



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

FEBRUARY/MARCH 2013

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

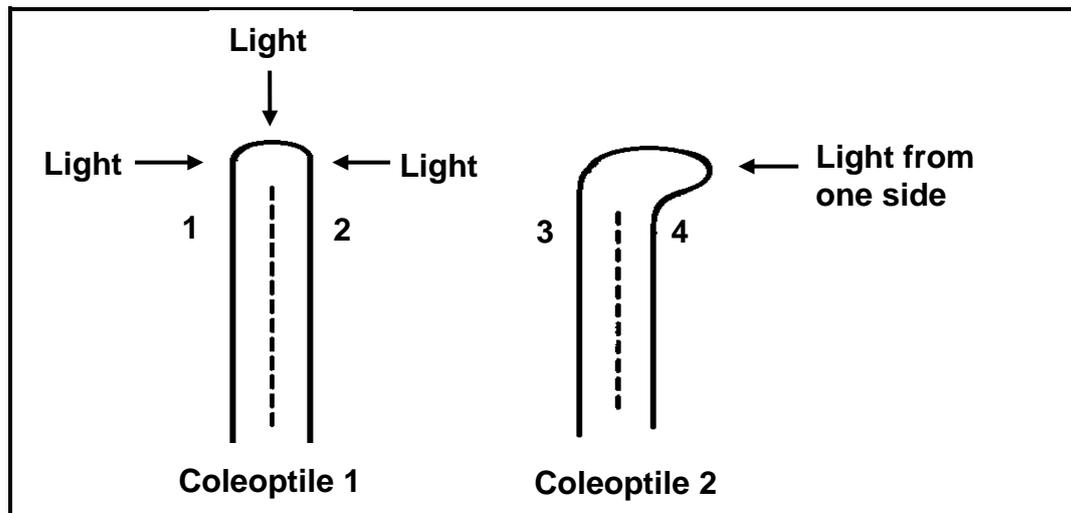
1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them 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 drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and 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 the ANSWER BOOK, for example 1.1.11 D.

- 1.1.1 Insects are attracted to a flower by its ...
- A sepals.
 - B petals.
 - C anthers.
 - D carpels.
- 1.1.2 Which ONE of the following statements about sexual reproduction is CORRECT?
- A Spores are produced by the fusion of two haploid gametes.
 - B Offspring are genetically identical to their parents.
 - C Diploid gametes are produced by mitosis.
 - D Fertilisation results in the formation of a diploid zygote.
- 1.1.3 The net change in a population could be determined by ...
- A adding births and deaths and subtracting emigration and immigration.
 - B adding births and immigration and subtracting deaths and emigration.
 - C adding births and emigration and subtracting deaths and immigration.
 - D adding deaths and immigration and subtracting births and emigration.
- 1.1.4 Drinking a large volume of water will lead to ...
- A increased production of ADH and kidney tubules becoming more permeable to water.
 - B decreased production of ADH and kidney tubules becoming less permeable to water.
 - C increased production of ADH and kidney tubules becoming less permeable to water.
 - D decreased production of ADH and kidney tubules becoming more permeable to water.
- 1.1.5 Sensory data supplied to the cerebellum is used to ...
- A initiate voluntary movement.
 - B coordinate motor movement.
 - C provide conscious information on muscular movement.
 - D control reflexes of the gut and blood system.

QUESTIONS 1.1.6 AND 1.1.7 REFER TO THE DIAGRAM BELOW.



1.1.6 Which growth hormone is most abundant in the tips of these coleoptiles/shoots?

- A Gibberellin
- B Abscisic acid
- C Auxin
- D Cytokinin

1.1.7 After light exposure from one side for several hours, where will the highest percentage of growth hormone referred to in QUESTION 1.1.6 most likely occur?

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

1.1.8 The following events occur during a reflex action:

- 1 The effector produces a response.
- 2 A sensory organ is stimulated.
- 3 An impulse passes along a sensory neuron.
- 4 An impulse passes along a motor neuron.

Which of the following represent these events in the CORRECT sequence?

