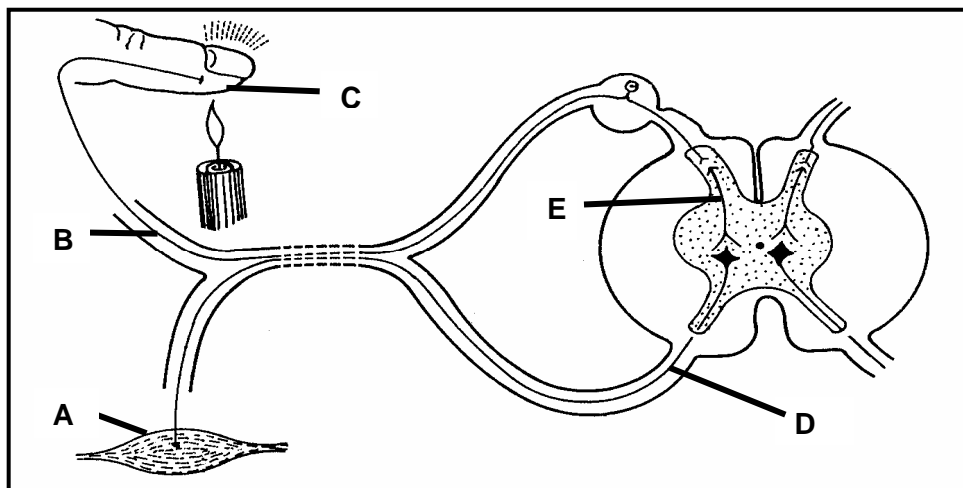
Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answers 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. Present your answers according to the instructions of each question.
6. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily all drawn to scale.
9. Do NOT use graph paper.
10. You may use non-programmable calculators, protractors and compasses.
11. 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 to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.
- 1.1.1 Which ONE of the following represents the stages of complete metamorphosis in an insect, in the correct order?
- A Adult → egg → pupa → larva
  - B Adult → egg → larva → pupa
  - C Adult → larva → pupa → egg
  - D Adult → pupa → egg → larva
- 1.1.2 The main purpose of sweating is to ...
- A excrete excess salts.
  - B eliminate the nitrogenous waste.
  - C cool the body through evaporation.
  - D remove excess water from the body.
- 1.1.3 Which ONE of the following occurs when you look up from reading a book to look at a distant mountain on a clear sunny day?
- A Pupils dilate
  - B Ciliary muscles relax
  - C Lens becomes more convex
  - D Radial muscles of the iris contract
- 1.1.4 Which ONE of the following represents the correct order of the parts through which spermatozoa pass?
- A Testis → vas deferens → epididymis → ureter
  - B Vas deferens → seminal vesicles → ureter → urethra
  - C Testis → epididymis → vas deferens → urethra
  - D Vas deferens → prostate gland → urethra → ureter

QUESTION 1.1.5 and QUESTION 1.1.6 are based on the diagram of a reflex arc shown below.



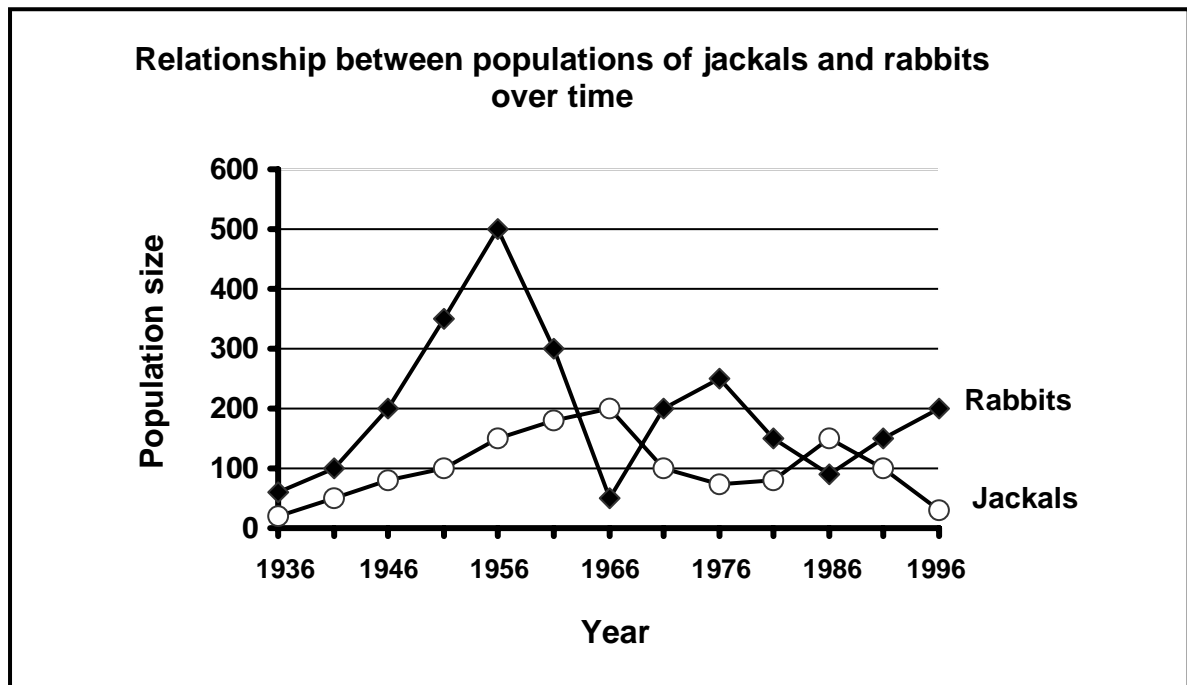
1.1.5 Part **B** indicates the ...

