



# 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 2012**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 18 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 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. 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 a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.

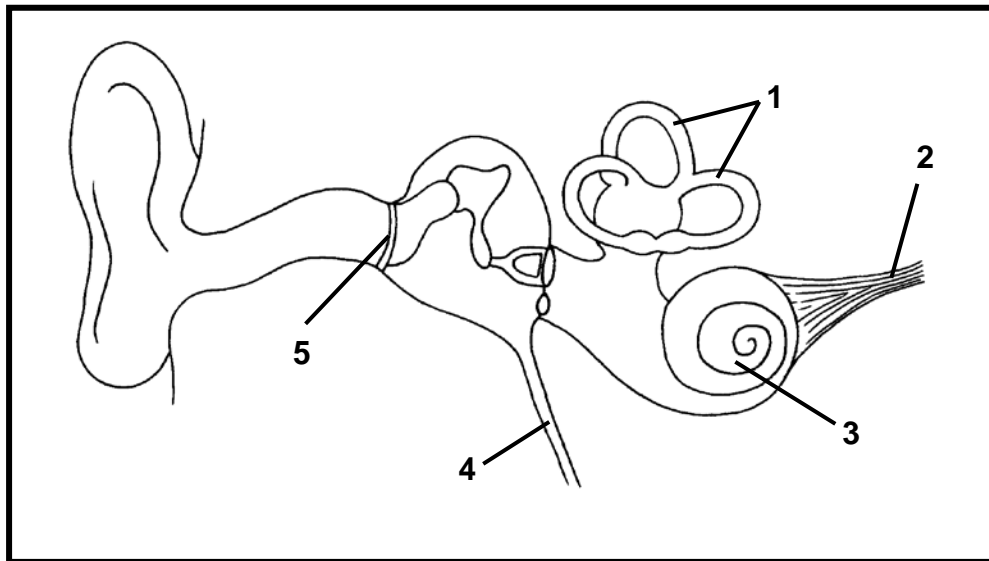
## SECTION A

### 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 An area of bushland is destroyed in a storm. The process by which the bush vegetation will re-establish itself is called ...
- A primary succession.
  - B secondary succession.
  - C competitive exclusion.
  - D evolutionary succession.
- 1.1.2 During oogenesis four haploid cells are formed. How many of these haploid cells develop into an ovum/ova?
- A 4
  - B 2
  - C 3
  - D 1
- 1.1.3 Which ONE of the following is an example of commensalism?
- A A pollinating insect visiting a flower
  - B A caterpillar feeding on a leaf
  - C A tapeworm living in the intestine of a pig
  - D An epiphyte, such as an orchid, growing on the branch of a tree for support only

QUESTIONS 1.1.4 and 1.1.5 refer to the diagram below, which shows the structure of the human ear.



