



# basic education

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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P2**  
**FEBRUARY/MARCH 2011**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 12 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 at 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 all drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, a protractor and a compass.
11. Write neatly and legibly.

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

1.1 Various options are given as possible 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 The super-continent, that broke up into smaller land masses, is called ...

- A Pangaea.
- B Gondwanaland.
- C continental drift.
- D Laurasia.

1.1.2 Which of the following are possible causes of extinction?

- 1. Diseases
- 2. Ice ages
- 3. Meteorite striking the Earth
- 4. Plate tectonics

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

1.1.3 Two individuals are most likely members of the same species if they ...

- A have a different number of chromosomes.
- B can mate and produce fertile offspring.
- C breed at the same time.
- D are phenotypically different.

1.1.4 Macroevolution is a term that describes ...

- A an increase in the size of individuals of a population over a long period of time.
- B the process leading to the formation of new genera and families of organisms.
- C a gradual change in the number of species found in the fossil record.
- D changes that can be seen without the need of a microscope.

1.1.5 The following steps occur during eutrophication:

1. Aquatic algae grow rapidly
2. Bacteria use up oxygen
3. Excess nitrate and phosphate discharged into the river
4. Dead algae decomposed by bacteria
5. Fish die of suffocation

The correct order in which eutrophication occurs is ...

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

(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 – 1.2.8) in the ANSWER BOOK.

1.2.1 Waste that cannot be broken down by decomposers

1.2.2 The study of fossils

1.2.3 A branched diagram showing the evolutionary relationships between species

1.2.4 The study of the distribution of living organisms found in different regions

1.2.5 Species that are no longer found on Earth

1.2.6 The era in which the genus *Homo* evolved

1.2.7 Structures inherited from the ancestor that are small, poorly developed and have no useful function

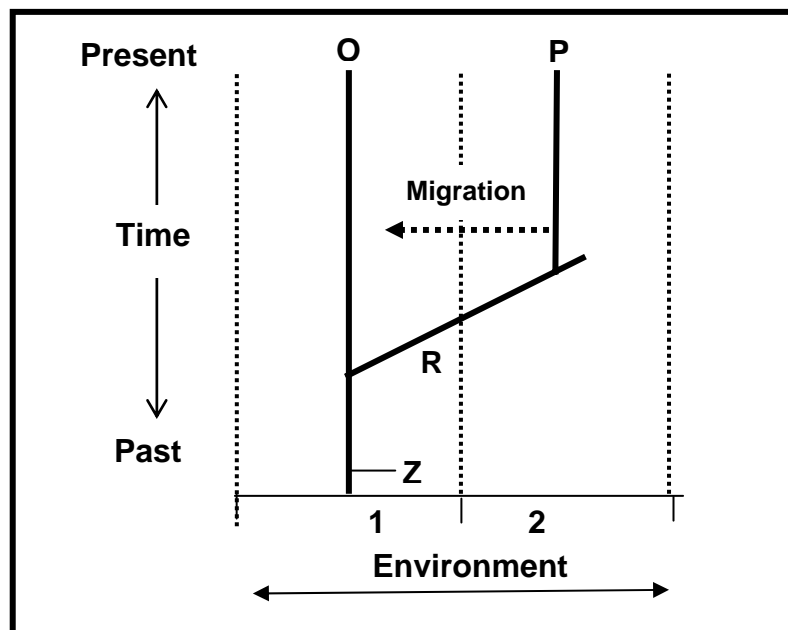
1.2.8 The variety of different species living in an area (8 x 1) (8)

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 – 1.3.5) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Organisms have an inherent/internal drive to change	A: Lamarck B: Darwin
1.3.2 Mutation(s) that lead to the death of the organism	A: Neutral mutation B: Lethal mutation
1.3.3 Australopithecines that were found in South Africa	A: Little Foot B: Mrs Ples
1.3.4 Dating of fossils by comparing the age of one fossil to another	A: Relative dating B: Radiometric dating
1.3.5 Evidence for evolution using comparative biochemistry	A: Different metabolic pathways B: Identical protein synthesis

(5 x 2) (10)

1.4 The diagram below represents the evolution of three different species (**O**, **P** and **R**) in two different environments (**1** and **2**) from an ancestral species **Z**.