- A dendrite of the motor neuron.
- B axon of the motor neuron.
- C dendrite of the sensory neuron.
- D axon of the sensory neuron.

1.1.6 The correct sequence in which impulses move from the receptor to the effector in the reflex arc above, is ...

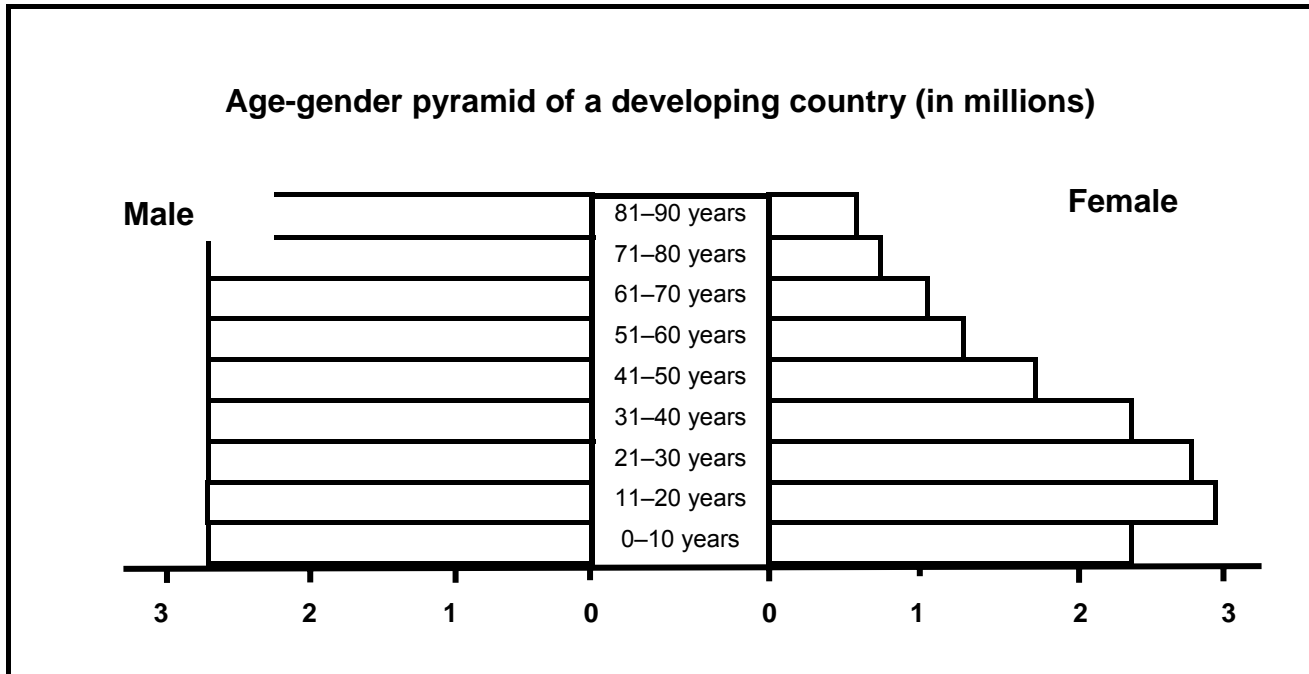
- A A → B → C → D → E
- B C → A → B → E → D
- C C → B → E → D → A
- D A → D → E → B → C

QUESTION 1.1.7 and QUESTION 1.1.8 are based on the graph below. Study the graph and answer the questions that follow.



- 1.1.7 Which interaction in a community is illustrated by the graph above?
- A Parasitism  
 B Predation  
 C Commensalism  
 D Division of labour in a colony
- 1.1.8 What effect does a decrease in the number of jackals have on the rabbit population?
- A Rabbit population decreases  
 B Rabbit population is eliminated from the habitat after a long period of time  
 C Rabbit population increases  
 D Both the rabbit population and the jackal population are eliminated from the habitat

1.1.9 Study the age-gender pyramid shown below for a developing country.



Which ONE of the following can be CORRECTLY deduced from the age-gender pyramid above?