1.1.4 Which part is responsible for balance?

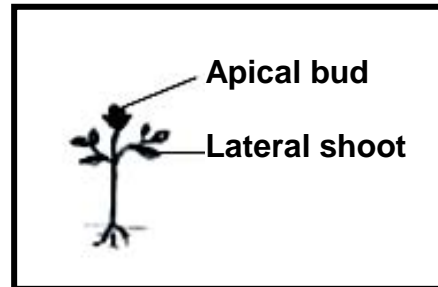
- A 3
- B 1
- C 4
- D 5

1.1.5 Which part contains the organ of Corti?

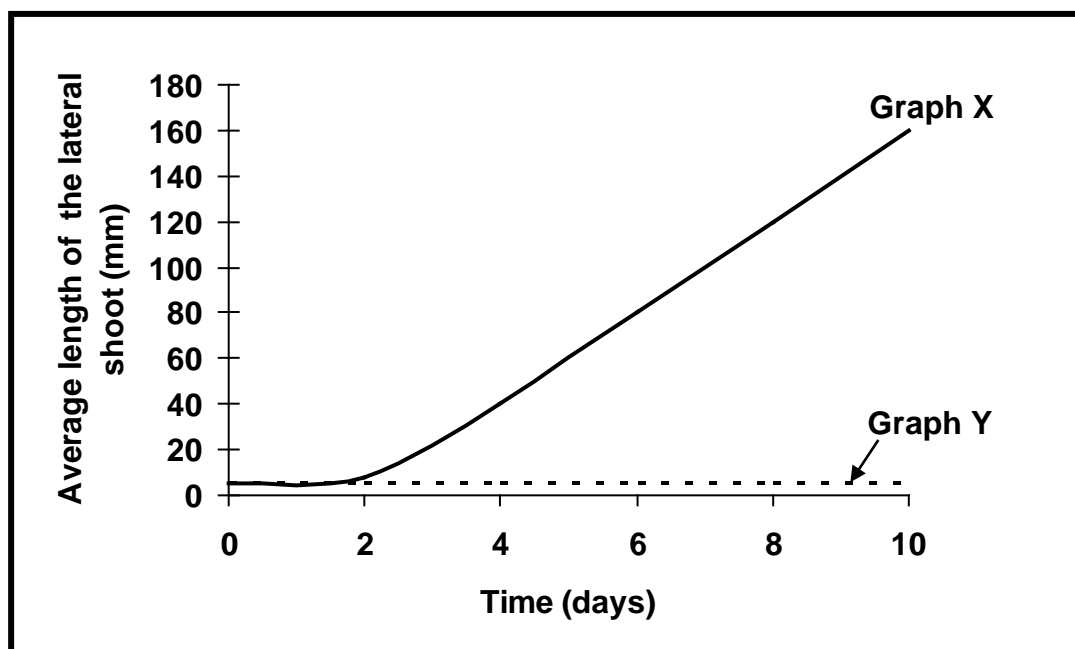
- A 1
- B 2
- C 3
- D 4

QUESTIONS 1.1.6 and 1.1.7 refer to the information below.

The diagram below shows the position of the lateral shoot and the apical bud in a plant.



A learner investigated the growth of lateral shoots in bean plants. Two groups of 20 plants were used. One group had their apical buds removed and the other group was left unchanged. Every two days the total length of the lateral shoots was measured and the average lateral shoot length calculated for each group. The result for each group is shown in the graph below.



1.1.6 From this data you may reasonably conclude that ...

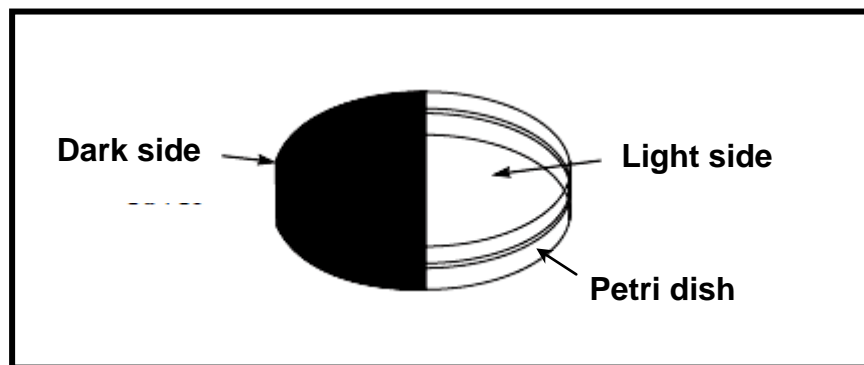
- A Graph X represents the group that had their apical buds removed.
- B roots produce a substance that stimulates lateral shoot growth.
- C Graph Y represents the group that had their apical buds removed.
- D lateral shoots produce a substance that stimulates apical bud growth.

1.1.7 The conclusion drawn from the above results would NOT be valid if ...

- A a large sample was used.
- B apical buds were not removed from all 40 plants.
- C the plants used were not identical to each other.
- D the measurement of growth of the lateral buds was done in millimetres instead of centimetres.

QUESTIONS 1.1.8 and 1.1.9 refer to the investigation below.

An investigation to demonstrate the response of woodlice to light was carried out in a petri dish. Half the petri dish was covered with black paper and the other half left in light as shown in the diagram below.



Ten woodlice were introduced into the petri dish. The number of woodlice in each side was counted for ten minutes every two minutes. The results are shown in the table below.

Time (minutes)	Number of woodlice	
	Dark side	Light side
2	6	4
4	7	3
6	7	3
8	8	2
10	10	0

1.1.8 Which of the following represents a hypothesis that can be supported by the data in the table?

- A There will be fewer woodlice in the dark side than in the light side.
- B There will be more woodlice in the dark side than in the light side.
- C The investigation is done to determine the response of woodlice to light conditions.
- D There will be the same number of woodlice in the dark side and the light side.