1.4.1 Which species is/are now extinct? (2)

1.4.2 Give ONE possible reason for the dying-out of the small population of species **P** which migrated to environment **1** as indicated in the diagram above. (2)

1.4.3 Name a process that resulted in the speciation of **P** from species **R**. (1)  
(5)

- 1.5 A type of bacterium, called *Escherichia coli* (*E. coli*), normally lives in the large intestine of humans. To determine whether *E. coli* is present in water, a chemical indicator is used.

If the chemical indicator changes from a clear red colour to a cloudy yellow colour, this indicates that *E. coli* is present.

In an investigation conducted by a group of Grade 12 learners, samples taken from **THREE rivers (X, Y and Z)** were investigated for the presence of *E. coli*. Samples were taken from each river and put into a glass bottle which contained the clear red indicator solution. The bottle was then incubated at 37 °C for 2 days.

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

Colour of chemical indicator	River X	River Y	River Z
Before incubation	Clear red	Clear red	Clear red
After incubation	Clear red	Cloudy yellow	Clear red

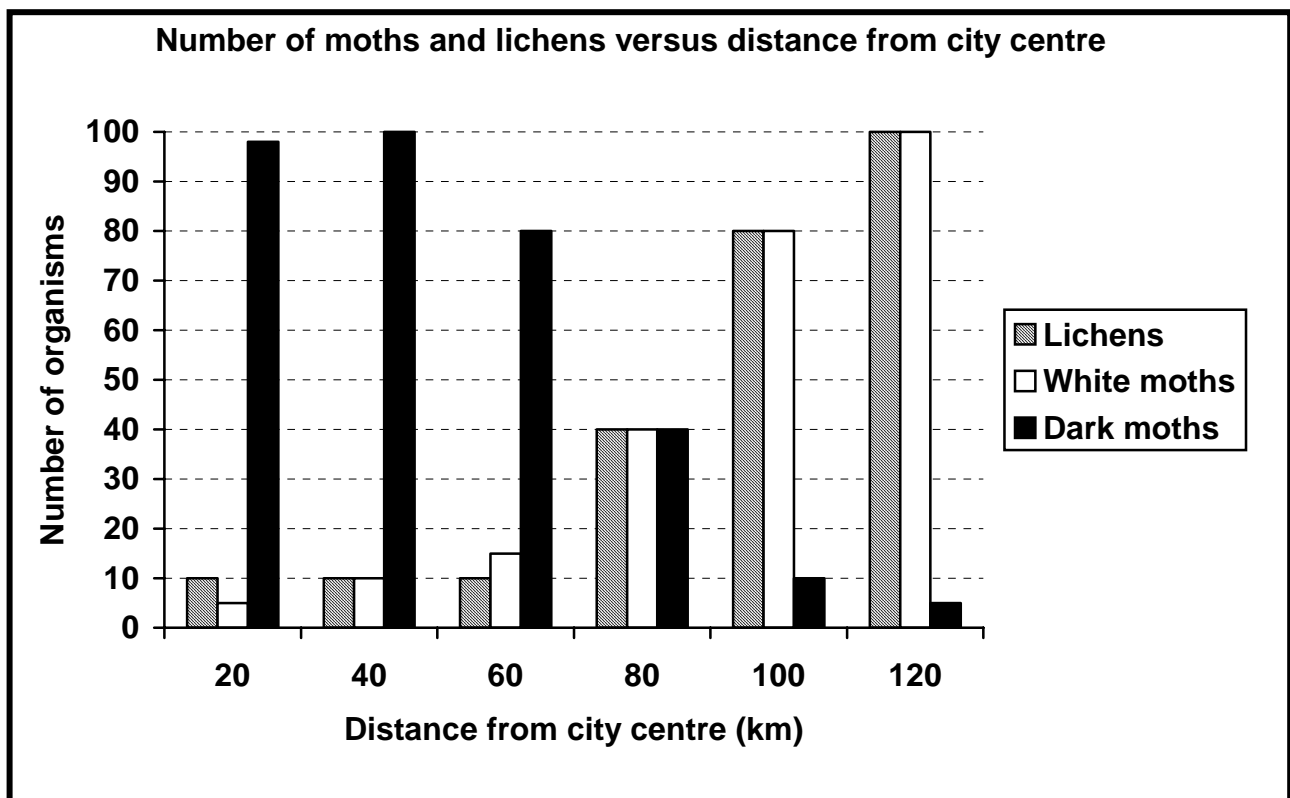
- 1.5.1 Explain TWO safety precautions that the learners should take when conducting this investigation. (4)
- 1.5.2 Give ONE reason for incubating the sample at 37 °C. (2)
- 1.5.3 Which river(s) (**X, Y or Z**) showed the presence of *E. coli*? (1)
- 1.5.4 Give a reason for your answer to QUESTION 1.5.3 above. (2)
- 1.5.5 Explain ONE way that *E. coli* could have gotten into the river(s) stated in QUESTION 1.5.3. (2)
- (11)**
- 1.6 Differentiate between:
- 1.6.1 *Homologous* and *analogous* structures (3)
- 1.6.2 *Inbreeding* and *outbreeding* (3)
- (6)**