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

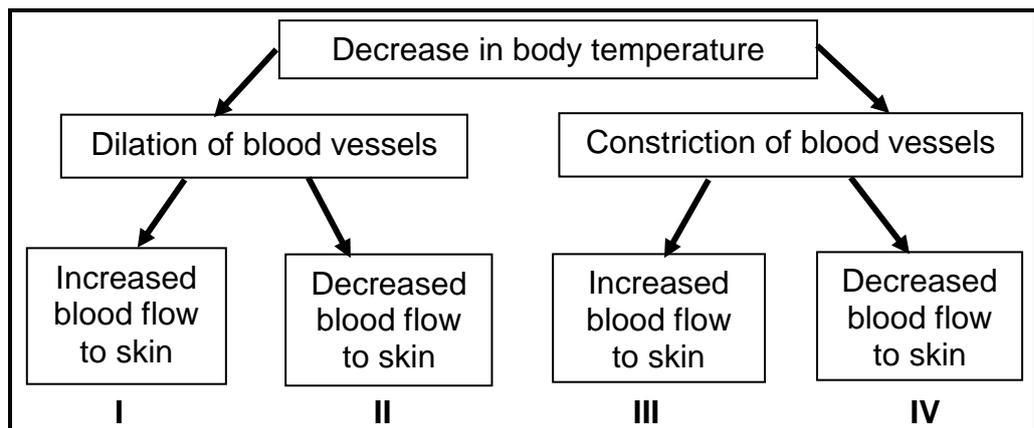
1.1.9 Four species of kangaroo were studied in their natural environment and were found to have the following food preferences:

SPECIES	FOOD PREFERENCE
I	Ants
II	Shoots and leaves
III	Ants
IV	Berries and roots

Competition is likely to be the greatest between species ...

- A I and II.
- B I and III.
- C II and IV.
- D III and IV.

1.1.10 When there is a decrease in human body temperature, which ONE of the following pathways shows the CORRECT response by blood vessels in the skin?



- A I
- B II
- C III
- D IV

(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 1.2.8) in the ANSWER BOOK.

- 1.2.1 A group of plants that colonise land that has never been occupied before
- 1.2.2 The type of development in birds where the young are incapable of moving around soon after hatching
- 1.2.3 The changes that occur in the life cycle of an insect
- 1.2.4 A habitat where all the living organisms and abiotic factors interact with each other
- 1.2.5 A community interaction where the competing species coexist in the same habitat since they use the resources in slightly different ways
- 1.2.6 A symbiotic relationship in which both species benefit from the association
- 1.2.7 The maximum number of individuals that can be supported by an environment under prevailing conditions
- 1.2.8 The movement of a part of a plant in response to gravity

(8)

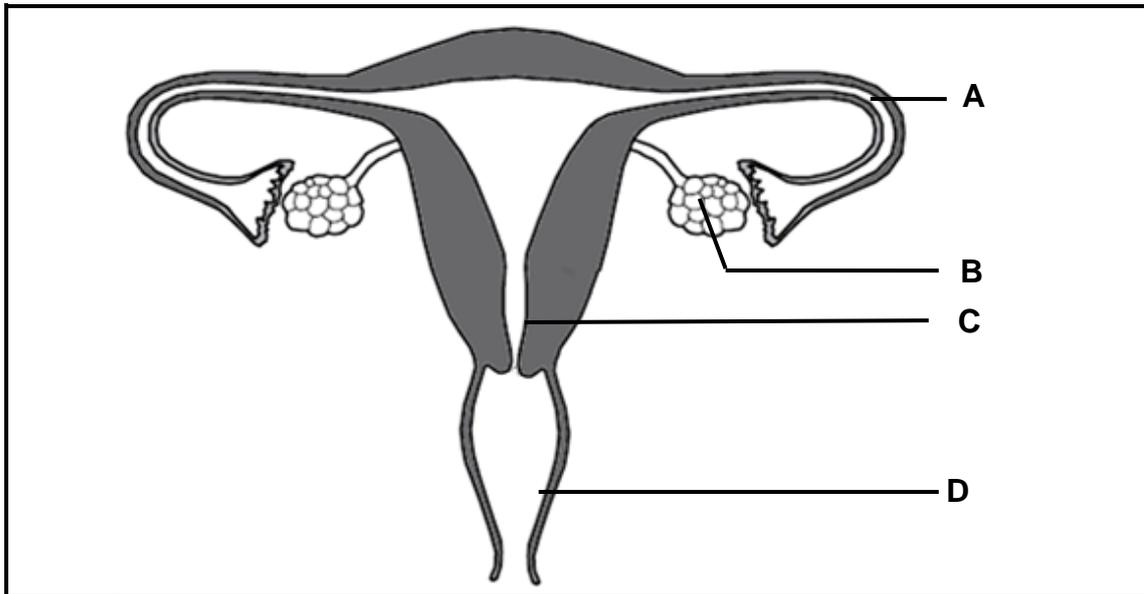
1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.7) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Competition between different species	A: Intraspecific B: Interspecific
1.3.2 Failure to regulate the core body temperature in cold conditions	A: Hypothermia B: Hyperthermia
1.3.3 The direct technique of determining population size	A: Simple sampling B: Mark recapture
1.3.4 Organisms that obtain their energy from plant and animal remains	A: Producers B: Decomposers
1.3.5 Limiting factor(s) for population growth	A: Food B: Water
1.3.6 Social organisation that increases the chances of survival	A: Hunting in packs B: Formation of herds or flocks
1.3.7 The stigma of this flower is large and feathery, and hangs outside the flower	A: Insect-pollinated B: Wind-pollinated

