



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**SEPTEMBER 2010**

**LIFE SCIENCES – SECOND PAPER  
MEMORANDUM**

**MARKS: 150**

**TIME: 2½ hours**

---

This memorandum consists of 9 pages.

---

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

- 1.1
- 1.1.1 A✓✓
- 1.1.2 D✓✓
- 1.1.3 C✓✓
- 1.1.4 D✓✓
- 1.1.5 D✓✓
- 1.1.6 B✓✓ 6x2=(12)
- 1.2
- 1.2.1 Food web✓
- 1.2.2 Fossil Fuels✓
- 1.2.3 Autotrophic (organisms)✓ / Producers
- 1.2.4 Deforestation✓
- 1.2.5 Poaching✓
- 1.2.6 Biological control✓
- 1.2.7 Population✓ (7)
- 1.3
- 1.3.1 F✓
- 1.3.2 E✓
- 1.3.3 D✓
- 1.3.4 B✓
- 1.3.5 A✓
- 1.3.6 M✓
- 1.3.7 K✓ (7)
- 1.4
- 1.4.1 homologous✓ (1)
- 1.4.2 The organs have similar structure ✓  
but different functions✓ (2)
- 1.4.3 The bones in the forelimbs have similar✓ structure/ layout  
therefore they probably share a common ancestor✓ (2)

1.5

1.5.1 30%:10%✓  
= 3✓:1✓

(3)

TYPE OF WASTE ✓	PERCENTAGE(%) COMPOSITION✓
Organic matter	30✓
Plastic	25✓
Other	20✓

✓(only those asked in question put in table)

Rubric

Caption	1 mark
Both columns headings	2 marks 1 mark each
Type of waste (only those being asked)	1 mark
Each entry with correct percentage	3 marks 1 mark each
Table format	1 mark

1.5.2 **Table showing the percentage composition of certain household waste from a community**✓ ✓(table)

(8)

1.6

1.6.1 Different scientists may make different **interpretations**✓ of the same data✓

(2)

1.6.2 *Australopithecus afarensis* lived about three million years ago/  
*Australopithecus africanus* evolved from *Australopithecus afarensis*✓

*Homo heidelbergensis* lived about one million years ago/  
*Homo heidelbergensis* evolved from *Homo ergaster* ✓✓

(2)

1.6.3 *Homo erectus* evolved from *Australopithecus afarensis* in Model 1✓  
*Homo erectus* evolved from *Homo ergaster* in Model 2✓

(2)

1.6.4 *Homo erectus* had:

- a larger brain case✓
- a less prominent brow ridge✓
- a more rounded jaw✓
- Flatter face✓
- No skull ridge✓
- Human teeth/small molars/no large canines✓

MARK FIRST TWO ONLY

(2)

(8)

TOTAL SECTION A:

[50]

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

2.1

2.1.1 All have:

- gill pouches/slits✓
- tail✓
- bronchial grooves✓
- developing notochord/ nerve cord ✓
- a fish-like heart✓

(MARK FIRST THREE ONLY) (3)

2.1.2 In the early stages of development of vertebrates there are marked similarities in structure / comparative embryology✓

It is quite difficult to tell the differences between embryos

This supports the idea that these organisms came from common ancestors✓ (2)

2.1.3 Comparative Anatomy/ homologous and analogous structures✓

Biochemistry/ Molecular Biology and genetics✓

Paleontology/ Fossil records✓

Biogeography✓

Vestigial organs✓

(MARK FIRST FOUR ONLY) (4)

2.2

2.2.1 Natural Selection✓

(1)

2.2.2

- Mutations ✓
- Crossing over✓ (in prophase 1)
- Random assortment of chromosomes in metaphase 1✓
- Random Fertilisation✓
- Gene flow✓
- Genetic drift✓

(MARK FIRST THREE ONLY) (3)

2.2.3 **Allopatric/ geographic speciation**✓ - allopatric speciation is caused by populations of one species being geographically separate and then evolving differently/becoming reproductively isolated by geographical separation✓

**Sympatric speciation**✓ - is when populations are reproductively/genetically isolated by something other than geography✓ (4)