**TOTAL SECTION A: 50**

**SECTION B**

**QUESTION 2**

2.1 Lichens are small organisms that can be used as pollution indicators. Lichens generally flourish in rural areas but do not appear in industrial areas which are normally near a city centre. The graph below shows the number of white and dark moths as well as the number of lichens at various distances from a city centre.



- 2.1.1 At what distance from the city centre was the number of white and dark moths and lichens the same? (2)
  - 2.1.2 Describe the relationship between the distribution of lichens, dark moths and white moths and distance from the city centre. (4)
  - 2.1.3 Explain why lichens do not grow in industrial areas. (2)
  - 2.1.4 Predict how the population of white and black moths will change when pollution is reduced in the industrial area. (2)
  - 2.1.5 Explain your answer to QUESTION 2.1.4. (4)
- (14)**

- 2.2 Deforestation is the destruction of forests by the removal of trees in large numbers. The table below shows statistics related to deforestation in different regions from 1990 to 2000.

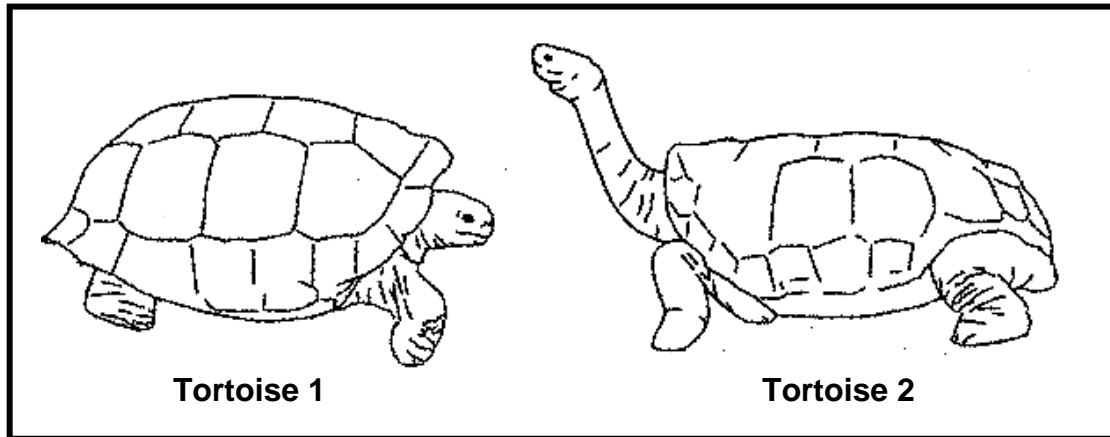
Region	Total land area (ha)	Total forest cover (ha)	Forest cover (%)	Deforestation rate 1990 – 2000 (%)
Africa	2 978 394	649 866	21,8	0,8
Asia	3 084 746	547 793	<b>X</b>	0,1
North and Central America	2 136 966	549 304	25,7	0,1
Oceania and Australia	849 096	197 623	23,3	0,2

- 2.2.1 Which region had the highest rate of deforestation in the 10-year period? (1)
- 2.2.2 Calculate the forest cover (%) of Asia indicated as **X**. Show ALL working. (3)
- 2.2.3 Give any TWO reasons for deforestation. (2)
- 2.2.4 Describe TWO consequences of deforestation for the ecosystem. (4)
- 2.2.5 Explain THREE management strategies to reduce deforestation. (6)
- (16)**  
**[30]**