- A An even spread of number at each age group
- B Population has a high number of people at reproductive age compared to pre-reproductive and post-reproductive ages
- C There are more males than females in each age group
- D The birth and death rate are about the same

1.1.10 What is the main characteristic of an age-gender pyramid for a developed country?

- A The number of newborn are high
- B There are more young people than old people
- C There are more females than males in each age group
- D The life expectancy of the population is high (10 x 2) **(20)**

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

- 1.2.1 The increase of the internal diameter of blood vessels so that more blood flows through them
- 1.2.2 A gradual change in numbers and variety of organisms living in a habitat, beginning with pioneer plants and ending with a climax community
- 1.2.3 The movement of individuals into a population
- 1.2.4 The ecological role of an organism and the way it interacts with biotic and abiotic resources in its habitat
- 1.2.5 The condition suffered by a person when the core body temperature is raised so much that the body's homeostatic control mechanism can no longer cope
- 1.2.6 The heat-regulating centre in the brain
- 1.2.7 A ripened ovule after fertilization
- 1.2.8 The transfer of pollen grains from anthers to a stigma

(8)

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 (1.3.1–1.3.6) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Development in which a hatchling is incapable of moving around on its own and needs to be fed by its parents	A: Altricial B: Precocial
1.3.2	Method of reproduction in which the foetus is retained in the mother's uterus and is nourished through an umbilical cord	A: Ovipary B: Ovovivipary
1.3.3	A dominant and haploid sporophyte generation alternates with a dependant gametophyte generation	A: Moss B: Angiosperm
1.3.4	A relationship between different species in which both species benefit	A: Commensalism B: Mutualism
1.3.5	An estimation of the amount of the Earth's resources a human population, person or activity	A: Ecological footprint B: Simple sampling

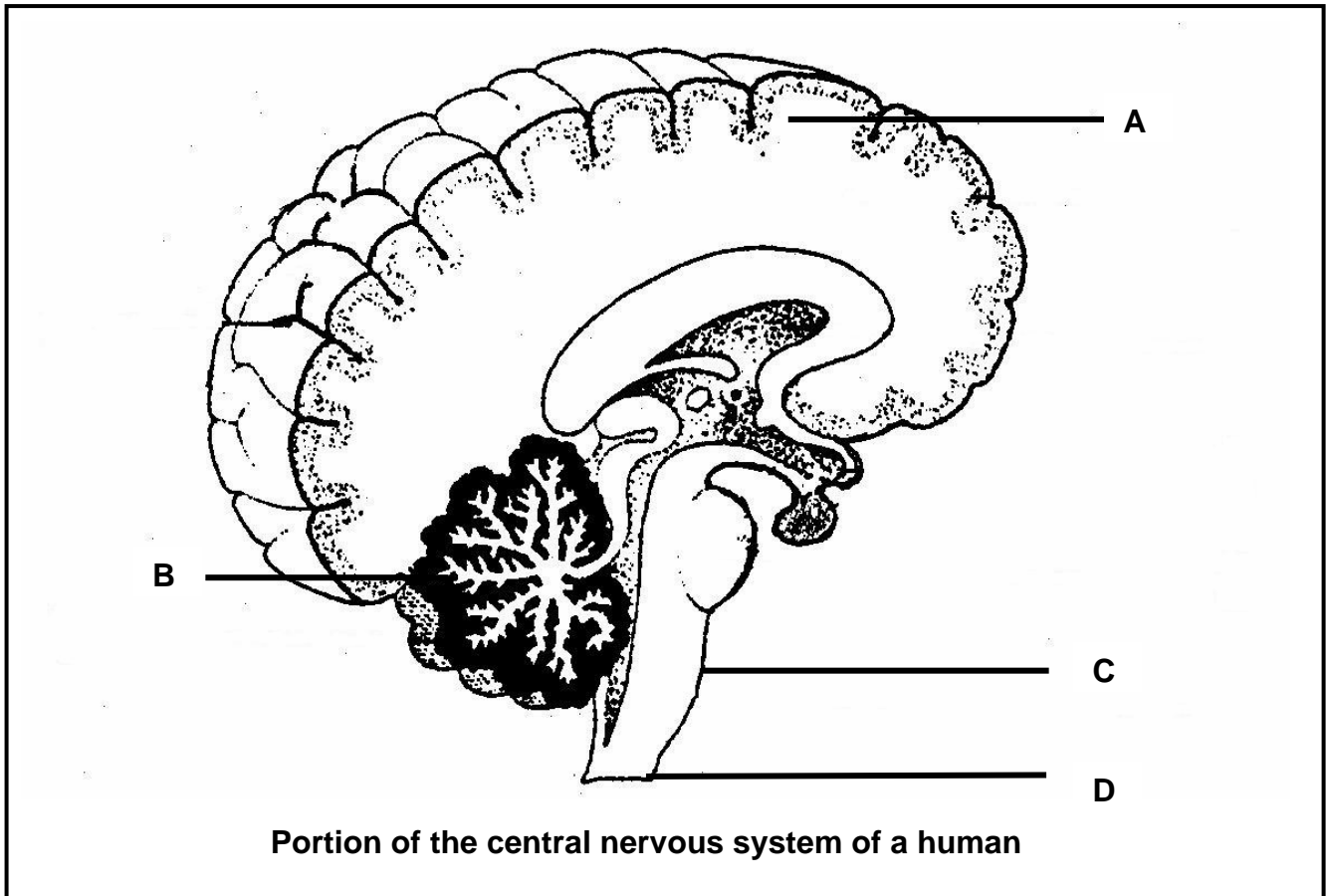
'consumes' in a year.	
1.3. Social organisation strategy 6 that enhances survival	A: Dominant breeding pairs B: Division of labour