2.2.4

(i) Sympatric speciation

(1)

(ii) Hybridisation/ Polyploidy

(1)

2.3

- 2.3.1 (a) Limbs not directly under body ✓ moves sideways ✓ (2)  
 (b) Long ✓ rib cage to tail ✓ (2)

2.3.2 Height =  $\frac{\text{measured x given scale length}}{\text{measured scale line}}$

$$= \frac{80 \text{ mm} \checkmark}{10 \text{ mm} \checkmark} \times \frac{200 \text{ mm}}{0,2 \text{ m} \checkmark}$$

$$= 1\,600 \text{ mm}/16,0$$

$$= 1,6 \text{ m} \checkmark$$

OR

$$= 8 \checkmark \checkmark \times 0,2 \text{ m} \checkmark = 1,6 \text{ m} \checkmark \quad (4)$$

- 2.3.3 - A /horse ✓  
 - longer legs ✓ /powerful legs  
 - horse foot ends in hoof enabling speed across terrain ✓ (3)

**[30]****QUESTION 3**

3.1.1 65 000 ✓ (1)

3.1.2 Drastic/steep ✓ decrease ✓ in the population (2)

3.1.3 Indiscriminate hunting ✓ for sport and leisure  
 Poaching ✓ for rhino horn/unfavourable environment/diseases/poor conservation measures. (2)

3.1.4 Slight/ steady increase ✓ from 1994 up to 2010 ✓ (2)

3.1.5 Global Ban ✓ on import and export ✓ of rhino horn/better awareness (2)

3.2.1 Oil ✓  
 Plastic (debris) ✓  
 (Aluminium) cans ✓ (MARK FIRST TWO ONLY) (2)

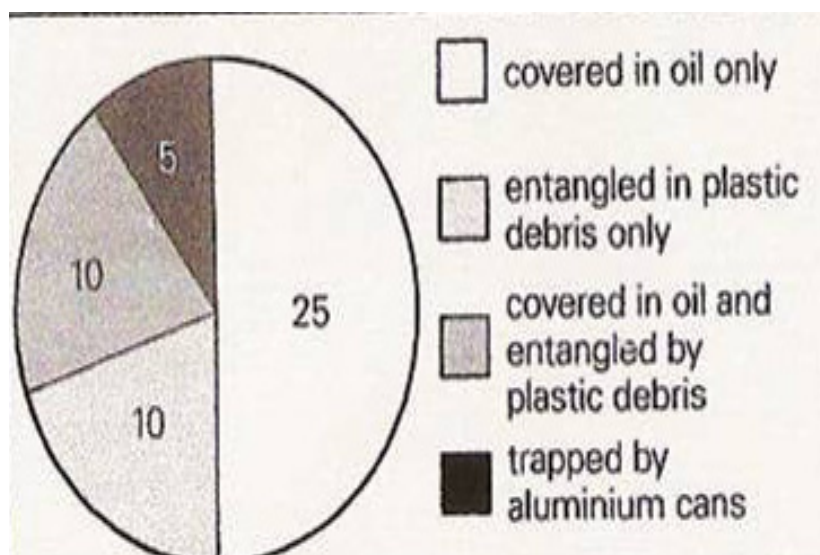
3.2.2 Covered with oil ✓ (1)

3.2.3 Engage in a clean-up campaign ✓  
 Put up posters on the water pollution problem ✓  
 Educate ✓ people  
 Introduce better control measures ✓ (3)

3.2.4 Clean-up campaign - to encourage people to keep the harbour clean ✓  
 Posters – to make people aware ✓ of the dangers of polluting the harbour  
 Education – so they reduce pollution ✓ in the harbour  
 Control measures – to decrease pollution ✓ (3)

3.2.5	Oil only	$25/50 \times 100 \times 360 = 180^0 \checkmark$
	Plastic only	$10/50 \times 100 \times 360 = 72^0 \checkmark$
	Oil and plastic	$10/50 \times 100 \times 360 = 72^0 \checkmark$
	Cans	$5/50 \times 100 \times 360 = 36^0 \checkmark$