(7 x 2)

(14)

1.4 The diagram below shows the structure of the female reproductive system.



Give the LETTER and NAME of:

- 1.4.1 The part that breaks down when the levels of progesterone and oestrogen drop (2)
- 1.4.2 The part that plays a role during copulation (2)
- 1.4.3 The part where the zygote will be formed (2)
- 1.4.4 The part where the Graafian follicles develop (2)

(8)

TOTAL SECTION A: 50

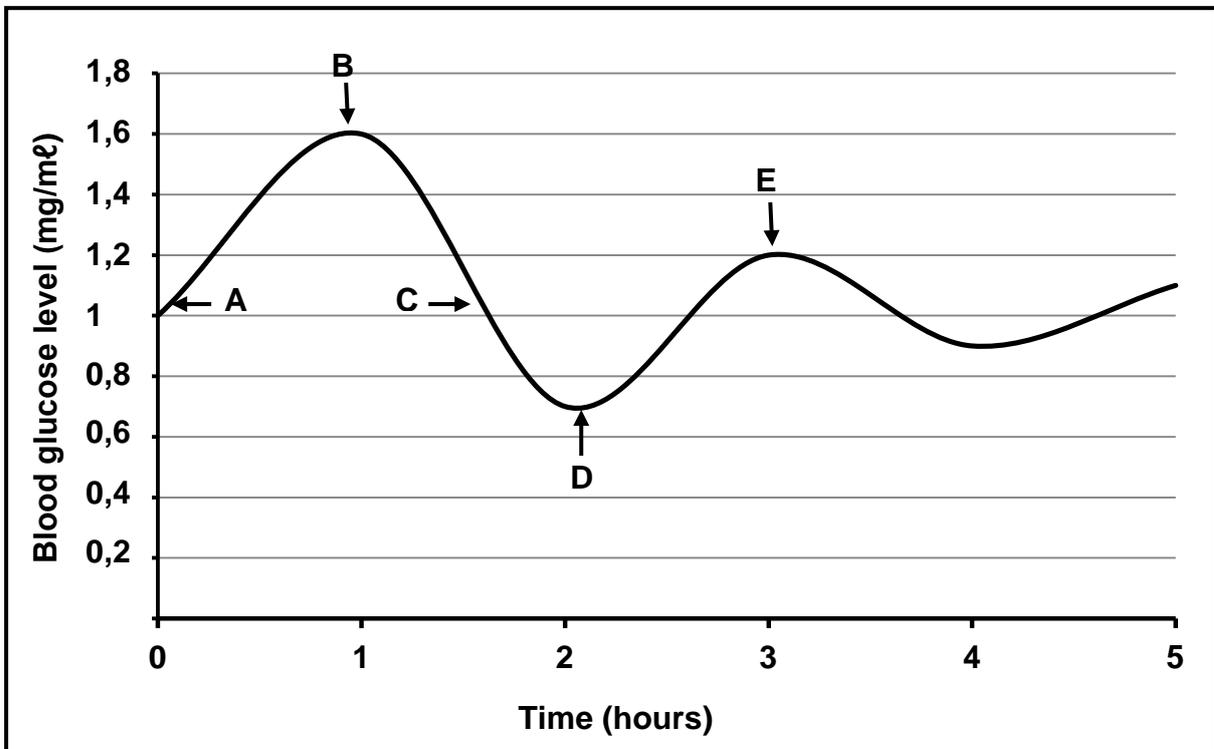
SECTION B**QUESTION 2**

- 2.1 Study the information in the table below showing the growth of a foetus in the uterus of a woman.

AGE OF FOETUS (MONTHS)	LENGTH OF FOETUS (mm)
1	10
2	45
3	90
4	165
5	245
6	300
7	350
8	380
9	405

- 2.1.1 Between which TWO months did the foetus grow the most? (2)
- 2.1.2 Draw a line graph to represent the data from the table above. (7)
- 2.1.3 State ONE general conclusion that can be drawn from the data about the growth of the foetus in the uterus. (2)
- 2.1.4 State TWO functions of the amniotic fluid that surrounds the foetus during its development. (2)
- 2.1.5 Name and describe the stage that signals the start of the natural birth process once the foetus is fully developed. (3)
(16)
- 2.2 A young couple, who already have three children, are planning to use contraceptives. They do not know which options for contraception are available.