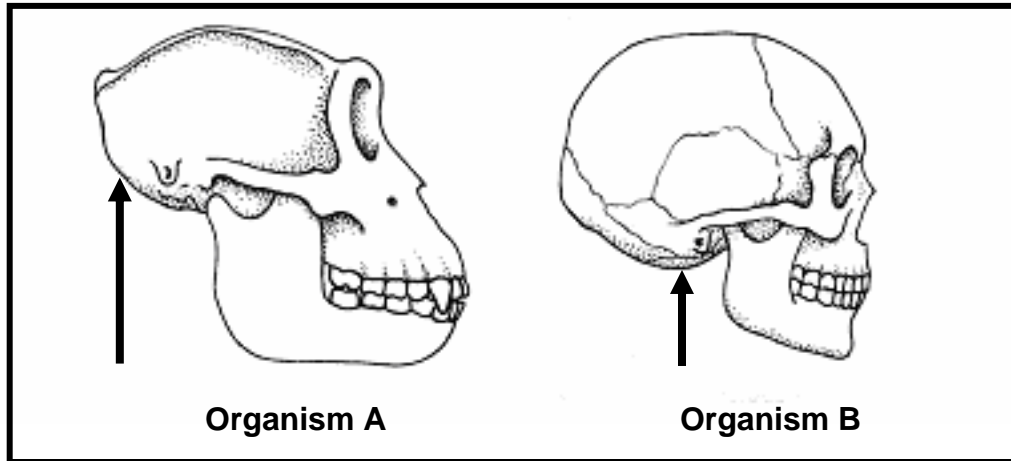
**QUESTION 3**

- 3.1 Darwin noticed different species of tortoises on the Galapagos Islands. Two of these tortoises, which are drawn to scale, are shown below.



- 3.1.1 Tabulate TWO visible differences between the two species of tortoises. (5)
- 3.1.2 Suggest what tortoise 2 may eat that tortoise 1 will not be able to eat. (1)
- 3.1.3 The two species of tortoises shown above lived on different islands. Darwin suggested that they might have evolved from a common ancestor. Explain how this could have occurred. (6)
- (12)**

- 3.2 The diagrams below represent the skulls of two organisms, namely a modern human and a gorilla. Each arrow indicates the position of the foramen magnum. Study the diagrams and answer the questions that follow.



- 3.2.1 Identify each of the organisms that are represented by **A** and **B**. (2)
- 3.2.2 Tabulate **FOUR** observable differences between the **skulls** of organisms **A** and **B**. (9)
- 3.2.3 Which organism is bipedal for most of its adult life? (1)
- 3.2.4 Explain **TWO** possible advantages of bipedalism to the organism referred to in QUESTION 3.2.3. (4)
- 3.2.5 Name any **TWO** similarities between organisms **A** and **B**. (2)

**(18)**  
**[30]**

**TOTAL SECTION B: 60**

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

- 4.1 The table below shows the annual catches of TWO species of fish, namely herring and cod, over a period of eight years.

Year	Catch (thousands of tons)	
	Herring	Cod
1	370	145
2	150	120
3	110	80
4	105	60
5	85	50
6	70	45
7	65	50
8	70	60

- 4.1.1 Plot line graphs, on the same set of axes, using the information in the table above. (12)
- 4.1.2 Describe how the catch size of the herring population changed over the eight years. (4)
- 4.1.3 State any TWO management strategies which can prevent the over-exploitation of herring and cod. (2)
- (18)**
- 4.2 Study the passage below and answer the questions that follow.

**HOODIA**

*Hoodia gordonii* is a spiny succulent plant (cactus) indigenous to the semi-desert of South Africa, Botswana, Namibia and Angola. It grows in extremely high temperatures and takes many years to reach maturity. *Hoodia* has been used by indigenous populations in southern Africa for centuries to treat indigestion and minor infections. However, the plant has become well known and is in big demand because of the discovery that indigenous people have always used the flesh of the plant to suppress their appetite while on long hunting trips in the desert. The South African Council for Scientific and Industrial Research has isolated the ingredient responsible for the plant's appetite-suppressant quality and it is now marketed as a slimming tablet.

- 4.2.1 What is the habitat of *Hoodia*? (1)
- 4.2.2 Name TWO medical conditions that can be treated with *Hoodia*. (2)
- 4.2.3 Explain why indigenous people must be compensated for the selling of the slimming tablets mentioned in the passage. (4)
- (7)**

- 4.3 Explain, with reasons, **FOUR** strategies you would use to manage solid waste if you were appointed as the head of the waste disposal division of your town/city.

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

**(15)**

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