1.1.9 The dependent variable in this investigation is the ...

- A light and dark side.
- B time in minutes.
- C number of woodlice in the light or dark side.
- D dark side.

1.1.10 When the pupil of the human eye constricts, the receptor and effector are respectively the ...

- A yellow spot/fovea and the ciliary muscle.
- B pupil and the ciliary muscle.
- C pupil and the radial muscle of the iris.
- D yellow spot/fovea and ciliary muscle of the iris. (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 to 1.2.7) in your ANSWER BOOK.

1.2.1 The structure into which the ovary develops after fertilisation in angiosperms

1.2.2 The type of development in birds where the young are incapable of moving around after hatching

1.2.3 The first organisms to occupy an uninhabited area

1.2.4 Compares human demands with the planet's ecological carrying capacity to meet those demands

1.2.5 The fibrous outgrowths of a neuron that transmits nerve impulses to the cell body of the same neuron

1.2.6 A phenomenon where an increase in one hormone inhibits the secretion of another hormone

1.2.7 A disease in which the hormonal control of blood glucose is defective because of a deficiency of insulin **(7)**

- 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 to 1.3.7) in your ANSWER BOOK.

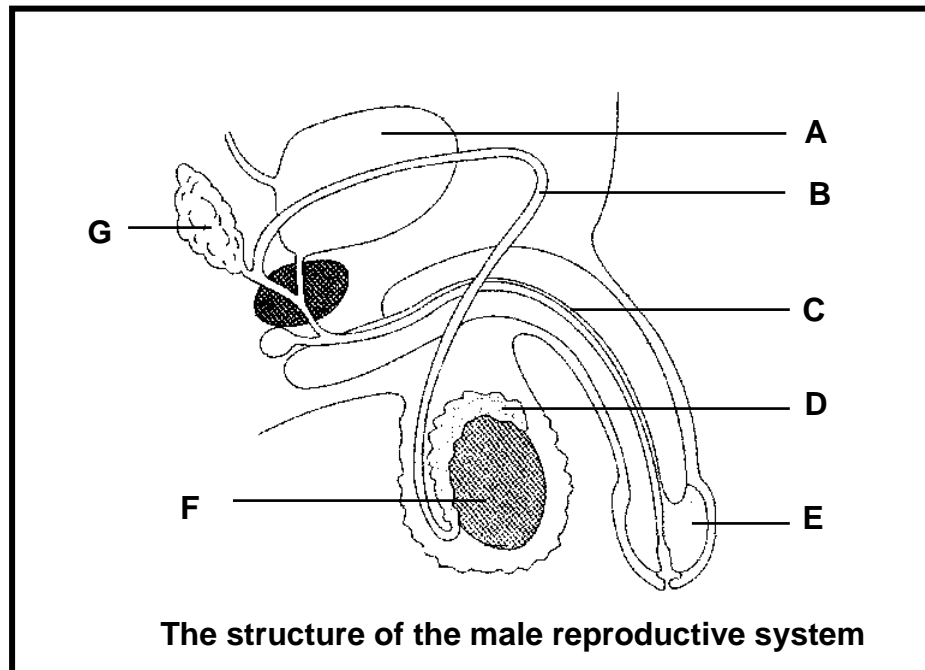
COLUMN I	COLUMN II
1.3.1 Method of reproduction in which the foetus is nourished through an umbilical cord	A: Ovipary B: Vivipary
1.3.2 Hormone secreted by the pituitary gland/hypophysis	A: Aldosterone B: FSH
1.3.3 The direct technique of determining the population size	A: Mark recapture B: Simple sampling
1.3.4 Social organisation that enhances the survival of a species	A: Formation of flocks B: Division of labour in a colony
1.3.5 The sporophyte generation is the dominant generation	A: Moss B: Angiosperm
1.3.6 Hormone that remains at a high level during pregnancy	A: Progesterone B: FSH
1.3.7 Characteristic of wind-pollinated flowers	A: Brightly coloured petals B: Production of nectar

(7 x 2)

(14)