**Pie chart showing the proportion of birds affected by various pollutants**



***Rubric for the mark allocation of the graph***

Calculation	1 mark for each calculation including correct answer (4)
Correct type of graph	1
Title of graph	1
Correct proportions for each labelled sector/slice	1 mark for each sector/slice (4)
Each sector/slice labelled or key given	1
Amount/Percentages on graph	1

(12)

[30]

**TOTAL SECTION B: [60]**

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

4.1

4.1.1 Area of bed sampled✓

Sampling time✓

Size of net✓

Kicking action✓

Net position✓

(MARK FIRST TWO ONLY)

(2)

4.1.2

Some animals not dislodged✓

Some animals missed /escaped net✓

Invertebrates difficult to identify✓

Invertebrates from outside area✓

(MARK FIRST TWO ONLY)

(2)

4.1.3

(i) 10✓ – 99✓

(2)

(ii) No change (at sample 2 and 3) ✓/  
 decreased/0 (at sample 4) ✓/  
 increases to 10 – 99 (at samples 5, 6 and 7) ✓  
 and then to (more than) 100 (at samples 8 and 9) ✓

(4)

(iii) Mayfly ✓

(1)

(iv) Not found downstream of point where sewage enters stream✓  
 found only in the unpolluted water/not found in polluted water✓

(2)

(v) Blackfly larvae✓ prefer/  
 grow better✓ in polluted water✓ OR  
 May flies do not appear in polluted water

(3)

4.2

4.2.1 Many offspring are produced✓ but not all reach adulthood/ Sexual maturity✓

(2)

4.2.2 Predator-prey/ predation✓

(1)

4.3.1 Carbon (14) dating/ radiometric dating ✓ and relative dating ✓

(2)

4.3.2 Artefacts e.g. stone tools/ pottery/ fire hearths✓

(MARK FIRST ONE ONLY)

(1)

#### 4.4 Possible answer

##### Mass extinction

The extinction of large numbers of species ✓ over a relatively short period of time ✓

as a result of a catastrophic event/massive change in environmental conditions. ✓

(3)

##### The asteroid impact theory

- The impact of a giant asteroid ✓ crashing into the earth about 65 million years ago ✓ produced such a vast dust cloud ✓ that the earth became cold and dark. ✓
- The asteroid penetrated the earth's crust, scattering dust and debris into the atmosphere. It also resulted in increased volcanic activities, earthquakes and tsunamis ✓ with high winds and acid rain. ✓ The chemical composition of the atmosphere changed. ✓ The concentration of sulphuric and nitric acid, as well as fluorides increased. ✓
- The impact from the blast ✓ would have resulted in the burning and destruction of everything in its path. ✓ (ANY3)

##### Volcano Theory

According to evolutionists:

The three greatest mass extinctions occurred at times when serious volcanic activities occurred ✓

It is thought that the eruptions threw up huge clouds of rock and lava ✓ which would have caused the death ✓ of many life forms ✓ (ANY 3)

(3)

##### Possible explanations

- The dust and debris in the atmosphere would have blocked out the sun's rays ✓ and lowered the temperature on earth. ✓
- Plant species that rely directly on the sunlight for photosynthesis would have been first to be negatively affected. ✓
- As the plants began to die out, the herbivores ✓ feeding on the plants would run out of food, resulting in their starvation/death. ✓ This would affect food availability for animals higher up in the food chain. ✓ Initially they would feed on dead carcasses and eventually each other. ✓ The situation would not be sustainable and their numbers would also begin to decline. ✓



- Less plants also would have resulted in **less oxygen**✓ being released during photosynthesis ✓ and this would have placed the animals with higher oxygen demands under stress, causing suffocation/death, ✓ because of the lower levels of oxygen in the environment.

ANY 6 (6)

The following rubric will be used to assess the synthesis in the essay

MARKS	DESCRIPTION
3	All 3 aspects discussed with no irrelevant information
2	2 aspects only discussed and contains some irrelevant information
1	Discussed 1 aspect only and contains much irrelevant information
0	Not attempted/nothing written other than question number/absolutely no correct information

(3)

[40]

TOTAL: 150