- 2.2.1 Give ONE reason why this couple may not want to have any more children. (1)
- 2.2.2 Name any TWO barrier methods they can use for contraception. (2)
(3)

- 2.3 The blood glucose level is regulated by hormones. The human body attempts to maintain a glucose concentration of approximately 1 mg per ml of blood. The graph below shows the fluctuations in an individual's blood glucose level over a five-hour period.



- 2.3.1 From the information above and your knowledge of hormones, name the hormone released at:

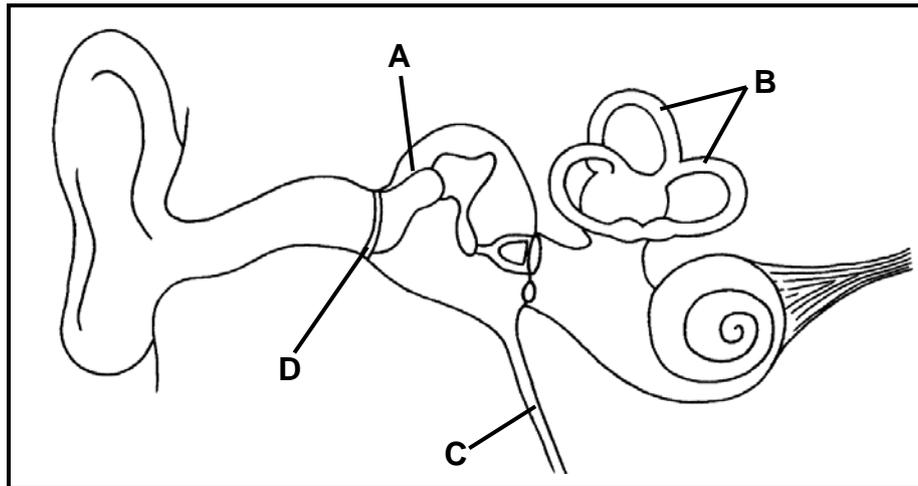
(a) **B** (1)

(b) **D** (1)

- 2.3.2 The individual ate a meal at point **D**. Explain the pattern of the graph for the next two hours. (4)

(6)

2.4 The diagram below shows a cross section through the human ear.



2.4.1 Identify part:

(a) **B** (1)

(b) **C** (1)

2.4.2 What does structure **A** consist of? (1)

2.4.3 Explain what would happen if structure **D** had a hole in it. (2)

(5)
[30]

QUESTION 3

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

SOCIAL ORGANISATION IN NAKED MOLE RATS

Naked mole rats (*Heterocephalus glaber*) are burrowing rodents, found in East Africa. They have no fur (naked) and they have a lack of pain sensation in their skin.