1.4 Study the diagram of the male reproductive system below.



1.4.1 Write down the LETTER (A to G) and the NAME of the following:

- (a) The part where meiosis takes place (2)
- (b) The part that transports semen and urine to the outside of the body (2)
- (c) The part where immature sperm cells are stored (2)

1.4.2 Name the male hormone that is responsible for the development of secondary sexual characteristics during puberty. (1)

1.4.3 Write down the LETTER (A to G) of the following:

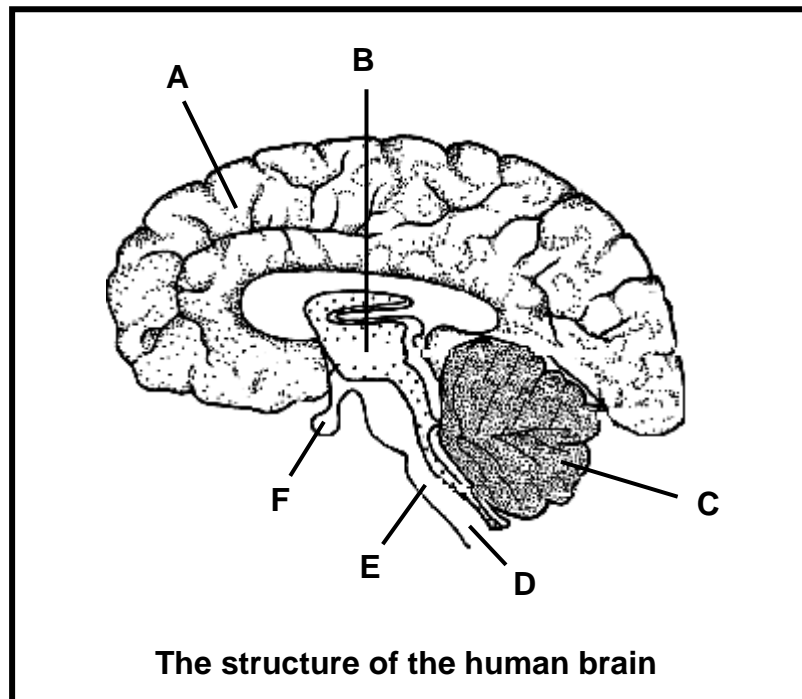
- (a) The part where the hormone mentioned in QUESTION 1.4.2 is produced (1)
  - (b) The part which is cut surgically during male sterilisation (1)
- (9)**

**TOTAL SECTION A: 50**

## SECTION B

### QUESTION 2

2.1 Study the diagram representing the structure of the human brain below.



2.1.1 Identify the parts labelled:

- (a) C (1)
- (b) E (1)

2.1.2 Write down the LETTER (A to F) of the part which controls body temperature. (1)

2.1.3 Explain how the body would be affected if the part labelled **F** did not secrete TSH. (4)  
(7)

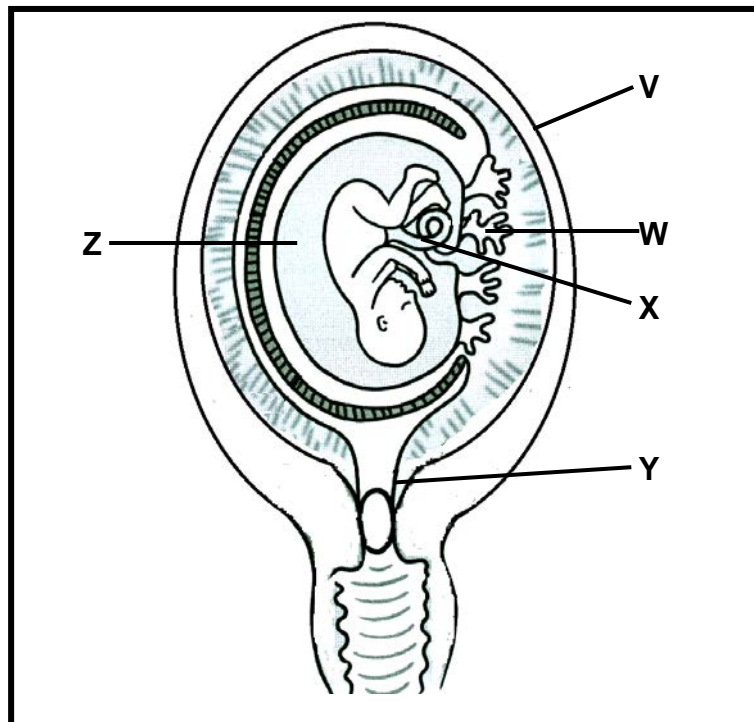
- 2.2 In an investigation a learner was asked to put a cotton thread through the eye of a needle 10 times with both eyes open and then with only the right eye open. This was done under the same light intensity and at a distance of 50 cm from the eyes.