(6 x 2)

**(12)**

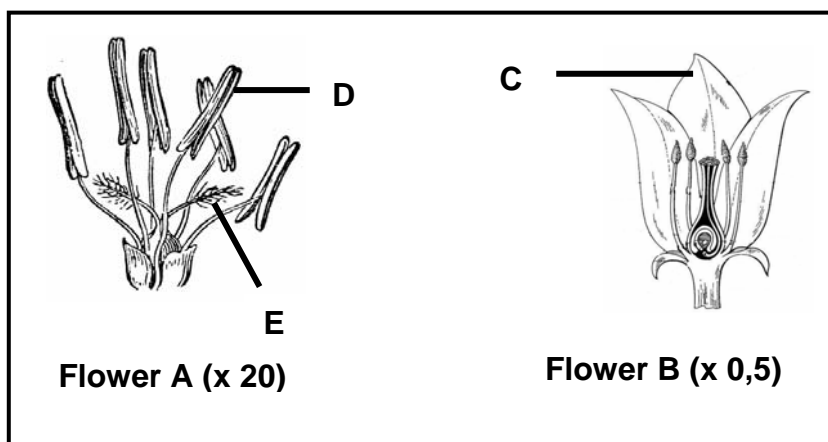


1.4 Study the diagram below and answer the questions that follow.



- 1.4.1 Write down only the letter (A–D) of the part which:
- (a) Controls heartbeat (1)
  - (b) Contains the centres that control balance, muscle tone and equilibrium (1)
  - (c) Has centres that interpret what you see (1)
  - (d) Coordinates voluntary muscle movements (1)
  - (e) Has grey matter on the inside and white matter on the outside (1)
- (5)**

- 1.5 Study the diagrams of the structures of two flowers below. The magnification of each flower is indicated in brackets.

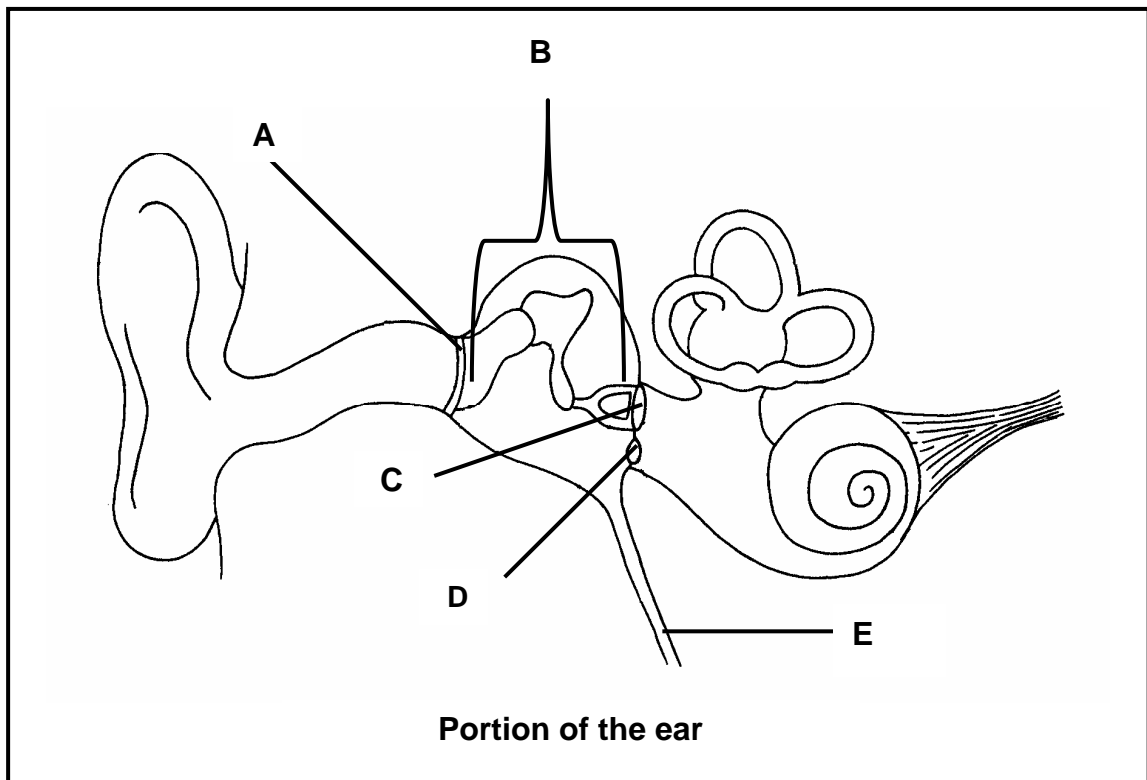


- 1.5.1 Provide labels for **C**, **D** and **E**. (3)
- 1.5.2 Which flower (**A** or **B**) is probably pollinated by insects? (1)
- 1.5.3 Which flower's (**A** or **B**) actual size is greater? (1)

**TOTAL SECTION A: 50**

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

- 2.1 Study the diagram below showing a portion of the human ear and answer the questions that follow.