Colonies of 70–80 live together in a burrow system. They have one breeding female (the queen) and only she and two or three males reproduce. The queen prevents other females from breeding by being very aggressive towards any other females who behave like a queen. The rest of the colony is workers. The workers are divided into classes, who carry out different functions. Some work on building tunnels and some are 'soldiers' that protect the colony from outsiders and predators.

Explain the following:

3.1.1 ONE disadvantage of having only one breeding female in the colony (2)

3.1.2 ONE advantage of the different workers carrying out different functions (2)
(4)

3.2 A study was carried out to establish the size of a mouse population in a field.

- Small mammal traps were used and 50 mice were captured.
- These mice were each tagged with a metal tag and released.
- The tagged mice were then free to mix with the rest of the population.
- A week later 120 mice were captured from the same area. Of these, only 12 mice carried a metal tag.

3.2.1 Use the following formula to estimate the total population of mice in the field.

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

Where:

P = The estimated number of mice in the field

F = The number of mice caught and marked in the first catch

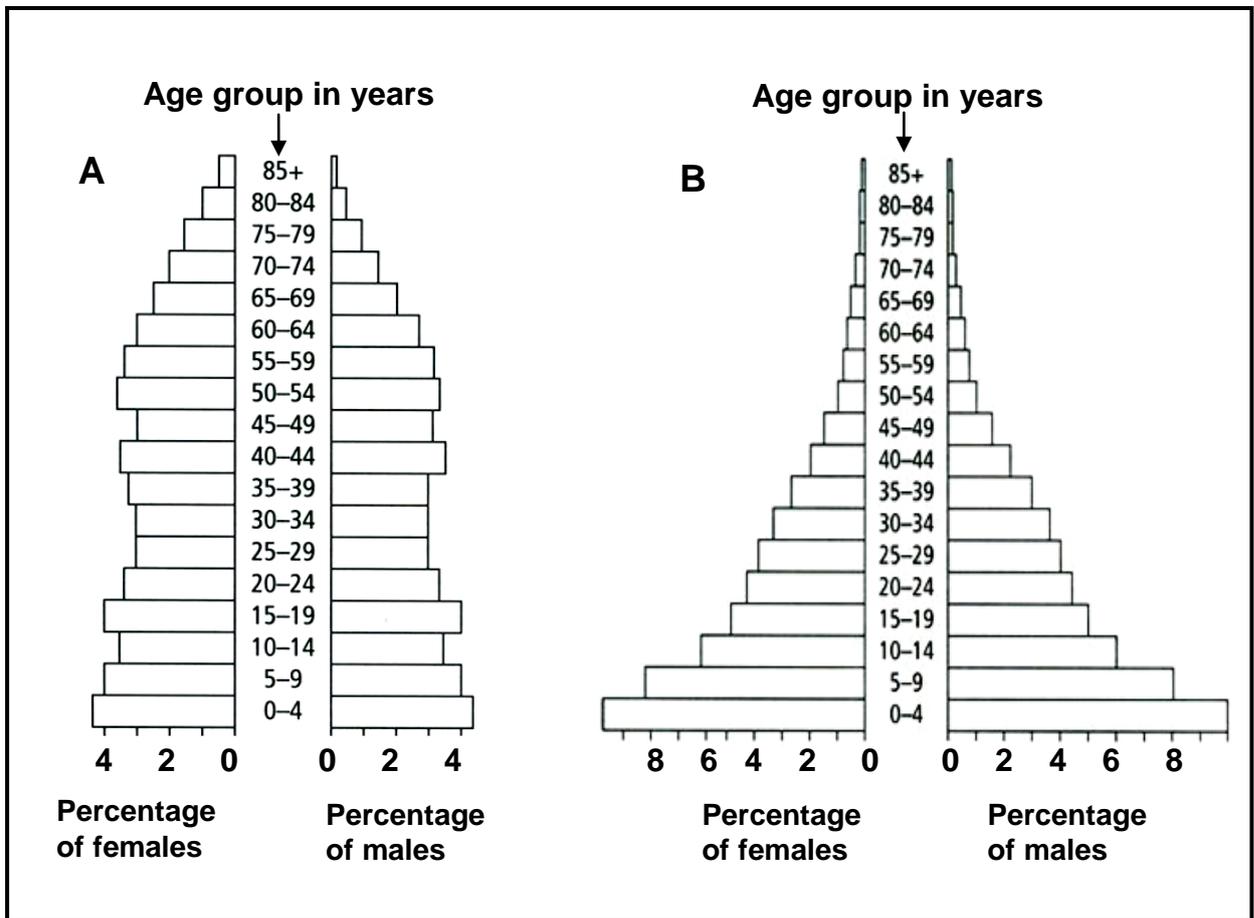
S = The number of mice caught in the second catch