The results are recorded in the table below.

TIME TAKEN TO THREAD THE NEEDLE in seconds (s)		
Attempts	Two eyes open	Only right eye open
1	12	38
2	12	35
3	10	37
4	11	36
5	9	34
6	9	33
7	10	30
8	8	31
9	7	29
10	7	28

- 2.2.1 Apart from the factors mentioned, state TWO other factors that had to be kept constant during the investigation. (2)
- 2.2.2 State a general conclusion that can be drawn for the results above. (2)
- 2.2.3 Give a reason why more than one attempt was made in this investigation. (1)
- 2.2.4 Describe the changes that would take place in the eye if the distance between the needle and the eye were reduced from 50 cm to 20 cm. (4)  
(9)

2.3 The diagram below represents a developing foetus in a human body.



2.3.1 Identify the parts labelled:

- (a) X (1)
- (b) Y (1)

2.3.2 State ONE function of the fluid labelled Z. (1)

2.3.3 Explain how the part labelled V is structurally suited to perform its function during the process of birth. (2)

2.3.4 Name TWO systems in the baby's body that take over the functions of part W once the baby is born. (2)

2.3.5 Explain what prevents another ovum from being produced while the foetus is developing in a human body. (2)

2.4 Describe how the human skin maintains the core body temperature on a day when the environmental temperature is around 40 °C. (5)

[30]

### QUESTION 3

- 3.1 The table below illustrates the data collected during an investigation to determine the changes in the population size of impala in a nature reserve.

Year	Number of impala
2000	6
2001	10
2002	18
2003	36
2004	63
2005	79
2006	101
2007	95
2008	100
2009	93

- 3.1.1 Use the data in the table to plot a line graph to show the population growth form of the impala over the 10-year period. (7)
- 3.1.2 What type of growth form is illustrated by the graph? (1)
- 3.1.3 Describe ONE characteristic of the growth form named in QUESTION 3.1.2. (2)
- 3.1.4 Name the phase from 2000 to 2002 illustrated in the graph. (1)
- 3.1.5 Explain the pattern of growth in the phase mentioned in QUESTION 3.1.4. (2)
- 3.1.6 An eland population was introduced into the same nature reserve in the year 2000. The eland and impala feed on the leaves of the same trees. Adult impala are smaller and shorter than adult eland.
- (a) Explain why the impala and the eland are not in competition with each other, although they feed on the same food source. (2)
- (b) Name the interaction explained in QUESTION 3.1.6(a). (1)
- (16)**