- 2.1.1 Provide labels for parts **A**, **C** and **D**, respectively. (3)
- 2.1.2 State ONE function for parts **B** and **D**, respectively. (2)
- 2.1.3 How are parts **A** and **C** together suited for the amplification of sound? (2)
- 2.1.4 Explain what would happen if part **E** is blocked with mucus. (2)
- (9)**

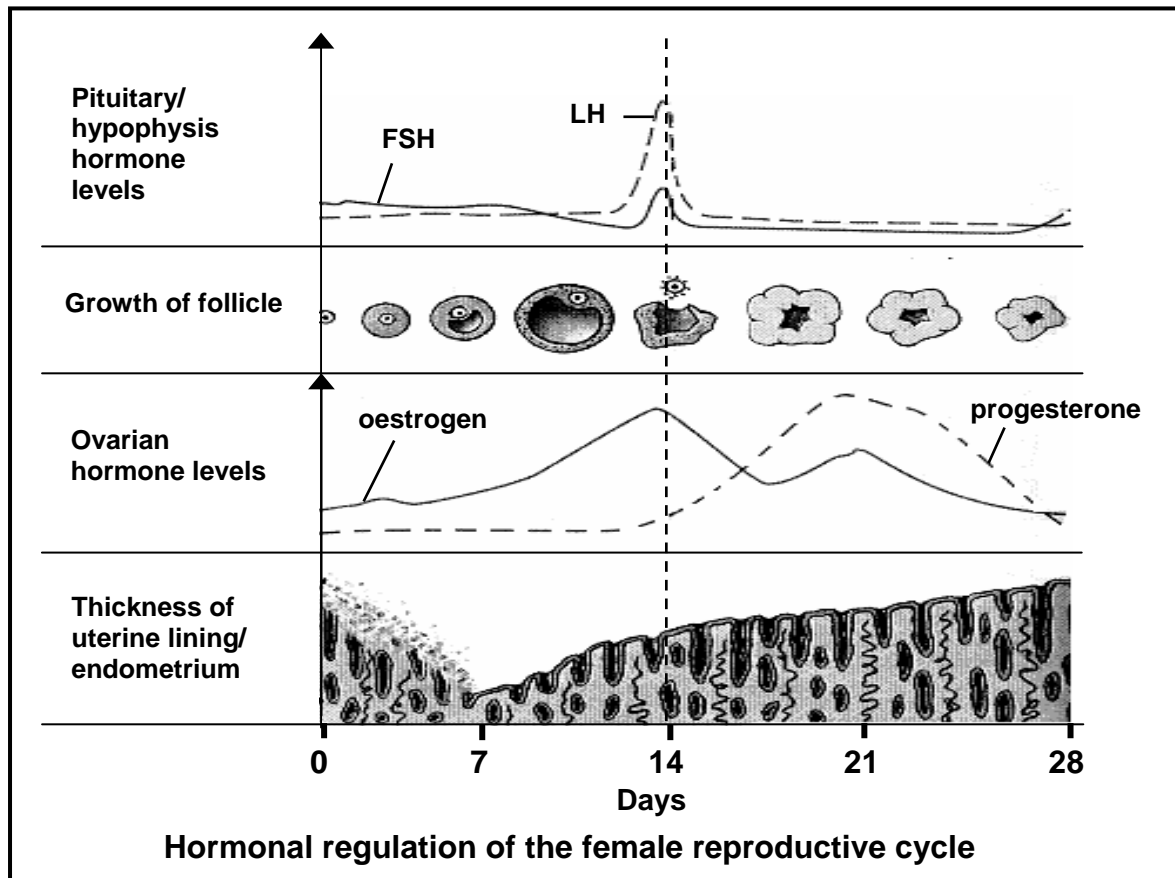
- 2.2 Jabu took part in an experiment on the eye's response to light. A lamp was placed at seven positions from Jabu's face. The diameter of Jabu's pupil was measured at each position.

The results are shown in the table below.

POSITION OF THE LAMP	DIAMETER OF THE PUPIL (mm)
1	1,2
2	1,8
3	2,4
4	3,0
5	3,6
6	4,2
7	4,8

- 2.2.1 (a) At which position was the lamp furthest from the eye? (1)
- (b) Explain your answer to QUESTION 2.2.1(a). (2)
- 2.2.2 When the lamp was moved from position 1 to position 2, describe the mechanism that caused the change in the diameter of the pupil. (4)
- (7)**