M = The number of marked mice in the second catch (3)

3.2.2 State TWO precautions that should be taken in capturing and tagging the mice to ensure validity of the procedure. (2)

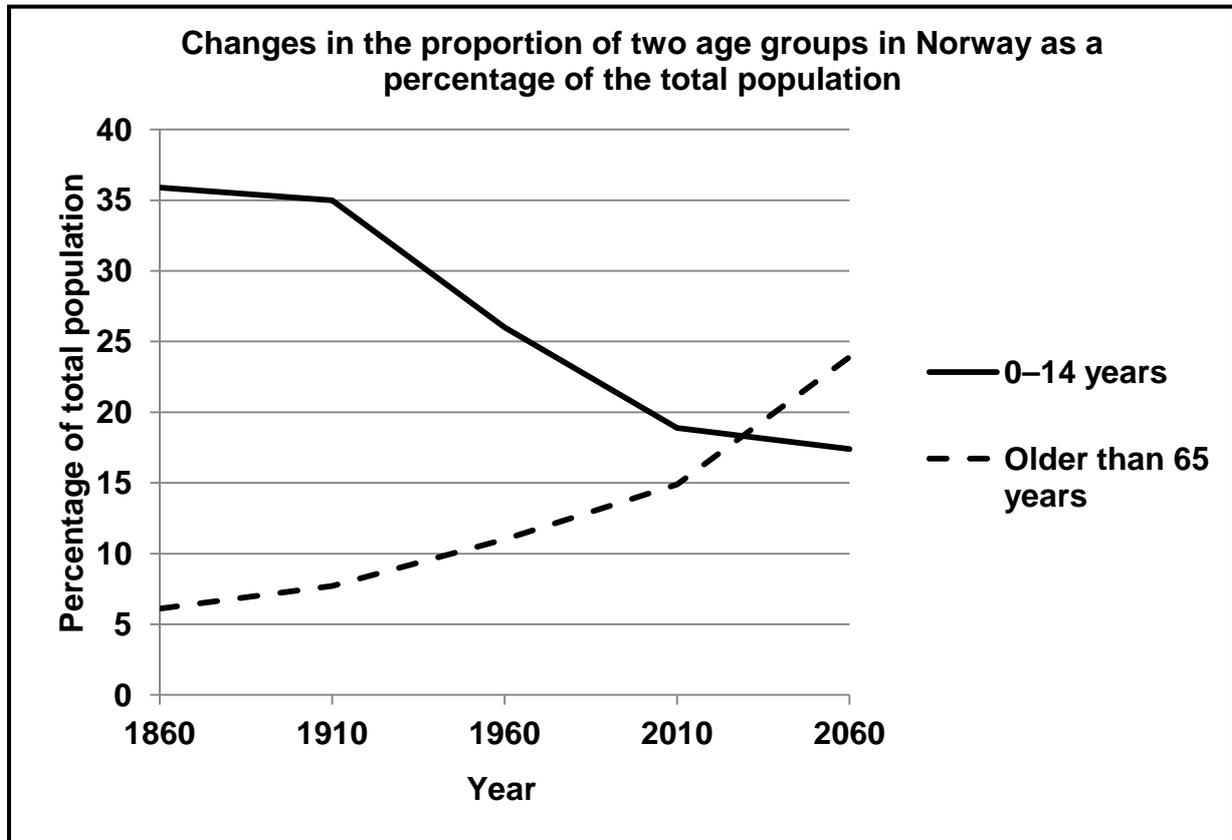
3.2.3 Give TWO reasons why the estimated population may differ significantly from the actual population. (2)
(7)