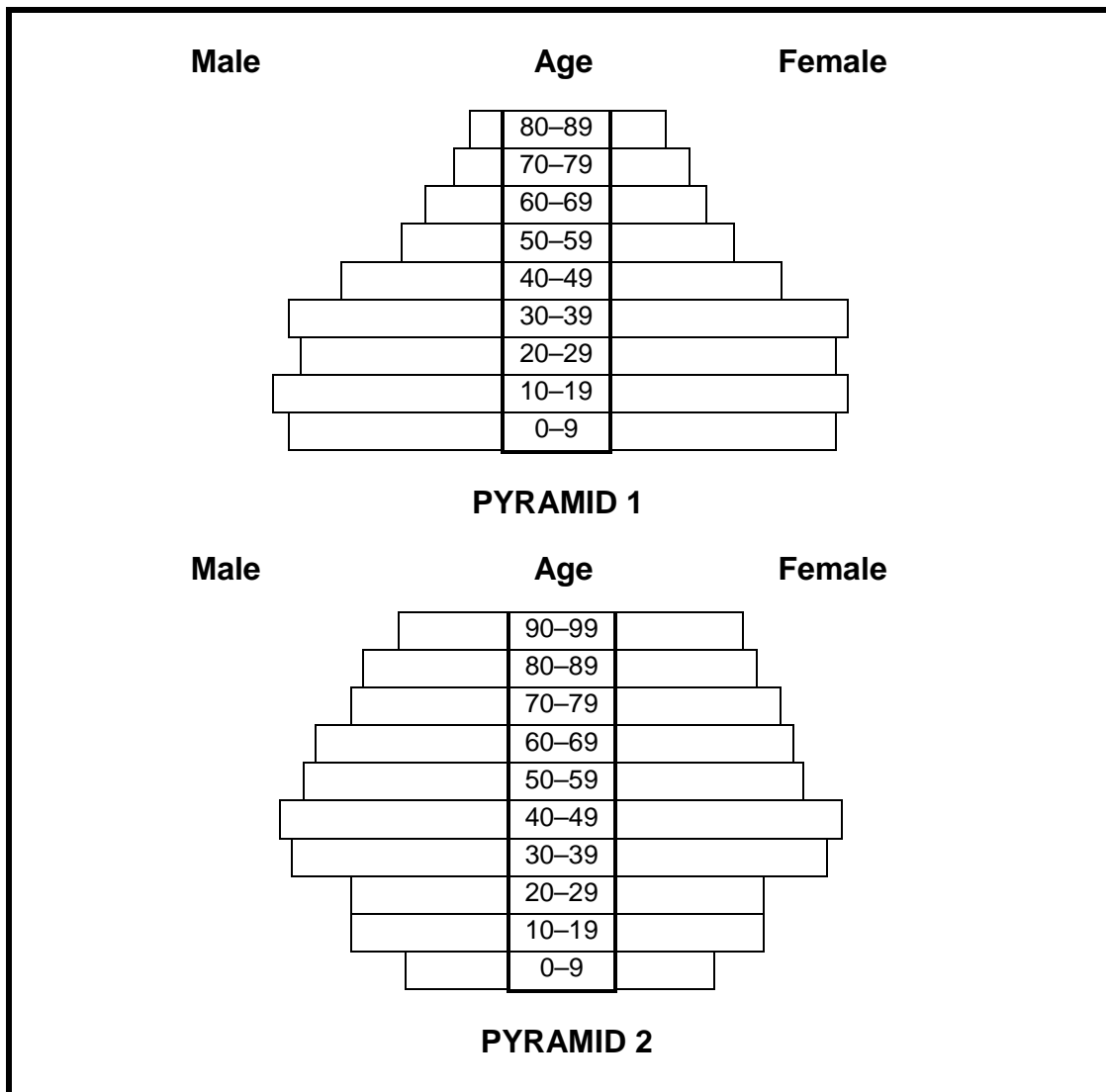
- 3.2 The table below compares the human population size of three different continents in the year 2000.

Continent	Population in the year 2000 (millions)	Birth rate (per 1 000 people)	Death rate (per 1 000 people)	Doubling time (years)
Africa	869	45	16	24
Asia	3 562	28	10	39
Europe	509	13	10	240

[Adapted from *Biology for Higher Tier*, Brian Beckett, RoseMarie Gallagher, 2001]

- 3.2.1 Using the information in the table above, calculate the percentage increase of the human population in Africa in a year. Show ALL working. (3)
- 3.2.2 If the doubling time stays the same, in which year will the population size of the year 2000 double in Europe? (1)
- 3.2.3 Give THREE possible reasons why the death rate in Africa is the highest. (3)  
(7)

- 3.3 Study the age-gender pyramids below representing a developing country and a developed country. Both pyramids have been drawn to the same scale.



- 3.3.1 Which pyramid (**1** or **2**) represents a developed country? (1)
- 3.3.2 Tabulate TWO differences between PYRAMID 1 and PYRAMID 2 with respect to life expectancy and the birth rate. (5)
- 3.3.3 Give ONE reason why it is important for a country to know the age and gender structure of its population. (1)
- (7)
- [30]

**TOTAL SECTION B: 60**

## SECTION C

### QUESTION 4

4.1 Read the passage below and answer the questions that follow.

#### TO CULL OR NOT TO CULL

Elephants are known to damage more vegetation than any other herbivore. In the Kruger National Park damage to trees by elephants is evident. From elsewhere in Africa it is also known that destruction of woodlands takes place where elephant numbers increase.