2.3 Study the graph below of a menstrual cycle and the influence of the different hormones on it.



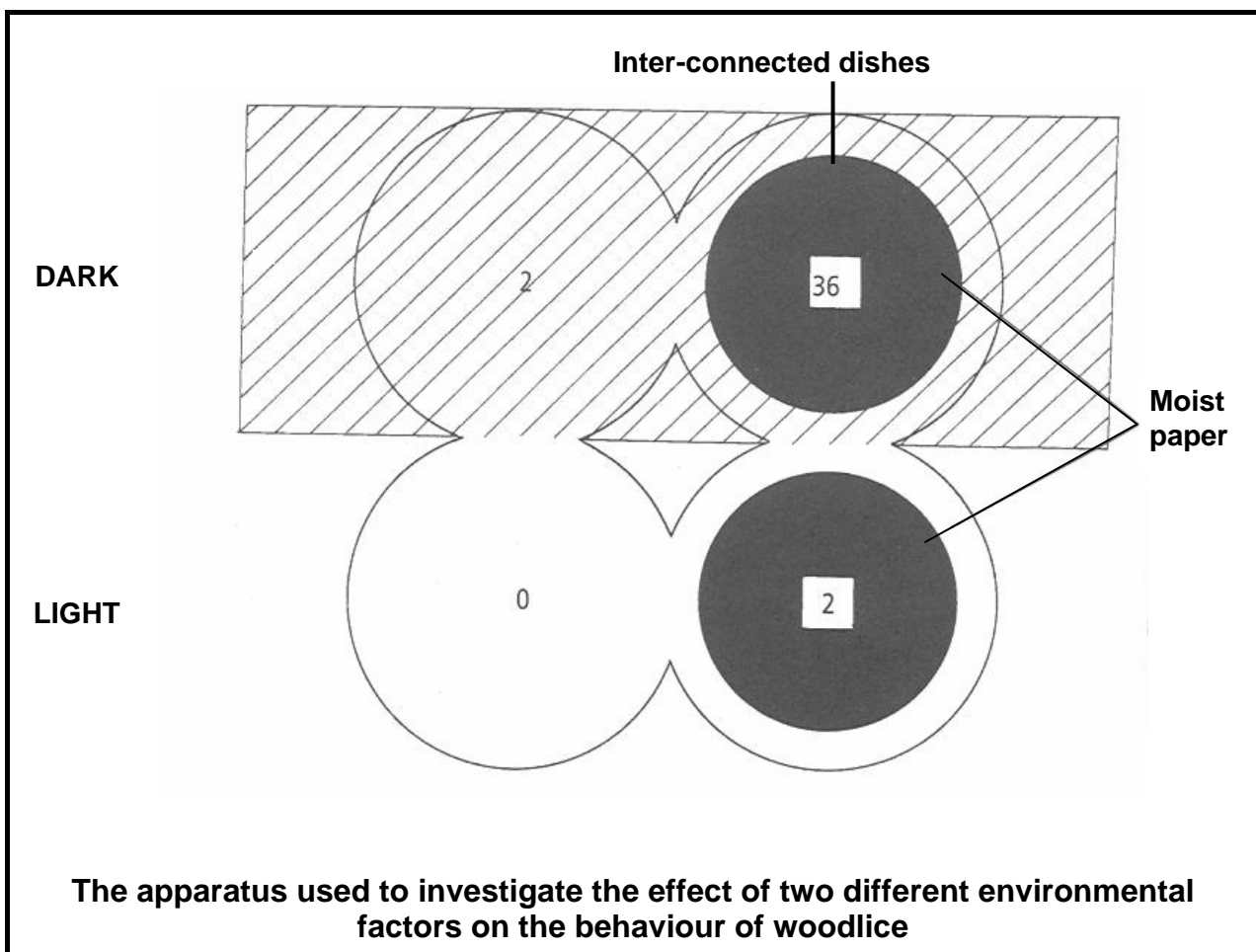
- 2.3.1 On which day does ovulation take place? (1)
  - 2.3.2 Between which days does menstruation take place? (1)
  - 2.3.3 State ONE function of FSH during the menstrual cycle. (1)
  - 2.3.4 Describe the functional relationship between progesterone and FSH. (2)
  - 2.3.5 Account for the change in the thickness of the endometrial lining between day 14 and day 21. (2)
  - 2.3.6 Did fertilisation take place within the 28-day cycle illustrated in the graph? (1)
  - 2.3.7 Give TWO reasons for your answer to QUESTION 2.3.6. (2)
- (10)**

2.4 The apparatus below was set up to investigate the effect of two different environmental factors on the behaviour of woodlice (small invertebrate animals). The usual habitat of the woodlice is decaying vegetation.

The apparatus consisted of four flattened, inter-connecting covered dishes. Two of these dishes were placed in dark and two in light conditions. Moist paper was placed in one of the two dishes in the dark and one of the two dishes in the light.

Ten woodlice were placed in each of the four dishes and allowed to move freely between the dishes.

The number of woodlice present in each dish after 15 minutes is shown in the diagram below.



2.4.1 According to the investigation, which conditions did the woodlice prefer? (2)

2.4.2 Explain ONE way in which the validity of this investigation could have been improved. (2)  
(4)  
[30]

**QUESTION 3**

- 3.1 A group of Grade 12 learners wanted to use the mark-recapture technique to determine the population size of a type of fish (*Tilapia sparrmanii*) in a large dam.

Their results are shown in the table below.

	OCTOBER 2010	NOVEMBER 2010	
	Number marked and released in first sample	Number in recaptured/ second sample	Number marked in recaptured/ second sample
<i>Tilapia sparrmanii</i>	15	150	10

- 3.1.1 List FOUR steps that should be considered when planning to determine the population size using this investigation. (4)
- 3.1.2 Use the formula below to estimate the population size of *Tilapia sparrmanii* in the dam.