3.3 The age-gender pyramids below represent the population distribution of two different countries, A and B.



- 3.3.1 In age-gender pyramid **A**, which gender has the higher proportion reaching old age (65+)? (1)
 - 3.3.2 In age-gender pyramid **B**, which age group makes up exactly 4% of the male population? (1)
 - 3.3.3 Which age-gender pyramid represents the population of a developing country? (1)
 - 3.3.4 Give TWO reasons for your answer to QUESTION 3.3.3. (2)
- (5)**

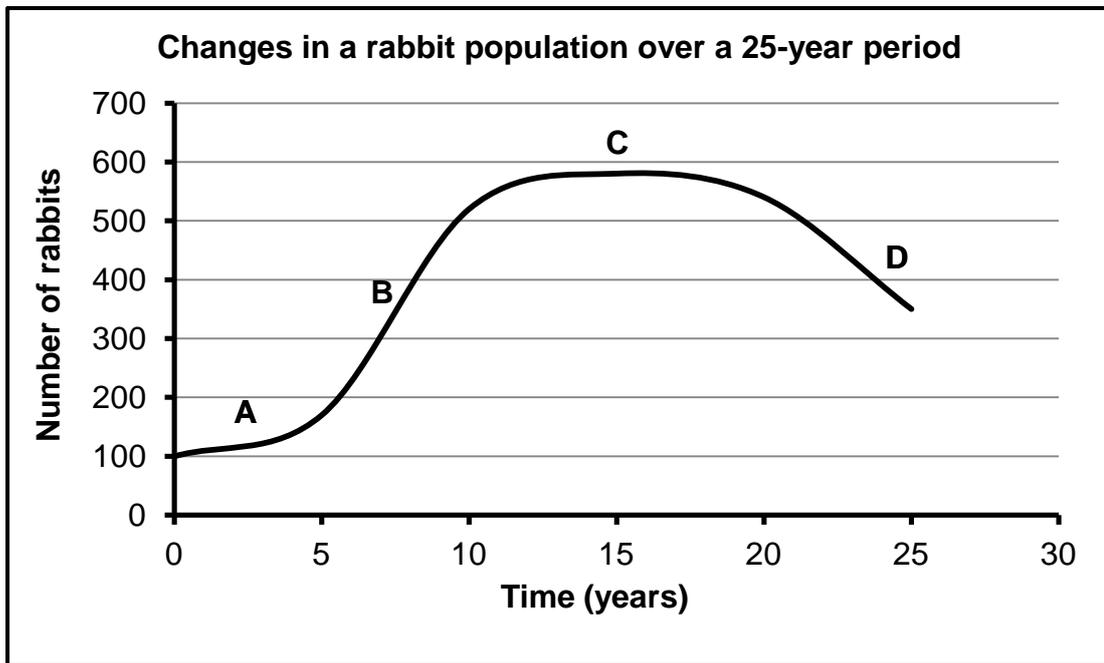
- 3.4 Study the graph below which shows the changes in two age groups in Norway, from 1860 to 2010, as a percentage of the total population and an estimation for 2060.



[Source: www.wikipedia.org/demographics]

- 3.4.1 From 1860 to 2060, what trend can be observed about the proportion of people:
- (a) Older than 65 years (1)
- (b) Younger than 15 years (1)
- 3.4.2 Give THREE reasons for the changes referred to in QUESTION 3.4.1(a). (3)
- 3.4.3 State TWO problems which these changes in age structure might cause in future. (2)
- (7)**

3.5 Study the graph below and answer the questions that follow.



3.5.1 Which part of the curve (**A**, **B**, **C** or **D**) shows the following the best:

- (a) The years in which the death rate was equal to the birth rate (1)
- (b) The years in which the birth rate was slightly higher than the death rate (1)
- (c) The years in which the birth rate was much higher than the death rate (1)

3.5.2 Explain how the trend in the graph above could change if a population of sheep was introduced in the area in the 10th year. (4)

(7)
[30]

TOTAL SECTION B: 60

SECTION C**QUESTION 4**

4.1 Topsy did an investigation to determine the effect of distance on the curvature (thickness) of the lens of the human eye.