Should culling of elephants occur to stop elephant numbers increasing to a point where damage of vegetation could reduce the biodiversity in the Kruger National Park?

The park's scientists suggested that culling should take place. The following points were discussed before any decision about culling was made:

- Culling undertaken up to 1994 had not stopped the declining density of large trees in the Kruger National Park.
- If elephant numbers are allowed to increase to carrying capacity, limited food and other factors will eventually slow down the growth rate of the elephant population.
- The destruction of woodlands elsewhere in Africa, with high elephant numbers, did not result in threats to biodiversity.
- The distribution of elephants in the Kruger National Park, rather than the size of the population, will affect biodiversity. The installation of artificial watering points throughout the park has distributed the elephant population across the park. Trees far away from rivers have become the targets of elephants. Removing the artificial watering points could therefore limit the damage to trees such as baobabs and marulas.
- The impact of global warming suggests that many plant and animal species currently found in the Kruger National Park will not survive there within a few decades. The culling of elephants to save them is therefore ineffective.

[Adapted from *Department of Environmental Affairs and Tourism Report, 2006*]

4.1.1 What is meant by each of the following terms:

- (a) Culling (2)
- (b) Carrying capacity (2)

4.1.2 What evidence from the above passage shows the following:

- (a) Scientists are blaming themselves for the elephants' damaging trees in the Kruger National Park (2)
- (b) Elephants are not the only threat to the reduction of biodiversity (1)

4.1.3 Give TWO explanations why some people object to the culling of elephants.

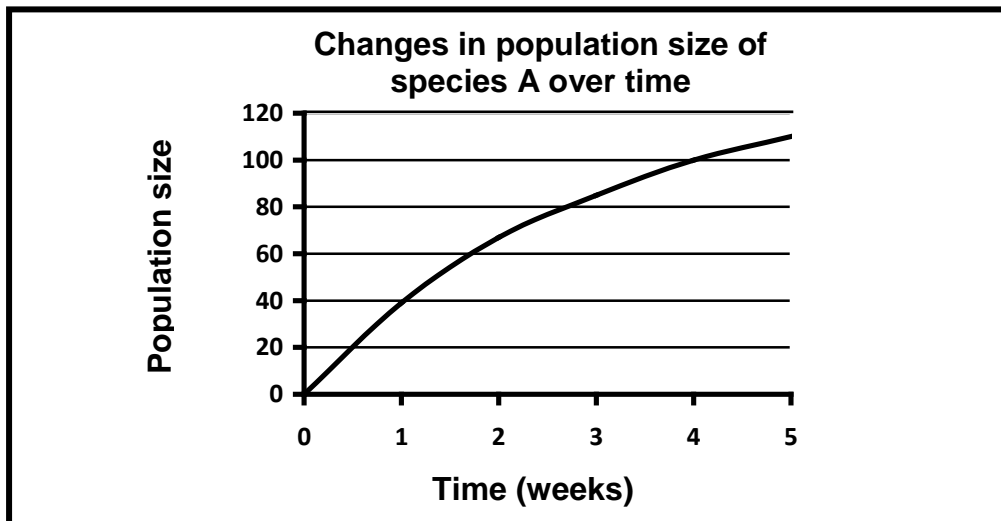
(4)  
(11)