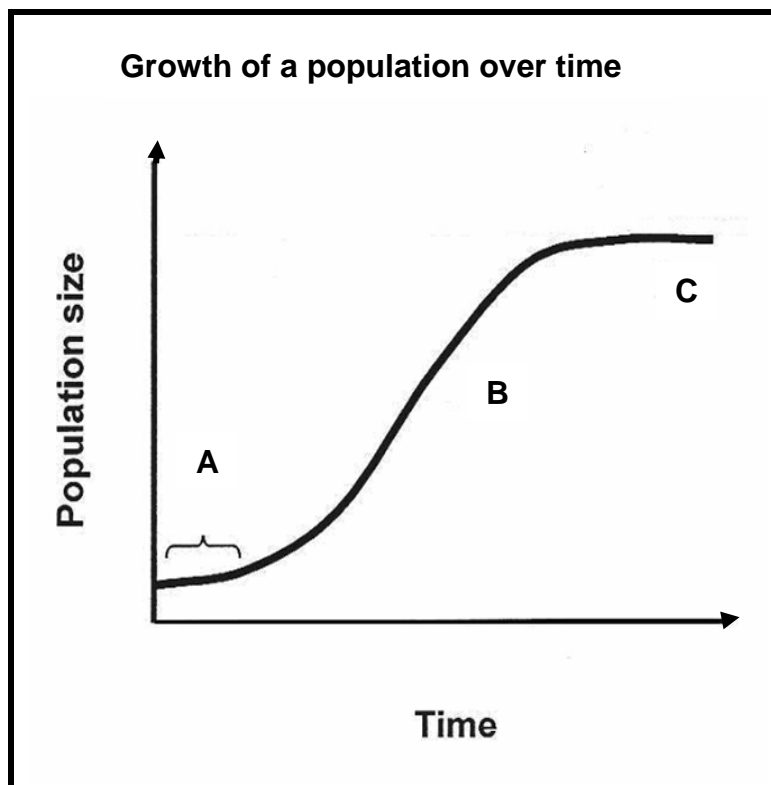
$$P = \frac{F \times S}{M}$$

- F = Number caught in the first sample  
 S = Number caught in the second sample  
 M = Number marked in the second sample

Show ALL working.

(3)  
(7)

- 3.2 Study the graph below showing the growth of a population over a period of time.



- 3.2.1 Identify the growth form indicated by the graph above. (1)
- 3.2.2 Identify the phases labelled **A**, **B** and **C**. (3)
- 3.2.3 Write down the letter (**A**, **B** or **C**) of the phase in the above graph which illustrates rapid growth. (1)
- 3.2.4 Explain why the population size at **C** stayed constant. (3)
- 3.2.5 Give TWO reasons why the population growth at **A** was slow. (2)
- (10)**



3.3 Study the case study below and answer the questions that follow.

**TENSIONS AND ISSUES AROUND MINING AT MTUNZINI**

Plans are in place for 2 800 ha of forestry and farming land, just outside the North Coast town of Mtunzini in KwaZulu-Natal, to be mined for minerals such as zircon, ilmenite and rutile. These valuable minerals are used in everyday products from paint, pigment and toothpaste to titanium golf clubs.

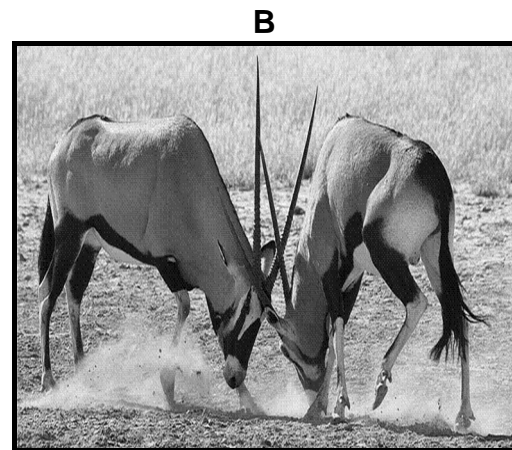
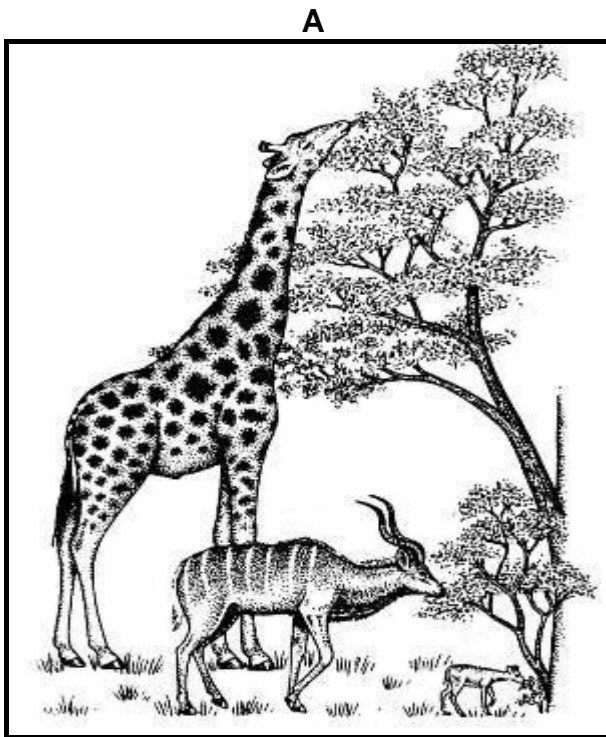
Tension is rising between some Mtunzini residents and the mining firm, Exxaro KZN Sands, over whether mining should take place there.