- She sat in a well-lit room.
- She covered her one eye with an eye patch.
- A pencil was held in front of her uncovered eye for 10 seconds.
- She focussed on the pencil until a clear image could be seen and at the same time the curvature of the lens of her eye was measured with an optical instrument.
- The pencil was then moved to different distances from the eye and the curvature of the lens of the eye was measured each time.

The results of the investigation are shown in the table below.

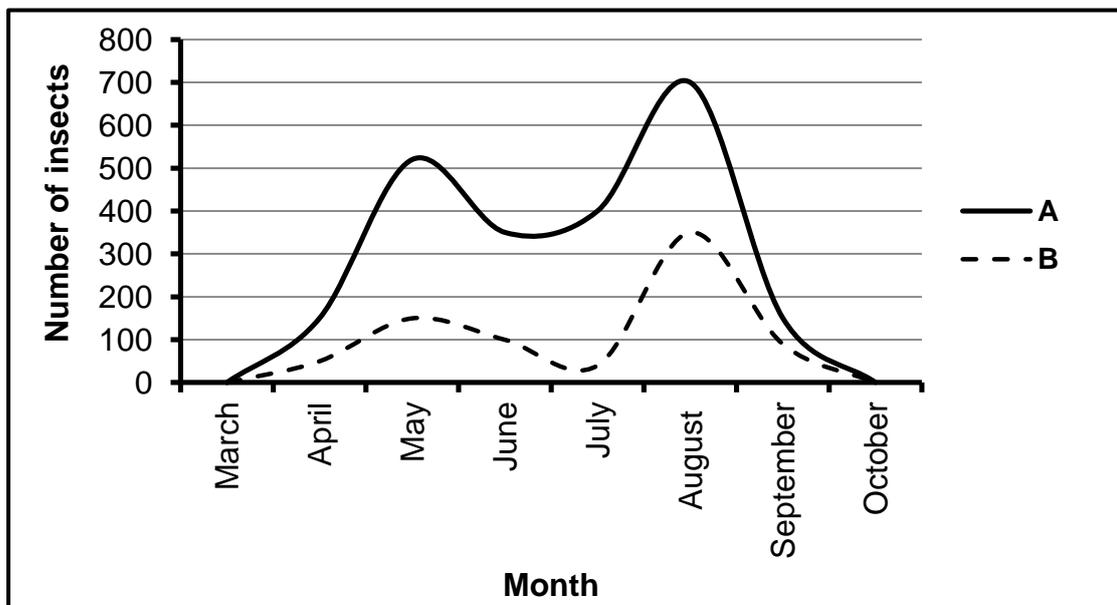
DISTANCE OF THE PENCIL FROM THE EYE (cm)	CURVATURE OF THE LENS OF THE EYE (mm)
10	4,0
20	3,6
30	3,2
50	2,9
100	2,7
150	2,6
200	2,6

- 4.1.1 In this investigation:
- (a) Which is the dependent variable? (1)
- (b) Which is the independent variable? (1)
- 4.1.2 State TWO factors that must be kept constant during the investigation. (2)
- 4.1.3 Explain why the factors named in QUESTION 4.1.2 must be kept constant. (2)
- 4.1.4 Describe the relationship between the distance of the pencil from the eye and the curvature of the lens of the eye. (3)
- 4.1.5 Name TWO structures in the eye that are responsible for the changes in the curvature of the lens. (2)

(11)

4.2 A farmer did an investigation to determine the changes in the population size of two types of insects (A and B) on her farm, from March to October. One insect is a type of green blowfly, and the other is a beetle which feeds on green blowflies. The farmer also discovered that the green blowflies are pests and carry diseases that affect her cattle.

The graph below shows the changes in the population size of the insects during the period of the investigation.



- 4.2.1 Which curve (**A** or **B**) represents the population size of the green blowflies? (1)
 - 4.2.2 Give a reason for your answer to QUESTION 4.2.1. (2)
 - 4.2.3 Explain why the two curves are similar in shape. (3)
 - 4.2.4 Explain how the farmer can use her knowledge about the relationship between **A** and **B** in the graph above to prevent diseases in her cattle. (3)
- (9)**

4.3 Describe the negative feedback mechanism involving TSH and thyroxin and describe the consequences if this mechanism does NOT function well. (17)

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