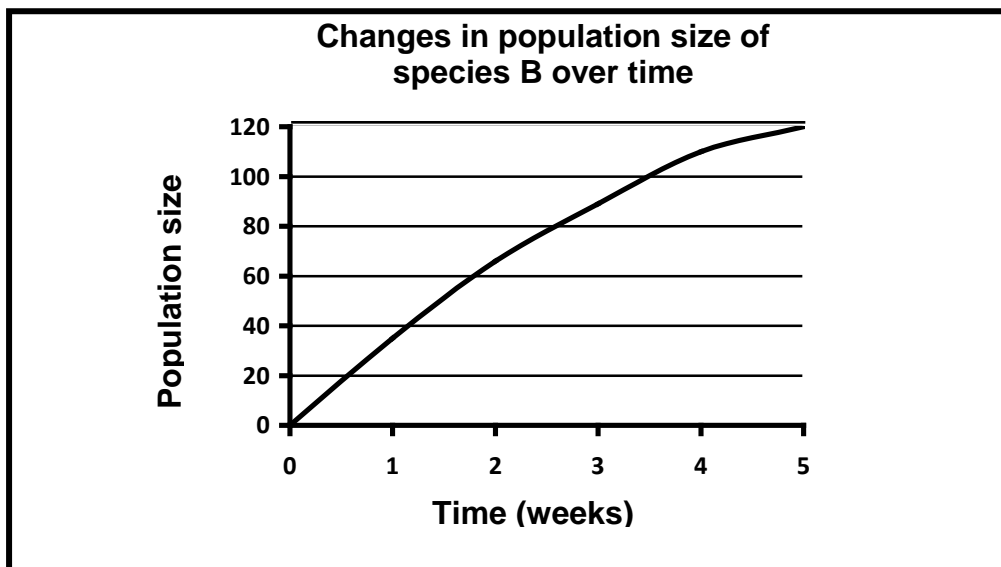
- 4.2 The growth patterns of two closely related species (**A** and **B**) that rely on the same food source were investigated. At first the two species were separated and then the two species were kept in the same habitat for the same period of time. In all cases the organisms were provided with a limited food supply.

The results are shown in the three graphs (**A**, **B** and **C**) below.

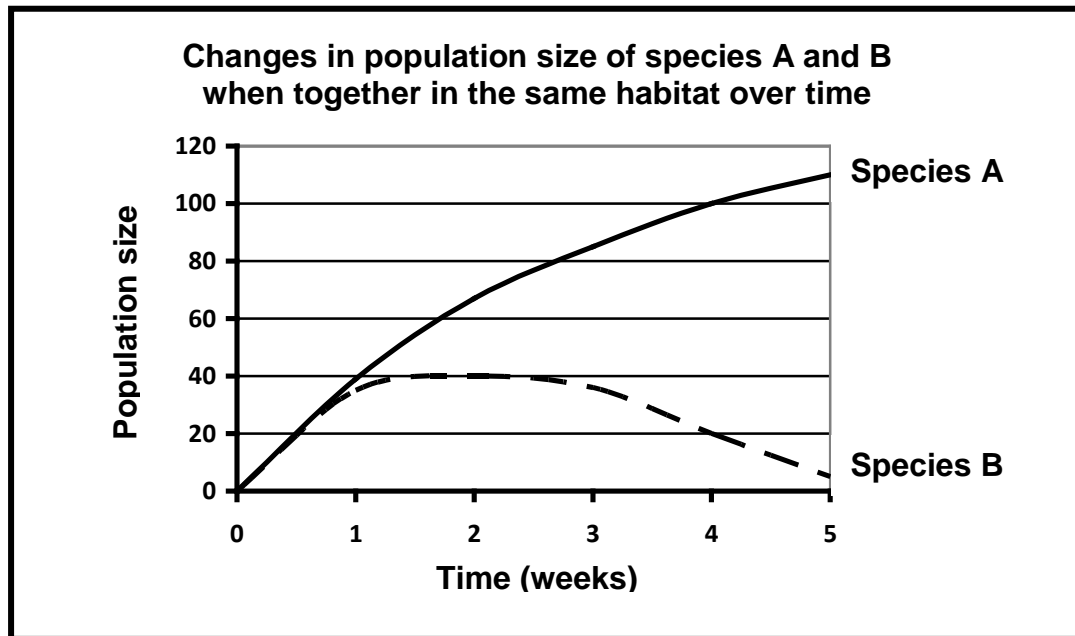
**GRAPH A**



**GRAPH B**



### GRAPH C



4.2.1 State the type of community interaction illustrated in GRAPH C. (1)

4.2.2 Use GRAPHS A, B and C to explain the growth patterns of species A and species B when separated, compared to the growth patterns of species A and B together in the same habitat. (6)

4.2.3 Explain how the growth patterns of the two species in GRAPH C might change if more food is provided while they are living together in the same habitat. (2)  
(9)

4.3 The nervous and endocrine systems help to protect the human body. Use suitable examples to describe how this is achieved through a reflex action and by the hormone adrenalin.

Content: (17)  
Synthesis: (3)  
(20)

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

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