One group of residents accused Exxaro of being environmentally unfriendly. Another group of residents, such as amakhosi and leaders from the tribal areas, supported the project saying that mining would have positive spin-offs for the community.

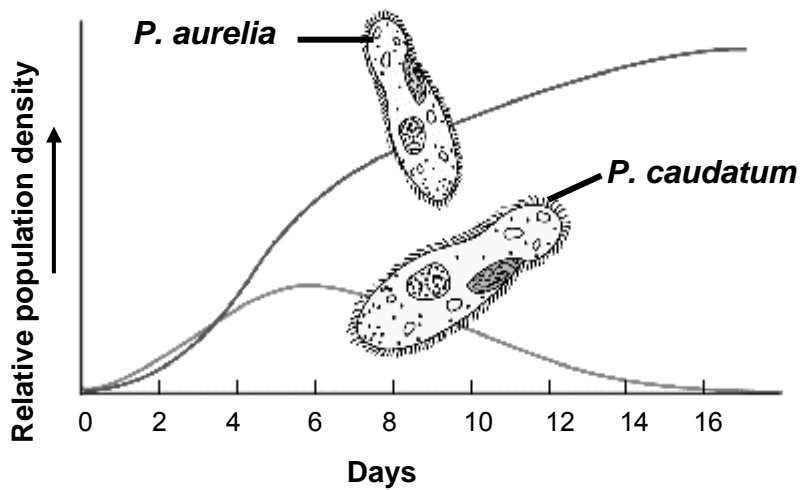
[Adapted from *Sunday Tribune*, 15 May 2011]

- 3.3.1 Name the THREE different role players/stakeholders involved in the issue above. (3)
- 3.3.2 State TWO advantages and TWO disadvantages of mining activities at Mtunzini. (4)
- (7)**

3.4 Study the pictures and a graph below showing community interactions and answer the questions that follow.



**C** Changes in the population density of two *Paramecium* species in the same habitat over time



3.4.1 Name the following:

- (a) Community interaction represented in **A**
- (b) Type of competition represented in **B**
- (c) Community interaction represented in **C**

(3)

3.4.2 Describe the community interaction represented in **A**.

(3)

(6)

[30]

**TOTAL SECTION B: 60**

**SECTION C****QUESTION 4**

- 4.1 Study the table below showing changes in the human population size of the world from 1650 to 1950 and projected to 2050.

Year	Human population size (millions)
1650	500
1750	750
1850	1 000
1950	2 010
2050	8 000

- 4.1.1 Use the information in the table to plot a line graph. (6)
- 4.1.2 From your graph determine the following:
- (a) The population size in the year 2000 (2)
- (b) The time taken for the human population to double for the first time (2)
- 4.1.3 Give TWO reasons why it is important for any country to understand how the population will grow in the future. (2)
- (12)**

4.2 Sipho did an investigation in his laboratory to look at the effect of different concentrations of auxin on cell elongation in coleoptiles (young stems). He used the following procedure:

- Fifteen (15) coleoptiles from one species of oat plants were used.
- All the coleoptiles used were of the same length.
- The tips of twelve (12) coleoptiles were cut.
- These coleoptiles were put into four groups (A, B, C and D). Each group of three coleoptiles was injected with a different concentration of auxin as shown in the table below.
- The last group (E) was used as a control in which the coleoptiles were not injected with auxin and tips were not cut.

After four days the length of coleoptiles in each group were measured and an average was calculated.

GROUP	TREATMENT		AVERAGE LENGTH OF COLEOPTILE (mm)
	TIP (PRESENT/ ABSENT)	CONCENTRATION OF AUXIN INJECTED (ARBITRARY UNITS)	
A	Absent	1	36
B	Absent	2	60
C	Absent	3	32
D	Absent	4	24
E	Present	0	30

4.2.1 Formulate a hypothesis for the investigation above. (3)

4.2.2 Suggest why Sipho cut off the tips of each coleoptile before he injected them with auxin. (2)

4.2.3 Apart from the factors that were kept constant, state ONE other factor that Sipho should have kept constant in all the groups. (1)

4.2.4 What conclusion can be drawn from the results, about the effect of auxin concentration on cell elongation in the coleoptiles? (2)  
(8)

4.3 Describe how the principle of negative feedback operates in controlling the glucose concentration of the blood in a normal healthy person. Also describe the causes, symptoms and management of the disease diabetes mellitus which results from an inability of the body to normalise the glucose concentration of the blood. (17)  
Content (3)  
Synthesis (20)

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

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